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Self-treatment of psychosis and complex post-traumatic stress disorder with LSD and DMT—A retrospective case study

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ABSTRACT

This article describes a case of a teenager with early complex trauma due to chronic domestic violence. Cannabis use triggered auditory hallucinations, after which the teenager was diagnosed with an acute schizophrenia-like psychotic disorder. Antipsychotic medication did not fully resolve symptoms. Eventually the teenager chose to self-medicate with LSD in order to resolve a suicidal condition. The teenager carried out six unsupervised LSD sessions, followed by an extended period of almost daily use of inhaled low-dose DMT. Psychotic symptoms were mostly resolved after approximately one year. Subsequent cannabis use caused a transient relapse. While his psychosis may have been due to cannabis use in the presence of a genetic predisposition, LSD and DMT did not promote psychotic symptoms in this case, and resolved the suicidal condition in one session. Additional high-dose LSD sessions and low-dose DMT sessions appeared to resolve the symptoms related to the early complex trauma. Alternatively, if psychosis is understood as a massive defense system resulting from early complex trauma, and if his psychotic symptoms were partially due to such trauma, psychedelics appeared to transcend this defense system, providing access to traumatic memories in order to allow for an integrative treatment effect. Information was acquired from medical record excerpts provided by the patient, a semi-structured retrospective video interview, and follow-up interviews a year later. The present case suggests a need for further studies on the relationship between psychedelics and psychotic disorders, the feasibility of supervised vs unsupervised settings for various situations, and alternative therapeutic models for utilizing the hyperaware-hypersensitive state induced by psychedelics. With regard to self-treatment, a harm reduction approach should be adopted. Low-risk psycholytic self-treatment protocols could be developed for future use in public health care systems.

Introduction

Currently, the potential of the psychedelic model for the treatment of mental disorders is being studied in a safe and structured manner in the field of psychiatry. Clinical trials have already been carried out, for example, for the treatment of post-traumatic stress disorder with MDMA, the treatment of depression (major, treatment-resistant, cancer-related), anxiety (cancer-related, generalized, obsessive-compulsive, post-traumatic), borderline and narcissistic personality disorders, suicidality, various addictions (alcohol, stimulants, cocaine, tobacco, opioids, cannabis) and inflammation with psilocybin (Gukasyan et al., 2022; Lowe et al., 2021), the treatment of Alzheimer's disease and anxiety associated with life-threatening disease with LSD (Family et al., 2019; Reiff et al., 2020; dos Santos et al., 2016), and the treatment of addictions (alcohol, cocaine, opioids), anxiety and depression with ayahuasca (Hamill et al., 2019).

Safety guidelines for human hallucinogen research from 2008 recommend the exclusion of volunteers with personal or family history of psychotic disorders or other severe psychiatric disorders (Johnson et al., 2008). They also recommend the presence of at least two study monitors, i.e. two extensively trained psychotherapists, during a psychedelic session. The proposed model requiring two therapists is time and labor intensive, and as such presents a major challenge in how to scale the treatment up to meet future demand (Nutt and Carhart-Harris, 2021).

In contrast to this model, the present case study discusses unsupervised self-administration of psychedelics by a teenager who had been diagnosed with a psychotic disorder. The objective of the present case study was to investigate the relationship between psychedelics and psychotic disorders. Research on the treatment of psychosis with psychedelics is rare, and most of it originates from the 1960s and 1970s. Due to lack of current clinical research the quality of evidence is considered low. Regardless, at this initial phase of research, the existing limited data is also of value. To the author's knowledge, this is the first case description of self-treatment of a psychotic disorder, or self-

Abbreviations: 5-HT 2A receptor, a subtype of serotonin (5-HT) receptors; ACE, adverse childhood experience; DMT, N,N-dimethyltryptamine; DOC, 2,5-dimethoxy-4-chloroamphetamine; LSD, lysergic acid diethylamide.

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treatment of complex trauma in the presence of a psychotic disorder, with psychedelics. As such, it may open up a new area of research.

