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Hear What You Feel, Feel What You Hear:

The Effect of Musical Sequences on Emotional Processing

Ana Marta Tavares Esteves

MESTRADO INTEGRADO EM PSICOLOGIA

Área de especialização em Psicologia Clínica e da Saúde

Psicoterapia Cognitiva-Comportamental e Integrativa

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Dissertação orientada pelo Prof. Dr. Nuno Miguel Silva Conceição

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Abstract

Music has a unique ability to access affective and motivational systems of the brain (Thaut & Wheeler, 2010). However, there is a large gap in research on the association between musical stimuli and their impact on emotional processing, a crucial component for the success of the therapeutic process (Greenberg & Paivio, 1997). The present study thus sought to explore both the capacity of music to access the affective system, to induce emotions, and to change emotional states, as well as to facilitate emotional processing leading to the resolution of emotional distress. An empirically validated sequential model of emotional processing from Pascual-Leone and Greenberg (2007) was used to test this dual capacity. Three musical sequences with distinct components were developed and presented in an online platform. One musical sequence followed the order of the sequential model (EED>AMM), another musical sequence inverted that same order (AMM>EED Sequence), and the last musical sequence was intended to serve as a baseline (Control Sequence). All musical sequences, not only led to shifts in participant's emotional states, but also led to an increase of participant's emotional resolution. Some of the results were surprising, since the Control Sequence also led the increase of emotional resolution and the EED>AMM Sequence didn't present itself as the winning candidate of leading to a higher emotional resolution. Nevertheless, these surprising results still demonstrated the power of music to impact emotional processing and allow future studies to keep exploring this relationship.

Keywords: music; emotional states; emotional processing; emotional resolution.

Resumo

A música pode ser descrita como a criação de emoções. Juslin e Västjfäll (2008, p. 572) focam esta ideia ao referirem que "aquilo que torna as emoções musicais únicas, não são os seus mecanismos subjacentes ou as emoções que evocam, mas sim o facto de que a música é, muitas vezes, intencionalmente desenhada para induzir emoções". Pelo menos, é difícil, se não impossível, imaginar a ausência de uma relação entre música e emoção.

Tendo uma forte presença na cultura humana (Blood & Zatorre, 2001; Marin & Bhattacharya, 2011; Sacks, 2007; Zentner et al., 2008), diversas formas de utilização da música no nosso dia-a-dia são apontadas na literatura, estando entre elas a libertação e regulação das emoções (DeNora, 2000; Juslin et al., 2008; Juslin & Västjfäll, 2008; Knobloch & Zillmann, 2002; Marin & Bhattacharya, 2011), conforto e alívio do stress (DeNora, 2000, 2016), revivência de experiências passadas valorizadas (Hays & Minichiello, 2005) ou acompanhamento na realização de tarefas do quotidiano (Sloboda et al. , 2009).

Apesar desta forte presença na cultura, o estudo da relação entre a música e emoções vê-se fortemente dividido entre duas posições: uma posição cognitivista e uma posição emotivista. Por um lado, a posição cognitivista defende que o estímulo musical é incapaz de induzir, verdadeiramente, emoções (Kivy, 1990; Meyer, 1956; Scherer, 2004; Zentner et al. 2008), pelo que estas são apenas percecionadas perante o estímulo musical. Por outro lado, na posição emotivista, são propostas diversas teorias explicativas para o como e porquê de o estímulo musical induzir, verdadeiramente, emoções. Blood e Zatorre (2001), Juslin e Västjfäll (2008), Koelsh (2012), Krumhansl (1997) e outros revistos por Juslin e Sloboda (2010) demonstraram como estímulos musicais são capazes de induzir emoções básicas, entre elas, tristeza, medo, nojo, raiva e felicidade.

Dentro da posição emotivista, foi, então, formulada a perspetiva de que a música tem uma capacidade única de aceder aos sistemas afetivos e motivacionais do cérebro (Thaut, 2005). Especificamente, Thaut e Wheeler (2010) afirmam que a música foi considerada como um dos maiores mecanismos para a eficácia terapêutica ao: 1) assumir um papel eficaz na influência e modificação em estados afetivos e 2) assumir um papel

central através da modificação afetiva ao aceder à totalidade das cognições, perceções, estados e organização comportamental do paciente.

No entanto, Thaut e Wheeler (2010) afirmam que ainda não existem teorias unificadoras que expliquem os mecanismos neuropsicológicos e psicológicos subjacentes às respostas afetivas na audição da música, nem modelos científicos sobre o papel de emoções evocadas pela música em contexto terapêutico. Adicionalmente, embora não faltem artigos e estudos que comprovem como estímulos musicais podem, efetivamente, induzir emoções, pelo contrário, há uma grande falta de estudos que analisem a influência dos estímulos musicais no processamento emocional. No campo da terapia musical, o Bonny Method of Guided Imagery and Music (Bonny, 1994) destaca-se como o único método comumente conhecido e utilizado, onde a música interage com o cérebro para evocar imagens que induzem emoções e memórias, permitindo a transformação de emoções dolorosas para emoções positivas (Lee et al., 2016). Este método não é suportado e não tem ligação com nenhum modelo de processamento emocional teórico, sendo largamente baseado na exploração e interpretação livre. Assim, o papel do cliente é partilhar abertamente as suas perceções e experiências dentro da música, e o papel do terapeuta é facilitar uma reflexão e uma integração dos sentimentos compartilhados do cliente.

Esta é uma importante lacuna sobre a qual refletir, uma vez que o processamento emocional é considerado como um dos principais elementos do processo terapêutico. Greenberg e Paivio (1997) descrevem-no através de três passos: (1) evocação de estados emocionais, (2) exploração das sequências cognitivo-afetivas associadas e (3) reestruturação dos estados afetivos através da introdução de algo novo. Estes passos estavam subjacentes a tarefas terapêuticas específicas, mas, Pascual-Leone e Greenberg (2007) apresentaram um modelo sequencial de processamento emocional, a um nível de abstração mais elevado, que explica a resolução do distress emocional consoante a evolução terapêutica. Neste modelo sequencial, parte-se de emoções indiferenciadas e não integradas (estados representativos de Early Expressions of Distress, EED), para experiências emocionais de aceitação (estados representativos de Advanced Meaning Making, AMM), independentemente da especificidade das tarefas terapêuticas percorridas. Esta independência permite a exploração de diferentes métodos com potencial terapêutico, mesmo fora do âmbito da psicoterapia.

No presente estudo, como principal objetivo pretendeu-se explorar se a experiência de estar exposto a sequências musicais com determinadas características, permite alcançar uma menor ou maior resolução emocional face a alguma angústia emocional. Assim, hipotetiza-se que:

- A audição de ambos os tipos de sequências musicais (experimental e de controlo) conduzirá a uma mudança no estado emocional dos participantes, que se refletirá em mudanças nas dimensões de valência, ativação e controlo
- Ouvir as sequências musicais experimentais, independentemente da ordem de progressão, e em comparação com a sequência musical de controlo, levará a um aumento da resolução emocional, levando os participantes a relatar uma menor angústia intra- ou interpessoal
- Ouvir a sequência musical com a progressão EED-AMM conduzirá a um maior nível de resolução emocional, em comparação com a sequência musical de controlo (sem progressão especificada) e com a progressão AMM-EED

De forma a responder às referidas hipóteses, o presente estudo recorreu a métodos quantitativos e a um breve elemento qualitativo, caracterizando-se por um estudo de abordagem de método misto. Quanto aos métodos quantitativos empregues, estes caracterizam-se por métodos experimentais, uma vez que pretende-se analisar e explorar relações causais entre diferentes sequências musicais, o estado emocional e a resolução emocional. São utilizados três grupos distintos, duas condições experimentais e uma condição de controlo. Foi aplicado um desenho pré-pós-teste, uma vez que este se apresenta como um design robusto com várias vantagens associadas que permitem isolar melhor o efeito nas análises (Christense et al., 2015).

Os estímulos musicais utilizados resumem-se a três sequências musicais: duas sequências experimentais que pretendiam simular os estados afetivos descritos no modelo sequencial (Sequência EED-AMM que seguia a ordem do referido modelo e Sequência AMM-EED que invertia a ordem do referido modelo), e uma sequência controlo. A seleção dos excertos musicais que integraram as duas sequências musicais experimentais apresentadas aos participantes passaram, assim, por duas fases de seleção: 1) opções com base na revisão de literatura, 2) melhor candidata com base num pré-teste aplicado à população geral. Quanto à sequência controlo, foram selecionados os primeiros 6 minutos e 6 segundos da peça musical Les Sylphides, de Chopin, uma vez que, num estudo de

Zimny e Weidenfeller (2015), os dados revelaram uma associação desta peça musical a um estado de neutralidade com base em medidas GSR (resposta galvânica da pele).

As medidas e escalas utilizadas foram:

- Self-Assessment Manikin (SAM): a utilização desta escala foi pertinente para o presente estudo pois permitiu averiguar se as sequências musicais impactaram o estado emocional dos participantes, nas dimensões valência, ativação e controlo

- Resolution of Long-Standing Interpersonal Grievances (UFB-RS): a utilização desta escala foi pertinente para o presente estudo pois permitiu determinar se as sequências musicais tiveram impacto no nível de resolução emocional sentido pelos participantes que selecionaram o marcador emocional de ressentimento e mágoa numa relação importante

- Resolution of Long-Standing Emotional Self-Neglect (ESN-RS): a utilização desta escala foi pertinente para o presente estudo pois permitiu determinar se as sequências musicais tiveram impacto no nível de resolução emocional sentido pelos participantes que selecionarem o marcador emocional de autonegligência

- Bern Post Session Report (BPSR-P): a utilização desta escala foi pertinente para o presente estudo pois permitiu aprofundar o possível impacto terapêutico que as sequências musicais tiveram nos participantes

- Tarefa de Escrita Expressiva: imediatamente após a indução experimental, foi dada a escolha aos participantes de realizarem uma tarefa de escrita expressiva, pelo que a realização desta tarefa por parte dos participantes pretendeu melhor averiguar o nível de processamento emocional induzido

O presente estudo foi desenvolvido sob o formato de um questionário *online*, através da plataforma Qualtrics (www.qualtrics.com). Em primeiro lugar, os participantes tiveram a oportunidade de escolher trabalhar: ou um marcador emocional de Autonegligência ou um marcador emocional de Ressentimento e Mágoa numa Relação Importante. Seguidamente, foi pedido que os participantes preenchessem as medidas SAM, UFB-RS ou ESN-RS. Posteriormente, foi iniciada a indução experimental através da audição de uma das três sequências musicais. Imediatamente após a audição da sequência musical, foi perguntado aos participantes se notaram alguma mudança ou transformação interna relativamente ao tema que escolheram trabalhar, e, caso respondessem sim, era pedido que descrevessem em alguns detalhes a transformação

sentida. Por último, foi pedido que preenchessem as medidas SAM, UFB-RS ou ESN-RS e BPSR-P.

