

# The hidden therapist: Evidence for a central role of music in psychedelic therapy

Mendel Kaelen<sup>1\*</sup>, Bruna Giribaldi<sup>1</sup>, Jordan Raine<sup>2</sup>, Lisa Evans<sup>1</sup>, Christopher Timmerman-Slater<sup>1,3</sup>, Natalie Rodriguez<sup>1</sup>, Leor Roseman<sup>1,3</sup>, Amanda Feilding<sup>4</sup>, David Nutt<sup>1</sup> and Robin Carhart-Harris<sup>1</sup>

<sup>1</sup>Centre for Neuropsychopharmacology, Department of Medicine, Imperial College London, London W12 0NN, UK

<sup>2</sup>Sussex University, School of Psychology, Brighton BN1 9RH

<sup>3</sup>Computational, Cognitive and Clinical Neuroscience Laboratory (C3NL), Department of Medicine, Imperial College London, London W12 0NN, UK

<sup>4</sup>The Beckley Foundation, Oxford OX3 9SY, UK

\*Corresponding author: [m.kaelen@imperial.ac.uk](mailto:m.kaelen@imperial.ac.uk)

## Abstract

Recent clinical trials have supported the safety and efficacy of psychedelic therapy for mood disorders and addiction. Music is considered an important therapeutic component in the psychedelic treatment model but little empirical research has been done to examine the magnitude and nature of its role. The present study used a structured interview to inquire about the different ways in which music influenced the acute experience and subsequent outcomes of patients undergoing psychedelic therapy for treatment-resistant depression. Interpretative phenomenological analysis (IPA) was applied to the transcribed interview data to identify salient themes that were subsequently scored by independent raters. Interviews revealed that the music had both 'welcome' and 'unwelcome' influences on patients' subjective experiences. Welcome influences included: the evocation of personally meaningful and therapeutically useful emotion and imagery, guidance, and the promotion of calm. Conversely, unwelcome influences included: the evocation of unpleasant emotion and imagery e.g. feelings of discomfort, irritation, and resistance, and a sense of being misguided. Correlation-analyses showed that patients' relationship to the music, and particularly their openness to it and its resonance with their underlying emotional state, was associated with the occurrence of 'peak experience' as well as autobiographical insight. Crucially, the nature of the music-experience was significantly predictive of reductions in depression one week after psilocybin, whereas general drug-intensity was not. Together, these findings suggest that music has a major influence on the quality of patients' psychedelic experiences, and is consequently predictive of treatment success.

## Introduction

The capacity of psychedelic drugs to facilitate emotional release and autobiographical insight was a primary motivation for their therapeutic use in the 1950s and 1960s in the form of “psychedelic therapy” (Busch and Johnson 1950). Music was introduced within the therapeutic framework as a way to support patients’ experiences non-verbally (Hoffer 1965; Bonny and Pahnke 1972; Grof 1980) and has thence remained a staple component of the treatment model. Recent clinical trials have rekindled interest in psychedelic therapy (Carhart-Harris and Goodwin 2017), with positive findings for: mood-disorders (Robin L Carhart-Harris et al. 2016; Osório et al. 2015), addiction (Bogenschutz et al. 2015; Johnson, Garcia-Romeu, and Griffiths 2016; Johnson et al. 2014), end-of-life care (Gasser et al. 2014; Grob CS et al. 2011; Griffiths et al. 2016; Ross et al. 2016), and post-traumatic stress disorder (Mithoefer et al. 2011; Mithoefer et al. 2013). These findings motivate us to address the question: what factors are most influential in driving positive therapeutic outcomes in psychedelic therapy? Psychedelic therapy sessions do not adhere to one specific psychotherapeutic model; however, music-listening is a consistent feature. The present study sought to address *why* this is the case.

In psychedelic therapy sessions, during drug-effects, patients are encouraged to focus their attention inwards while lying down in a relaxed position and listening to a carefully designed music playlist for the duration of the session. In this way, it is believed that music can help facilitate experiences that have therapeutic import. Studies have shown that psychedelics significantly modulate music-evoked emotion (Kaelen et al. 2015), music-evoked mental imagery (Kaelen et al. 2016), and perceived personal meaningfulness of music (Preller et al. 2017). Although these studies support the hypothesis that the subjective response to music is intensified under psychedelics, they were all performed in healthy volunteers, and only employed short periods of music-listening and limited music styles. To date, no data has been reported on the role of music in a clinical trial of psychedelic therapy and the present study sought to address this knowledge gap.

To do this, we conducted structured interviews one week after the second of two treatment sessions with psilocybin in which we asked about patients’ relationship to the music heard during their therapy sessions and the specific different ways in which it influenced their subjective experiences. We predicted that music would promote so-called ‘peak experiences’\* (Maslow 1964) that would subsequently predict long-term therapeutic outcomes. Endorsing this view, music (Gabrielsson and Wik 2003) and psychedelics (Griffiths et al. 2006) have previously been found to facilitate peak experiences, and peak experiences have been associated with positive therapy outcomes to psychedelic therapy (Garcia-Romeu, R. Griffiths, and W. Johnson 2014; Ross et al. 2016; Griffiths et al. 2016).

\* The term peak experience was firstly coined by the psychologist Abraham Maslow (Maslow, 1964, 1971). Peak-experiences are characterized by a transcending of the usual sense of self, and are typically accompanied by feelings of wonder, bliss, union and awe. Peak experiences have also been referred to as mystical-type of spiritual experiences, and can occur under natural conditions such as when being deeply moved by a work of art or a moment of creative inspiration but are frequently reported with psychedelics (Garcia-Romeu et al., 2014; Griffiths et al., 2016; Ross et al., 2016)

## Methods

### Approvals

The National Research Ethics Service London (West London) provided a favourable opinion for this study. The study was sponsored and approved by Imperial College London’s Joint Research and Compliance Office (JRCO), and the National Institute for Health Research Clinical Research Network adopted the study. The National Institute for Health Research/Wellcome Trust Imperial Clinical Research Facility provided approval for the study-site. The study was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. A Home Office Licence for storing and dispensing Schedule One drugs was obtained.

## Participants

Inclusion criteria for the study were moderate to severe major depression, as determined by the 21-item Hamilton Depression Rating scale (HAM-D), with absence of improvements despite at least two different pharmaceutical antidepressant treatments for a minimum of 6 weeks within the current depressive episode. Exclusion criteria included current or previously diagnosed psychotic disorder, diagnoses of psychotic disorders in immediate family members, history of suicide attempts that required hospitalisation, history of mania, having a blood or needle phobia, pregnancy, and current drug or alcohol dependence.

## Experiment overview and procedures

This study was part of a larger study assessing safety and efficacy for using psilocybin to treat depression (Robin L Carhart-Harris et al. 2016). Psilocybin was synthesised and obtained from THC-Pharm (Frankfurt, Germany), and formulated into 5mg capsules of psilocybin, by Guy's and St Thomas' Hospital's Pharmacy Manufacturing Unit (London, UK). Screening consisted of evaluating the patient's current and past physical and mental health. Patient-rated scales for the severity of depressive symptoms were completed during the screening visit and served as baseline measures. These included the 16-item Quick Inventory of Depressive Symptoms (QIDS) and Beck Depression Inventory (BDI). Written informed consent was given, and by the end of the screening, eligible patients met with the two therapists that would support them through the remainder of the trials.

A subsequent visit functioned as preparation for the session. This included conversations with the therapists about the patient's personal history, expectations for the sessions and education about the effects of psilocybin. The patient also had an opportunity to listen to samples of session music while wearing eye-shades, as a simulation-experience in preparation for their first session. The preparation visit lasted approximately 4 hours in total.

Following the preparation session, patients received two different dosages of psilocybin on two separate subsequent occasions, each separated by one week. In the first session, all patients received an oral dose of 10 mg psilocybin. This lower dose was intended to function like a "taster", a preparation for the higher dose administered one week later. In the second session, all patients received 25 mg. Each session included only one patient and two therapists, and took place in a specially designed therapeutic environment. Each session started with arrival at the research facility at 9am, with psilocybin being administered at 10.30am. The majority of patients were ready to leave the facility approximately 7 hours after administration. Transport from the research facility to home was organised ahead of the sessions and consisted of being accompanied by a close friend or relative. Patients also had the option of staying overnight in accommodation adjacent to the research facility, the night before and the night after the session.

Clinical improvement was defined as reductions in depression severity, measured via the QIDS, completed by all patients at baseline and 1 week after the second and final psilocybin session. The different aspects of the subjective experience of psilocybin were measured with the 11-dimensional Altered States of Consciousness Scale (11D-ASC) (Dittrich, 1998) at the end the session. The structured interview assessing the patient's experience of the music was always conducted 1 week after the high dose (25 mg) session. For a report on the clinical outcomes, see Carhart-Harris et al (2016) (Robin L Carhart-Harris et al. 2016).

## Therapeutic setting

In consideration of the perceived importance of the therapy environment (Johnson, Richards, and Griffiths 2008), all sessions took place in a specially designed therapy room within the Clinical Research Facility at Imperial College London. All unnecessary medical equipment was either removed or hidden, light quality was adjusted using Philips hue lamps. Drapes, cushions, plants, art paintings and artefacts were introduced to engender a cosy and comfortable climate. After receiving psilocybin, patients were encouraged to relax in a reclined position on the bed and wear eye-shades. Two therapists were present on either side of the bed, and 'checked-in' with the patient every 30-60 minutes, to obtain insight into how their subjective experience was unfolding, and to determine whether psychological support (e.g. reassurance) might be needed. Calming ambient music was played on entrance, but the session playlist (see supplementary material) was started just prior to ingestion of psilocybin. Patients had the option of listening to the music via high quality in-ear headphones (Sennheiser IE 800) or via a high fidelity standing stereo-speaker (Meridian DSP3200). Both headphones and speakers received the same audio signal, which allowed the music be played in synchrony and continuously through both channels. This set-up was considered helpful for **1)** providing a sense of continuity in case the headphones were abruptly removed or muted, **2)** enabling the therapists to empathise with the patient's current state, as well as how they were responding to a particular piece, **3)** allowing a deeper immersion in the music and depth of sound.

## Music selection

The central purpose of the use of music in the present therapeutic study was consistent with that of early psychedelic-therapy studies, i.e. to facilitate personally meaningful experiences that can lead to sustained changes in behaviour and outlook. In order to achieve this, researchers often emphasised the importance of adapting the music to individual patient's changing therapeutic needs, as their therapeutic experience unfolds dynamically (Hoffer 1965; Bonny and Pahnke 1972; Grof 1980). For the present study, however, a standardized playlist was used to control for music as a potential confounding variable. Therefore, all patients were intended to listen to the same music playlist. In (rare) cases where the music selection was strongly disliked by the patient in the first session, or a strong preference was expressed to only listen to classical music, the music playlist used by John Hopkins was used (Richards 2015), which includes music originally suggested by Bonny and Pahnke (Bonny and Pahnke 1972).

Several of the musical works originally included in playlists for psychedelic-therapy are very familiar today. Examples include: "Samuel Barber - Adagio for strings" and "Beethoven – Piano Concerto 5". Such high familiarity may reduce the opportunity for patients to have a new experience with the music, unfettered by prior associations. In addition, a strong emphasis on music with "Christian religious" content may not be appropriate for individuals that are either non-religious or practice a different religion. Therefore, a music playlist was designed for the present study, containing predominantly contemporary music such as the ambient-, neo-classical-, contemporary classical-, as well as jazz and ethnic- music styles. The intention with this music selection was to transcend religious boundaries, and to support spiritual peak experiences within a secular framework.

## Playlist design

The design of the music-playlist was informed by Bonny and Pahnke (1972) (Bonny and Pahnke 1972), William Richards (Richards 2015), and the psychedelic therapist Stanislav Grof (Grof 1980), who defined different phases in psychedelic therapy sessions, where each phase is associated with a distinguishable set of psychological needs the music can serve. These phases are, in chronological order: "pre-onset", "onset", "building towards peak", "peak", "re-entry" and "return". In the present study, the durations of the phases were adjusted to the shorter duration of psilocybin's effects, compared with LSD.

Furthermore, “onset” and “building towards peak”, were grouped together as “ascent”, and “re-entry” was named “descent”. Music with emotional sentiments was only played during peak drug intensity, on the assumption that this music would then enable an activation of autobiographical and therapeutically significant content, and thereby increase the person’s therapeutic engagement in the experience. See supplementary material for the full playlist.

### **The structured interview**

The structured interview was always conducted one week after the final session, by the same researcher, apart from on one occasion. The interview consisted of four open questions: **1)** “Did the music influence your experience? And if so: in what ways?”, **2)** “Can you comment on how the different styles of music influenced your experience? And which music did you prefer?”, **3)** “Were there any aspects in the music that influenced your experience in a positive way?”, and **4)** “Were there any aspects in the music that influenced your experience in a negative way?”. Additional questions were sometimes asked to clarify patient’s responses if the interviewer felt the need to do so.

