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ARTICLE

Music Time-Out with digital voice assistant: Design of a music intervention to complement psychotherapeutic/psychosomatic treatment

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ABSTRACT

This paper presents the design and explanatory approach of a digital music intervention, termed 'Music Time-Out,' that aimed at enhancing psychosomatic post-treatment care for patients with psychosomatic disorders after a hospital stay. By utilizing a digital voice assistant (DVA), the intervention facilitates attentive music listening, fostering self-awareness and emotional regulation. Grounded in theory and research from psychotherapy, music psychology, and music therapy, the DVA guides patients through relaxation, imaginative exploration, and emotional reflection. Potential benefits in terms of self-care are weighed against the technology-related challenges and data handling. Further clinical application and evaluation are proposed to assess therapeutic effectiveness and user experience.

KEYWORDS

outpatient aftercare,
music intervention,
digital voice assistant,
psychosomatic disorder,
self-awareness,
emotional regulation

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INTRODUCTORY NOTES

This article is based on an interdisciplinary project that combined music therapy, psychology, and engineering sciences/informatics. The project aimed to develop a music-based intervention to complement the aftercare of patients[1] following treatment at a psychosomatic hospital. This intervention, termed 'Music Time-Out', involves listening to music while engaging in interactive activities with a digital voice assistant (DVA), which encourages reflection on the inner processes and imagery evoked by the music. This article focuses on providing a description and detailed explanation of the theoretical approach that forms the foundation for developing and implementing the intervention in clinical practice.

When designing a music intervention, guiding principles include the specific care needs of the clientele, the intervention's goals, the specific contextual conditions including the national healthcare system, and finally ethical criteria. This means that a large number of decisions must be made consciously during the development phase, i.e. before clinical application and evaluation. Clinical and therapeutic experience as well as theoretical considerations are required to justify the chosen setting, procedure, indication, and objectives, and to assess possible risks.

Theories and research findings relevant to the 'Music Time-Out' originate from various fields, including psychotherapy and music therapy, both based on psychodynamic principles, as well as music psychology. Each of these fields is large, complex, and heterogeneous. Therefore, it is necessary to select suitable theorems and research findings. Due to the interdisciplinary nature of the project, it is unrealistic to expect this selection to be exhaustive within the aforementioned domains or to be fully comprehensible to their specialists.

The combination of the individual components of 'Music Time-Out' is not arbitrary; it follows the criteria of relevance, consistency, transferability, and application-related plausibility. The aim is to achieve a certain degree of systematic coherence and construct validity. However, permeability is also a feature of a new concept because it allows new perspectives or research results to be incorporated into the explanatory approach at a later stage. The fundamental assumptions related to the scientists' preferred theoretical orientation and the use of primary sources representing original ideas provide stable points of reference for comparison with other concepts. In addition, a careful review of current sources and research findings was conducted to determine their potential for clinical application.

CLINICAL APPLICATION AREA

Target group: Persons with psychosomatic disorders

Psychosomatic disorders, or according to international terminology, medically unexplained physical symptoms (MUPS), are any organ damage or disturbances in physical functions whose development

[1] The term 'patient' is used throughout this article. It does not diminish those affected by a psychosomatic disorder; rather, it acknowledges their suffering from symptoms and their need for support. Using neutral terms from engineering sciences such as 'user' or 'listener' would not reflect the clinical perspective of this article. Furthermore, the term 'client' is inappropriate, as people cannot be clients of a DVA.

or progression (onset, maintenance, and deterioration) are strongly influenced by psychological or psychosocial factors. Diagnostically, there are indications of altered body perception, vegetative dysregulation, neuropsychological stress symptoms, psychological symptoms, altered processing and behaviour patterns, and abnormalities in the individual's socialisation or biography. The life history and behaviour of patients regularly show characteristics and patterns of unfavourable stress-related biographical influences like emotional or physical neglect and/or abuse in childhood or experiences of violence, which make the psychological and psychosomatic complaints equally plausible (cf. Egloff et al. 2018). Those affected have a deficiency in basic skills, such as the ability to put inner conflicts and emotional states into words (symbolisation) or to perceive their own and others' emotional states (alexithymia; Binneböse et al., 2022).