As recommended by the above mentioned safety guideline, any hints of psychotic disorders comprise an exclusion criterion with regard to current psychedelic therapy clinical trials. However, in late 1960s LSD was successfully administered to children between the ages of 9 and 12 diagnosed with chronic schizophrenia-like psychotic disorders (Fisher, 1970; 1997; Walsh and Grob, 2005). Clinicians considered that the children had suffered severe early traumas, with psychosis acting as a massive defense system (Fisher, 1997). Under the influence of LSD, supervised by two members of the ward personnel who had had their own experience with LSD and psilocybin, the children relived situations from their traumatic past in a safe environment, in many cases resulting in resolution of symptoms. In one case, 12-year old girl, considered schizophrenic and characterized as 'bizarre, grossly regressive, retarded, hyperactive, assaultive, erratic and destructive' as a result of having been raised by 'a completely psychotic mother', underwent 14 sessions with 100–300 μg of LSD and two sessions with psilocybin, and became 'one of the most tender, loving, compassionate and courageous persons the author has ever known' (Fisher, 1970; 1997). Another case, 11-year old girl, was 'the most difficult and challenging person we treated' who was kept 'in complete restraints 24 h a day' (Fisher, 1997). After a similar number of psychedelic sessions in the course of approximately half a year she became 'affectionate and warm, loved to be physically touched, smiled happily a great deal of the time', and 'began to attend school on half days and was able to adjust to the setting'. Five other cases and the methodology were described (Fisher, 1970; 1997; Walsh and Grob, 2005). Various other experimental psychedelic treatment programs for severely disturbed children also existed (Rhead, 1977).

On the other hand, LSD is known to occasionally cause psychosis in previously non-psychotic individuals with no risk factors. In a European case series of presentations to emergency departments dealing with acute recreational drug and novel psychoactive substance toxicity, psychosis was present in 348 (6.3%) of 5529 cases (Vallersnes et al., 2016). In 27 presentations involving LSD as the only substance used (0.5% of all 5529 presentations), psychosis was present in 7 cases (2.0% of all cases with psychosis, or 0.1% of all presentations). DMT was not mentioned separately in the study but for tryptamines, two cases of psychosis were reported (0.6% of all cases with psychosis, or 0.04% of all presentations). In other literature, three case reports described psychotic episodes associated with DMT but in all cases the subjects had used cannabis as well (dos Santos et al., 2017).

Oram has provided a history of LSD psychotherapy (Oram, 2018). Recent examples of its application include for example group psychotherapy practices in Switzerland in the early 2000s (Sessa and Meckel Fischer, 2015). Grof has presented experiences of a large amount of LSD psychotherapy sessions (Grof, 2001). A recent book on psychedelic psychotherapy discusses various approaches including individual, group, and underground settings, as well as various substances (Read and Papaspyrou, 2021). Vollenweider et al. have provided an overview of biological mechanisms, predictors of psychedelic experience, as well as acute and long-term outcomes (Vollenweider and Smallridge, 2022). Flanagan et al. have noted that psychedelics are anti-inflammatory (Flanagan and Nichols, 2018).

In 2010, a Swiss court agreed that LSD was not a dangerous drug and that it had no significant physical or psychological adverse effects when given in a controlled clinical setting (Sessa and Meckel Fischer, 2015). In 2020, the District Court of Southwest Finland, based on an expert opinion, issued a similar decision, stating that 'LSD cannot be characterized as very dangerous' (R19/3703, 20/142412).

In Switzerland, since 2014, two psychotherapists obtained 50 licenses on a case-by-case basis and developed a psychedelic-assisted group therapy model utilizing MDMA and LSD for patients suffering from chronic complex post-traumatic stress disorder (C-PTSD), dissociative, and other post-traumatic disorders (Oehen and Gasser, 2022). The authors noted that the treatment of complex traumatic stress disorder (C-PTSD) needed a larger number of psychedelic experiences in contrast to PTSD resulting from single trauma. A short case vignette described a typical process comprising over ten sessions. The majority of participants improved according to clinical judgement, and no serious adverse events occurred.

Concerning the physiological safety of LSD, DMT and psilocybin, coadministration with lithium may cause seizures (Nayak et al., 2021), and coadministration with tramadol is unsafe (TRI, 2022). Caution is advised in combination with cannabis, amphetamines and cocaine (TRI, 2022). SSRI medication is not a contraindication but decreases or cancels the effects (SpiritPharmacist.com, 2022). Most other combinations increase the effects.