### **Theoretical approach of interview data-analysis**

Interpretative phenomenological analysis (IPA) was chosen to analyse the interviews (Smith, Osborn, and Flowers 1997). IPA is an approach increasingly used in healthcare research (Biggerstaff and Thompson 2008; Smith 2011) that examines the meanings particular experiences have for people. It is particularly appropriate for ascertaining the complexity (i.e. the quality and phenomenology of experience) of patients’ subjective experience of music during the therapeutic sessions, and has previously been used to investigate the benefits of music therapy interventions in cancer care settings (Pothoulaki, MacDonald, and Flowers 2012).

### **Interview data analysis: Coding**

Interviews were transcribed verbatim and checked for accuracy. All coding was done by at least two researchers, to increase inter-rater reliability. A step-by-step analysis of the data was followed. All transcripts were read through twice before carrying out the analysis. During the third reading, any phrases considered especially pertinent in terms of how the music influenced the patients’ subjective experience, were highlighted and coded into initial interpretations. At this stage, some text was assigned to more than one code when more than one interpretation could be made, and queries about the meaning of what was being said were recorded in a separate column. This process was repeated for four further transcripts.

Key words, phrases and initial interpretations from the first four completed transcripts were then comprehensively explored, leading to the creation of themes in a separate column. These themes were then used as guidelines for subsequent transcripts. As new themes emerged from these subsequent transcripts, all data were iteratively scrutinised and the list of themes refined. Throughout the process of analysis, codes were examined and discussed among the authors to decide which themes were the most accurate reflections of participants’ experiences.

Following further discussion between authors, a final master list of themes emerged. The final stage of analysis involved the organisation of the list of themes into a more concise list of overarching, superordinate “clusters” or domains representing the patient experience of music, each of which contained a number of subsidiary themes. After all transcripts were coded into themes and clusters, the presence of each unique theme and cluster across all patients’ responses was calculated. This led to a percentage index describing the frequency to which the themes and clusters were present within the total study population.

## Ratings for music-experience

Three predictors for therapy-response were hypothesized: **1)** “liking”, referring to the degree to which the music styles and the music quality were liked, **2)** “resonance”, referring to the degree to which the music matched with or was “harmonious” with the intrinsic emotional state of the patient, and **3)** “openness”, referring to the degree in which the patient was open to, or accepting of the music-evoked experience.

Four researchers that were blind to patient identifiers and treatment outcomes rated these variables for all 19 patients based on their interview transcripts. Ratings were done via a visual analogue scale, with five anchors presented. For the “liking”, the question was formulated as “To what extent did the patient like or dislike the music?”, with the following anchors on the response scale: “0 = strong disliking”, “25 = major disliking, some liking”, “50 = mixed disliking and liking”, “75 = major liking, some disliking”, “100 = major liking”. For “resonance”, the question was formulated as “To what extent was the music in resonance with the patient’s subjective experience?”, with the following anchors on the response scale: “0 = strong dissonance”, “25 = major dissonance, some resonance”, “50 = mixed resonance and dissonance”, “75 = major resonance, some dissonance”, and “100 = strong resonance”. And finally, for the third, the question was formulated as “To what extent was the patient accepting of or open to the music-evoked experience?”, with the following anchors on the response scale: “0= strong resistance”, “25 = major resistance, some openness”, “50 = mixed resistance and openness”, “75 = major openness, some resistance” and “100 = strong openness”.

## Correlating music-experience with psilocybin-experience and therapy outcomes

Pearson correlation tests were performed between the three music-experience variables and ratings from the 11D-ASC. To reduce the number of comparisons, a principle component analysis (PCA) was performed on the 11 factors of the 11D-ASC. Varimax rotation was performed on the first 5 principal components (PCs) that explained over 95% of the variance (see Figure 3 for rotated PCs and their respective loadings). Subsequently, the three music-experience variables (liking, resonance and openness) were correlated with these 5 PC’s. To test whether music-experience and drug-intensity are associated with different aspects of subjective experience of psilocybin, drug-intensity ratings were also correlated with all 5 PC’s. False discovery rate (FDR) control was used to correct for multiple comparisons (Benjamini and Hochberg 1995).

The average of the scores from all researchers was calculated for each patient, and a Pearson correlation test was applied to test for a relationship between these variables and reductions in depressive symptoms 1 week after the last session with 25mg psilocybin. Reductions in depressive symptoms were defined as the percentage reduction in scoring on QIDS relative to baseline (i.e.  $(\text{score}/\text{baseline}) \times 100$ ). To test for the discriminative value of music-experience variables in predicting therapy response, compared with mere drug-intensity, ratings for drug intensity were also correlated with reductions in depression. Inter-rating reliability of researcher’s ratings was tested by correlating ratings of all researchers with each other. To test for differences between music-experience and drug-intensity effects, ratings for drug-intensity were correlated with each music-experience value. The three music-experience variables were correlated with each-other to test for their discriminative value.

## Results

A total of four separate groups were identified, that include clusters of related themes. These groups were: **1)** “Welcomed influences”, including all influences of music on subjective experience that were described as welcomed, wanted, accepted or appreciated (Figure 1), were identified in 18 out of 19 patients (95% of total); **2)** “Unwelcomed influences”, including all experienced influences of music that

were described as unwelcomed, unwanted, rejected or unappreciated (Figure 1), were identified in 10 out of 19 patients (53% of total); **3**) “Appreciated music styles and playlist features”, including all aspects related to music genres, styles, and playlist design, that were appreciated or liked, (Figure 2), and were identified in all 19 patients (100% of total) ; **4**) “Unappreciated music styles and playlist design”, including all aspects of music genres, styles and playlist design that were not appreciated or were disliked (Figure 2), were identified in 11 out of 19 patients (58% of total). Here, the term “music styles” refers broadly to the instrumentation, compositional-, genre- and acoustic- features of the music. The term “playlist design” refers to all aspects related to the selection and structuring of the music into the full music playlist.

The figures displaying the four groups (Figure 1 and Figure 2) include the clusters present in more than 30% of the respective group, and the themes present in more than 30% of the respective cluster. All patient’s quotes of themes present in each of these groups and clusters, are displayed in separate tables in supplementary materials (Table 1-11). It is important to emphasise that the identification of a theme in a patient’s experience, and subsequently the including of that theme in counting its presence in the total population, does enable to make any statements on the duration that this theme was present in the patient’s total experience. E.g. one patient may have experienced a sense of irritation in response to one particular song, and therefore the theme “irritation” under the cluster “intensification” in the group “unwelcomed influences” is present. But this does not imply that the patient experienced persistent feelings of irritation during his or her experience. In addition, the measure also only allows the capturing of spontaneous mentioning and elaborations on the subjective experience of the music in response to the open questions, as opposed to the questions targeting (and biasing) specific facets of the experience.

### **Welcomed influences: Intensification**

The most prominent cluster in the group “welcomed influences”, including 17 out of 19 patients (88% of total), refers to themes that describe an “intensification” of the subjective experience by the music. Within this cluster, themes that describe an “intensification of emotion” were identified in 15 out of 17 (82% of cluster), including descriptions of music enhancing or changing emotions. Importantly, the emotion-evoking effects that were welcomed, showed diverse emotional valence, and included descriptions of the music facilitating “happiness” or strong “ecstatic” experiences, as well experiences of the music intensifying “tearfulness”.

Themes describing an “intensification of imagination” were identified in 9 out of 17 (53% of cluster). This included statements of the music evoking vivid and complex mental imagery, and of the concrete imagery related to specific aspects of the music. Such as for example the ethnic “Indian” style of the music being associated with “seeing an Indian temple”. 8 out of 17 patients (47% of cluster), mentioned a “general intensification” effect of the music, without specifically referring to this being an intensification of emotionality, imagery or others. Other themes, present below 30% in the cluster “intensification”, include effects of music on “personal thoughts or memories” (2/17, 12% of cluster), music facilitating a “sense of transcendence” (2/17, 12% of cluster) and music enhancing “ego-dissolution” (2/17, 12% of cluster) (Figure 1). See Table 1 (Supplementary materials ) for a listing of all themes present in the cluster “intensification”.

### **Welcome influences of the music: Guidance**

The second most prominent cluster of welcome influences, includes themes that depict the music as a source of “guidance”. This cluster was mentioned by 15 out of 19 patients (79% of total). Within this cluster, statements that the music provided a “sense of being on a journey” were identified in 11 out of 15 (73% of cluster). This included descriptions of the music being experienced as a “vehicle” that

“transports” or “carries” the listener forward, providing a sensation of “traveling” to different psychological “places”.

Themes describing the music as a source for psychological “support” were identified in 11 out of 15 (73% of cluster). This includes various statements of the music providing a sense of “grounding”, “help” and “reassurance”. Descriptions of the music being in tune with, or in “resonance” with the person’s intrinsic emotional state were identified in 6 out of 15 (40% of cluster). Rather than describing the music as evoking emotion, this theme is defined by statements of the music being experienced as “fitting”, “following” or “matching” present emotional states.

Finally, 5 out of 15 of patients (33% of cluster) referred to the music as providing a “sense of continuity and direction”, this included statements of music providing a sense of connection between different parts in the experience, making the experience feel “driven” by the music and “flowing” into a certain direction (Figure 1). See Table 2 (Supplementary materials) for a listing of all themes present in the cluster “guidance”.

### **Welcomed influence of the music: Calming**

Ten out of 19 patients (53% of total) described calming effects of the music. From this cluster, 9 out of 10 (90% of cluster) described “general calming” effects, whereas 5 out of 10 patients (50% of cluster) described the music as providing “mental calming” effects, including sensations of peacefulness and of the music calming and “slowing the mind”. One out of 10 (10% of cluster) described the music to help feel more physically relaxed. Calming effects of music often referred to ambient music by Brian Eno, Harold Budd and Stars of the lid. See Table 3 (Supplementary materials) for a listing of all themes present in the cluster “calming”.

### **Welcome influences of the music: Openness to music-evoked experience**

Seven out of 19 patients (37% of total) made statements about their own attitude of openness towards the influences of the music, and in addition, about the effects of music on their attitude of openness. From this cluster, 6 out of 7 (86% of cluster), referred to the “importance” and the “purpose” of being open to “challenging experience” evoked by the music, and that this felt like an important part of the therapeutic process. This included statements of accepting being deeply emotionally moved by the music, and the music helping to “face” or “connect with” the listener’s “unresolved” inner conflicts. Four out of 7 (57% of cluster) described that some music specifically helped to enhance their attitude of openness, such as statements that “the music opened [him/her] up” or that because of the music was “well-chosen”, the listener “felt open to it all” (Figure 1). See Table 4 (Supplementary materials) for a listing of all themes present in the cluster “openness to music-evoked experience”.

### **Unwelcome influences of the music: Intensification**

The most prominent cluster, including 5 out of 10 patients (50% of cluster), described music to “intensify” emotions they did not want to feel, such as increased “fearfulness”, “sadness” or “fear”. In addition, 5 out of 10 (50% of cluster) said made statements about the music creating a sense of “discomfort”, including “unpleasant” or “uncomfortable” experiences, and 4 out of 10 (40% of cluster) described “irritation” as a consequence of the music. In less than 30% of the cluster, the music was described as bringing mental imagery, thoughts or memories that were unwelcome, a sense of puzzlement, inner conflict, and tension, or a “dark atmosphere”. This cluster of unwelcomed “intensification” influences, forms a contrast with the cluster of themes describing intensification as a welcomed influence (Figure 1 and Table 1(Supplementary materials)). See Table 5 (Supplementary materials) for a listing of all themes present in the cluster unwelcomed “intensification”.



### **Unwelcome influences of the music: Resistance to music-evoked experience**

Nine out of 19 patients (47% of total) described feelings of “resistance to the music-evoked experience”. This includes statements of “not liking” or “not wanting” the subjective effects of the music. This cluster of unwelcomed influences contrasts the cluster of themes describing an “openness to music-evoked experience”, as a welcomed influence (see Table 4 (Supplementary materials) and Figure 1). See Table 6 (Supplementary materials) for a full list of all themes in the cluster “intensification”.

### **Unwelcome influences of the music: Misguidance**

Six out of 19 (32% of total) made statements about the music providing a sense of “misguidance”, this cluster primarily includes descriptions of the music being a “mismatch” or being incongruent with the unfolding subjective experience. This cluster, named “dissonance”, was present in 4 out of 6 (67% of cluster), and forms a contrast with the welcome influence “resonance”, when the music was experienced as harmonious, or a good match, with the subjective experience. Other themes of misguidance, present in less than 30%, include descriptions of the “music feeling intrusive”, the music being “unable to positively influence a challenging experience”, the music giving a “sense of being manipulated”, the music giving a “sense of unmet potential”, or the music giving a sense of “foreboding”, as if something “bad” was going to happen. This cluster of unwelcome influence contrasts the cluster of themes describing a sense of “supportive” and “helpful” guidance, as a welcome influence (see Table 2 (Supplementary materials) and Figure 1). See Table 7 (Supplementary materials) for a full list of all themes in the cluster “misguidance”.