Inpatient psychotherapy treatment of psychosomatic disorders

In Germany, the inpatient psychotherapy treatment of persons with severe psychosomatic disorders lasts 6-12 weeks and typically involves a multimodal treatment approach (Spitzer et al., 2016). This may include music therapy (Schmidt & Kächele, 2017), including music-imaginative methods like Guided Imagery and Music (Liesert, 2018) or Music-imaginative Pain Treatment (Glomb et al. 2022; Metzner, 2021; Metzner et al., 2022).

Music therapy is not alone in its use of mental imagery, as it is also used in psychotherapy (Dorst & Vogel, 2014). According to a psychodynamic theoretical approach, imagination has (among other things) an expressive and clarifying function. Due to its aesthetic potential, with aspects of excess meaning, product character, and flow and playfulness, mental imagery is accompanied by a revitalisation and a therapeutically promoted self-contact: an incentive for self-exploration and self-experience, the mobilisation of strengthening early kinaesthetic experiences, and the exploration of previously unexperienced ego possibilities (Bahrke & Nohr, 2023). Through the subsequent detailed verbalisation in therapeutic conversation, emotions, conflicts, relationship desires, and typical defence mechanisms, but also particular ego strengths and regulatory abilities come to consciousness. This describes a process towards an ever-increasing ability to distance oneself from the pressure of a given situation, comparable to what Fonagy and colleagues (2004) have termed mentalised affectivity.[2]

From the above, it is apparent that the overall aim of multimodal inpatient treatment is not solely to reduce symptoms, but also to encourage self-regulation in daily life, changes in lifestyle, and (interpersonal) behaviour (Haase et al., 2008). The change in the pathology of conflict is an essential aspect of psychotherapeutic success (Henkel et al., 2024).

Outpatient aftercare for psychosomatic patients

After discharge from a psychosomatic hospital, a structured outpatient aftercare would ideally be offered to consolidate the empirically proven successes of residential treatment (Valdes-Stauber et al., 2020) and continue the change processes initiated during hospital stay. The aim is not primarily

[2] The highly complex discourse on mentalisation in contemporary psychoanalysis cannot be explored in depth here. As introductory reading for music therapists, the article by Hannibal & Schwantes (2017) is recommended.

to promote well-being, but to help patients overcome the challenges they face in everyday life. In particular, aftercare aims to provide assistance in regulating emotions, affirming a sense of self, reducing depression, and overcoming feelings of isolation, as well as regulating personal relationships. Returning to working life as soon as possible is also one of the central issues because of the growing threat of permanent job insecurity. The challenge is that during their recovery process, patients have to cope with rapid structural changes in the world of work, such as technological advances and/or accelerated work processes. These changes increase the demands placed on self-regulation, flexibility and mobility (Binneböse et al., 2022).

Aftercare, however, is not available in all regions. To compensate for gaps in outpatient treatment, there is an increasing tendency to develop hybrid or purely digital health services (Berger et al., 2024; Ebert & Baumeister, 2023). As well as evaluating general success factors identified by Schramm and Carbon (2024) like patient-centred design, efficiency of application, user-friendliness, compliance with data protection, and information security regulations, researchers have conducted a wide range of studies on the application and impact of these offerings. Support services with digital voice assistants (DVAs) that are specifically oriented towards psychotherapy show a broad variety regarding objectives, therapy forms, technologies, and level of implementation (Siegert et al., 2023). This is an indication that the entire field of e-health applications is still in the pilot phase.

When it comes to music therapy, outpatient follow-up treatment options are extremely rare in Germany. A music therapy programme for tinnitus patients at Rostock University Hospital is an exception (Körber et al., 2023). Normally, outpatient music therapy must be paid for privately, which only a small percentage of patients can afford. A literature search on various databases (e.g., PSYNDEX, MEDLINE, and PUBMED) regarding the use of music within follow-up psychotherapy typically financed by health insurances yielded no results.

A growing interest in internet-based, self-help music interventions as an adjunct digital therapy by caregivers or healthcare providers, as well as music streaming services and software development companies (Schriewer & Bulay, 2016; Gadd et al., 2020) were the starting point for the interdisciplinary collaboration outlined in this article.