Os dados quantitativos obtidos no presente estudo foram analisados estatisticamente com recurso ao software IBM SPSS *Statistics* (versão 26.0) e os dados qualitativos foram analisados com recurso o software Nvivo12. Para todas as análises estatísticas realizadas, os dados das amostras de participantes atribuídos às escalas UFB-RS ou ESN-RS foram agregados, uma vez que ambas permitem a medição do nível de resolução emocional. Não era pretendido diferenciar entre o nível de resolução emocional alcançado em cada marcador, mas sim o nível global de resolução emocional alcançado. As variáveis foram analisadas separadamente consoante cada condição (Sequência EED-AMM, n = 30; Sequência AMM-EED, n = 30; Sequência Control, n = 30).

Quanto à primeira hipótese, os resultados demonstraram que, dentro de cada condição, ocorreram mudanças nas dimensões valência, ativação e controlo do estado emocional dos participantes entre o pré- e o pós-indução experimental. Adicionalmente, entre condições, foi demonstrado como os participantes estavam igualmente emocionalmente ativos, tanto no pré- como no pós-indução experimental. Quanto à segunda hipótese, inversamente ao esperado, os resultados demonstraram como todas as sequências musicais levaram ao alcance de uma maior resolução emocional. Quanto à terceira e última hipótese, os resultados quantitativos demonstraram como a sequência musical com a progressão EED-AMM não conduziu a um maior nível de resolução emocional, em comparação com as restantes sequências.

Os resultados aqui encontrados permitiram explorar uma relação entre a audição de sequências musicais que simulam o modelo sequencial de processamento emocional de Pascual-Leone e Greenberg (2007) e o alcance de uma tentativa de maior resolução emocional. Este estudo permite ponderar sobre o potencial de intervenções mais curtas, simples e económicas, mesmo fora do âmbito de psicoterapia. Igualmente, os dados aqui registados permitem começar a preencher uma lacuna, ao associarem estímulos musicais a um modelo de processamento emocional empírico. Conclusivamente, o presente estudo demonstra como, não só a música pode ser descrita como a criação de emoções, como também pode ser descrita como o a transformação de emoções.

Palavras-chave: música; estados emocionais; processamento emocional; resolução emocional.

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Literature Review

Music can be described as the creation of emotions. Juslin and Västjfäll (2008, p. 572) mention that "what is unique about musical emotions is not the underlying mechanisms or the emotions they evoke, but rather the fact that music is often intentionally designed to induce emotions, using whatever means available". At least, it is difficult, if not impossible, to imagine the absence of a relationship between music and emotion.

The connection between music and emotions has intrigued academics from several different areas and has been studied since ancient Greece (Juslin & Sloboda, 2010). Indeed, the presence of music in people's everyday life goes far in our past, since sound expression seems to be one of the oldest and most universal forms of human communication (Flores-Guitérrez & Díaz, 2009). Cook and Dibben (2010) emphasize this idea by affirming that writing about music is as remote as writing itself. Hevner (1936), however, a few decades earlier pointed out that the symbolism of music is not as exact or as specific as verbal symbolism, but it is also not chaotic and has a system of understanding that governs its functioning.

Thus, one could infer that this system of understanding is associated with the structural components that integrate and govern the musical functioning. The musical tone, the rhythm, the level of complexity, the expressiveness, the harmony and the timbre represent the main structural components of the music, allowing, through varied combinations of these, to generate different emotions (Hevner, 1936; Juslin & Laukka, 2004; Krumhansl, 1997; Scherer & Zentner, 2001). The time dimension of this type of stimulus, reminded Hevner (1936), should be emphasized, since this is the characteristic that distinguishes music from other forms of art. Díaz (2010, p. 543) thus concluded that music presents itself as a "stimulus organized in terms of its sonorous, spatial and time components, which results in a complete auditory perception endowed with emotional and figurative states that are aesthetically conscious and culturally valued".

Having a solid system of understanding allowed music to have a strong presence in human culture (Blood & Zatorre, 2001; Marin & Bhattacharya, 2011; Sacks, 2007; Zentner et al., 2008). This presence is expressed in different ways in our daily lives, being commonly used in the liberation and regulation of emotions (DeNora, 2000; Juslin et al.,

2008; Juslin & Västjfäll, 2008; Knobloch & Zillmann, 2002; Marin & Bhattacharya, 2011), for comfort and stress relief (DeNora, 2000, 2016;), to relive valued past experiences (Hays & Minichiello, 2005) or as an accompaniment in the performance of daily tasks (Sloboda et al., 2009). Music is also used to evoke emotions in films, marketing and music therapy (Daly et al, 2015; Juslin & Sloboda, 2010).

Despite this strong presence in human culture, the study of the relationship between music and emotions is strongly divided between two major contrary positions: a cognitive position and an emotivist position.

On the one hand, the cognitive position argues that the musical stimulus is unable to truly induce emotions (Kivy, 1990; Meyer, 1956; Scherer, 2004; Zentner et al., 2008), which implies that these are only perceived in musical stimulus. Meyer (1956, p. 8) states that "when a listener reports that he felt this or that emotion, he is describing the emotion which he believes the passage is supposed to indicate, not anything which he himself has experienced". Based on this idea, the same author developed a theory about the emotional meaning present in musical stimuli, which is evoked accordingly to the expectations of listeners that are expressed in physiological changes. This theory then came to influence a number of other theoretical models that postulated the role of arousal (Berlyne, 1971; Konečni, 1982) and the role of expectancy (Narmour, 1990) in music listening.

In a complementary fashion, Noy (1993), Scherer (2004) and Zentner et al. (2008) claim that there is a fundamental difference between emotions evoked by music and emotions evoked by everyday activity. It is defended by them that emotions evoked by music have no material effects on the individual's well-being and are not associated with survival functions, which makes them incapable of inducing basic emotions. The lack of behavioural signals in listeners upon hearing a musical stimulus is also pointed out.

On the other hand, in the emotivist position, several explanatory theories are proposed for how and why the musical stimulus truly induces emotions. Blood and Zatorre (2001), Juslin and Västjfäll (2008), Koelsh (2012), Krumhansl (1997) and others revised in Juslin and Sloboda (2010) demonstrated how musical stimulus can induce basic emotions, including sadness, fear, disgust, anger and joy. Some of the same authors have also demonstrated how music is capable of provoking behavioural signals, including changes in the activity of limbic and paralimbic structures (Blood & Zatorre, 2001), changes in skin conductance levels (Blood & Zatorre, 2001; Krumhansl, 1997), changes

in heart rate (Krumhansl, 1997) and changes in neuronal activity (Baumgartner et al., 2006; Blood & Zatorre, 2001; Daly et al., 2015). Amongst the studies developed within the emotivist position, in the appendix A some considerations for the present study were highlighted.

Still within this position, Juslin and Västjfäll (2008) proposed a theoretical framework to explain the relationship between music and emotions, by presenting six distinct mechanisms through which musical stimuli evoke emotions. These mechanisms vary accordingly to their characteristics, so there is not only one mechanism responsible for all instances of musically induced emotions. The mechanisms present in this theoretical framework are: 1) the brainstem reflex, emotion is induced because one or more fundamental acoustic characteristics of the music are acquired by the brainstem to signal a potentially important event; 2) evaluation by conditioning, emotion is induced by a piece of music that has been repeatedly paired with other positive or negative stimuli; 3) emotional contagion, emotion is induced because the listener perceives the emotional expression of the music and "mimics" that expression internally; 4) visual imagery, emotion is induced because the listener conjures visual images while listening to the music; 5) episodic memory, emotion is induced because the music evokes a memory of a particular event that occurred in the listener's life; 6) musical expectation, emotion is induced because a specific characteristic of the music violates, delays or confirms the listener's expectations.

The emotivist position was then able to formulate the perspective that music has a unique ability to access the brain's affective and motivational systems (Thaut, 2005). Specifically, Thaut and Wheeler (2010) stated that music was regarded as one of the greatest mechanisms for therapeutic efficacy by: 1) assuming a role in influencing and modifying affective states and 2) assuming a role in affective modification by accessing the totality of the patient's cognitions, perceptions, states and behavioural organization. The authors also underlined that music can be defined as a powerful language that can be used to involve the patient in a complex process of thought-emotion, this being a process that can be directed towards functional non-musical rehabilitation goals. This means that the use of music in therapeutic sessions may allow the creation of a translational behavior space where patients experience, (re)learn and train desired behaviours through music-based therapeutic exercises and where musical stimuli allow the creation of responses that can be transferred and significant in non-musical behavior.

Neurological research reinforced this idea by formalizing the influence, change, and education that music can have on cognitive, affective and sensorimotor processes in the brain (Hallam et al., 2011; Thaut & Wheeler, 2010). Koelsch (2014) reviewed several functional neuroimaging studies that point to the ability of music to evoke changes in the activity of central brain structures to cause the induction of emotions. The conclusions of these studies allow, accordingly to the author, the possibility of several applications in therapies based on music. Lee et al. (2016) also emphasize this idea by stating that Koelsch's study pointed out that music is a modulator that activates neuronal regions related to emotional functions, which allowed the justification of using music to evoke emotions and subjective feelings in psychotherapy.

Although these ideas allow the use of music in a therapeutic context, using it to achieve individual goals within a therapeutic relationship (American Music Therapy Association, 2007), music is rarely used as an object in the research field of emotions (Lundqvist et al., 2009). Juslin & Sloboda (2010) also acknowledge this fact and elaborate it by stating that there was a general neglect of music in the field of psychology, and only in the 90s a greater interest in integrating the study of the former into the latter emerged. As the main justification for the increase of this interest, the authors justified that it is not possible to explain how people experience music without referring to the role of emotions. In other words, although the cognitivist position predominates in emotion research, in the research field of the musical experience the emotivist position has been gaining strength.

The difference of prevalence of these positions in the research field can be easily observed. Even though there is no shortage of articles and studies that prove that music stimuli can indeed induce emotions, on the contrary, there's wide gap of studies that analyse the influence of music stimuli on emotional processing. In the field of music therapy, the Bonny Method of Guided Imagery and Music (Bonny, 1994) stands out as the only commonly known and used method where music interacts with the brain to evoke images that induce emotions and memories, allowing the transformation from painful emotions to positive emotions (Lee et al., 2016). Objectively, Bonny observed that after playing a carefully selected programme of classical music to a group of subjects, it was possible to reach significant insights in therapy issues due to the powerful feelings and symbolic images that were evoked. However, this method it is not supported and has no connection with a theoretical emotional processing model, being largely based on free exploration and interpretation. Thus, the role of the patient is to openly share his/her

perceptions and experiences within the music, and the role of the therapist is to facilitate a reflection and an integration of the shared feelings.