### **Appreciated music styles and playlist features: Music styles**

All 19 patients referred to some music styles within the music playlist that they especially appreciated (Figure 2). Most frequent were positive statements about “ethnic music”, present in 8 out of 19 patients (42% of cluster), such as “Indian”, “Spanish” or “African” music styles (e.g. Jon Hassel, Ry Cooder & Ronu majumdar). Positive statements about music with human voice were mentioned by 7 out of 19 patients (37% of cluster). Importantly, this refers to vocal music either without lyrics or music with lyrics in a foreign language (e.g. *The Journey* by Ludivoco Enaudi, and Enya’s *sumiregusa*). One other music style that was frequently appreciated by 7 out of 19 (37% of cluster), was neo-classical music (e.g. Max Richter or Olafur Arnalds) or classical music (e.g. Henryk Gorecki or Arvo Part). Apart from these styles, the appreciated music styles showed a noticeable diversity. In less than 30%, positive statements were directed to “music with crescendo” (5 out of 19, 26% of total), “powerful music” (4 out of 19, 21% of total), and only 1 to 2 out of 19 made explicit statements about their appreciation for specific instruments, such as violin, guitar, piano, or “music with a solid drone”. See table 8 (Supplementary materials) for a full listing of all themes referring to music styles that were explicitly appreciated.

### **Appreciated music styles and playlist features: Playlist design**

Seventeen out of 19 patients (89% of total) made statements reflecting appreciation for the design of the playlist (Figure 2). Most prominent were positive descriptions of the “music selection”, described by 12 out of 17 patients (71% of cluster), including descriptions of the music “working well” or being “well-selected”. Secondly, 9 out of 17 patients (53% of cluster), provided positive descriptions on the way the music was structured into the full playlist. This theme, named “music order”, is defined by statements of the “structure” and the “ordering” of the music playlist, “aligned” well with the drug-effects. The third most prominent theme, present in 6 out of 17 (35%), corresponds to the “music

presence”, meaning the mere presence of the music itself. This includes descriptions from the music being present as “helpful”, to statements that it couldn’t be imaginable doing the sessions without it and that the music presence felt “necessary”. Finally, other themes include appreciation for “calming music” to be played mainly during “onset”, “ascent” and “return” phases, whereas more emotive music (i.e. “sentimental” or “cinematic” music) to be better reserved for late in the “ascent” phase and during “peak” phase. See Table 9 (Supplementary materials) for a full listing of all themes describing playlist design features that were appreciated.

### **Unappreciated music styles and playlist features: Music styles**

Eleven out of 19 patients (58% of total) referred to musical styles that were not appreciated. These responses reflected different degrees of the individual’s disliking of the music, and were highly diverse, making no theme present in more than 30% of this cluster (Figure 2). Some examples of themes in this cluster refer to “music with lyrics”, “vocal music”, “piano music” “classical or neo-classical music” and “cheesy music”. Often, “vocal music” and “cheesy music” referred to one particular song played during the final “return” phase by Buffy Saint Mary, *up where we belong*. See Table 10 (Supplementary materials) for a list of all themes present in the cluster of un-appreciated music styles.

### **Unappreciated music styles and playlist features: Playlist design**

Six out of 19 patients (32% of total) referred to aspects of the playlist design that were not appreciated. In 2 out of 6 (33% of cluster), a clear disliking of the “music selection” was present, and a preference for “own music selection” was expressed (Figure 2). See Table 11 for a complete list of all themes present in the cluster of un-appreciated playlist design features.

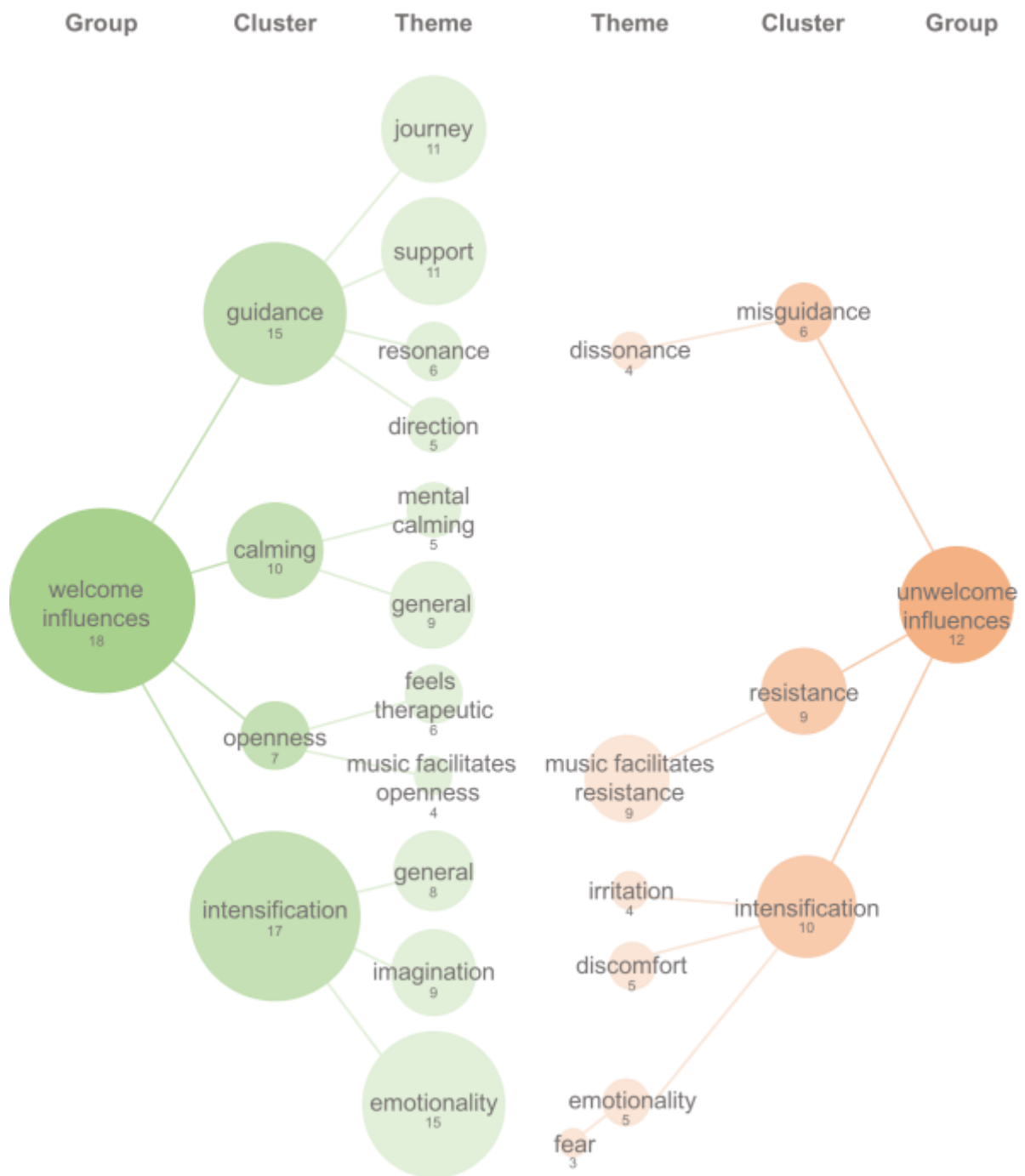
### **Predictors in music-experience for psilocybin-experience and therapy outcomes**

PCA reduced the dimensions of the 11-ASC to 5 factors, explaining more than 95% of total variance. These PC’s are 1) “Peak experience” (loadings from “experiences of unity”, “spiritual experience” and “blissful state”), 2) “Impaired cognition (loadings from “disembodiment”, “impaired cognition” and “new meanings”), 3) “Audiovisual perception” (loadings from “audio/visual synaesthesia” and “elementary imagery”), 4) “Anxiety” (primarily loaded by “anxiety”), and 5) “Insightfulness” (loadings from “insightfulness” and “complex imagery”) (see Figure 3). Subsequently, music-experience (liking, resonance, and openness) and drug-intensity scores, were correlated with these 5 factors and ratings for reductions in depression (1 week after psilocybin, defined by % reduction in QIDS score).

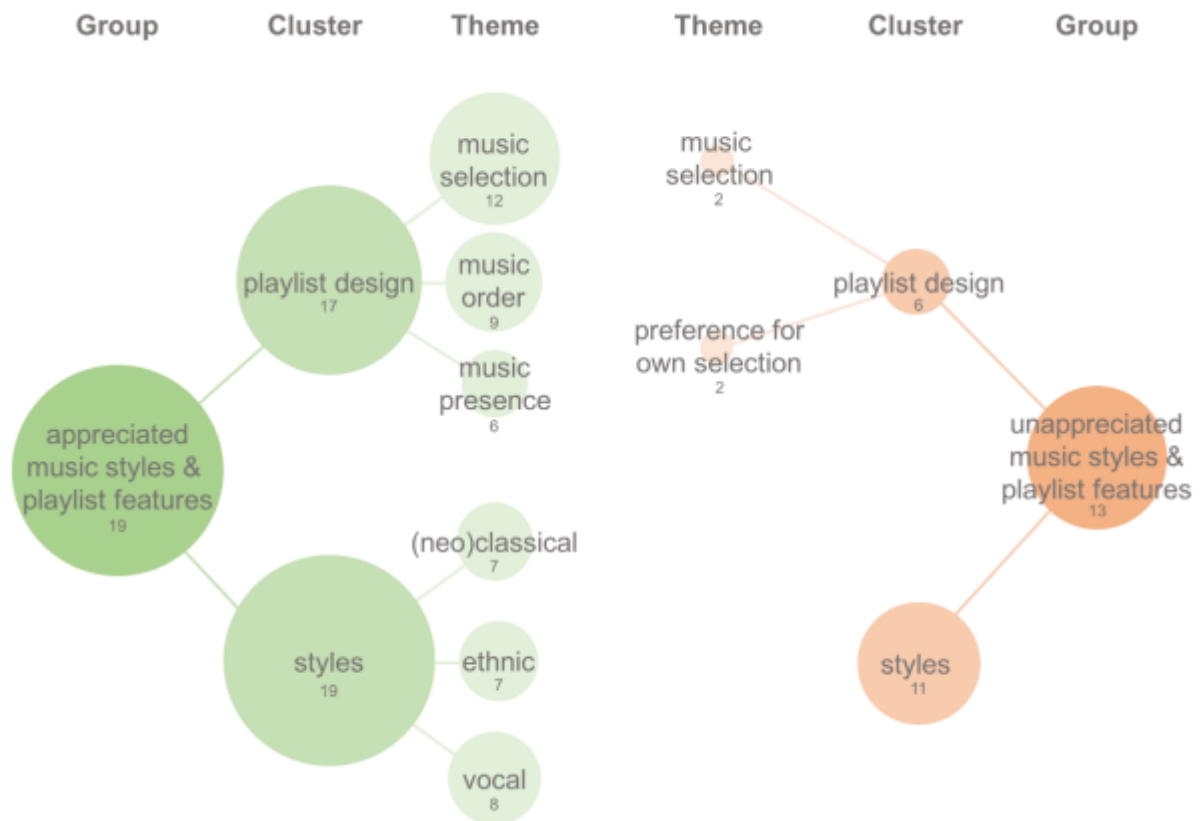
Reductions in depression one week after psilocybin were significantly predicted by the music-experience variables “liking” ( $r = 0.60$ ,  $p = .006$ ), “resonance” ( $r = 0.59$ ,  $p = .008$ ), and openness ( $r = 0.57$ ,  $p = .001$ ), but not by drug-intensity ( $r = 0.004$ ,  $p = 0.98$ ). Peak experience during the psilocybin sessions was significantly predicted by music-variables liking ( $r = 0.61$ ,  $p = .006$ ), resonance ( $r = 0.67$ ,  $p = .002$ ), openness ( $r = 0.70$ ,  $p = .0008$ ), and by drug-intensity ( $r = 0.58$ ,  $p = 0.009$ ). Insightfulness was predicted by music variables resonance ( $r = 0.53$ ,  $p = .016$ ) and openness ( $r = 0.59$ ,  $p = .007$ ), as well as by drug-intensity ( $r = 0.65$ ,  $p = 0.002$ ), but not by music liking ( $r = 0.44$ ,  $p = .06$ ). Impaired cognition ( $r = 0.55$ ,  $p = 0.01$ ), and audiovisual perception changes ( $r = 0.71$ ,  $p = 0.0006$ ) were only predicted by drug-intensity, and not by any of the music variables. Anxiety was not predicted by any of the variables. All reported significant p-values refer to FDR-adjusted threshold for significance of 0.016.