Large doses are physiologically safe (when it is certain that the substance is in fact LSD and not something else). In one case, 1000 μg of LSD was reported to have accidentally cured a bipolar disorder (Haden and Woods, 2020). A second case report concluded that 500 μg of LSD while in early pregnancy did not appear to cause harm to the fetus. A third case, in which a man had accidentally ingested 55,000 μg of LSD while alone at home, required no medical intervention but reported that his physical pains had disappeared the next day (Haden and Woods, 2020). A report from 1974 described cases where apparently hundreds of milligrams of LSD had accidentally been ingested (Klock et al., 1974). They required intensive care but were discharged from the hospital in 2–3 days without further consequences.

The main 'mechanism of action' of psychedelic therapy is to revive or bring back to life repressed or 'forgotten' traumatic events. These events are not only 'remembered' as cognitive memories but *relived* embodied experiences, with their original, associated physical feelings. This main feature of this therapy also represents the main risk. By definition, these 'repressed', 'split' or 'exiled' events had been overwhelming at the time of original trauma. Psychedelics typically remove the 'defenses', 'blocks', 'managers' or 'firefighters' that keep these traumas away from consciousness. This protection against the trauma requires significant energy and is often associated with psychiatric symptoms. Reliving the trauma may release this energy and resolve the symptoms.

When these traumas originate from a very early age, they may present themselves as psychotic symptoms. A psychotic state may be a partial regression into the conceptual framework of the age of the original trauma. The conceptual framework of, say, two-year old, with concepts of time and causality still very undeveloped and vague, is obviously unsuitable for navigating the adult world.

It should be clear from the above description that in order to undergo a psychedelic therapy session, in addition to being willing to re-experience their worst moments, one needs to have the time and all other resources to process their traumatic events without becoming overwhelmed again. Many adverse in-session experiences may be related to dysregulated breathing patterns and might be resolved with easily learnable techniques such as relaxation and conscious breathing in which exhalation is longer than inhalation. Most people benefit from external support. However, suitable support is not always available. In case of self-therapy, one needs to be certain that one can handle all such issues without such support. If skills and resources are insufficient, the experience may lead to *retraumatization*. In addition to in-session events, there may be adverse post-session consequences. A session may, for example, trigger generalized anxiety lasting weeks. These are typically features of the original trauma.

Non-pharmaceutical methods capable of inducing similar effects can be used instead of or in conjunction with pharmaceutical methods. Holotropic breathwork developed by Stanislav and Christina Grof as an alternative to LSD therapy sessions consists of continuous forceful circular breathing, combined with simple bodywork techniques applied by trained guides in specific situations (Grof, 2010). The breathing technique leads to changes in oxygenation and typically to altered states of consciousness. The risk of retraumatization applies also to breathwork but the pace of the session is typically slower and more manageable.

Two dosing strategies were utilized in the present case. The first was 'regular dosing' (e.g. 100–300 μg of LSD), producing the conventionally assumed psychedelic effects. The second was 'minidosing', i.e. a half or a third of a 'regular dose' (e.g. 50 μg of LSD). Effects of this 'psycholytic therapy' ('psychotropic' combined with 'analytic') are qualitatively different from those of higher doses, allowing normal functioning but adding an enhanced capability for introspection and perception, as well as enhanced physical capabilities including improvements in coordination, balance and stamina (Oroc, 2011). Examples of extreme sport feats performed under the influence of LSD included mountaineering, heli-skiing, competitive snowboarding, big-wall climbing, motor racing, big wave surfing, flying hang-gliders, and playing major league baseball (Oroc, 2011). There is also a third dosing strategy, high dosing, described for example in a recent book by a professor of religious studies who underwent 73 solo sessions with 500–600 μg of LSD between 1979 and 1999 (Bache, 2019). The sessions were carried out at his home in a separate room but his wife was present in the house. A fourth strategy is 'microdosing' (Murray et al., 2021). Each strategy tends to produce qualitatively different outcomes and are thus not directly or quantitatively comparable to each other.