Serôdio (2016) tried to bridge this gap, by exploring whether certain musical excerpts would facilitate the occurrence of affective states associated with different levels of emotional processing. The results revealed how participants were able to differentiate most musical excerpts in regards to the level of emotional processing. However, no practical or therapeutic impacts of using the musical excerpts in facilitating emotional processing were explored.

This is an important gap to reflect upon since emotional processing is regarded as one of the main elements of the therapeutic process. Greenberg and Paivio (1997) described emotional processing in three steps. First, it is necessary to evoke and focus on the negative emotions associated with non-adaptive emotional schemes that contribute, or are at the origin, of the sensation of psychological malaise. Secondly, by deconstructing these emotional schemes, the level of analysis for the exploration of cognitive-affective sequences associated with negative emotional experiences is deepened. Thirdly, a new element is introduced, bringing a new perspective on the situation that is generating the psychological malaise, allowing the reorganisation of the self and the formation of new emotional contents. The emotional processing model described here allows the occurrence of cognitive changes and of emotional changes, which, together, allow a new reorganization of the self-experience so that the individual can symbolize and organize the emotional experience with a new vision.

The steps that constitute the Greenberg and Paivio (1997) model underlie specific therapeutic tasks. Based on these, Pascual-Leone and Greenberg (2007) presented a sequential model of emotional processing, at a higher level of abstraction, which clarifies the resolution of emotional distress according to therapeutic evolution. In this sequential model, one starts from undifferentiated and unintegrated emotions and progresses to emotional experiences of acceptance, regardless of the specificity of the therapeutic tasks performed. The sequencing of these emotional experiences is formalised in a division of emotional states with different characteristics related to their levels of activation, action tendencies, and specificity of meaning. This formal division of emotional states translates into two major categories of emotional processing: those representing Early Expressions of Distress (EED) and those representing Advanced Meaning Making (AMM).

The EED category is composed of initial states described as necessary and inevitable steps to achieve emotional change, encompassing both secondary and primary maladaptive emotions (Kramer et al., 2015; Pascual-Leone, 2018; Pascual-Leone & Greenberg, 2005). Global Distress is identified as an unprocessed emotion with high activation and low meaning, being commonly described as a reaction of affliction expressed emotionally with little or no intention of elaboration. Individuals then move on to the states of Fear/Shame, where feelings of loneliness, incapacity and maladaptive action tendencies persist, or Rejecting Anger, where feelings of protest, repulsion, or hatred originate with high levels of activation and tendencies of maladaptive action. Through the elaboration of meanings of all these states, it is possible to enter into more differentiated states of emotional processing. This elaboration of meanings can occur through: 1) elaboration of meanings associated with Rejecting Anger, transforming it into Assertive Anger; 2) passage through an intermediate level of meaning creation associated with a dialectic construction where two opposite states cooccur (Need and Negative Evalutation about the Self), leading to a reassessment of the Self.

In the AMM there is a facilitation of adaptive primary emotions, where new feelings are experienced in the moment and expressed, clearly, in an integrative and affirmative way (Kramer et al., 2015; Pascual-Leone, 2018; Pascual-Leone & Greenberg, 2005). The Assertive Anger state is characterised by an anger that has enough differentiation to incorporate a positive self-evaluation and a clear affirmation of individual needs. At the same time, the individual may experience the Self-Soothing state, where there is a direct response to the individual needs. On the same level as the previous states, the Grief/Hurt state translates in sadness combined with the recognition of loss or dissatisfaction with the needs of the self. Finally, through a second dialectic construction that synthesises the previous states, the Acceptance and Agency state results from a new positive evaluation of the self as confident and future-oriented, as being able to recognise past losses and channel its capacities to deal with them.

The sequence of the presented emotional states is nonlinear (Pascual-Leone & Greenberg, 2007). Not only is substantive emotional change a developmental process where some emotion sequences may be inherent to the trajectory of therapeutic emotional developments, but also the idiosyncratic characteristics of each individual must be considered as factors that contribute, or not, to greater involvement in different emotional states (Pascual-Leone, 2018). Thus, although this is nonlinear path, all the emotional

states mentioned are necessary to reach a higher level of emotional processing (Pascual-Leone & Greenberg, 2007).

Several other authors consistently advocate emotional exploration through the activation of a problematic emotional state, followed by the activation of adaptive emotional states (Welling, 2012). Within the therapeutic, in Short-Term Dynamic therapy, Kramer et al. (2015) demonstrated the usefulness of the referred model to explain elements of therapeutic change for adjustment disorder. In Emotion-Focused Therapy, Pascual-Leone et al. (2019) demonstrated through the analysis of two case studies that sequential emotional processing may generalize across the course of treatments, even if each case engages in a different process route to reach the same outcome goal. In Clarification-Oriented Therapy and in Attachment based Family Therapy more empirical support was found when the sequential model was utilized to describe patients' emotional change (Pascual-Leone et al., 2019).

Considering that the sequential emotional processing model does not link its emotional states to specific therapeutic tasks, this independence allows the exploration of different methods with therapeutic potential, even outside the scope of psychotherapy. Rohde et al. (2015) explored the gains of cognitive-affective meaning-building through an experimental paradigm based on the expressive writing of Pennebaker (1997) that sought to induce different phases of emotional processing. The experimental paradigm employed by these authors raises the possibility of using other types of stimuli to induce emotional states associated with emotional processing.

In the present study, as a follow-up to the work started by Serôdio (2016), the experimental paradigm employed by Rohde et al. (2015) will be adapted in order to use musical stimuli, instead of writing, to induce emotional states associated with the sequential model. Thus, the association of a musical stimuli with the referred model poses itself as an attempt to better fill the identified gap in the emotivist position. Additionally, by combining the ability of music to induce emotions with the sequential model, it may be possible to shine light on the level and type of utility that music has in inducing and processing emotions. Obtaining this understanding is extremely relevant since it provides the opportunity to enable emotional experiences that help individuals to progress in their emotional resolution of issues that cause them discomfort or that are not resolved.

As the main objective of this study, it is intended to explore if the experience of being exposed to musical sequences with certain characteristics allows to achieve lesser or greater emotional resolution of emotional distress. Thus, it is hypothesized that:

- Listening to both types of musical sequences (experimental and control) will lead to a shift in participants' emotional state, which will be reflected in changes in the dimensions of valence, arousal and control;

- Listening to the experimental musical sequences, regardless of progression order, in comparison to the control musical sequence, will lead to an increase in the emotional resolution, leading participants to report fewer intra- or interpersonal distress;

- Listening to the musical sequence with the EED-AMM progression will lead to a higher level of emotional resolution, compared to the control musical sequence (with no specified progression) and the one with AMM-EED progression.

Method

Research Design

The present study is characterized as a quantitative study, with a brief qualitative element. More specifically, the quantitative methods employed are characterized by the experimental method.

Because we are starting this study with solid hypotheses to be confirmed, the experimental methodology presents itself as the most adequate since it is designed to explore the effects of presumed causes (Christensen et al., 2013). However, it is important to mention that this type of research methodology is very susceptible to the interference of strange variables (Christensen et al., 2013; Cronbach, 1957), so an active effort was made to try to reduce their impact on the results obtained.

Furthermore, although we pretend to explore possible causal relationships, it is necessary to understand two key aspects. Firstly, considering that situations and responses are multifaceted (Cronbach, 1957), there is usually an interaction of several factors for a certain effect to occur. Changes in any one of those factors may lead to an impossibility in the replication of the identified causal relationship, thus defining these causal relationships as probabilistic and non-deterministic (Cook et al., 2002). Secondly, an effect concerns the difference between what occurs when a certain treatment is administered and what happens to the same group of individuals when that treatment is not administered. As it is not possible for the same group to have the conditions of treatment and non-treatment simultaneously, it is only possible to obtain imperfect measures of this difference by working with different groups of individuals, administering to each group only one condition of treatment (Christensen et al., 2013).

This study, using a mixed method approach, will seek to explore the impact of music on shifts in emotional states, as well as on resolution of emotional distress. It uses three distinct groups, two experimental conditions and one control condition. A pretest–posttest design is applied, as it presents itself as a robust design with several associated advantages that better allow to isolate the effect in analyses (Christensen et al., 2013).

Sample description

The study sample consists of a total of 90 participants, 33 male (37% of the sample), 54 female (60% of the sample) and 3 other genre (3%). The participants' ages are between 18 and 65 years old, with an average of 28 and standard deviation of 12.13.

Participants were recruited through publications on social media platforms (e.g., Facebook, LinkedIn, Twitter, Instagram, among others) with a short text alluding to the total duration and type of elements they would experience (appendix B).

Stimuli description

One of three different musical sequences was presented to the study participants. In the experimental conditions, two of the musical sequences presented to participants had as an objective to simulate affective states described in the emotional processing model of Pascual-Leone and Greenberg (2007). Thus, each musical excerpt present in these sequences was selected in order to correspond to a specific emotional state, with the intention of inducing this same state in the participant through the activation of the emotional contagion mechanism (Juslin & Västjfäll, 2008). It is expected that the brainstem reflex and visual imagery mechanisms will also be activated, leading to a further expansion of the emotional process. Only orchestral/instrumental musical excerpt were selected, as there is less familiarity of the general population with this musical genre (North & Hagreaves, 2008), thus reducing the probability of activation of the evaluation by conditioning and episodic memory mechanisms (Juslin & Västjfäll, 2008).

The selection of musical excerpts that integrate the two experimental musical sequences presented to the participants went through two stages of selection: 1) options based on the literature review, 2) best candidate based on a pre-test applied to the general population.

As for the first selection phase, three candidate options were gathered for each emotional state based on musical excerpts already explored and proven in the literature as being associated with the elicitation of a specific emotion or emotional category (Eerola & Vuoskoski, 2011; Florez-Gutiérrez & Díaz, 2009; Hevner, 1936; Krumhansl, 1997; Lopez Serôdio, 2016; Peretz et al., 1998).

After combining these three candidate options, the selection process for the best candidate was carried out through a pre-test applied with an online questionnaire developed on the Qualtrics platform (www.qualtrics.com). Throughout the questionnaire, each participant was only presented with the three candidate options referring to a single emotional state, followed by a short description of it elaborated from the CAMS manual (Pascual-Leone & Greenberg, 2005). The participants where then asked to select which of the three options best suited the description of the emotional state presented and which of the three options worst suited the description of the emotional state presented.

The online questionnaire was circulated to the general population through various social platforms (Facebook, Instagram, Twitter, LinkedIn and Reddit). In the end, a total of 300 responses were obtained, with 30 responses for each of the ten emotional states presented. Based on the data obtained, a descriptive analysis was performed using the SPSS *Statistics* 26 platform.

For the pre-test, all music excerpts had a duration between 1 minute and 30 seconds to 2 minutes, which allowed us to use the excerpts with the highest number of votes for best candidates in the final sequences. The final musical excerpts selected for the present study are shown in Table 1.