### **Inter-rating reliability and discriminative validity of music-experience variables**

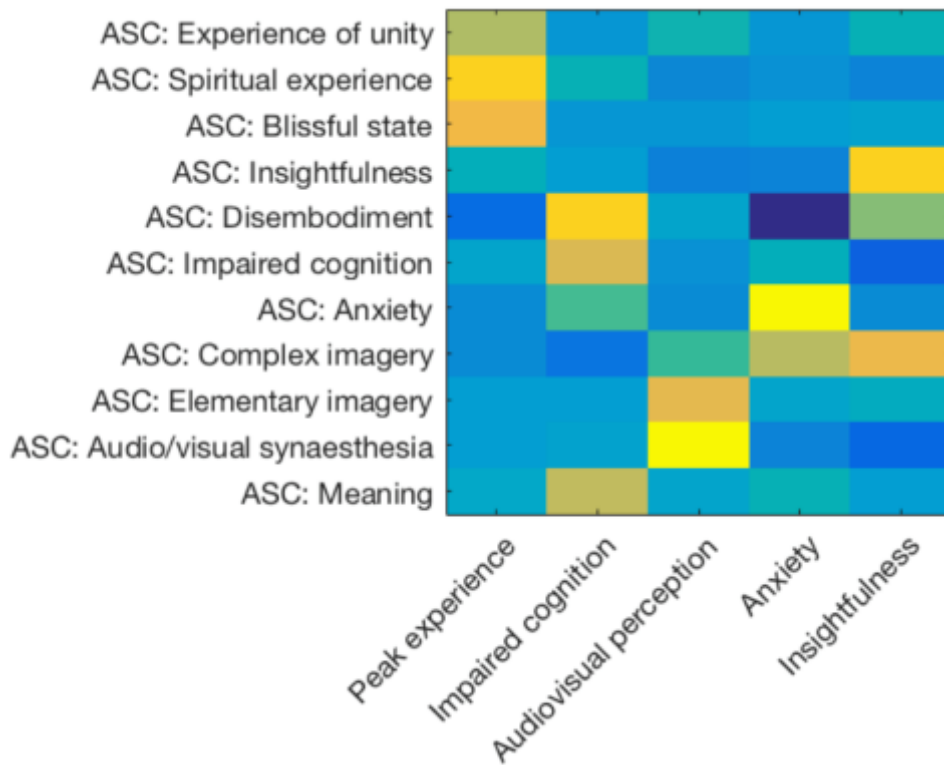
Pearson correlation tests between the scores of all researchers (n=4) who rated the three music-experience variables (liking, resonance and openness), demonstrated good inter-rater reliability (average  $r = 0.6 \pm 0.1$ , from total of 18 correlations). Pearson correlation tests between the three music-experience variables showed significant correlations ( $r = 0.9$ ,  $r=0.96$ , and  $r=0.91$ ). Drug intensity did not correlate with any of the music-experience variables.



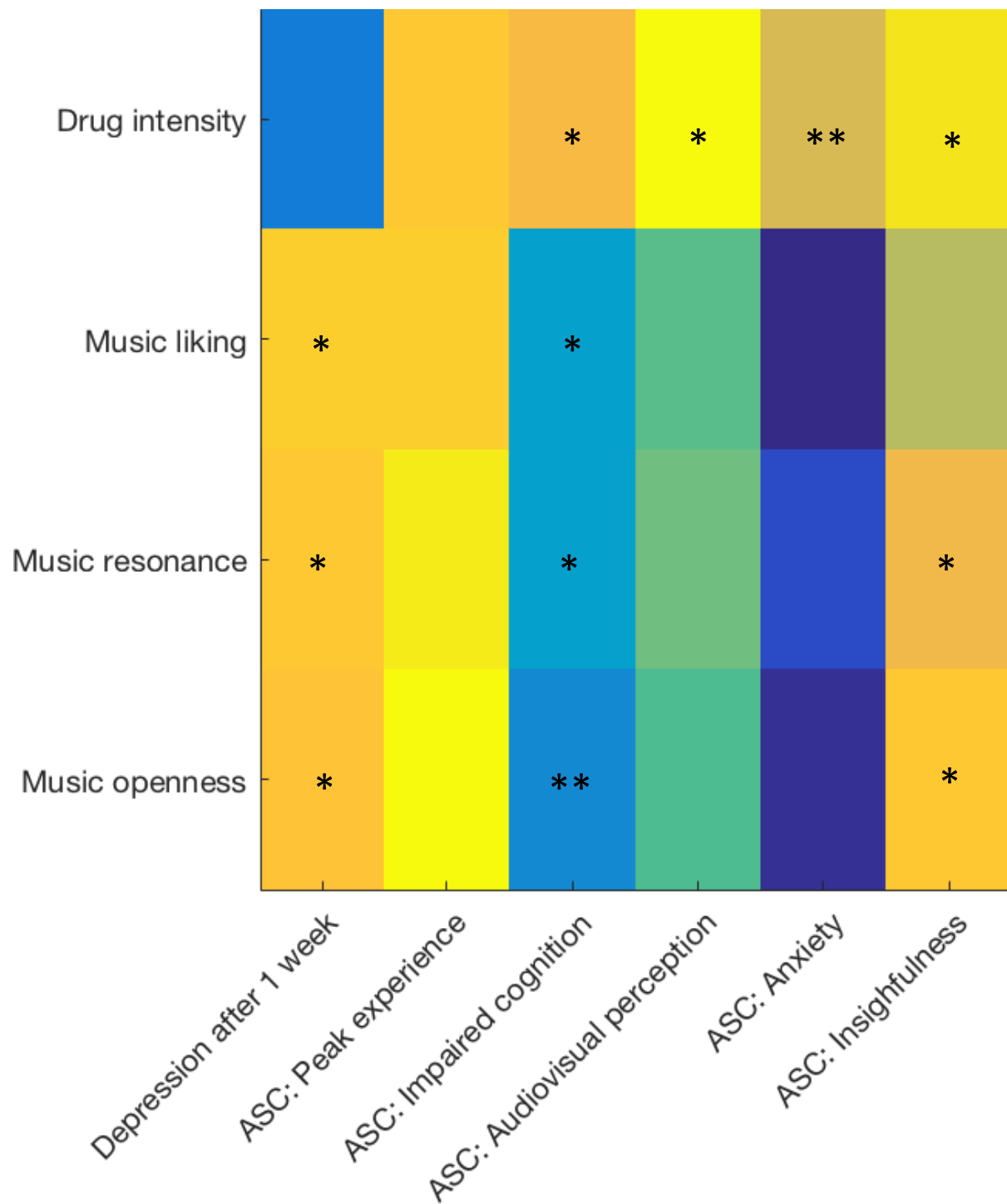
**Figure 1 | Welcome and unwelcome influences of the music.** Welcomed influences are displayed on the left in green, and unwelcomed influences are displayed on the right in red. All clusters and themes that are defined as an accepted or welcomed influence of the music on subjective experience. The figure displays cluster present in more than 30% of all participants, and per cluster the themes that were present in more than 30% of the cluster. The numbers below the group-, cluster- or theme-name, refers to the total number of patients that referred to this. The size of the circle is proportional to the percentage of patients referring to the group, cluster or theme.



**Figure 2 | Appreciated an unappreciated music styles and playlist features.** Appreciated music styles and features are displayed on the left, in green, and un-appreciated influences are displayed on the right, in red. The figure only displays cluster present in more than 30% of all participants, and per cluster the themes that were present in more than 30% of the cluster. The numbers below the group-, cluster- or theme-name, refers to the total number of patients that referred to this. The size of the circle is proportional to the percentage of patients referring to the group, cluster or theme.



**Figure 3 | Principle component analysis (PCA) of variables from the 11D-ASC.** Loadings of the 11 dimensions of the ASC, on the first 5 PCs obtained from PCA followed by varimax rotation explained more than 95% of the variance. The x-axis shows the ordering of principal components, with the components ordered by explained variance (from left to right). The colour bar corresponds to the strength of the loading for each acoustic feature for that components: warm colours indicates a positive loading, and cold colours a negative loading.



**Figure 4 | Correlations between music-experience, and therapy-experience and outcomes.** Outcomes of Pearson correlation tests between music-experience variables and drug-intensity ratings (on y-axis), with reductions in depression 1 week after psilocybin and the acute psilocybin-experience (5 PC's from ASC principle components) (on x-axis). \* =  $p < 0.05$ , and \*\* =  $p < 0.001$ , after FDR correction for multiple comparisons.

## Discussion

Via patient interviews regarding the music listened to during the psilocybin treatment sessions, this study identified a number of welcome and unwelcome influences of music on the subjective experiences of patients undergoing psychedelic therapy with psilocybin for treatment-resistant depression. The most frequently reported themes describe an intensification of emotions and mental imagery by music under psilocybin, complementing previous studies that demonstrated modulatory effects of LSD on music-evoked emotion (Kaelen et al. 2015) and music-induced imagery (Kaelen et al. 2016) in healthy volunteers. By focussing on the phenomenology of the acute experience, the present study provides new insights into the role and importance of music in the context of psychedelic therapy. For example, the music appeared to be a critical guidance influence, grounding as well as carrying the listener to different psychological places. Specific examples of this can be found in the following two excerpts:

“The sad songs would bring painful memories on, more happy songs would make me think of a really good period in my life. Every new song could bring a different image.” (#4)

“I feel the music in large part drove a lot of the experience. Under the influence of psilocybin, the music absolutely takes over. Normally when I hear a piece of sad music, or happy music I respond through choice... but under psilocybin I felt almost that I had no choice but to go with the music. [...] I did feel I was being held. And it did feel like the music opened [me] up to grief, and I just was very happy for that to happen. It wasn't particularly pleasant in any way, but extraordinarily powerful. It took my thinking and my experience to uncomfortable places, but I was kind of reassured in the experience. There was something there that meant *“I'm going to take you on a ride here, but I promise I won't abandon you. It's just going to be tough, and you know, you're going through the grinder here, but you won't be left in pieces.”* That seemed to be... what the music was saying to me.” (#14).

In contrast to the sense of guidance by the music, were descriptions of the music providing a sense of misguidance. In these situations, the music was most often described as being dissonant with the patient's emotions and thoughts. One example of the experience of misguidance and dissonance can be found in the following excerpt:

“The light music at one point took me to a place where I thought I was safe, and it became unsafe, and the music was playing a trick with me, you know, sort of giving me a false sense of security. I can remember thinking *“this is beautiful music, why am I going to this dark place?”* It didn't line up with what had gone on before. I just felt as I was being manipulated, being duped almost. The music lured me to this beautiful place, and then things started to become dark even with this beautiful music still playing.” (#16)

One important observation is that effects of the music that were welcome, sometimes included emotions such as increased grieving or tearfulness, and that this attitude of openness towards “negative” music-evoked emotions, was frequently described as helpful in bringing to expression inner psychological conflicts that might then be resolved. These experiences were grouped under the theme “openness to challenging experience feels therapeutic”, and one example of this attitude of openness towards the music can be found in the following interview excerpt:

“I can even view the negative moments as positive in a way because they served a purpose. The purpose was to sort of let me face the darkness, and my demons, I guess. It was beautiful at times, but also... yeah, the darker moments really helped to reflect on and connect with your unresolved shadows.” (#19)



Contrasting such an attitude of openness, is an attitude of resistance to the intensifying effects of the music. This experience was characterised by not wanting the music or its effects, and was named “resistance to intensification”. An example of this can be found in the following excerpt:

“I worried that I let [the music] shape this sort of melancholy. There was resistance, massively, to everything, every sort of sensory input, I had a fearful response. I was afraid to open my eyes, I was afraid to do anything, I was afraid that this sort of music was the last thing I’d ever hear.” (#5)

### **Music styles and playlist design**

The study also shed light on how different musical styles and the design of the music playlist were experienced. The choice of the music and the design of the music playlist was overall well-appreciated, with the most frequently appreciated musical genres being ethnic-, vocal- and (neo-) classical music. Appreciation was also expressed for the design of the playlist, in particular for the calming music being primarily present during the early (pre-onset and early ascent) and the final (return) phases, and for the more emotive music to be reserved for the peak phase. This indirectly supports the view that the music should be structured to match the general intensity of the different phases of drug-experience (Bonny and Pahnke 1972; Grof 1980; Richards 2015). Strong disliking of the music-selection was rare, but when this did occur it proved insightful about the possible functions of music-selection: Typically, disliking of the music seemed to be associated with either a “diminishment” of psilocybin’s subjective effects, accompanied by unpleasant feelings (such as discomfort and irritation), and with an attitude of resistance, characterised by an attempt to psychologically reject and distance oneself from the music, such as detailed in the following excerpt:

“The music blocked my experience and feelings. A sense of irritation, frustration, and sense of lowering mood. The majority of the songs were not my kind of music, I can't sit with that music ... I have to leave the room. I was sort of feeling bad, because I wanted to work with it. I sensed the potential for a really profound experience. I couldn't meet that potential with music that I felt was quite mediocre. To me it didn't feel real, so I felt quite torn. (#6)

### **Music-experience predicts experience and therapy outcomes**

As outlined above, notable polarities were observed in the music-experience, such as the music being either liked or disliked, the music being either resonant or dissonant with the patient’s experience, and the patient being either open or resistant to the influence of the music. These variables (liking, resonance and openness) positively predicted the extent to which patients reported having peak experiences (defined as the experience of unity, blissful emotionality and spirituality). In addition, resonance and openness, but not liking, predicted the extent to which people reported autobiographical insightfulness (defined by having inventive ideas, feelings of profoundness, insights and the experience of vivid personal memories or mental images). Drug-intensity, on the other hand, also correlated with other aspects of the psilocybin-experience, such as impaired cognition and audio-visual perception changes.