FUNDAMENTAL PROCESSES AND FUNCTIONS OF LISTENING TO MUSIC FOR 'MUSIC TIME-OUT'

Music can have positive health effects for both healthy individuals and those with various physical, mental, or social issues (Bernatzky & Kreutz, 2024; MacDonald et al., 2012). A wide range of theoretical explanations have been proposed to address the evolutionary, biological, physiological, anthropological, psychological, social, and socio-cultural dimensions of music (Fancourt & Finn, 2020; McCrary et al., 2021). In particular, listening to music triggers complex interactions between multiple mechanisms involving different neural networks. These include basal processes such as arousal and entrainment, as well as mental imagery, musical expectations, and aesthetic judgements (Juslin, 2013, 2019; Juslin & Västfjäll, 2008). Researchers have increasingly become interested in the internal connections and interrelationships of these multidimensional processes (e.g., Baltazar, 2018; Juslin et al., 2022).

Bridging music as an everyday resource and Music Time-Out as an after-care application

Any aftercare must be integrated into everyday life and therefore be based on everyday behaviour. For this reason, the concept of 'Music Time-Out' initially proceeds from the basic assumption that listening to music has an important place in many people's everyday lives (DeNora, 2000).

The influence of individual and situational variables on music listening in daily life varies considerably (Greb et al., 2018). But regardless of age and gender, listening to music has three key functions: (1) to regulate arousal and mood/emotion, (2) to become more conscious of oneself, and (3) to express social connectedness (Schäfer et al., 2013). These functions should be viewed dimensionally. The fact that healthy people intuitively use music as a social surrogate when feeling sad (Schäfer et al., 2020), for example, shows parallels between music listening and interpersonal emotional regulation strategies. Listening to music is chosen more often than contacting a good friend (Kahn et al., 2022).

Music components such as tempo, dynamics, pitch, rhythm, harmonic structure, and/or instrumentation can contribute to the patient's arousal, mood or imagery. However, there are no monocausal mechanisms as expectation, predictability, and familiarity mediate the subjective experience (van den Bosch et al., 2013).

Determination of the locus of emotion

When people pay attention to their emotions while listening to music, they recognise them as either induced or expressed by the music itself (Gabrielsson, 2002). This is a decisive factor in the 'Music Time-Out' intervention because, from a psychodynamic perspective, it corresponds to two modes of mentalisation: the psychic equivalence mode and the reflective mode (Allen & Fonagy, 2009). Mentalisation is defined as the imaginative mental activity through which one attributes feelings, actions, and intentions to oneself, other people, or phenomena in the external world. Psychic equivalence describes mental activity when the external world — in this case, the music — and the patient's internal world converge. In reflective mode, the patient distinguishes between the emotional expression of the music and their own state of mind. In short, perceiving music as sad does not automatically make the listener feel sad (Eerola & Peltola, 2016).

With practice, listeners can determine the locus of emotion, shifting between recognising music as an object outside themselves and focusing on the feelings, images, and memories that it inspires. A side effect that may be relevant for psychosomatic patients is that psychophysiological reactions vary depending on the locus of emotion (Merrill et al., 2020).

Mental imagery during music listening

The 'Music Time-Out' is designed to stimulate creative internal processes in the form of mental imagery that arise spontaneously, which is termed music-guided imagery. While listening to music, the dynamic character of the music influences the vividness and affective quality of mental imagery, but not the actual content (Taruffi et al., 2019). Music-guided imagery activates areas of the brain

that intersect with those involved in the emotional processing of events (Ballan & Abraham, 2016; Holmes & Matthews, 2010; Koelsch, 2015).

Mental imagery (in general) is multimodal and includes bodily sensations, movements, actions, and events experienced (Nanay, 2018; Taruffi & Küssner, 2019). The changeable, sensory-perceptual, and/or kinaesthetic (Leikert, 2011) symbolisations develop from early childhood and are connected to an individual personality structure and life history, as well as to a particular context. These insights are used in several music therapy methods, for example in analytic music therapy (Priestley, 1994) or in Guided Imagery and Music (Bonny, 2002; Bruscia & Grocke, 2002). In these methods, the imagery and emotions arising from the music are discussed in therapeutic conversations, which offer the therapeutic benefits outlined above.