Table 1

Musical excerpts selected for the present study

Emotional State	Excerpt selected (Compositor and play)	Number of votes per Excerpt	Excerpt Characterization
Global Distress (GD)	Tomaso Albinoni's Adagio in G Minor	14	Slow tempo, minor mode, firm rhythm and complex
Fear (F)	Béla Bartóks Music for Strings, Percurssion and Celeste	15	Slow and fast tempo, minor mode, firm rhythm and complex
Shame (S)	Tomaso Albinoni's Adagio in G Minor	15	Slow tempo, minor mode, firm rhythm and complex
Need (N)	Bach's Inventions	14	Slow tempo, minor mode, flowing rhythm and simple
Negative Evaluation (NE)	Schubert's String Quartet	11	Slow tempo, minor mode, firm rhythm and complex
Rejecting Anger (RA)	James Horner's Futile Escape	13	Fast tempo, minor mode, firm rhythm and complex
Assertive Anger (AA)	Beethoven's Symphony	19	Fast tempo, major mode, firm rhythm and complex
Self-Soothing (SS)	Debussy's Reflections on the Water	12	Slow tempo, major mode, flowing rhythm and simple
Grief and Hurt (GH)	Mozart's Piano Concert	15	Slow tempo, major mode, flowing rhythm and simple
Acceptance and Agency (AAA)	Japanese Usagi Folk Music	15	Slow tempo, minor mode, flowing rhythm and simple

Based on this selection, a musical sequence was constructed following the order of the affective states described in the sequential model (EED-AMM Sequence), and, equally, a musical sequence that reverses the order of the same affective states was constructed (AMM-EED Sequence). Both musical sequences have a total duration of 14 minutes.

As for the third musical sequence, since it is the one shown in the control group and it does not intend to simulate the sequential model, it does not include any of the musical excerpts presented. Here, it was intended to create a neutral sequence that would serve as a baseline (Control Sequence). To achieve this purpose, the first 6 minutes and 6 seconds of the musical piece Les Sylphides, by Chopin, were selected, since in a study

by Zimny and Weidenfeller (2015) the data revealed an association of this piece with a state of neutrality based on GSR measurements (galvanic skin response). In order to match the duration of all musical sequences, the present sequence was duplicated and extended, leading to a total duration of 14 minutes.

In Figure 1 we can observe a visual composition of each of the final musical sequences.

Figure 1

Final composition of the musical sequences
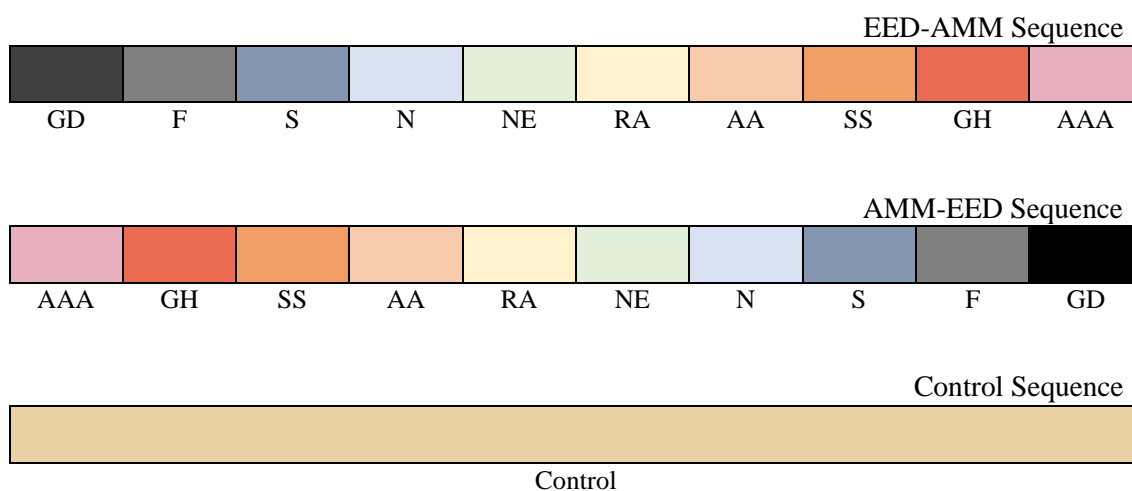
Measures and Scales

Self-Assessment Manikin (SAM). The first scale to be completed by the participants intended to assess participant's emotional state before and after the experimental induction. Developed by Lang (1980), SAM is characterized as a brief graphic and non-verbal scale that intends to evaluate emotional states in 3 dimensions: valence (i.e., pleasant/unpleasant dimension), arousal (i.e., relaxation/activation dimension) and dominance (i.e., lack of control/possession of control dimension). These dimensions are evaluated based on a continuous 9-point scale, which is presented in different sequences of 5 figures.

The use of this scale is pertinent to the present study because it allowed to analyse if the musical sequences impacted the emotional state of the participants.

Resolution of Long-Standing Interpersonal Grievances (UFB-RS). This scale was only completed by the participants who selected resentment and hurt in an important relationship as the emotional marker to work on during the experiment. This scale was filled out pre- and post-experimental induction. The UFB-RS was developed by Singh in 1994, with the objective to evaluate how the participants feel about their unfinished interpersonal matters (Rohde et al. 2015). The scale consists of 11 items assessed on a 5-point Likert scale, which assess emotional resolution through the evaluation of the interpersonal grievances reported. In this sense, the lower the total sum of the scores of the 11 items, the smaller the number of reported grievances and the greater the emotional resolution. Since some items of this scale are reversed, it was necessary to uniform the scale before initiating its statistical analysis.

The use of this scale is relevant for the present study because it allowed to determine if the musical sequences impacted participants' of emotional resolution.

Resolution of Long-Standing Emotional Self-Neglect (ESN-RS). This scale was only completed by the participants who selected emotional self-neglect as the emotional marker to work on during the experiment. The ESN-RS was developed for this study, as an adaptation of UFB-RS. Instead of the items being referred to the assessment of feelings towards another, they were referred to the assessment of feelings towards the self, allowing us to assess how the participants feel about the self-neglect they enact on disliked parts of the self. The scale consists of 11 items evaluated on a 5-point Likert scale, being structurally and semantically identical to the original UFB-RS, which asses emotional resolution through the evaluation of the intrapersonal grievances reported. In this sense, the lower the total sum of the scores of the 11 items, the smaller the number of reported grievances and the greater the emotional resolution. Since some items of this scale are reversed, it was necessary to uniform the scale before initiating its statistical analysis. ESN-RS as a construct may contain self-criticism, but not necessarily.

The use of this scale is relevant for the present study because it allowed to determine if the musical sequences impacted participants' of emotional resolution.

Bern Post Session Report (BPSR-P). The present scale intended to evaluate, post-experimental induction, therapeutic process variables. This scale was developed by

Flückiger in 2010 with the objective to assess different psychotherapeutically relevant process variables. Rohde et al. (2015) adapted and used it to measure mechanisms of change and experience present in an expressive writing task.

For the present study, it was pertinent to adapt the version developed by Rohde et al. (2015), using some of the same items employed by the authors but adapting them for a musical listening task. This adaptation allowed to analyse the impact of the musical sequences presented in the spectrum of psychotherapeutically relevant process variables. The 6 items used in this scale were divided into 4 subscales: Problem Activation (items 1 and 2), Problem Mastery (items 3 and 4), Problem Clarification (item 5) and Perceived Utility (item 6). The higher the total sum in each of the subscales, the greater the psychotherapeutic quality. The items are evaluated on a 7-point Likert scale.

Expressive Writing Task. Immediately after the experimental induction, participants were given the choice to perform an expressive writing task, similar to the writing paradigm developed by Pennebaker (1997). After listening to the musical sequence, the participants were asked if they noticed any changes or internal transformation in relation to the emotional marker they had chosen to work on, and, if they answered yes, they were asked to describe it in some detail that transformation.

The completion of this task by the participants intends to ascertain and better clarify the level of emotional processing induced.

Procedure

The present study was developed in the form of an online questionnaire, through the Qualtrics platform (www.qualtrics.com). Firstly, the written consent and instructions were presented to the participants, so the experience only started after the confirmation of its conscious reading and the affirmance of the desire to continue.

Initially, the participants were presented with a scheme that described two distinct emotional markers: Self-neglect or Resentment and Hurt in an Important Relationship. The participants were then given the choice to work with only one of the presented markers. It was also asked for them to define, briefly, what the topic of the selected emotional marker was and to classify how much the selected marker disturbed/activated or emotionally affected the participant in the present moment.

In the pre-induction phase, that is, before listening to the musical sequence, participants were asked to answer to two different measures (SAM and UFB-RS or ESN-RS). Subsequently, experimental induction was initiated by listening to one of the three musical sequences. Finally, in the post-induction phase, that is, after listening to the musical sequence, participants were asked to complete a short writing task (of voluntary participation) and to answer to three different measures (SAM, UFB-RS or ESN-RS and BPSR-P).

Participants were asked to use earphones/headphones during this experiment and to try to minimize contact with potentially stimulating external stimuli. These instructions intended to create a more engaging and more introspective experience and to facilitate a neutral environment common amongst the participants. In addition to the measures mentioned, sociodemographic measures were also collected after the experimental induction.

Informed consent and instructions presented to participants, the scales that were used and the sociodemographic questionnaire can be found in the appendixes C, D, E, F, G and H, respectively.

Data analysis

The data obtained in all scales used in this study was statistically analysed with the IBM SPSS Statistics software (version 26.0).

The data obtained in the Expressive Writing Task was analysed using the Nvivo12 software. As this was an optional task, it was only completed by 47 (52%) of the 90 participants. For a comprehensive content analysis, which allows us to better learn from the data (Bazeley & Jackson, 2013), the principal investigator of the present study carried out, manually, an analysis of the lexicon present in the descriptions of the emotional transformation felt by the participants. All references of emotional states were analysed and distributed, also manually, into the formulated categories of EED states and AMM states, based on the descriptions of CAMS (2005). It is important to note that, amongst each of the 47 descriptions analysed, several cases contained references of emotional states that fell into the category of EED states, and other references that fell into the category of AMM states. In total 65 valid references were considered.

Results

For all the statistical analyses carried out, the data from the samples of participants allocated to either UFB-RS or ESN-RS scales were aggregated, since both allow the measuring of emotional resolution. We did not intend to differentiate between the level of emotional resolution achieved in each marker, but rather the overall level of emotional resolution achieved. Variables were analysed separately according to each condition (EED-AMM Sequence, $n = 30$; AMM-EED Sequence, $n = 30$; Control Sequence, $n = 30$).

In the internal consistency study, for the UBF-RS scale it was obtained $\alpha = .74$ and for the ESN-RS scale it was obtained $\alpha = .77$. The SAM scale is divided into 3 subscales composed of only 1 item that measures a specific dimension of the emotional state, so no internal consistency study is needed. The BPSR scale, for the present study, was divided into 4 subscales that measure distinct dimensions of the therapeutic process, the first 2 of which are only composed of 2 items and the last 2 of which are composed of only 1 item each, thus the application of internal consistency study was not justifiable.