The selective association of the music-experience with peak experience and autobiographical insightfulness, and not with other subjective experiences under psilocybin, supports the original motivations to include music in psychedelic-therapy, i.e. to promote the occurrence of therapeutically meaningful experiences. Modern studies have confirmed that psilocybin can reliably facilitate peak experiences (Griffiths et al. 2006; Griffiths et al. 2011), and these experiences have been associated with sustained positive changes in behaviour and personality (MacLean, Johnson, and Griffiths 2011), with positive therapeutic outcomes (Garcia-Romeu, R. Griffiths, and W. Johnson 2014; Griffiths et al. 2016; Ross et al. 2016). Although these studies incorporated music-listening in combination with

psilocybin, this study is the first to demonstrate that the way music is experienced during these sessions relates to the occurrence of peak experiences. A positive relationship was also found between the music-experience and reductions in depression one week after the psilocybin-experience. Importantly, reductions in depression were not related to the intensity of the drug-effects. This finding provides tentative support for the hypothesis that it may not be merely drug effects in isolation, but that the interaction between the drug and the music on subjective experience promotes positive therapeutic outcomes.

### **Possible therapeutic mechanisms of music in psychedelic therapy**

A principal effect of psychedelics is that they temporarily dysregulate brain mechanisms that normally regulate emotion (Robin L. Carhart-Harris et al. 2016; Robin L. Carhart-Harris et al. 2012; Muthukumaraswamy et al. 2013; Tagliazucchi et al. 2016), and this could underlie the enhanced emotional responsiveness to stimuli reported here and elsewhere (Vollenweider et al. 2007; Quednow et al. 2012; Kaelen et al. 2015; R. L. Carhart-Harris et al. 2012). The belief that accepting and moving through challenging emotions is important for psychotherapeutic change is central to many psychotherapeutic models (Greenberg and Pascual-Leone 2006), and has empirical support (Whelton 2004). In psychedelic therapy, the function of psychedelics may be to bring about a quick relinquishment of psychological control (i.e. ego-dissolution and enhanced suggestibility (Carhart-Harris et al. 2014)), thereby allowing a fuller (i.e. less inhibited) expression of emotionality. The enhanced receptivity to music, in turn, may play the important function of activating emotionality, thoughts and memories that are most personally salient, thereby guiding the patient's experience into directions that are most therapeutically crucial. One key difference between psychedelic therapy and other forms of psychotherapy (and indeed conventional antidepressant medications), may be the capacity of psychedelics and music to facilitate deeply emotionally felt "breakthrough" experiences, and do so more quickly (Robin L Carhart-Harris et al. 2016; Griffiths et al. 2016; Ross et al. 2016; Johnson et al. 2014; Grob CS et al. 2011; Gasser et al. 2014).

### **Implications for the use of music in psychedelic therapy**

Due the prominence of music-listening in psychedelic therapy, increasing the knowledge of the appropriate therapeutic use of music in psychedelic therapy is important. This may however become of particular significance when psychedelic therapy is implemented on increasingly larger scales, including a greater variance in patients and therapists.

The therapeutic influence of music has been referred to as being of "*profound significance*" (Bonny and Pahnke 1972), and several authors emphasised the care needed in selecting appropriate music and playing this music at the right circumstances (Hoffer 1965; Grof 1980). The present study provides tentative support for these views, by having shown that when the music was experienced as dissonant (out of tune) with the unfolding experience, that this was associated with poorer therapy outcomes. In contrast, when the music was more resonant (in tune) with the patient's experience, this was associated with better therapy outcomes.

Liking and openness (to the music) were also associated with positive therapy outcomes. Liking of music is usually characterised as a mixture of genre-appreciation and aesthetic judgements (Juslin et al. n.d.), and liking could be an important pre-requisite for music to evoke meaningful emotionality. In addition, some music styles and acoustic properties may be more suitable for the conscious states induced by psychedelics than others, although this has not been studied yet. The patient's attitude may require a sufficient degree of openness to the music-evoked experience, and this may include not only a state of surrender, but also a pro-active engagement and the minimization of intellectualisation.

This hypothetical framework holds that if these three requirements are met (style liking, music's resonance and openness to music), an expression of meaningful therapeutic content could occur, often characterized by the sense of being on a personal journey, with a spontaneous and often intense emergence of personally meaningful imagery, thoughts and emotionality. If any of these pre-requisites are not met adequately, the patient is likely to distance him or herself from the music and the experience (resistance), characterised by feelings of discomfort and irresolution, together with the absence of personally meaningful imagery, thoughts and emotionality (i.e. the absence of the sense of being on a journey). Adaptation of the music to the patient's highly individual and dynamic experiences during psychedelic therapy may therefore be critical in order to provide adequate therapeutic support conditions.

In this framework, resistance/rejection can be regarded as an important indicator of music's failure to act therapeutically, and the type of intervention needed to restore music's therapeutic function may be determined by one central question the therapist may need to clarify, i.e. *what is the source of the resistance to / rejection of the music?* Is it due a disliking of music style, or due a dissonance of the music with the individual's experience, or due a resistance to therapeutically meaningful content? The therapist bears a responsibility to ensure the music styles are sufficiently liked, via thoughtful music-selection, as well as to appropriately provide an attunement of the music to the patient's dynamically unfolding experience, via thoughtful playlist-design and adaptation of the music when needed. In other scenarios, the music-evoked experience may be rich with therapeutically meaningful content, yet the experience may be highly unpleasant or in other ways emotionally challenging. In these scenarios, feelings of resistance may be due the patient wanting the experience to be different, and the therapist's may help resolving this conflict via providing therapeutic support to explore these challenging feeling states.

### **Limitations and future directions**

This study has a number of limitations. First of all, the data was acquired without a placebo-condition, making inferences about the effects of psilocybin on the experience of music problematic. Secondly, the main body of data used for this study was qualitative in nature. Therefore, the experiment did not allow studying the magnitude of the observed effects of music. It should therefore be emphasised that the primary objective of this study was to provide a patient-perspective on the influence of music. We hope that the theoretical framework this provided, inspires testable hypotheses for future studies, and that it assists therapists and researchers in their use of music in psychedelic therapy. Example of such hypotheses are whether an optimisation of resonance/attunement, and the attitude of openness could improve therapy outcomes, and to what extent these variables are part of a similar construct or represent separate factors in larger sample sizes.

Furthermore, to advance the therapeutic use of music, a significant body of work is required to establish baseline measures that predict music-experiences during psychedelic therapy sessions. Such predictive measures can range from personality traits (e.g. openness to experience, absorption or suggestibility), to measures for music preferences at baseline. Furthermore, research that focuses on identifying reliable indicators for positive (welcome/supportive) and negative (unwelcome/unsupportive) influences of music on the therapeutic processes during psychedelic therapy sessions, may be highly significant for the development of psychedelic therapy, and the tools used during psychedelic therapy. These could range from simple physiological measures, such as heart-rate, body movement, and breathing patterns, or more complex measures such as facial affect-coding, vocal-affect coding, and EEG-signatures, that could inform therapists in on-the-fly adaptation of music-selection, or inform playlist generation algorithms.

## Conclusions

In patients with treatment-resistant depression treated with psilocybin, music was described as having a substantial influence on their therapeutic experience, and subjective ratings endorsed this. Patients' experience of the music was predictive of peak experiences and insightfulness during the sessions, and reductions in depression one week later, suggesting it plays a central mediating role in psychedelic therapy. These findings motivate greater appreciation of music as a key variable in psychedelic therapy, and highlight the need for further research to better understand how music interacts with certain personality traits (e.g. suggestibility vs stubbornness) and concurrent and anticipatory emotional states (e.g. openness vs resistance) to influence the acute experience and longer-term outcomes of psychedelic therapy.

## Supplementary materials

**Table 1 | Welcomed influences: Intensification.** A list of all the themes and respective quotes by patients, that were present in the cluster “intensification”

#	Quote	Theme
1	“The level of intensity of the music made things in my mind seem more intense.”	General intensification
3	“[The music] can amplify the emotions, either negatively or positively.”	Emotionality
	“Make you feel happy when there’s a good song on.”	Emotionality (happiness)
	“it was all good [...] all in the same area where it can get people meditating, or releasing, or just chilling out to it.”	Emotionality
	“Your emotion goes with that [music] and the happy feeling, and its like all connected.”	Emotionality (happiness)
4	“[The music] made me even more emotional.”	Emotionality
	“The sad songs would bring painful memories on, more happy songs would make me think of a really good period in my life.”	Personal thoughts or memories
	“I didn’t like the emotional music the first experience cause I didn’t want to cry, but actually, you know, the second time I sort of enjoyed crying to this music.”	Emotionality (tearfulness)
	“[The soothing music] brought up nice images, like I imagined I was an unborn child and I felt very safe. Every new song could bring a different image, and I couldn’t finish the previous one that I was thinking about. It was interesting.”	Imagination
5	“[The music] made me see what I considered ephemeral things, like a sense of a mother and a sense of a child. And their behaviour was definitely informed by the music.”	Imagination
	“[The music] caused different feelings.”	Emotionality
	“[The music] caused the different imagery.”	Imagination
6(2)	“There were moments when I felt just this burst of joy.”	Emotionality (happiness)
	“And I connected [the music] very strongly thinking about Rembrandt who I love.”	Personal thoughts or memories
	“So I just felt overwhelmed with joy and gratitude to have that [music] in my life.”	Emotionality (gratitude)
	“There was one piece that I knew very well and it reminded me of somebody.”	Personal thoughts or memories
7	“Some bits of it were otherworldly.”	Imagination
	“I could almost picture myself there.”	Imagination
	“[The music] seemed to heighten the experience.”	General intensification

	"[The music] stirred something."	Emotionality
	"[The music] seemed to fit the space that I was inhabiting. I felt a dissolution, where you sort of dissolve. And I felt the music after the quiet ambient music, in the beginning, emphasized that beautifully. And it definitely enhanced it."	General intensification, Ego-dissolution
9	"There's one track [Greg Haines - Azure] that gets really really really intense."	General intensification
	"[Greg Haines - Azure] I felt like I was sort of the highest I could get, it was like the absolute, the top of everything."	Sense of transcendence
	"[Greg Haines - Azure] really really beautiful, overwhelming, but really peaceful as well."	Emotionality
10	"[The music] helped me to emotionally connect."	Emotionality
	"I wouldn't say that I felt sad, but, I obviously cried, but I don't know why I did (half-laugh)- but I wasn't sad."	Emotionality (tearfulness)
	"if I'd listened to anything else then I probably would have had a different experience [emotionally]."	Emotionality
	"At the beginning, as the effects starts to, you know, creep up on me, it was quite "Chinese-ey"? And (giggles) the bit where I saw the psychedelic Chinese dragon."	Imagination
	"I was tearful at some points."	Emotionality (tearfulness)
11	"In terms of movement, of the patterns going along with the music."	Imagination
	"Indian music, where I was seeing an Indian temple."	Imagination
	"Setting the place, an Inca princesses singing and seeing the terraced Inca-type setting."	Imagination
	"The music was influencing the movements and influencing the setting."	Imagination
	"During that same Indian piece, that's when I was dancing for Shiva and then I was Shiva."	Imagination
	"[The music] influenced this sensory perception."	Imagination
	"Saying that it made me sad or it made me happy, those words are actually not irrelevant, a little too mild almost to explain what it was."	Emotionality
12	"[The music] helped with the visual stuff and the mood."	Imagination, Emotionality
	"the visuals ... [The music] kind of opens up your imagination in a way, your imagination is much easier to picture. One of the songs created imagery of a "wooden bannister" that had a shape, it had a texture and a material, with some water and marbles with rainbows in it. I could picture it really clearly."	Imagination