The substances originated from illegal markets, and their contents had not been analyzed. This uncertainty cannot be avoided in a retrospective non-clinical study. In general, European Monitoring Centre for Drugs and Drug Addiction has noted that deep web or darknet marketplaces feature a very effective user feedback model which incentivizes sellers to ensure their products are as described (European Monitoring Centre for Drugs and Drug Addiction, 2016). Eight samples sold as LSD and tested in 2014 were LSD with a purity level of 100%. A larger Spanish study of 263 samples, 50% of which were bought on the internet, indicated that 80% of the samples were unadulterated and contained LSD (Energy Control Drug Checking Service, 2015). 13% of samples contained psychedelic amphetamines (25x-NBOMes or DOC). In the present case, the substances were acquired from the darknet.

The case description mentions two designer drugs, 25B-NBOMe and 25E-NBOH (Machado et al., 2019; Poulie et al., 2019). Neurotoxicity, cardiotoxicity, other adverse effects and fatalities have been reported. The role of the mentioned designer drugs was not central to this case.

With regard to the relationship between child abuse and mental disorders, for example a study about a highly traumatized minority sample ($n = 328$) found that exposure to moderate-to-severe child abuse was predictive of current psychotic disorder diagnosis in adulthood (Powers et al., 2016). There was also significant comorbidity between current psychotic disorder and post-traumatic stress disorder, major depression, substance use disorders, and suicide attempts. The present case aligns with these findings.

An early-onset complex post-traumatic stress disorder (C-PTSD) (Cloitre, 2020), or complex trauma in short, represents an absence of normal emotional and social development. Despite bearing a similar name within the framework of current diagnostic thinking, its treatment is very different from a 'simple' post-traumatic stress disorder (PTSD) which represents a singular disruption of normal development, typically at an older age. The treatment involves not only removal of consequences of the repeated traumas but also building something new to replace the resulting 'emptiness' and lack of structure. While PTSD symptoms can often be resolved in a single session, rebuilding a personality requires a more extensive approach.

The young man had written about his experience on an online discussion platform and was subsequently invited to participate in this case study by the author. The author's approach was ethnographic, with an intention to collect cases of self-treatment or small-group treatment of various mental disorders with different psychedelics. The details of this case have been acquired from medical record excerpts provided by the patient, a one-hour semi-structured retrospective video interview conducted in September 2020, and follow-up interviews in September 2021–April 2022. There was no opportunity to interview the various clinicians who had treated the patient. The discussion section contains occasional unreferenced, summarizing notes which are based on the author's direct ethnographic observation of various psychedelic therapy contexts internationally between 2017 and 2019.

Case description

From early childhood the teenager had felt unsafe, mostly due to a competitive relationship between the teenager and his brother who had been volatile and violent. Physical and emotional violence had been a daily occurrence. Family communication patterns had featured daily shaming, blaming and other unsupportive behavior. These environments often lead to complex trauma. There had been no singular major traumas, only a series of repeated, smaller traumatic events. Fig. 1 represents an overview of significant life events of the young man, including psychiatric treatments and psychedelic sessions.

This life history resulted in escapist behavior. At the age of eleven the teenager had heard about LSD's capacity to produce 'new kinds of experiences'. At the age of thirteen he had begun using various other drugs and pharmaceuticals including designer drugs 25B-NBOMe and 25E-NBOH. By the age of fifteen, cannabis use had triggered a hearing of voices. The contents appeared to be mood-congruent replays of previous social communications but they were not recognized as such at the time. The teenager did not pay much attention to the nature or origin of these voices, nor did he consider their existence a problem.

Initially, the use of 25B-NBOMe and 25E-NBOH had been 'mind-opening', resulting in improved school grades. Later, however, he had 'lost control'. By the age of sixteen he had consumed ecstasy, cannabis, alcohol, amphetamine, metamphetamine, cocaine, various benzodiazepines, oral opioids and various other designer drugs whenever he had been able to acquire these substances but especially during weekends. He said this had 'magnified the negativity he had absorbed from the environment', and he had ended up 'saturated with negative sensory experiences'. He had suffered from 'existential issues': hopelessness and meaninglessness. As an example, he had not understood why he should set goals or even eat when he was going to die regardless. He said this depression had later 'turned into joy' as a result of his 'training program' with psychedelics.

After telling his mother about the voices, his mother mentioned that there had been schizophrenia in the family. An online investigation of the concept of schizophrenia evoked fears in the boy. He was voluntarily hospitalized for surveillance. A psychological evaluation revealed only minor defects in reality checking. The teenager said he 'had not presented with the same symptoms as psychotic people in general': he had not followed instructions given by the voices nor tried to invent explanations for their existence.