Among the dependent variables, only Emotional Resolution met the necessary assumptions for the use of parametric tests, verified with the Kolmogorov-Smirnov for the analysis of the normal distribution of the sample and with the Levene test for the analysis of the equality of variances. Once these assumptions were met, parametric tests were used in the proceeding analyses concerning the dependent variable Emotional Resolution. As for the dependent variable Emotional State and for the dependent variable of Therapeutic Process, through the referred statistical tests it was observed that the parametric assumptions were not met in several dimensions. Thus, non-parametric tests were used in the proceeding analyses concerning these dependent variables. In the appendix I the values of this analysis are presented.

Finally, association measures were applied to quantify the intensity and direction of the association between these dependent variables (Emotional State, Emotional Resolution and Therapeutic Process). This analysis aims to reduce the alpha slippage effect/probability of the Type I error being committed, where the null hypothesis is rejected when, in fact, it should be retained. Through the application of Pearson's Correlation on the referred variables, no significant correlations were found, ruling out the hypothesis of using a multivariate statistic in the subsequent analyses.

Sample Characterization

      With Chi-square statistical tests it was verified that there were no differences between the groups of participants present in each condition, regarding their socio-demographic characteristics. Therefore, the three groups did not differ regarding age, gender, previous musical learning experience, classical music appreciation, type of selected emotional marker and arousal of the selected emotional marker (all p values > .05). The socio-demographic characteristics for each of the three conditions are reported in Table 2. Since no differences were found between the groups of participants in the different conditions, it is possible to assume that the aforementioned characteristics did not influence the results achieved in the remaining analyses.

Table 2

Sample's Chacteristics

	Sequence		
	EED-AMM	AMM-EED	Control
Sample Size	30	30	30
Age in years M (SD)	29.8 (13.96)	27.8 (10.88)	27.87 (11.65)
Gender (female)	17 (56.7%)	14 (46.7%)	23 (76.7%)
Previous musical education (yes)	13 (43.3%)	14 (46.7%)	15 (50%)
Classical music appreciation M (SD)	6.9 (2.53)	6.9 (2.14)	6.8 (2.20)
Selected Emotional Marker (self-neglect)	22 (73.3%)	21 (70%)	21 (70%)
Emocional marker arousal M (SD)	6.8 (1.72)	6.3 (1.71)	6.8 (1.67)

Hypothesis 1: Listening to both types of musical sequences (experimental and control) will lead to a shift in participants' emotional state, which will be reflected in changes in the dimensions of valence, arousal and control

      Emotional arousal is considered a prerequisite for subsequent emotional processing (Rohde et al., 2015). Thus, it became important to verify whether listening to musical sequences led participants to become similarly emotionally active in the various conditions.

To ascertain differences in emotional state between conditions at the pre-experimental induction, we resorted to the Kruskal-Wallis test with the musical sequence (EED-AMM Sequence, AMM-EED Sequence, Control Sequence) as independent variable and the valence, arousal and control dimensions measured by the SAM as dependent variables. No significant differences were found between musical sequences in the different dimensions (valence dimension in the pre-experimental induction: $X^2_{KW}(2)$ = 2.533; p = 0.282; n = 30; n = 30; arousal dimension in the pre-experimental induction: $X^2_{KW}(2)$ = 1.706; p = 0.426; n = 30; control dimension in the pre-experimental induction: : $X^2_{KW}(2)$ = 2.049; p = 0.359; n = 30). Similarly, to ascertain differences in emotional state between conditions at the post-experimental induction, using the Kruskal-Wallis test no significant differences between musical sequences were found in the different dimensions (valence dimension at post-experimental induction: $X^2_{KW}(2)$ = 1.234; p = 0.540; n = 30; arousal dimension at post-experimental induction: $X^2_{KW}(2)$ = 5.115; p = 0.077; n = 30; n = 30; control dimension at post-experimental induction: : $X^2_{KW}(2)$ = 0.312; p = 0.856; n = 30). This allowed us to confirm that participants were equally emotionally active across conditions, both pre- and post-experimental induction.

The analysis with the Kruskal-Wallis test with the musical sequence (EED-AMM Sequence, AMM-EED Sequence, Control Sequence) as independent variable and the subscale of problem activation as dependent variable, also indicated no significant differences between conditions regarding emotional arousal (X^2_{KW} (2) = 5.115; p = 0.078; n = 90). These results show, once again, how participants were equally emotionally active across conditions.

To assess differences in the emotional state measured by the SAM between the pre- and post-experimental induction within each condition, we used the Wilcoxon test with the valence, arousal and control dimensions as dependent variables. Separate analyses for each condition revealed distinct results: in the EED-AMM Sequence condition only a significant decrease from pre to post-experimental induction was found in the arousal dimension (*Mdnpre* = 4.93; *Mdnpós* = 4.23; Z = -2.11; p = 0.035); in the AMM-EED Sequence condition only a significant increase from pre to post-experimental induction was found in the control dimension ((*Mdnpre* = 4.70; *Mdnpós* = 5.23; Z = -2.22; p = 0.027); in the Control Sequence condition significant differences were found from pre to post-experimental induction in all dimensions (valence dimension: *Mdnpre* = 5.13; *Mdnpós* = 6.27; Z = -3.43; p = 0.001; arousal dimension: *Mdnpre* = 5.13; *Mdnpós* = 3.47;

Z = -4.02; *p* = 0.000; control dimension: *Mdn*pre = 4.50; *Mdn*pós = 5.47; Z = -3.48; *p* = 0.001). The scores on the SAM and the Problem Activation subscale of the BPSR are presented in Table 3.

Table 3

Mean values (and standard deviations) obtained in the SAM and in the BPRS Problem Activation subscale

Sequence	SAM						BPRS
	Valence		Arousal		Control		Prob Act.
	Pre	Post	Pre	Post	Pre	Post	Post
	M (dp)	*M (dp)*	*M (dp)*	*M (dp)*	*M (dp)*	*M (dp)*	M (dp)
EED-AMM	5,23	5,67	**4,93**	**4,23**	5,13	5,37	3,97 (0,31)
	(1,76)	(1,75)	**(1,79)**	**(1,89)**	(1,62)	(1,61)	
AMM-EED	5,73	6,00	4,53	4,53	**4,70**	**5,23**	3,82 (0,28)
	(1,48)	(1,66)	(1,91)	(2,08)	**(2,04)**	**(2,06)**	
Control	**5,13**	**6,27**	**5,13**	**3,47**	**4,50**	**5,47**	3,12 (0,19)
	(1,46)	**(1,31)**	**(1,78)**	**(1,96)**	**(1,81)**	**(1,59)**	

Note: the statistically significant values regarding the differences in the emotional state between the pre- and post-experimental induction are highlighted in bold

Hypothesis 2: Listening to the experimental musical sequences, regardless of progression order, in comparison to the control musical sequence, will lead to an increase in the emotional resolution, leading participants to report fewer intra- or interpersonal distress

To assess whether the experimental musical sequences managed to significantly increase the level of emotional resolution achieved, through reported the decrease of intra or interpersonal distress, between the pre- and post-experimental induction periods, we used the *t*-Student test for paired samples for each of the conditions. The scores of emotional resolution in pre- and post-experimental induction are shown in Figure 2.

Figure 2

Emotional resolution scores in the pre-experimental induction (blue) and post-experimental induction (red)
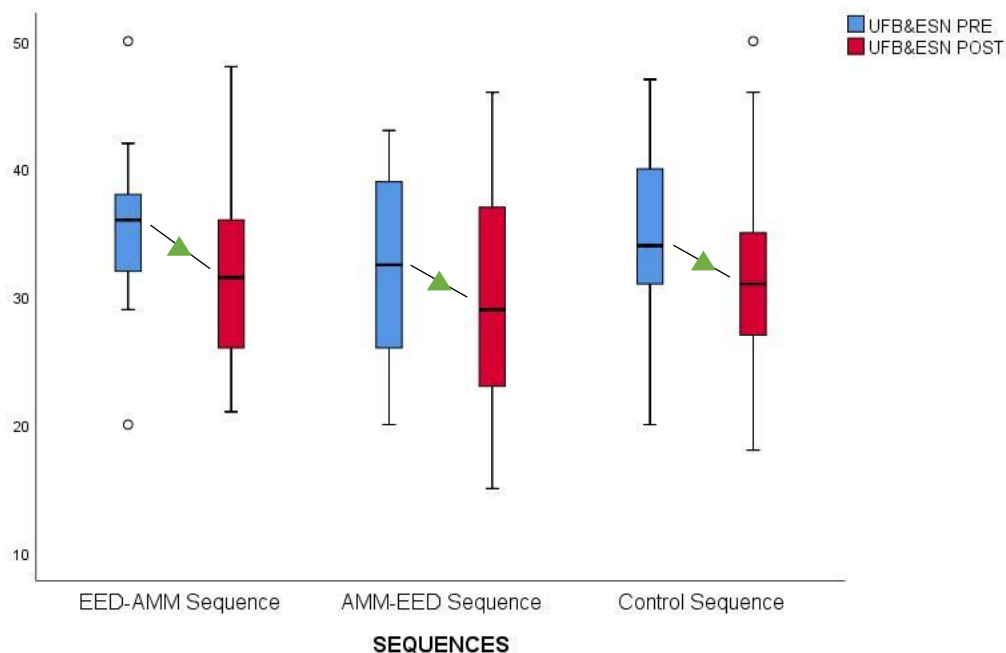
Between the pre- and post-experimental induction in both experimental conditions EED-AMM Sequence (M_{pre} = 35.1; SEM_{pre} = 0.944; M_{post} = 31.8; SEM_{post} = 1.279) and AMM-EED Sequence (M_{pre} = 32.3; SEM_{pre} = 1.353; M_{post} = 29.4; SEM_{post} = 1.546) a statistically significant increase in emotional resolution was observed (t (29) = 3.83; $p_{(1-tailed)}$ = 0.001; t (29) = 2.98; $p_{(1-tailed)}$ = 0.003). However, inversely to what was expected, between the pre- and post-experimental induction in the Control Sequence condition (M_{pre} = 34.7; SEM_{pre} = 1.224; M_{post} = 31.8; SEM_{post} = 1.361), a statistically significant increase was also found in emotional resolution (t (29) = 2.60; $p_{(1-tailed)}$ = 0.008).