DESIGN OF THE MUSIC TIME-OUT

'Short music journeys'

The "Music Time-Out" is based on the 'short music journey' model (*korta musikresor*, KMR; Kaestele & Müller, 2013; Wärja, 2015), a resource- and solution-oriented approach, originally developed as a complementary intervention in the context of psychotherapy, coaching, or counselling. KMR as an aftercare intervention has proven effective in a randomised controlled study with cancer patients (Wärja, 2018), helping to reduce anxiety/depression and improve quality of life.

The KMR process begins with a short preliminary conversation. Once the therapist has checked the patient's current mental state, they agree on a thematic focus. The therapist selects a suitable piece of music of around 4 minutes and then leads a short relaxation exercise before the patient embarks on the 'imaginative journey' with a thematic stimulus and the music. After the music finishes, the therapist invites the patient to return to the here and now, and to respond to the experience – first visually, by drawing a mandala, and then verbally, talking with the therapist about its meaning for the patient's life.

Music is seen as having a co-therapeutic function in this process (Wärja & Bonde, 2014). To address the different degrees of intensity of mental processes, pieces of music used in KMR are assigned to the categories 'supportive' (e.g., secure, holding), 'mixed supportive' (e.g., opening, stimulating), and 'challenging' (e.g., exploring, discovering).

The use of a digital voice assistant to support music listening

The starting point for the design of the digital assistance was insights from a qualitative study on the interaction with a DVA (Krüger, 2018; Krüger et al., 2018). This study found that despite some confusion and uncertainty about interacting with a non-human counterpart, users tried to turn the system into a predictable, trusted partner, with whom they could potentially build a relationship. This finding was explained by the human need for security and belonging. Consequently, the use of the DVA to support health depends on the properties and intentions that the users attribute to the system – in both beneficial and unfavourable ways.

The idea of the 'Music Time-Out' is that with the help of the DVA, attentively listening to music will give patients sensory/aesthetic stimulation, distract them from the outside world, and allow them to focus on their own inner world. The focus is therefore still on the reception and processing of music. The programme is designed for Amazon's 'Alexa', an established DVA. The role envisaged for the DVA is on the one hand to provide music choices, and on the other hand to support the musical experience by directing the patient's attention and – this is the innovative step – asking open questions to stimulate narratives. Patients are invited to assess their own mental state, select music and, if necessary, deal with unsuitable choices, adopt a relaxed, non-judgemental attitude while listening to the music, identify the mental images that arise, capture and express them in spoken language, tolerate or regulate the associated emotions, and finally finish the process so as to be able to resume everyday activity.

The interaction with the DVA during the 'Music Time-Out' is modularised as follows: (1) the DVA welcomes the patient and directs their attention to their body and current mental state; (2) offers one piece of music from each of the above-mentioned categories, by playing a short segment of each and remembering the patient's choice; (3) leads a relaxation exercise; and (4) provides the selected piece, which is roughly 5 minutes in length. (5) When the music and a short silence have finished, (6) the patient is invited to focus their attention on the present and to resume their interaction with the DVA. (7) They are then given the opportunity to review and express verbally the feelings and images that have arisen, and (8) to answer open questions about the experience including its effect on their mental state. The idea is that the DVA is programmed to ask the next question once the patient has given an answer. To conclude, the DVA encourages the patient to record the experience retrospectively in an appropriate form (in writing, drawings etc.). (9) It then says goodbye after about 15 minutes in total (see figure 1; for technical information see Siegert et al., 2022).