According to the medical record he had presented with paranoid ideation, feeling he had been followed. At the ward he had wanted to isolate but had been prevented from doing so, and forced into social settings. He described that a doctor, 'an authority figure', had convinced him that the hallucinations were bad for him and that they would get worse, destroying his life. As a result, the teenager's neutral attitude to the voices had changed. He had become convinced that he needed to get rid of them, and accepted quetiapine, aripiprazole, and olanzapine medications. These had not resulted in disappearance of the voices, leading the teenager into despair. He had experienced the hospital practices, including isolation from his girlfriend, as unjustified. There had been no therapy. The teenager had felt he had been 'pressured to accept the idea of psychosis', and he had 'internalized the idea, believed in it', partly in order to avoid possible punitive consequences.

The first hospitalization lasted 3.5 months, ending in April 2017. In mid-June 2017, he was given diagnoses of a psychotic disorder due to multiple drug use taken in intoxicating amounts (F19.50), a generalized anxiety disorder (F41.1) and harmful use of cannabinoids (F12.1). According to the medical record, borderline personality disorder had also been considered. Antipsychotic medication had not eliminated hearing

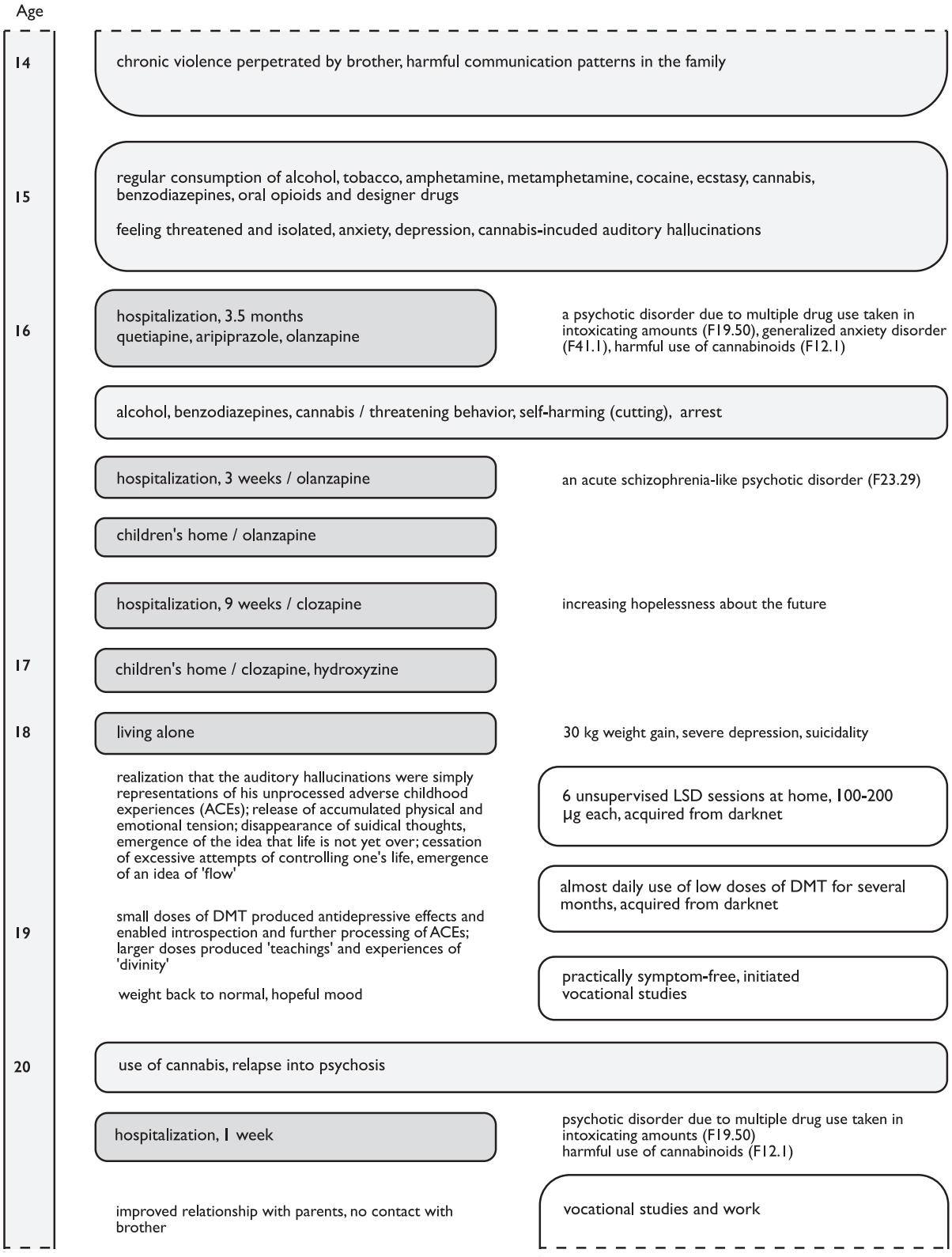

Fig. 1. Timeline of life events, psychiatric treatments and psychedelic sessions.

voices but he had been discharged from the hospital after he had repeatedly demanded it.

A second three-week hospitalization was involuntary and occurred in mid-July 2017. He had discontinued olanzapine, consumed alcohol, cannabis and benzodiazepines, threatened others with a knife he had been carrying for a few days, cut himself, and been arrested by the police. He was diagnosed as an acute schizophrenia-like psychotic disorder (F23.29). Voices had told he was going to die in one year. In the hospital he had cut himself again, experienced visual hallucinations and threatened the personnel but eventually stabilized somewhat, with less anxiety, agitation and aggression. The auditory hallucinations had decreased in frequency but had not completely disappeared. His mental state was 'apathetic'. It was decided he could not return to his parents, and he was transferred to a children's home.

After three weeks in a children's home he was voluntarily hospitalized due to suicidality and increased auditory and visual hallucinations despite olanzapine treatment. He suspected he was being followed by unidentified people who wanted to extract information from him. He had become increasingly more worried about the voices, wanting to get rid of them completely. A clozapine medication had been initiated. After a nine-week hospitalization he returned to the children's home on clozapine and hydroxyzine medications.