The qualitative analysis of the expressive narrative task allowed to reinforce the results found in the statistical analysis. Among the 65 valid references, it was found that a majority of 38 references (58.5%) fell into the category of AMM States, which indicates that participants were able to achieve greater emotional resolution after listening to the musical sequences. A query on the frequency of words present in the descriptions of the felt transformation illustrates the referred effect. The results of this query are reported in

Table 4. Complementarily, in appendixes J and K a Word Cloud and a Word Tree, can be consulted, respectively, which complete the aforementioned idea

Table 4

Frequency of words present in the descriptions of emotional transformation

Words	Count	Similar words
Felt	35	I felt, I feel
Feeling	33	Joy, calm, contentment, emotion, hope, happiness, lightness, sorrow, wanting, recognition, sensation, feelings, tranquillity, sadness
State	33	Burden, condition, confusion, consciousness, guilt, curiosity, distrust, hope, state, end, final, form, junction, improvement, level, peace, problem, relation, security, situation, transcendence, life
Calm	20	Calm, sensation, tranquil, tranquility
Modified	13	Improvement, modified, change, relaxation, successful, transformation, transform
Improvement	11	Condition, state, better, improvement, transformation

Hypothesis 3: Listening to the musical sequence with the EED-AMM progression will lead to a higher level of emotional resolution, compared to the control musical sequence (with no specified progression) and the one with AMM-EED progression

To assess this hypothesis, a one-way ANOVA was used for both the pre- and post-experimental induction, with the musical sequence (EED-AMM Sequence, AMM-EED Sequence, Control Sequence) defined as the factor and the emotional resolution as the dependent variable. As expected, at the pre-experimental induction emotional resolution was shown to not be dependent on the musical sequence ($Z_{(2)} = 1.68$; $p_{(1-tailed)} = 0.096$). However, inversely to what was expected, at the post-experimental induction the emotional resolution was also shown to not be dependent on the musical sequence ($Z_{(2)} = 0.95$; $p_{(1-tailed)} = 0.195$). The present statistical results do not support hypothesis 3 by showing that the level of emotional resolution was statistically similar across conditions.

The analysis performed with the Kruskal-Wallis test with the musical sequence (EED-AMM Sequence, AMM-EED Sequence, Control Sequence) as independent variable and the mastery experience, problem clarification and perceived usefulness subscales of the therapeutic process as dependent variables, did not indicate a statistically significant effect (problem mastery subscale: $X^2_{KW}(2) = 1.282$; $p_{(1-tailed)} = 0.264$; n = 90; problem clarification subscale: $X^2_{KW}(2) = 0.603$; $p_{(1-tailed)} = 0.370$; n = 90; perceived usefulness subscale: $X^2_{KW}(2) = 0.846$; $p_{(1-tailed)} = 0.328$; n = 90). The present statistical results also do not support hypothesis 3, by showing that the referred dimensions of the therapeutic process were statistically similar between conditions.

However, when analysing the item presented immediately after the experimental induction, which asked the participants if they had felt any transformation, data was found that contradicts the results presented in the ANOVA. The results of this item reveal that 22 of the 30 participants (73%) in the EDD-AMM Sequence condition affirmed to have felt a transformation after listening to the musical sequences, while in the AMM-EED Sequence condition and in the Control Sequence condition only 15 participants (50%) and 8 participants (27%) also affirmed to have felt a transformation, respectively. Furthermore, by applying the chi-square test it is possible to state that the transformation reported by the participants is not independent of the musical sequence ($X^2(2) = 1.234$; $p = 0.029$; N =90). The results of this analysis can be found in Figure 3.

Figure 3

Results of the participant's reported Emotional Transformation
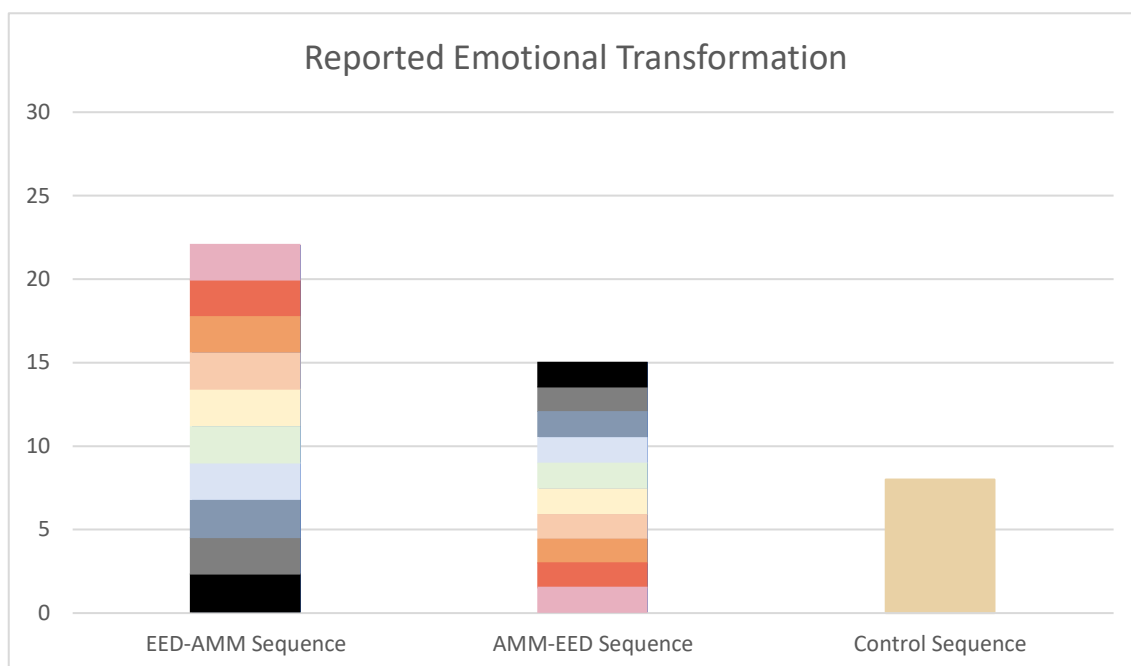
As a follow-up to the previous item, it was once again explored the qualitative analysis of the expressive narrative. The data found here also contradicts the results shown by ANOVA. It was observed that in the EED-AMM Sequence condition, 21 participants voluntarily adhered to the expressive narrative task, while in the other conditions only 15 (AMM-EED condition) and 11 (Control Sequence condition) adhered to the task. It should also be noted that the EED-AMM condition presents itself as the condition with the most references inserted in the category AMM states (16 out of 38 references). The AMM-EED condition presents itself with an almost equal number of references present in the category AMM States (12 references) and references present in the category EED States (11 references). Although the Control condition presents the greatest difference between references inserted in these categories (AMM States with more 7 references in comparison to the EED States), it is also the condition that presents the lowest total number of references in each of these categories under analysis. The results of this analysis are presented in Table 5.

Table 5

EED and AMM states references present in the Expressive Narrative task

Participants per condition	Sequence			Total
	EED-AMM (21)	AMM-EED (15)	Control (11)	(47)
AMM references	16	12	10	38
EED references	13	11	3	27
Differences between AMM-EED references	3	1	7	
Total	29	23	13	65

Discussion

The present empirical study set a proposition to explore the impact of different musical sequences on emotional processes. Results demonstrated how both experimental and control musical sequences led to shifts in the emotional state of the participants, as well as allowed the participants to reach a higher emotional resolution.

The shifts in the emotional state of participants, as reflected in changes in level of in valence, arousal and control dimensions, was an important finding, since emotional arousal is a prerequisite for emotional processing (Rohde et al., 2015). However, this effect was extremely diversified. Namely, in EED-AMM Sequence condition there was only a significant reduction from the pre- to the post-experimental induction in the arousal dimension; in AMM-EED Sequence condition there was only a significant increase from the pre- to the post-experimental induction in the control dimension; and in Control Sequence condition there was a significant increase from the pre- to the post-experimental induction in the affect dimension and in the control dimension, and there was also a significant reduction from the pre- to post-experimental induction in the arousal dimension.

The presence of emotional arousal, regardless of the differences found within each of the three conditions, supports the emotivist position by demonstrating how music can induce emotions and generate impact on the emotional state of listeners (DeNora, 2000; Juslin et al., 2008; Juslin & Västjfäll, 2008; Knobloch & Zillmann, 2002; Marin & Bhattacharya, 2011). Moreover, the use of a simple and visual self-report measure of dimensional emotional rating, presented at the pre- and post-experimental induction, facilitated the observation of differences in the emotional state. This methodological choice reduced the danger of interpretation biases caused by poorly worded questions that, instead of assessing the emotions induced by the music, end up assessing the perceived emotions and supporting cognitive position (Kivy, 1990; Scherer, 2004).

Furthermore, it was also verified that emotional arousal was identical across all conditions, ensuring that differences in this parameter would not influence the results later found at the level of emotional resolution. Thus, when compared together, no significant differences in the dimensions of emotional state were found between the conditions at the pre-experimental induction, just as no significant differences were found between the

conditions at the post-experimental induction. No differences were also found between the conditions regarding the level of problem activation, a dimension of the therapeutic process measure that also verifies emotional arousal, which again indicates that participants were similarly emotionally involved in the different conditions. The similarity of emotional arousal across dimension renders some validity to methodological design of the study up to this point. Since all musical stimuli were characterized by orchestral/instrumental excerpts, the similarity of structural features within this musical style may have enabled the activation of the brainstem reflex mechanism (Juslin & Västjfäll, 2008), by emotionally activating the listeners through the signalling of a potentially important event, which could explain the similarity of emotional involvement across conditions.

By ensuring the similarity of emotional involvement, across all conditions, both in pre- and post-experimental induction, we could proceed with the analysis of our data. Inversely to what was hypothesised, in that we expected the experimental conditions to be the winning candidates, all musical sequences won prizes in terms of leading to higher emotional resolution. The qualitative analysis of the expressive writing task reinforces the presence of this effect, since words that fit into EED emotion states and even more words that fit into the AMM emotion states were found across all conditions.

On the one hand, the presence of this effect in the EED-AMM Sequence is extremely significant, since it shows that it is possible to provide an emotional processing experience through sequenced musical stimuli based on the sequential model. Pascual-Leone and Greenberg (2007) demonstrated that the achievement of the emotional states in the AMM category proceeded in the occurrence of the emotional states present in the EED category. Also, in research using this model in a therapeutic context, the presence of sequential links between various states is demonstrated, regardless of the type of therapeutic modality applied (Kramer et al., 2015; Pascual-Leone, 2018; Pascual-Leone & Kramer, 2019; Pascual-Leone et al., 2019). Complementarily, Welling (2012) reflects on the importance of the transformative emotional sequence as a common therapeutic principle of change, reinforcing the idea of the need for a prior activation of a problematic emotional state, followed by the activation of adaptive emotional states. Thus, the results found in EED-AMM Sequence condition are not surprising and align with the aforementioned research, since this condition followed an emotional transformation sequence.