	"[the music and the experience] was a symbiotic kind of thing."	General intensification
	"That piece of music was probably the peak of positivity, it was almost like a subdued kind of ecstasy, you know, it was so amazing. It was such a beautiful feeling."	Emotionality (ecstasy)
	"[Experiencing a challenging influence of the music] wasn't a bad thing you know, it opened you up."	Openness
	"The music is kind of changing your state of mind almost, or putting you on a different resonance."	General intensification
13	"It feels like your mood, or the the intensity of the drug, it feels like it goes with the music."	Emotionality, General intensification
14	"Under the influence of psilocybin,[the music] absolutely takes over."	General intensification
	"Normally when I hear a piece of sad music, or happy music, I respond through choice, but under psilocybin I felt almost that I had no choice but to go with the music."	Emotionality, Ego-dissolution
	"And I did feel like [the music] opened up to grief, and I just was very happy for that to happen."	Emotionality (tearfulness)
	"Primitive music felt like it was taking me under, I had no choice."	Ego-dissolution
	"The patterns of the sound were doing something to me visually, and I responded emotionally to the visuals, and the visuals were directly related to the sound."	Emotionality, Imagination
15	"It's so beautiful it just made me cry."	Emotionality (tearfulness)
16	"It changed the sort of imagery in my head, it didn't make it any better or worse, but it had a definite impact"	Imagination
	"It felt like everything added towards the experience rather than took away"	General intensification
17	"The music evoked a lot of emotions."	Emotionality
	"I had a sort of ecstatic experience."	Emotionality (ecstasy)
	"That seemed to be the point at which I was kind of carried away, in this ecstatic rapture."	Emotionality (ecstasy)
	"Clearly the music enhanced the emotional experience."	Emotionality
	"I suppose church-type music, I think was responsible for enhancing the religious experience."	Emotionality (spirituality)
18	"My experience seemed sometimes to coincide with the lightness of the music into the light place and the darkness of the music to the dark."	Emotionality

	“There was a specific moment when I felt as though I was being given birth to the universe, and I semi-recall there was this sort of crescendo of music at that point, that was a very strong point in the journey for me.”	Imagination, Sense of transcendence
	“When I was born into the universe, you know, everything dropped away apart from these slight tethers that were holding me back, and I was into the vastness of the universe, and that could have been when the music stopped, because I remember at that particular point looking at this immense void in front of me.”	Sense of transcendence
19	“The music did affect [the experience].”	General intensification
	“The music just made it more emotional.”	Emotionality
	“Yeah, it definitely served the function of helping emotions flow.”	Emotionality



**Table 2 | Welcomed influences: Guidance.** A list of all the themes and respective quotes by patients, that were present in the cluster “guidance”.

#	Quote	Theme
1	“I think that it was comforting, knowing that the music was there, because it was there the whole period, the music was always in the background, so in in a way it grounded me.”	Sense of support
	“Having the music in the background, it somehow just was helpful.”	Sense of support
	“[The music] gave me a sense of safety during the experience.”	Sense of support
	“[The music] was structured in line with the way the effects of the drug were.”	Resonance
	“It was there throughout, I think it was just that continuity.”	Sense of continuity and direction
2	“The music was spot on with my feeling.”	Resonance
	“[The music] was following my emotion at the time.”	Resonance
	“I could see that there was a great effort to put the music together in a way that it followed the experience as it was meant to be.”	Resonance
	“[The music helped with the] relaxation I went through.”	Sense of support
4	“When I had this difficult moment and [I was] encouraged to focus on the music and I put the headphones on, the song that came up was very soothing and it made me calm down and get out of that.”	Sense of support
	“[The soothing music] brought up nice images, like I imagined I was an unborn child and I felt very safe. Every new song could bring a different image, and I couldn’t finish the previous one that I was thinking about. It was interesting.”	Sense of support
6(2)	"It all just flowed."	Sense of continuity and direction, Sense of support
7	“It began quite ambient-like, quite relaxing, which I felt was good. It calmed you in the experience.”	Sense of support
	“[The music] made me feel that I was in different locations.”	Sense of being on a journey
	“I could almost picture myself there.”	Sense of being on a journey
	“I felt as if I was travelling.”	Sense of being on a journey
9	“And the music felt really open itself.”	Resonance
	“[Greg Haines - Azure] just builds and builds. You're holding on to an extent, you just kind of go up and you're like 'ok, where am I? Can I go any further?'"	Sense of being on a journey
	“That saying, going in and through it, really helped me throughout the whole experience.”	Sense of support

10	"it was all kind of a journey."	Sense of continuity and direction, Sense of being on a journey
	"It was seamless- apart from the breaks. But after breaks they would put the headphones in and I would go straight back into that world."	Sense of continuity and direction
	"Without it I would have gone mad."	Sense of support
11	"The most facilitative to the trip were the straight on classical pieces."	Sense of support
12	"[The music] helped with the visual stuff and the mood."	Sense of support
	It was like a rollercoaster, you move with the music."	Sense of being on a journey
	"You were led up and then brought down and led up."	Sense of being on a journey
	"The music is kind of changing your state of mind almost, or putting you on a different resonance."	General intensification
13	"I think the way it was guiding me. It was good."	Sense of support
	"It's [the music] definitely necessary. It kind of cuts you off from where you are at that time."	Sense of being on a journey
14	"I feel the music in large part drove a lot of the experience."	Sense of continuity and direction
	"I did feel as if I was being held"	Sense of support
	"[The music] took my thinking and my experience to uncomfortable places, but I was kind of reassured in the experience."	Sense of support
	"There was something there that meant that, you know, 'I'm going to take you on a ride here, but I promise I won't abandon you. It's just going to be tough, and you know, you're going through the grinder here, but you won't be left in pieces.' That seemed to be what the music was saying to me."	Sense of support, sense of being on a journey
16	"The music took you to the places you needed to be."	Sense of support, sense of being on a journey
	"It felt we had a profound relationship, between my heartbeat and the beat of the music."	Resonance
	"It felt like the music picked you up and carried you to the next part, and the next piece, and it was the vehicle that moved you."	Sense of being on a journey, Sense of continuity and direction
	"There was a point and I didn't want music anymore, I didn't want anything but I definitely think the music sort of transported there to where you should be"	Sense of being transported
	"It felt like it all fitted the experience"	Resonance

17	"That seemed to be the point at which I was kind of carried away, in this ecstatic rapture."	Sense of being on a journey
	"I was able to just put the headphones on and the mask on, and really enjoy it."	Sense of support
	"The music definitely assisted me."	Sense of support
18	"The music both took me to very beautiful places and to incredibly dark places."	Sense of being on a journey
	"My experience seemed sometimes to coincide with the lightness of the music into the light place and the darkness of the music to the dark."	Resonance
	"I went to a very dark place."	Sense of being on a journey
	"It was a woman's voice, it was a sort of operatic voice, and first it was beautiful because, you know, I was following it and it took me to a beautiful place."	Sense of being on a journey
19	"Yeah, it definitely served the function of helping emotions flow."	Sense of support

**Table 3 | Welcomed influences: calming.** A list of all the themes and respective quotes by patients, that were present in the cluster "calming".

#	Quote	Theme
1	"The music helped me to be relaxed."	General calming
	"My body, my breathing, was better when the medicine was wearing off, because the music was very mellow."	Physical calming
2	"There was a part of the experience where I felt really relaxed. It was a very relaxed music and I was feeling very relaxed, so definitely there was an influence there."	General calming
	"[The music helped with the] relaxation I went through."	General calming
3	"it was all good [...] all in the same area where it can get people meditating, or releasing, or just chilling out to it."	General calming, Mental calming
4	"When I had this difficult moment and [I was] encouraged to focus on the music and I put the headphones on, the song that came up was very soothing and it made me calm down and get out of that."	General calming, Mental calming
6(1)	"It was relief, because I hadn't liked the ones before."	General calming
	"Just relief really when I just felt oh, its ok, its ok."	General calming
7	"It began quite ambient-like, quite relaxing, which I felt was good. It calmed you in the experience."	General calming
	"It did help to calm and slow the mind."	Mental calming

9	"[Greg Haines - Azure] <i>really really</i> beautiful, overwhelming, but really peaceful as well."	Mental calming
10	"More often than not I was sort of peaceful."	Mental calming
	"I was really calm and peaceful and relaxed."	General calming, Mental calming
13	"And particularly once it starts to mellow out towards the end, you do feel that more relaxed."	General calming
15	"There was a piece that was quite calming, so that was very positive."	General calming

**Table 4 | Welcomed influences: openness to music-evoked experience.** A list of all the themes and respective quotes by patients, that were present in the cluster "intensification".

#	Quote	Theme
3	"That's not what it's about, just skipping to the next track to the good stuff. It's there, that you don't like it, then deal with it (chuckles), so that's our approach."	Openness to challenging experience feels therapeutic
4	"I didn't like the emotional music the first experience because I didn't want to cry, but actually, you know, the second time I sort of enjoyed crying to this music."	Openness to challenging experience feels therapeutic
	"In the first experience I was a bit annoyed that this music is too emotional, but I'm sort of thinking it was good for me, so I wouldn't consider it as bad in the end."	Openness to challenging experience feels therapeutic
6(2) )	"It all flowed, I opened myself to it, and it was totally positive."	Music facilitates Openness
9	"As far as positivity goes it was amazing. Yeah, <i>really, really, really</i> helped to open me up... [The music] really opened things up."	Music facilitates Openness
	"I can even view the negative moments as positive in a way because they served a purpose. The purpose was to sort of let me face the darkness, and my demons, I guess. It was beautiful at times, but also... yeah, the darker moments really helped to reflect on and connect with your demons, your unresolved shadows."	Openness to challenging experience feels therapeutic
	"[Henry Gorecki – Symphony of sorrowful songs] was uncomfortable, but not bad. That was necessary I feel."	Openness to challenging experience feels therapeutic
	"There's the odd chord change as well within other parts of the music, that affected me negatively, but that all served a purpose."	Openness to challenging experience feels therapeutic
	"It wasn't like having Justin Bieber for 6 hours, 'everything's jolly and light and bright and saccharine!'"	Openness to challenging

		experience feels therapeutic
	"It was such a well chosen playlist I felt that I was opened to all of it."	Music facilitates openness
12	"[Experiencing a challenging influence of the music] wasn't a bad thing you know, it opened you up."	Openness to challenging experience feels therapeutic
		Music facilitates Openness
14	"And I did feel like [the music] opened up to grief, and I just was very happy for that to happen."	Openness to challenging experience feels therapeutic
		Music facilitates Openness
	"It wasn't particularly pleasant in any way, but extraordinarily powerful."	Openness to challenging experience feels therapeutic
16	"There was a point and I didn't want music anymore, I didn't want anything, but I definitely think the music sort of transported there to where you should be"	Openness to challenging experience feels therapeutic

**Table 5 | Unwelcomed influences: intensification.** A list of all the themes and respective quotes by patients, that were present in the cluster "intensification".

#	Quote	Theme
3	"It was crazy, it was like: change the song, please change the song! [Interviewer: Like a discomfort?], big time."	Discomfort
4	"Very trippy music, making me more scared when I had this difficult phase, that I was thinking 'ah, I'm going crazy!'"	Emotionality (fear)
	"In the first experience I was a bit annoyed that this music is too emotional"	Irritation
	"I didn't like the emotional music the first experience because I didn't want to cry."	Emotionality (tearfulness)
5	"My response to the music was one of fear, I guess, in part, because I viewed part of the music as this really sombre, serious, negative, cynical way of thinking, like it was my funeral, or like something really profound was about to happen, or death. And it was the music that was informing that feeling."	Emotionality (fear, sadness), Imagination, personal thoughts or memories
	"In the period where it wasn't so intense, when I cried a lot, the music elicited that sort of response."	Emotionality (tearfulness)

	"It accentuated any sense of like... emotional music, it just made me even sadder."	Emotionality (sadness)
6(1)	"A sense of irritation, frustration, and sense of lowering mood."	Irritation, Emotionality (sadness)
	"It's music that I can't listen to, I find it irritating or agitating."	Irritation
	"I felt quite torn."	Inner conflict
7	"Creating puzzlement rather than just accepting the music. [...] 'Why is that person singing it in that particular way?' and I felt myself spending a lot of time thinking about that. Trying to work out why she was singing it in that particular style."	Puzzlement
9	"[Some of the music influenced the experience by] making things seem darker."	Dark atmosphere
	"Uncomfortable chord changes."	Discomfort
13	"With a higher tempo everything feels a bit more tense."	Tension
15	"I wanted to explore a certain experience or vision, but the music changed that. I was experiencing these geometric shapes which were seeming to construct themselves into something that I was beginning to understand, but then the music interrupted that and changed it and I was slightly annoyed by that."	Irritation
	"The piano pieces, irritated me. It was like little needles."	Irritation, Discomfort
	"The piano playing was irritating, because I found it quite amateurish."	Irritation
17	"There was some sort of Indian-style music, I think I found it a bit creepy at the time."	Emotionality (fear)
19	"Made me a bit more emotional, more vulnerable."	Emotionality
	"A bit annoying"	irritation
	"What I was experiencing at the time, it was you know, unpleasant"	Discomfort
	"Made me feel 'uurgh'"	Irritation
	"Some of [the music] was uncomfortable."	Discomfort

**Table 6 | Unwelcomed influences: resistance to music-evoked experience.** A list of all the themes and respective quotes by patients, that were present in the cluster "resistance to music-evoked experience".