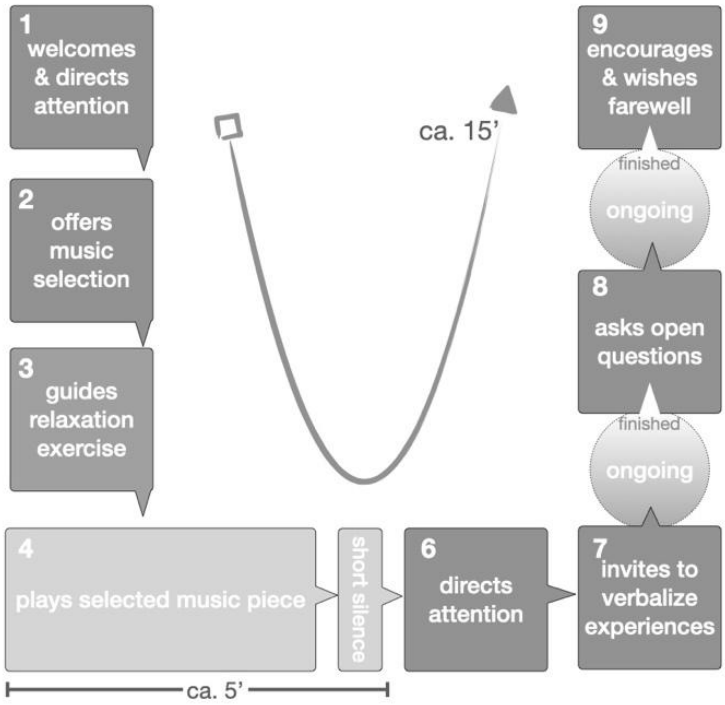

Figure 1: Digital voice assistant-modules for 'Music Time-Out'

Data handling

The programme does not store the patient's comments and/or choice of music in a back-end database. Nor does it use sensors to collect physiological data, or use speech recognition, voice recognition, or facial recognition to gather non-verbal data as indicators of intrapsychic processes. The programme also takes a different path to Ferguson et al. (2023), where the music selection is based on physiological measurements and not on personal decision by the user. Partly for ethical and psychological reasons, special emphasis is placed on the self-determination of the user, because any of these technological optimisations work imperceptibly and, in contrast to the interaction with a human (music therapist), cannot be questioned.

SUMMARY AND CONCLUSION

Current state of knowledge

The 'Music Time-Out' is not music therapy, but rather a therapeutically informed adjuvant intervention offered during aftercare to fill the gaps in outpatient treatment. It aims to promote autonomy in self-regulation and is based firstly on the everyday functions of listening to music, especially the positive effects of music and imagery, and secondly on the supportive function of an interactive virtual assistant.

The decision to use a psychodynamic approach is based on the characteristics of the target group, the goals of the 'Music Time-Out,' and the context of follow-up care after discharge from a multimodal treatment at a psychosomatic hospital. Due to its psychodynamic orientation, 'Music Time-out' differs from mindfulness-based approaches, such as an online music-based meditation programme presented recently by Kelly et al. (2025). However, adapting 'Music Time-Out' for use in different clinical contexts will require consideration of its psychological basis. This could potentially include the widely used mindfulness-based approach with consequences especially for therapeutic goals.

Unlike other socially interactive assistants designed for aftercare (e.g., Arora et al., 2024), which aim to simulate a therapy session with a human counterpart, the function of the DVA in the 'Music Time-Out' can be described as a (moderately) anthropomorphic interlocutor for the musical experience and for the intrapsychic processes that the music triggers. This decision reflects the concern that patients should not be misled into thinking that a DVA can experience music or empathise with highly subjective imagery. Rather than concentrating on the development of a highly effective technical simulation of human-like support, the design of the 'Music Time-Out' emphasises the relevance of autonomous self-care, which also informs the decision not to gather data and not to apply sensor technology.

When it comes to the use of music for aftercare, it must be assumed that everyday behaviour of psychosomatic patients may also be different compared to healthy individuals. As the 'Music Time-Out' is a structured adjuvant intervention, which would be introduced by a therapist, it can be assumed that unhealthy strategies for dealing with music in everyday life (Alluri et al., 2022) should not be encouraged. This is relevant because uncontrolled music listening for mood regulation by

adults who are overweight – one of the patient groups for psychosomatic treatment – showed unfavourable consequences for health (Ginström et al., 2025). This risk could potentially be reduced by engaging with the application of the 'Music Time-Out'. However, the risk of mind wandering (Nathan et al., 2023) or the occurrence of negative memories (Sakka & Saarikallio, 2020) should be kept in mind as, from a music psychology perspective, they cannot be completely ruled out, even if the time-limited nature of the 'Music Time-Out' provides a certain degree of protection.

Unanswered questions and proposals for the future

When scientifically evaluating a new intervention, the primary focus is not on its effectiveness but on how it is accepted and received by users. If the target group is a vulnerable clientele, initial assessments are obtained from healthy test subjects. In the case of this interdisciplinary project, two empirical sub-studies were conducted (Krüger et al., in preparation; Siegert et al., 2022), the results of which are not the subject of this article. It is crucial that at the present time, no statements can be made on the reception, user behaviour, and therapeutic effect of the 'Music Time-Out' for patients.