On the other hand, in regards to the AMM-EED Sequence, Pascual-Leone (2018) has indeed admitted that no study has yet been able to establish links that simultaneously unify all the emotional states present in the sequential model. Moreover, and as previously mentioned, the sequence of emotional states present in the sequential model is nonlinear, only being necessary to experience all emotional states to reach the higher level of emotional processing (Pascual-Leone & Greenberg, 2007). In the present study, in the two experimental sequences, the total experience of the 10 short lived emotional states is provided, and very concrete instructions are given for participants to focus their effort on the processing of the emotional theme they had chosen to work on. Although the AMM-EED Sequence inverts the order of presentation of the referred emotional states, the participants in this inverted condition may have had the necessary and sufficient conditions for some type of emotional processing to occur, thus also leading to a higher level of emotional resolution.

Additionally, Pascual-Leone et al. (2016) demonstrated how different patterns of dynamic change can be observed in the same dataset, depending on the time window and the intended goal of analysis. Thus, the authors presented a "saw-toothed"/zig-zag pattern that jointly described change within and between sessions. Pascual-Leone and Kramer (2019) also noted the existence of this pattern when referring to the occurrence of emotional "collapses", where patients, when making initial attempts to move towards primary adaptive emotions, eventually regress to their initial distress expressions. Around this collapse argument, two lines of thought occur to us that could explain this result. First, in the present study, one can consider that, in the AMM-EED Sequence, the first part of the music guided the participants immediately towards primary adaptive emotions, but the second part of the music quickly transported the participants to the experience of emotions related to a state of distress, which led to the referred emotional collapse. Secondly, since participants were presented with instructions to focus on their emotional distress marker, their mind/bodyset was in contact with a state of emotional suffering; thus, in turn, by being invited to immediately experience primary adaptative emotions, while focusing on the emotional distress experience, may have been facilitating for the occurrence of the referred emotional collapse. In other words, this collapse here, could be explained by the premature and non-structured movement towards the experience of primary adaptive emotions, difficult to sustain and susceptible to interference of the initial state of emotional suffering prompted by instructions.

In regards to the Control Sequence, which also had a significant impact on emotional resolution, the result was surprising to us. Here, the presence of music alone, without specified and differentiated ingredients, is considered to have been a sufficient condition for the facilitation of emotional processing. One could admit that it is not a strange concept, since the Bonny Method of Guided Imagery and Music uses classical music to provide moments of reflection and emotional transformation (Bonny, 1994). Additionally, the present condition not only provided participants with a musical sequence, but also provided specific instructions to help create a moment of focus, connection and reflection of the self. The creation of this moment or task may then have also been facilitative of emotional processing. Mindfulness or focusing tasks alike are associated with emotional transformation (e.g. Gendlin, 1998; Žvelc & Žvelc, 2020).

Reflecting on which musical sequence allowed to achieve a higher level of emotional resolution, quantitative and qualitative results are at least somewhat inconclusive or conflicting. Although the quantitative data concerning the scales point out that there are no differences between conditions, on emotional resolution as well as on the dimensions problem mastery and problem clarification of the therapeutic process measure, the quantitative data regarding the direct question about the presence of a feeling of transformation revealed that a greater number of participants in the EED-AMM Sequence condition (73%) claimed to have felt transformation. Furthermore, the qualitative data set also interestingly revealed that there was a higher number of participations in the brief expressive writing task by participants in the EED-AMM Sequence condition (also 73%). It could be hypothesised that the participants in this condition did experience a higher emotional resolution, which in turn led them to be more predisposed to generously participated in this facultative task (Taubner et al., 2016).

Finally, when asked to rate the usefulness of listening the musical sequence, no differences were found between the conditions regarding the perceived usefulness of this task. Therefore, participants in all three conditions valued and perceived it as useful task, since the mean in all conditions was higher than the midpoint of the scale. Music is commonly used in the release and regulation of emotions (DeNora, 2000; Juslin et al., 2008; Juslin & Västjfäll, 2008; Knobloch & Zillmann, 2002; Marin & Bhattacharya, 2011) and to relive valued past experiences (Hays & Minichiello, 2005), so it can be understood how the present task was perceived as useful in all three conditions. It is also considered that, in all conditions, a moment of introspection and contact with one's own

emotions was provided. So, even though each sequence may have facilitated different types of experiences, overall, this was a moment that allowed participants to disconnect from their surroundings and to connect with themselves.

As this is an experimental study, solely conducted in an online platform and for a short period of time, there are several limitations that may have impacted the present results. In any type of experimental study, regardless of the setting in which it is conducted, there are numerous extraneous variables that may interfere with the data collected (Christensen et al., 2013.; Cook et al., 2002). However, in studies conducted over the Internet, this risk increases considerably, since the experimenter is not present and close to his/her participants to better control and avoid the interference of the mentioned extraneous variables. Furthermore, considering that the present experimental study intended to induce an emotional process, we must consider that this is a very subtle process that is even more likely to be influenced and altered due to the interference of extraneous variables. Although an effort was made to ensure a standardization of experimental conditions between participants, regarding the environment and modality of listening to the musical sequences, there is no possibility of fully confirming that these were ensured.

However, it should be noted that, due to the current pandemic context triggered by the SARS-CoV-2 virus, it became unfeasible to carry out this study in another type of setting. Thus, despite these limitations, it was advantageous to be able to take this study to the participants, without any need for physical or face-to-face contact.

Considering the different data presented, it is important to reflect on some advantages and disadvantages of using self-report measures. Firstly, although self-report measures are the only method that allow access to the participant's subjective experience (Scherer & Zentner, 2001), these measures are considered to be very sensitive to all the stimuli present at the moment of response. Therefore, and as this was an Internet study, the influence of undesired stimuli at the moment of response presents a strong threat to the results obtained. Secondly, it should be considered that closed-response self-report measures may miss important aspects of the phenomenon. Thus, the current use of a complementary open-format response revealed itself as an indispensable tool to deepen the level of analysis and better reveal the variety of possible responses to musical stimuli (Zentner & Eerola, 2010).

As for the statistical analysis, it is important to reflect on the option of combining the data concerning the UFB-RS and ESN-RS scales. Although both scales allow the measuring of emotional resolution, each scale measured this dimension regarding a different emotional marker. And although the present study did not intend to perform analyses with distinction of emotional resolution achieved between emotional markers, it may be an added value, in future studies, to perform statistical analyses separately for each emotional marker. Thus, future studies may verify if the use of musical sequences for inducing emotional processing has a greater effect depending on the type of emotional marker selected by the participants, which will allow us to refine and better understand the potentiality of the therapeutic effect of music.

In addition, the use of a scale that was not empirically tested also presents a limitation. Although the ESN-RS scale was developed based on an empirically tested scale (UFB-RS), we did not verify the psychometric adequacy of the scale developed for the self-neglect marker. Nonetheless its psychometric properties mirrored that obtained in the German version (Rohde et al., 2015). It should also be noted as a limitation that the translation we made of the UFB-RS scale was not psychometrically validated.

When considering the musical stimulus used, it should be pointed out that in experimental studies it can be easier to work with stimuli with only two parts, for example, one for each different emotional state. Thus, it could be posed as a limitation the use of musical sequences with 10 emotional states, which leads to an increase of the possibility idiosyncratic assimilation by the participant among that variability mix of states and thus of error.

Based on the theoretical framework proposed by Juslin and Västjfäll (2008), we can consider another type of aspect in regards to the different mechanisms that may have been activated when listening to musical stimuli. Considering that these authors pointed out that it is not possible to specify directly which mechanisms are activated during the hearing of a musical stimulus, since many of these mechanisms are activated and processed unconsciously, we tried to verify them indirectly. The participants were asked directly if they recognised any of the musical excerpts present in the sequences, and more than half (64%) said they recognised them. The participants were also asked directly if they had ever attended, outside of school activities, any type of musical learning classes, and almost half of the participants (47%) stated that they had had this type of learning. Furthermore, participants were also asked directly how much they appreciated classical

music, and more than half (74%) of participants indicated values above 5. Taking all of the above factors into consideration, it is very likely that the activation of unwanted mechanisms such as the evaluation by conditioning mechanism and the episodic memory mechanism have occurred, and these mechanisms in turn may have interfered with the induction of emotional processing.

Even in the presence of all the aforementioned limitations, it was possible to find a relationship between listening to musical sequences that simulate the emotional processing model of Pascual-Leone and Greenberg (2007) and the tentatively achievement of greater emotional resolution. In this sense, for future research, it is advisable to explore this type of relations in settings with face-to-face procedures, if possible, in order to ensure a greater experimental control over the conditions of emotional induction and response. Additionally, it may be relevant to deepen the type of impact that the activation of emotional contagion mechanisms and episodic memory may have on the triggering of emotional processing. Finally, it is recommended that future studies develop longer musical sequences that allow participants to experience each emotional state more deeply, possibly allowing an even higher emotional resolution.

Although different from the expressive writing paradigm of Rohde et al. (2015), this study also allows us to consider the potential of shorter, simpler and cheaper interventions, even outside the psychotherapy setting. Equally, the data recorded here allows us to begin to fill a gap by linking musical stimuli to an empirical emotional processing model, in the quest of if or how music can facilitate emotional processing. Conclusively, the present research demonstrates how not only can music be described as the creation of emotions, but it can also be described as the transformation of emotions.

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Appendix A

Considerations for the present study

Area of study	Considerations
Consistency and Generality	The existence of structural components in the musical stimulus facilitates the attribution of an emotion to a specific musical expression (Juslin & Laukka, 2004; Scherer, & Zentner, 2001). Thus, it is expected that the perception and processing of these components will lead to patterns of shared judgement, which in turn will lead to the induction of similar emotional states. The consistency and generality of these judgments provides a strong basis for empirical support for the present study, allowing the use of musical excerpts already analysed and associated with the induction of a certain emotional state.
Emotional evocation capacity	In all research dedicated to proving the capacity of the musical stimuli to evoke emotions, it is always necessary to make it very clear to the participants that it is intended to analyse the emotions they experience and not the perception they may have of the emotions present in the stimuli (Marin & Bhattacharya, 2011; Scherer and Zentner, 2001). The lack of a clear distinction can contribute to investigations with ambiguous results and can lead to the reinforcement of the cognitivist position. In view of this concern, in the present research, careful consideration will be given to the type of measures employed and the vocabulary used in the instructions given to participants.
Music-listener-situation interaction	Given the influence and interaction of these characteristics, in the context of the present study it will be necessary to control for the environment where musical stimuli will be presented and for some of the demographic characteristics of the participants in order to ensure the investigational control over strange variables.