#	Quote	Theme
3	"It was crazy, it was like: change the song, please change the song! [Interviewer: Like a discomfort?], big time."	Music facilitates resistance
4	"I didn't like the emotional music the first experience because I didn't want to cry."	Music facilitates resistance

5	"I worried that I let [the music] shape this sort of melancholy."	Music facilitates resistance
	"There was resistance, massively, to everything, every sort of sensory input I had a fearful response. I was afraid to open my eyes, I was afraid to do anything, I was afraid that this sort of music was the last thing I'd ever hear."	Music facilitates resistance
	"But I listen to a lot of similar kind of music on my own, so obviously, it does move me, whether or not I admit that, it does shape my emotions and my moods."	Music facilitates resistance
6(1)	"I was trying to suppress [the anger]."	Music facilitates resistance
7	"Creating puzzlement rather than just accepting the music. [...] 'Why is that person singing it in that particular way?' and I felt myself spending a lot of time thinking about that. Trying to work out why she was singing it in that particular style."	Music facilitates resistance
9	"There were times when I thought 'I don't like the effect of this, on me.'"	Music facilitates resistance
14	"I noticed I didn't wanna hang around for the last hour, that version of Joe Cocker, 'Love Lift Us Up'."	Music facilitates resistance
	"That is my issue sometimes, not being willing to go with the experience [of disliked music], but there's a lesson in there for me."	Music facilitates resistance
15	"It was very difficult to totally let go because I thought that, I felt that if I totally let go I might not be able to bring myself back."	Music facilitates resistance
16	"There was a point, and I didn't want music anymore, I didn't want anything."	Music facilitates resistance

**Table 7 | Unwelcomed influences: misguidance.** A list of all the themes and respective quotes by patients, that were present in the cluster "misguidance".

#	Quote	Theme
5	"My response to the music was one of fear, I guess, in part, because I viewed part of the music as this really sombre, serious, negative, cynical way of thinking, like it was my funeral, or like something really profound was about to happen, or death. And it was the music that was informing that feeling."	Sense of foreboding
	"Everything was like 'aaaaahh you're about to die!' (singing in dramatic voice)."	Sense of foreboding
6(1)	"To me [the music] didn't feel real."	Dissonance
	"I was sort of feeling bad, because I wanted to work with it."	Sense of unmet potential
	"I sensed the potential for a really profound experience, but I couldn't meet [that potential] with music that I felt was quite mediocre."	Sense of unmet potential

14	I've heard classical music perform live and wonderfully, but I'm kind of suspicious of it now. There's something malevolent in it, maybe not totally, but from its inspirations, because it was intended to be nationalistic and patriotic."	Sense of being manipulated
15	"I was very aware of the influence of the music, which I found at times intrusive."	Music feeling intrusive, Dissonance
	"The music was discordant"	Dissonance
	"I just found it [the piano music] grating. Intrusive even. Maybe the way it was being played."	Music feeling intrusive
18	"I went to a very dark place with that beautiful music still playing for a while, and then it got darker. The music didn't get dark and then I went to the dark place, I went to the dark place with the light mystical music."	Dissonance, Music unable to positively influence challenging experience
	"There was a kind of out-of-place piano, that was almost sort of 'hunky-tunky', but that just didn't sort of fit really."	Dissonance
	"I think the music lured me to this beautiful place, and then things started to become dark even with this beautiful music still playing."	Music unable to positively influence challenging experience
	"I can remember thinking 'this is beautiful music, why am I going to this dark place?' It didn't line up with what had gone on before, you know, that pattern. I just felt as if I was being manipulated, being duped almost."	Dissonance, Sense of being manipulated
	"A little conversely, the light music at one point took me to a place where I thought I was safe, and it became unsafe, and the music was playing a trick with me, you know, sort of giving me a false sense of security."	Sense of being manipulated
	I think really only that that luring beautiful woman's voice that took me initially to a beautiful place, and then it took me to a really bad place. A <i>really</i> bad place."	Transportation to "bad place"
	"That was profound, because it was as though there was somebody orchestrating that, somebody manipulating that, you know, not in a good way."	Sense of being manipulated
19	"I couldn't connect with the music."	Dissonance

**Table 8 | Appreciated music styles and playlist features: music styles.** A list of all the themes and respective quotes by patients, that were present in the cluster "music styles".

#	Quote	Theme
1	"I liked the piano pieces."	Piano music
	"A Spanish piece with a guitar and the singing, that was quite beautiful, I still remember that one."	Ethnic or cultural music (Spanish),



		Guitar music, Vocal music
	"Like I said there was a Spanish piece and there was a piece that sounded more African."	Ethnic or cultural music (Spanish, African)
2	"It was a song that is quite special to me, there was the one in Spanish, I knew what it was saying. It's a very popular song, especially for people of my age."	Ethnic or cultural music (Spanish), Familiar music
	"I think the one that I liked the most was the one in the beginning, sort of film-like music?"	Cinematic music
	"There was some sort of activity going on and a suspense, and I did like that one."	Cinematic music
	"There was activity going on and at the same time some feeling of expected, which you would see in film, a soundtrack."	Cinematic music
3	"At the end where there were more words, which was pretty good. I respect that maybe in the beginning I wouldn't have appreciated that as much, when the drug was at its most intense."	Vocal music
	"There was an "African" song, where, I think they're singing about "our father" or something? And it was just a whole bunch of voices most of the time in the song, which was pretty good."	Ethnic or cultural music (African)
	"There was one that just built up, [Greg Haines – Azure] was one example where in the beginning it just sounds like someone is just hitting sh*t randomly in his music room and then it all comes together in the end and blows your mind."	Music with crescendo, powerful music
	"Those aspects of it where it's like, slightly... surprising. It just builds up, and with it your emotion goes with that and the happy feeling, and its like all connected."	Music with surprise
4	"[The soothing music] brought up nice images."	Soothing music
	"The second time I sort of enjoyed crying to this music."	Emotional music
5	"African-like music tapped into some deeper, more ancient part."	Ethnic or cultural music (African)
6(2)	"I knew lots of the music."	Familiar music
	"I felt joy of the existence of Bach."	Classical or neo-classical music
7	"It began quite ambient-like, quite relaxing, which I felt was good. It calmed you in the experience."	Ambient music
	"Arabian music was quite strong."	Ethnic or cultural music (Arabic), Powerful music
	"With instrumental music [the story] is left to you."	Instrumental music

	"I preferred ambient music, and more broadly I preferred the music without lyrics."	Music selection
8	"Quite liked the sort of more operatic one, with the lady that sang in Italian."	Vocal music (female), Choral or opera-like music
	"Guitar playing, like a solo, I really liked that one."	Guitar music
	"Some parts being more energetic, and more sort of driven."	Energetic music
	"Other things being more quiet and subtle, and maybe encouraging reflection."	Calming music
9	"[Henry Gorecki – Symphony of sorrowful songs] starts off very nice chorally and then it goes off into a more kind of uncertain dark place and then comes back to the choral part again."	Dynamic music, Choral or opera-like music
	"[Greg Haines - Azure] I felt like I was sort of the highest I could get, it was like the absolute, the top of everything."	Powerful music
	"I thought ambient music would've resonated more with me than the rest"	Ambient music
	"I'm not a massive classical music fan, but the classical pieces that were there worked really well."	Classical or neoclassical music
	"[Greg Haines - Azure] just builds and builds. You're holding on to an extent, you just kind of go up and you're like 'ok, where am I? Can I go any further?'"	Music with crescendo
10	"It was more upbeat, so it was almost like it was arousing me from my slumber."	Energetic music
11	"Indian music, where I was seeing an Indian temple."	Ethnic or cultural music (Indian)
	"For me what worked best in the sense of being the most facilitative to the trip, were the straight on classical pieces."	Classical or neo-classical music
	"I recognized a couple of pieces, those were very strong for me."	Familiar music
	"During that same Indian piece, that's when I was dancing for Shiva and then I was Shiva."	Ethnic or cultural music (Indian)
	"Some Celtic music."	Ethnic or cultural music (Celtic)
	"That's just what I normally respond to."	Familiar music
	"Pieces that had a solid drone to them drew me right in"	Drone music
"The drone, it was the chanted repetition of that, it was the layering of the other voices and the other instruments and the other syncopation and the rhythm as they would all come in and just build."	Drone music, Vocal music (chanting), Music with regularity, Music with rhythm, Music with crescendo	

12	"The violin music, it was stunningly beautiful."	Violin music, Classical or neo- classical music
	"[The violin music was] very beautiful. It's one of my favourite kind of instruments."	Violin music
13	"As the energy [in the music] kind of builds upward, it reaches a tension point."	Music with crescendo
	"But at the same time I kind of think that the other higher intensity stuff is probably necessary, I think, to get you along."	Powerful music
14	"Primitive and deep "African" music, it wasn't particularly pleasant in any way, but extraordinarily powerful"	Ethnic and cultural music (African)
	"The Composer has stayed true to his or her own intuition or inspiration. Almost the antithesis to the Bach and the Brahms, which I felt were terribly contrived."	Authentic music
	"There was something in the regularity, but also the pattern, the pattern of it. I seem to be responding to the patterns of the sound.""	Music with regularity
15	"One of the vocal tracks reminded me of one of Nusrat Fateh Ali Khan's tracks, Yeni Yeniden, it's so beautiful it just made me cry."	Familiar music
	[interviewer: were there any ones that you had a particular preference for?] "Yeah, the classical pieces."	Classical or neo- classical music
16	"There were some [that I preferred], a man's voice. The experience changed when there was a voice, from when it was just music."	Vocal music (male)
17	"I heard the beginning of one of my favourite pieces of music. Beethoven's Emperor Piano Concerto, the second movement."	Familiar music, Classical or neo- classical music
	"I preferred I suppose (chuckles) the sort of Classic FM stuff on the whole."	Classical or neo- classical music
	"I suppose church-type music, I think was responsible for enhancing the religious experience."	Choral or opera- like music
	"I think it was probably the great works of classical music that I preferred."	Classical or neo- classical music
	"Great works of music by great composers, it's normally expected to sort of move you more."	Classical or neo- classical music
	"I think [classical music] was more moving."	Classical or neo- classical music
18	"There was a woman's beautiful voice."	Vocal music (female)
	"There was a specific moment when I felt as though I was being given birth to the universe, and I semi-recall there was this sort of crescendo of music at that point, that was a very strong point in the journey for me."	Music with crescendo

19	“The Mexican song I thought was quite good.”	Ethnic or cultural music (Mexican)
	“The Spanish guitar song was probably my favourite track out of all of them, with a man singing.”	Ethnic or cultural music (Spanish), Guitar music, Vocal music (male)
	“It’s a classical track that was on both [playlists]. Probably a bit overused in the media, but an emotive piece of music.”	Classical or neo-classical music
	“Because I play guitar, and I can’t play piano, I find guitar music more accessible.”	Guitar music, music with personal connection
	“Like the kind of world music as well, it’s more interesting.”	Ethnic or cultural music

**Table 9 | Appreciated music styles and playlist features: playlist design.** A list of all the themes and respective quotes by patients, that were present in the cluster “playlist features”.