The authors believe that the first clinical application should only be considered if there are sufficient resources available for a thorough evaluation, including qualitative interviews with patients and therapists. It will be important to learn more about how the adjuvant use of the 'Music Time-Out' influences real-life therapeutic relationships. Patients, psychotherapists, and music therapists should explore and develop the use of 'Music Time-Out' together, to ascertain its acceptance, suitability for aftercare, and therapeutic effectiveness - also in contrast to the interaction with a human counterpart.

From the perspective of psychodynamic music therapy (Metzner, 2004, 2016) it will be interesting whether the 'Music Time-Out' acquires intrapsychic significance as a transitional object (Winnicott, 1971), and whether an intermediate space, as in psychotherapy (Ogden, 1985), is formed with the DVA. While this is theoretically conceivable, it depends entirely on how the user engages with the 'Music Time-Out'. Of particular interest here is how patients cope with the DVA's simulation of interest and intentionality (Fuchs, 2022). In other words, what types of relationships are formed and what role is played by mental imagery and the prereflexive physical and sensory affect produced by the music (e.g., Schmitz, 2011)?

Another area to be examined is the factors influencing sustained use and the efficacy of 'Music Time-Out', regardless of illness. These factors include musicality and music capacity, as defined by Chin et al. (2018) which includes the everyday use of music, educational level, and other socio-economic factors (Merzhvynska et al., 2024). Research is also needed on the suitability of music pieces or playlists for the 'Music Time-Out', particularly with regards to their musical properties. Lastly, the pros and cons of variety versus repetition of music, and of self-selection versus therapeutic prescription, should be weighed up in terms of their impact on the formation of mental imagery.

Final note

Due to gaps in provision, there is much to suggest that optimistic assessments of digital health services (Selke, 2023) and associated expectations will continue to grow. While technological developments such as emotional regulation strategy recognition by virtual assistants (e.g., Müller et al., 2024) are advancing, certain developmental steps in the healing process must still be completed independently by psychosomatic patients. The 'Music Time-Out' intervention addresses this issue.

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Ελληνική περίληψη | Greek abstract

Music Time-Out με ψηφιακό φωνητικό βοηθό: Σχεδιασμός μιας μουσικής παρέμβασης για τη συμπλήρωση της ψυχοθεραπευτικής/ψυχοσωματικής θεραπείας

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ABSTRACT

Το παρόν άρθρο παρουσιάζει τον σχεδιασμό και την επεξηγηματική προσέγγιση μιας ψηφιακής μουσικής παρέμβασης με τον τίτλο «Music Time-Out», η οποία στοχεύει στη βελτίωση της ψυχοσωματικής μετα-θεραπευτικής φροντίδας για ασθενείς με ψυχοσωματικές διαταραχές μετά από νοσηλεία. Μέσω της χρήσης ενός ψηφιακού φωνητικού βοηθού (Digital Voice Assistant – DVA), η παρέμβαση διευκολύνει την προσεκτική ακρόαση μουσικής, ενισχύοντας την αυτεπίγνωση και την συναισθηματική ρύθμιση. Θεωρητικά και ερευνητικά βασισμένη στην ψυχοθεραπεία, τη μουσική ψυχολογία και τη μουσικοθεραπεία, η παρέμβαση μέσω DVA καθοδηγεί τους ασθενείς σε διαδικασίες χαλάρωσης, φαντασιακής εξερεύνησης και συναισθηματικού αναστοχασμού. Τα πιθανά οφέλη σε σχέση με την αυτοφροντίδα εξετάζονται παράλληλα με τις τεχνολογικές προκλήσεις και τα ζητήματα διαχείρισης δεδομένων. Προτείνονται επιπλέον κλινική

εφαρμογή και αξιολόγηση, ώστε να εκτιμηθεί η θεραπευτική αποτελεσματικότητα και η εμπειρία των χρηστών.

KEYWORDS

μετα-θεραπευτική φροντίδα εξωτερικών ασθενών, μουσική παρέμβαση, ψηφιακός φωνητικός βοηθός, ψυχοσωματική διαταραχή, αυτοεπίγνωση, συναισθηματική ρύθμιση