Area of study	Considerations
Type of emotions evoked	Studies by North and Hargreaves (2008), Juslin et al. (2008), among others, provide converging evidence as to the predominance of positive emotions in music listening. However, for the present study it will be important to achieve a varied emotional induction that allows the model of Pascual-Leone and Greenberg (2007) to be musically replicated, so the existence of a greater probability of inducing positive emotions with musical stimuli can present itself as a limitation.
Activated mechanisms	For the present study it will be important to focus on the theoretical framework proposed by Juslin and Västjfäll (2008), as the activation of the mechanism of emotional contagion is intended, since musical excerpts with specific emotional expressions will be used with the aim of inducing these in the participants. It will also be expected and desirable to activate the brainstem reflex mechanism and the imagery mechanism. It will be verified, indirectly, if the activation of other mechanisms besides the intended one has occurred.
Objectives and motivations of listeners	Juslin and Sloboda (2010) state that in order to obtain a greater emotional effect in the face of a musical stimulus, an act of will or decision on the part of the listener is necessary. Therefore, for the present study, it will be important to prepare the participants for the conscious act of listening to musical stimuli and, equally, it will be important to clarify and reinforce to the participants the importance of their focus on the emotions experience.

Appendix B

Recruitment text

Good morning everybody!

I would like to invite you to participate in the research that I am developing for my Master's Dissertation. This research seeks to explore the influence that different musical experiences can have on the emotional processing of a subject that the participant himself/herself chooses to work on.

The participation in this experiment is scheduled for about 30 minutes.

To participate, you only have to access the following link. Your participation will be completely anonymous and voluntary, so you may withdraw at any time.

I would like to thank everyone, in advance who is interested and willing to participate!

Appendix C

Informed consent

Dear participant,

In the Paradigmatic Complementarity Laboratory of the Faculdade de Psicologia da Universidade de Lisboa we are developing a study with the purpose of exploring how different musical sequences may facilitate different levels of emotional processing. In this context, I would like to request your collaboration in this experimental study as part of the research for my Master's Thesis in Psychology.

For that, you will just have to fill in this questionnaire, where you will be randomly assigned to one of three musical experiences (with an approximate duration of 14 minutes). Each musical experience has a different potential, as being more or less facilitator of emotional processing.

You will be asked, before and after this musical experience, to answer some brief questions regarding an emotional experience you select, which will help us understand the level of emotional processing facilitated by each of the musical experiences.

By participating in this study, you will contribute to the knowledge of this topic and we trust that you will have an interesting and unusual experience as a participant. Your participation will last approximately 30 minutes in total, in which you will have the opportunity to

- Listen to a unique and emotionally captivating musical experience
- Reflect on and work through an emotional issue you have selected
- Clarify and get closer to your psychological needs

Respect for confidentiality of all personal information revealed by you is ensured, and data will only be processed in a group and not on an individual basis.

For further clarifications, suggestions, complaints or if you wish to be informed about the results of this study, please contact Marta Esteves (martatesteves@gmail.com), principal investigator of the study under the supervision of Prof. Nuno Conceição (nconceicao@psicologia.ulisboa.pt).

By proceeding I declare that I am over 18 years of age, have read and understood all the information provided and thus accept to collaborate voluntarily in this research, being able to withdraw at any time if I wish to do so.

Appendix D

Self-Assessment Manikin (SAM)

Given the present moment, please indicate how you would characterise your emotional state in relation to the following 3 dimensions:

A) Negative/Badness vs. Positive/Goodness

1 – Very negative; 9 – Very positive

1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○

B) Relaxed vs. Activated

1 – Very relaxed; 9 – Very Activated

1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○

C) Vulnerable vs. Powerful

1 – Vulnerable, no control; 9 – Powerful, with control

1	2	3	4	5	6	7	8	9
○	○	○	○	○	○	○	○	○

Appendix E

Resolution of Long-Standing Interpersonal Grievances (UFB-RS)

Instruction	Here is a list of statements that focus on how you feel about unfinished business with the person identified as the focus for this experience. Read each statement and indicate how well they fit with how you feel right now (1. Not at all or very slightly; 2. A little; 3. Moderately; 4. Quite a lot; 5. Extremely)
Item 1	I feel troubled by my persisting unresolved feelings (such as anger, grief, sadness, hurt, resentment) in relation to this person
Item 2	I feel frustrated about not having my needs met by this person
Item 3	I feel worthwhile in relation to this person
Item 4	I see this person negatively
Item 5	I feel comfortable about my feelings in relation to this person
Item 6	This person's negative view or treatment of me made me feel badly about myself
Item 7	I feel okay about not having received what I needed from this person
Item 8	I feel unable to let go of my unresolved feelings in relation to this person
Item 9	I have a real appreciation of this person's own personal difficulties.
Item 10	I have come to terms with not getting what I want or need from this person
Item 11	I feel accepting towards this person

Appendix F

Resolution of Long-Standing Emotional Self-Neglect (ESN-RS)

Instruction	Here is a list of statements that focus on how you feel about a recurring aspect or pattern in yourself or in your life that you dislike that you have identified as the focus for this experience. Read each statement and indicate how well they fit with how you feel right now (1. Not at all or very slightly; 2. A little; 3. Moderately; 4. Quite a lot; 5. Extremely)
Item 1	I am bothered by my persistent unresolved feelings (such as anger, loss, sadness, pain and resentment) towards a recurring aspect or pattern that I dislike
Item 2	I feel tenderness for the unmet needs of this part of me (that gives expression to the recurring pattern)
Item 3	I feel useless about this recurring aspect or pattern in myself or in my life that I dislike
Item 4	I view this recurring aspect or pattern in myself or in my life negatively
Item 5	I am curious and willing to learn how to care for this recurring aspect or pattern in me or in my life
Item 6	The presence of this recurring aspect or pattern in me or in my life makes me feel bad about myself
Item 7	I feel open to the fact that this part of me (that gives expression to the recurring pattern) needs my attention and care
Item 8	I feel unable to let go of frustration about this recurring aspect or pattern in myself or my life
Item 9	I have appreciation for the part of me that expresses the recurring pattern
Item 10	I can accept that this part of me (that gives expression to the recurring pattern) reflects needs that I can try to meet
Item 11	I feel accepting and hopeful of improving the relationship with this part of myself and thereby overcoming our limitations

Appendix G

Bern Post Session Report (BPSR-P)

Instruction	Using the following scale, please select the number that best describes what happens to you for each statement (Likert scale from 1 to 7 points)	Subscale
Item 1	What I attended during listening of the musical sequence churned me	Problem Activation
Item 2	While listening to the musical sequence I was very emotionally involved	
Item 3	After listening to the musical sequence, I feel better prepared for situations I could not handle before	Mastery Experience
Item 4	After listening to the musical sequence, I know better what I want	
Item 5	I understand myself and my problems better after listening the musical sequence	Meaning Clarification
Item 6	Listening to the musical sequence was somehow a beneficial experience	Perceived Usefulness

Appendix H

Sociodemographic Questionnaire

Please, fill some information regarding yourself:

Age: _____

Gender:

Female __

Male __

Other __

Nationality: _____

Have you ever attended, outside of school activities, any kind of music learning classes?
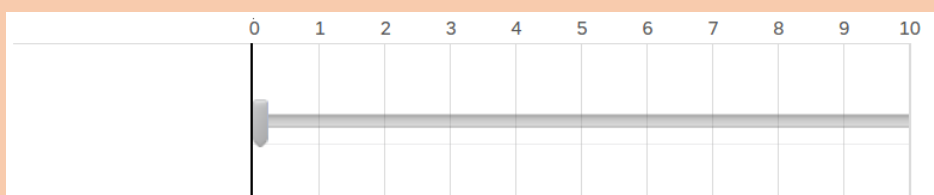
Yes __

No __

If you answered yes in the previous question, what was the type of apprenticeship and how long did you attend it: _____

_____

From 0 to 10, being 0 no appreciation and 10 total appreciation, please rate your level of appreciation towards classical music:

Appendix I

Results of the assumptions verification for the use of parametrical test

Values of Emotional Resolution variable regarding normal distribution and equality of variances

	Pre-Experimental Induction	Post-Experimental Induction
Kolmogorov-Smirnov Test		
EED-AMM Sequence	KS(30) = 0.077; p = 0,200	KS(30) = 0.152; p = 0,77
AMM-EED Sequence	KS(30) = 0.077; p = 0.200	KS(30) = 0.121; p = 0.200
Control Sequence	KS(30) = 0.121; p = 0.200	KS(30) = 0.115; p = 0.200
Levene Test	F(2,87) = 0.498; p = 0.610	F(2,87) = 1.271; p = 0.286

Only values that allowed to retain the null hypothesis of normal distribution in the Emotional State variable

	Pre-Experimental Induction	Post-Experimental Induction
Kolmogorov-Smirnov Test		
EED-AMM Sequence	Valence Dimension KS(30) = 0.153; p = 0.71	
AMM-EED Sequence	Control Dimension KS(30) = 0.125; p = 0.200	Arousal Dimension KS(30) = 0.122; p = 0.200 Control Dimension KS(30) = 0.122; p = 0.200
Control Sequence	Valence Dimension KS(30) = 0.136; p = 0.161	Control Dimension KS(30) = 0.151; p = 0.077

Only values that allowed to retain the null hypothesis of normal distribution in the Therapeutic Process variable

	Post-Experimental Induction
Kolmogorov-Smirnov Test	
EED-AMM Sequence	Problem Activation Dimension KS(30) = 0.126; p = 0.200 Mastery Experience Dimension KS(30) = 0.128; p = 0,200 Perceived Usefulness Dimension KS(30) = 0.150; p = 0.085
AMM-EED Sequence	Problem Activation Dimension KS(30) = 0.117; p = 0.200 Mastery Experience Dimension KS(30) = 0130; p = 0.200
Control Sequence	Mastery Experience Dimension KS(30) = 0.152; p = 0.074

Appendix J

Word cloud derived from the query of word frequency present in the descriptions provided regarding the emotional transformation felt

Appendix K

Word tree derived from the query of word frequency present in the descriptions provided regarding the emotional transformation felt

À medida que ia decorrendo
começou a acelerar . Por fim
relaxada mas , ao mesmo tempo
segunda metade da música , gradualmente
- me sentir tranquilidade e segurança
cena de redescoberta e aceitação
e alegre trazia bem estar
face à relação em questão
mas houve uma certa realização
menos ansioso e mais calmo
para atingir o meu objetivo
pensamentos e sentimentos mais apaziguados
relação a eles e calma
ansiosa . Reflexão sobre o problema
ao assunto e visualisa - las
entre elas tristeza , confusão , ansiedade
mais altas Por um lado
no início da experiência e
objetivos , e conseguiu alcançá - los
tema . Houve momentos em que
uso de escalas menores) . Também

senti

- me
calma nas partes mais
em baixo Raiva transicionou

mais
agitada / angustiada ao
calma e mais
calmo e em
relaxada e com
relaxado que no

também menos ansioso e
a acalmar essas emoções , e
alguma exacerbação da raiva noutras ,

calma
e relaxamento , clareza e
Fiquei mais relaxada mas ,

culpa nesse relaxamento , o que
felicidade , mágoa , frustração . . as músicas

que
a música me acalmava ,
abandonei as emoções negativas
consegui atingir um contacto
há espaço e tempo
havia mais esperança e

um intensificar muito grande das
várias emoções entre elas tristeza ,