#	Quote	Theme
1	“I liked that there was a lot of variety.”	Variety
	“Gentle at the beginning, I think that that did help.”	Calming music in pre-onset
	“Having the music in the background, it somehow just was helpful.”	Music presence
	“I think that that it was comforting, knowing that the music was there.”	Music presence
	“Variations in the degree of the music and the intensity of it. Some of it was more mellow, some of it more forceful.”	Variety
	“[The music] was structured in line with the way the effects of the drug were.”	Music order
	“I think that the music, because it was so varied I think it did kind of make you think a bit.”	Variety
2	“I think the one that I liked the most was the one in the beginning, sort of film-like music?”	Cinematic music in ascent-phase
	“I could see that there was a great effort to put the music together in a way that it followed the experience as it was meant to be.”	Music order
	“The fact that it was put together in that sequence made sense.”	Music order
	“[The playlist was] made in a sort of logical order. It had some sort of beginning, halfway through, and then the end, it was logical, it was good.”	Music order
3	“There was quite a variance.”	Variety
	“And most of it was good, because it was flipping good music.”	Music selection

	"It was all good."	Music selection
	"I don't know which one I'd say I prefer. I liked them."	Music selection
	"[The music] had their moments for each time of the dosage."	Music order
	"At the end where there were more words, which was pretty good. I respect that maybe in the beginning I wouldn't have appreciated that as much, when the drug was at its most intense."	Vocal music during return phase
	"In the beginning part, the uh, the Greg Haines stuff was, pffff.. f*%#ing, in another planet!"	Music with crescendo during peak phase
5	"[I preferred] the changes in style."	Variety
	"I don't know if I preferred any one above the other."	Variety
6	"[The music] all worked really, really well."	Music selection
	"Even bits that I didn't necessarily love, it all flowed."	Music selection
7	"Certainly the first time [the music had a greater influence], cause I think the second time you're sort of familiar with the music."	Unfamiliar music
	"It began quite ambient-like, quite relaxing, which I felt was good. It calmed you in the experience."	Calming music in pre-onset phase
	"There was no uncertainty because of it, it didn't create any anxiety or 'woah, what is this?!'"	Music selection
	"[The songs] Superb they were without doubt you know."	Music selection
	"In terms of the musical choice I think it was absolutely superb."	Music selection
8	"Well-composed sort of selection."	Music selection
	"Well done, really well put together."	Music order
	"I think I could kind of understand what each part was meant to evoke."	Understanding thoughts behind playlist design
9	"[Buffy Saint Marry - Up Where We Belong] You could tell that was quite cheesy, a bit of an anomaly in there, but no, it just worked."	Music selection
	"It all worked together really well."	Music order
	"The music worked really well, within the context of the rest of the music and that setting."	Music order
10	"Whoever thought of putting that playlist together in the order that they did is a genius."	Music order
	"It was seamless- apart from the breaks. But after breaks they would put the headphones in and I would go straight back into that world."	Music order, music presence
	"Without it I would have gone mad."	Music presence

	"Certainly the experience would not have been a positive one were it not for that music."	Music presence
11	"[Some songs] I connected immediately with."	Music selection
12	"When there was a pause in the music it was really noticeable. It just felt that all the energy kind of drained out of the room, I really wanted the music back."	Music presence
	"There was one point, that was very beautiful."	Music selection
	"Wouldn't have been as positive without the music, absolutely, you know. No, a hundred percent."	Music presence
	"I think it was designed that way."	Music order
13	"And particularly once it starts to mellow out towards the end, you do feel that more relaxed."	Calming music during return phase
	"[I preferred] more towards the end of the session, I think, whenever it's a bit more mellowed out. I kind of felt like a nicer place to be."	Calming music during return phase
	"The music is] definitely necessary."	Music presence
	"I wouldn't see any major changes with the music."	Music selection
	"I think it was a good, a good layout."	Music order
14	"I preferred Mendel's playlist."	Music selection
15	"An hour and a half before the end, when the music began to wind down, and it was at that point that I thought "oh yes, this is, this is much better. This is helping. Yeah, because I was slowly coming out. So yes, that was positive."	Calming music during return phase
	"One of the vocal tracks reminded me of one of Nusrat Fateh Ali Khan's tracks, Yeni Yeniden, it's so beautiful it just made me cry."	Familiar music
	[interviewer: were there any ones that you had a particular preference for?] "Yeah, the classical pieces."	Classical or neo-classical music
16	"I get the impression that if the music wasn't there it'd been a very different experience."	Music presence
	"There wasn't any that I didn't like. It felt like it all fitted the experience, and that everything was in the right order."	Music selection, music order
17	"I was able to just put the headphones on and the mask on, and really enjoy it."	Music selection
	"When the music stopped it was a very spooky atmosphere."	Music presence
	"I think it was the beauty of the music, and the sort of uplifting nature."	Music selection
18	"On the whole really lovely music, with obviously the dark music sometimes taking me to dark places, but I wasn't really aware of that at the time, it just sort of happened."	Music selection

**Table 10 | Unappreciated music styles and playlist features: music styles.** A list of all the themes and respective quotes by patients, that were present in the cluster “music styles”.

Un-appreciated music styles and playlist features: music styles		
#	Quote	Theme
4	“Very trippy music [...] making me more scared when I had this difficult phase, that I was thinking ‘ah, I’m going crazy!’”	Trippy music
5	“It was all sad music.”	Sad music
	“It’s all very serious music, there was no light. It was all really, serious, profound.”	Serious music
7	“I found lyrics confusing.”	Lyrics
	“No interpretation, the story is being told to you... with lyrics, whereas with instrumental music it’s left to you.”	Lyrics
11	“I remember at some point saying “this music is really corny”, and there was one particular part where there was music going on that just reminded me of the ‘Sound of Music’, which our theatre in my little college town played for months, because that’s what the old folks in the town wanted to see, and it just had that sense of being that kind of kitsch almost.”	Cheesy music
13	“With a higher tempo everything feels a bit more tense.”	Music with high tempo
14	“I did struggle with the Brahms and the Bach.”	Classical or neo-classical music
	“Almost the antithesis to the Bach and the the Brahms, which I felt were terribly contrived.”	Classical or neo-classical music
	“I noticed I didn’t wanna hang around for the last hour, that version of Joe Cocker, ‘Love Lift Us Up’. I would consider that there was other music which is subtly more powerfully sort of joyous, rather than stating, claiming, ‘love will lift us up where we belong’.”	Music with lyrics, Cheesy music
15	“The piano pieces, irritated me. It was like little needles.”	Piano music
	“I don’t know why, I found the vocal pieces so amusing.”	Vocal music
16	“I could remember hearing tracks that I’d heard before. I wasn’t unaware, you know, because I could remember music from the last time. And I could remember how I felt when I’d heard that track the first time, which was another thing that I found for the second one, which was ‘why is it not feeling the same?’”	Familiar music
17	“I didn’t really like the sort of world music stuff.”	Ethnic and cultural music
	“There was some sort of Indian-style music, I think I found it a bit creepy at the time.”	Ethnic and cultural music (Indian)
	“There was a sort of ambient musical sound which I found too non-specific.”	Ambient music

	"I complained a bit about the ambient music because I thought it was it was too downbeat. It wasn't sufficiently uplifting."	Ambient music
18	"There was a kind of out-of-place piano, that was almost sort of 'hunky-tunky', but that just didn't sort of fit really."	Piano music
	"[Henryk Gorecki – Symphony of sorrowful songs] It was a woman's voice, it was a sort of operatic voice, and first it was beautiful because, you know, I was following it and it took me to a beautiful place. And then there was almost a shriek that started, and that that perhaps that shrieking, that really high pitched, almost reaching the end of that particular song, that was when things started to turn for me."	Vocal music (female)
19	"I found the first [playlist] a bit of synthetic."	"Synthetic" music
	"Didn't like George Harrison or the Louis Armstrong. And there was that weird kind of cover [Buffy Saint Mary - Love Lifts Us Up]. It didn't feel bad, it just felt a bit cheesy, a bit annoying. It was a bit like forcing a point."	Cheesy music
	"Even though there was the opera stuff, I can't speak Latin, I couldn't understand it"	Music with lyrics in foreign language
	"I don't really understand opera."	Music without a personal connection
	"I think if you appreciate opera, Classic FM, you would have got something else out of it."	Choral or opera-like music, Classical or neo-classical music
	"Classical to me can be a bit inaccessible, a bit highbrow."	Classical or neo-classical music
	"Opera as well, because I don't understand the stories behind it."	Choral or opera-like music, Music with lyrics in foreign language

**Table 11 | Unappreciated music styles and playlist features: playlist design.** A list of all the themes and respective quotes by patients, that were present in the cluster "playlist features".

#	Quote	Theme
6	"The majority of them are not my kind of music, I can't sit with that music, I have to leave the room."	Music selection
	"It's music that I can't listen to, I find it irritating or agitating."	Music selection
7	"Second time, not as much [influence of the music]."	Familiar music
	"I would finish with more sort of ambient music rather than to try and bring the lyrics in."	Lyrics during return phase



13	"Some of the earlier stuff did get a bit tense at times."	Intense music during ascent
15	"I did ask if I could have my own music, I would probably have chosen my own pieces."	Preference for own music selection
	"Less of the piano music."	Piano music
	"Maybe the pieces could be slightly shorter."	Preference for shorter pieces
17	"When the music stopped and it was a very spooky atmosphere."	Silences in playlist
19	"There was stuff in the second playlist I didn't like as well."	Music selection
	"Nothing I would have chosen if I wanted to relax."	Preference for own music selection
	"Like the kind of world music as well, it's more interesting."	Preference for more ethnic or cultural music

## Music playlist (v1.2.) for psychedelic therapy sessions for depression with psilocybin

The music playlist used in this study is displayed below. Please note that the playlist did not merely list the selected songs in the structure suggested below, but included a thoughtful mixing of volume, fade-ins, fade-outs, and moments of silence. Also note that following this study, an updated version of this playlist has been developed which you can access via [www.mendelkaelen.com](http://www.mendelkaelen.com)

Time	Track
00:00:00	Stars of the Lid - Dungtitles (In A Major)
00:05:57	Stars of the Lid - Articulate Silences Part 1
00:11:20	Stars of the Lid - Articulate Silences Part 2
00:16:58	Stars of the Lid - Evil that never arrived
00:22:03	Harold Budd & John Fox - Sunlit Silhouettes
00:25:05	Harold Budd & John Fox - A Delicate Romance
00:32:36	Brain Eno & Harold Budd - Against the Sky
00:37:29	Brain Eno & Harold Budd - Lost in the Humming Air
00:41:43	Robert Rich & Lisa Moskow - Bija
00:52:24	Robert Rich – Sagrada Familia
00:56:15	Robert Rich – The spiral steps
	<i>Silence (3 minutes)</i>
01:08:34	Henry Gorecki - Lento - Sostenuto Tranquillo Ma Cantabile
01:33:44	Maria Bayo & Sinfonica De Tenerife - Bailero
01:39:25	David Darling – Prayer for compassion
01:43:36	David Darling – Stones start spinning
01:47:53	Carlos Cipa – The Whole Truth
01:53:25	Greg Haines – 183 Times

02:02:36 Harold Budd & John Fox – Coming into focus  
*Silence (30 seconds)*

02:08:06 Ludovico Einaudi - The Journey

02:10:43 Arvo Part – Da Pacem Domine

02:16:28 Max Richter – The Young Mariner

02:20:39 Max Richter – Diner and the ship of dreams

02:26:07 Henryk Gorecki - Lento e Largo Tranquillissimo

02:35:41 Greg Haines – Azure  
*Silence (20 seconds)*

02:50:12 Otto A. Totland - Open

02:52:42 Otto A. Totland - Steps

02:54:34 Federico Albanese - Disclosed  
*Silence (50 seconds)*

03:01:21 Dead Can Dance - Devorzhum

03:07:30 Robert Rich - Amrita (Water of Life)

03:13:56 Ólafur Arnalds & Alice Sara Ott - Verses

03:17:54 Ólafur Arnalds & Alice Sara Ott - Piano Sonata No.3 Largo

03:26:58 Ólafur Arnalds & Alice Sara Ott - Nocturne in C Sharp Minor

03:31:23 David Darling – Beautiful Life

03:33:30 David Darling – When we Forgive

03:37:35 Enya - sumiregusa

03:42:20 Jon Hassel, Ry Cooder & Ronu majumdar - Bay of Bengal

03:47:08 Jon Hassel, Ry Cooder & Ronu majumdar - River song  
*Silence (25 seconds)*

04:12:55 Anugama - Shamanic dream  
*Silence (20 seconds)*

04:24:26 Arvo part - Spiegel Im Spiegel

04:35:12 Nest - Stilness

04:40:49 Arve Henriksen - Glacier descent

04:48:17 Arve Henriksen - Opening Image

04:52:33 Arve Henriksen - Hambopolskavalsen

04:57:54 Daniel Namkhay - Um Bolero Galíctico  
*Silence (15 seconds)*

05:04:05 Dead Can Dance - Nierika  
*Silence (15 seconds)*

05:09:49 Brian McBride – Toil Theme Part 1,2& 3

05:17:31 Nils Frahm - Ambre

05:21:19 Nils Frahm - Tristana  
*Silence (2.5 minutes)*

05:42:44 Mozart - Ave Verum Corpus

05:46:46 Mercedes Sosa - Gracias a la Vida

05:51:17 Ladysmith Black Mambazo - King of Kings

05:55:33 Buffy saint Mary - Up where we belong

06:00:10 Olafur Arnalds & Alice Sara Ott - Letters of a traveler

06:04:22 Stars of the Lid - Don't Bother They're Here