In retrospect, he said that clozapine had 'dismantled his mind', resulting him in 'not having the energy to continue any longer'. He had gained 30 kg of weight. He said the doctor's claim that the voices would get worse had created 'a snowball effect' that had made the situation progressively worse.

Regular dose LSD and psycholytic dose DMT sessions

Being acutely suicidal he decided to try his childhood idea of LSD treatment and acquired it from the darknet. He decided to commit suicide if the experiment would not help. In mid-February 2019 he took 100–200 μg of LSD. At first he had what he worried was a psychotic idea, and thought he should stop the process with antipsychotics. However, he recalled that this session was to be the last effort in saving his life, decided there was nothing to lose, and continued.

He cried, shouted and laughed for eight hours, reliving his previous life experiences: what he had done to others and what others had done to him. He realized that the voices were only representations of his unprocessed, previous life experiences. He gave up attempts to control his life, gave up resistance. The purportedly final nature of the session had enabled him to 'let go'. He had 'surrendered' to, 'accepted' what had been happening. He said he had learned that 'one can go with the flow and that it's futile to fight one's own nature'.

The session had triggered 'a flow state' and a decision that his life was not yet at its end: he would start a new life. He described having then 'trained his mind with the help of LSD', processing more of the adverse childhood experiences (ACEs), body postures and positions, such as the fetal position, related to the ACEs. He said he had previously been fearful of processing the ACEs. The auditory hallucinations mostly disappeared after he began processing the ACEs.

Yet a residual 'bad feeling' remained. He therefore experimented with DMT which 'opened completely different perspectives'. Currently he was 'open to experiences' and 'no longer fearful'. He described psychedelics had enabled him to question his negative self-image and transform it into a positive one.

In addition to psychedelic sessions he devised a method for scrutinizing his thoughts for psychotic ideation. He said psychotic people typically deviated into pseudo-explanations. His method included 'taking a concept and seeing it from different perspectives, finding new ways of conceptualizing the situation, then reinspecting it once again, to find the most logical explanation'. He stressed the importance of logic and probabilities. He had never received psychotherapy, 'except taking psychedelics alone at home'; he said that had worked for him.

He carried out six LSD sessions in 2019, with doses of 100–200 μg. In the last session he felt the presence of entities who wanted to show him something but he did not feel ready to receive what they were offering. He encountered an icosahedron with a consciousness. Every thought that the teenager shared with the icosahedron was mirrored back to him as if it would have answers to all possible questions. The teenager told the entity that it was welcome to visit but that after the trip if would have to leave. The entity refused to leave. This caused the teenager to panic and interrupt the session with clozapine. The next morning he felt confused because he thought one could only see entities with psilocybin and DMT. Others told him it was normal also with LSD. This information resolved the fear and he now interpreted the entities as parts of himself.

The teenager's friends felt LSD sessions to be too demanding for them. As a result the teenager also discontinued LSD sessions. He instead smoked psycholytic doses of DMT almost daily for a few months, feeling that it helped him process remaining issues, after which he felt little need for further processing. By the time DMT use began his paranoia had already been resolved. However, DMT caused a feeling of being 'smarter than other people' which vanished as DMT use ceased.

The main difference between DMT and LSD had been the duration of the experience. The quality of the DMT experience depended on the dose. A small dose produced an antidepressive effect. Larger doses simply 'hit one in the face'. He had eventually decided that entities in the DMT world were fundamentally good, and initially negative experiences were intended as 'teachings'. A later integration showed that they had been 'useful lessons', and 'getting beaten up' was 'a part of the process'.

He encountered one entity twice. He described it as all his recent negative experiences collected into one entity. The entity resided with him in an empty space containing nothing but him and the entity representing his negativity. Time had ceased to exist, yet in the background he maintained the idea of it being only a short-term experience. Confronting negative emotions head on without 'filters' or 'defenses' felt slightly shocking at first, yet the next day the experience gained a new interpretation: he had been very negative without noticing it, and it was time to change it. He called these experiences 'wake-up calls'.

He also described divine experiences, the details of which have been forgotten. These repeated divine, i.e. positive, experiences had slowly begun to alter his worldview, causing forgotten positive childhood memories to resurface. He said he needed more repetitions than an average person. After one summer of psycholytic DMT use he had not felt the need for further sessions. He wanted belong to the society and the world, to live and enjoy life. He described that 'life had begun to feel like a life'. A major factor had been an avoidance of 'toxic people' including his parents, brother, and some friends. However, recently his relationship with his mother had improved.

A psychiatric re-evaluation at the age of nineteen in September 2020 by a different psychiatrist concluded that his symptoms had mostly disappeared. This psychiatrist considered that his earlier psychotic symptoms had not been due to schizophrenia but multiple drug use, and mentioned to the patient that clozapine appeared to have been 'a mistake'. The reasons behind this interpretation were not given and the opinion of this psychiatrist about the earlier treatment decision of another psychiatrist was not mentioned in the medical record.

The teenager described that the effect of psychedelics depended on the environment. At the age of fourteen his environment had been very negative, enforcing a feeling of powerlessness. According to him, psychedelics would have been unlikely to improve the situation much at the time. After the children's home he moved to an apartment on his own, gained increased autonomy, and was not directly targeted by violence and external emotional influences. The LSD sessions had been carried out in this situation.

The initial interview for this article was conducted in September 2020. At the time he was enrolling in a program at a vocational school intended for the general public (not a special education program). In the winter of 2021 he 'got involved in bad company' for a few weeks, resumed cannabis use, relapsed into a psychosis, and was involuntar-

ily hospitalized for a week. Upon discharge he discontinued psychiatric medication and returned to his studies.

In a follow-up interview in September 2021, he said the studies felt suitable for him and he had successfully finished the school year. He occasionally heard voices but conceptualized them as 'fragments of reality'. The voices were helpful in revealing unprocessed ACEs. The voices prepared him for the future, defending him, teaching him how to handle situations he was expected to face. Due to their usefulness he now wanted to retain the voices. Following his first LSD session three years earlier, he had taken antipsychotic medication on three days: once to terminate a psychedelic session (as described above), and twice for insomnia. In his own estimation he fulfilled criteria for a type 2 hallucinogen persisting perception disorder which 'caused his brain to recognize patterns that didn't exist' (HPPD; F16.983) (Halpern et al., 2016). He was moving to another city for a new job. He advised others to let go of fear, be brave, and accept things. He said that instead of changing brain chemistry, the social environment should change, and 'people should be nicer to each other'.

Discussion

The ICD-10 diagnostic manual does not contain the diagnosis of complex post-traumatic stress disorder; it will be added in the forthcoming ICD-11 manual. The patient had therefore not been assigned this diagnosis by a qualified clinician. We can, however, compare the ICD-11 diagnostic criteria 6B41 to the clinical features presented in the case description. There had been prolonged domestic violence and/or repeated childhood physical abuse. He described the contents of the psychotic symptoms as reminders of earlier traumatic events; these could be interpreted as a specific form of the 'flashback' phenomena. He avoided contact with the aggressor and his parents. The psychotic paranoid ideation could be interpreted as persistent perceptions of heightened current threats. Severe and pervasive problems in affect regulation were present as violent outburst and self-harm. There were persistent beliefs about oneself as diminished, defeated or worthless. He also avoided social interaction and did not feel close to his peers. The disturbances resulted in significant impairment in all areas of life. Suicidal behavior, substance abuse, as well as depressive and psychotic symptoms were present. It thus appears justified to classify the case as complex post-traumatic stress disorder, and possibly to designate C-PTSD as the root issue leading to substance abuse as a way to escape the symptoms of C-PTSD. The substance abuse, in turn, appears to have been a major factor in the emergence of the psychosis.

While the cessation of cannabis use may have been the primary contributor to the resolution of psychosis, the resolution of the complex trauma with psychedelics may have been the primary contributor to the resolution of major depression and generalized anxiety disorder. With regard to the diagnosis of schizophrenia, in retrospect he did not seem to have unambiguously presented with Schneider's First Rank Symptoms (Soares-Weiser et al., 2015). Schizotypal personality disorder could be also considered as an option but it was not mentioned in the medical record. Nevertheless, during the two interviews the patient no longer appeared to present with criteria sufficient for any of these diagnoses. The outcome, produced by the teenager by himself, with no formal education or assistance, may be seen as a notable achievement. Alternatively, the outcome may be interpreted as illustrating the self-guiding nature of a psychedelic therapy process. It could also be claimed that since the teenager mentioned having some residual symptoms and continued to possess a sensitivity to psychosis triggered by cannabis, his psychosis was not fully healed. However, comparing the situations before and after, including the newly acquired capability to study and work and the resolution of almost all symptoms, residual symptoms appear irrelevant.

The teenager mentioned that the process had made him 'open to experiences', whereas before the sessions he had not been. This might illustrate that a central feature of mental disorders could be resistance to experience, i.e. defensiveness or non-acceptance of what is. This is likely due to the negative and overwhelming nature of traumatic events.

Fisher, who treated children diagnosed as schizophrenic-autistic with LSD, defined psychosis as a massive defense system (Fisher, 1997). Seikkula, the developer of an 'open dialog' model for treatment of psychoses, defined psychosis not as an illness but as a survival strategy in the case of severe stress (Seikkula, 2019). The present case aligns with these views but also highlights the role of cannabis and genetic predisposition, with schizophrenia having been diagnosed in the extended family.

A minimalist explanation of the origin of the distorted, psychotic ideas of the teenager could be that his interpretations were simply a result of learning the features of his childhood environment which was too different from the other environments to which he later tried to apply these models. The models therefore did not produce reliable predictions, i.e. did not enable correct reasoning about behaviors of other people. As the magnitude of these prediction errors was so high, the condition was deemed psychotic, whereas errors of lesser magnitudes might have been labeled for example a personality disorder or being a difficult person.

As an example, the teenager's estimation that people were trying to hurt him appeared to be simply derived from his experiences with his brother and parents. However, this model fit badly in an environment which was relatively unthreatening or neutral, leading to misinterpretations. Considering this, it may be feasible to cease labelling these kind of over-generalizations a 'psychosis'. Interestingly, the teenager was able to devise a system for correcting these biases. In general, a feasible method to correct such misinterpretations may be an environment that would present with overly positive, even exaggerated yet believable affirmations of being non-threatening, i.e. safe.

As a detail of the described LSD sessions, the fright in the last session was caused by experiencing something unexpected. With better understanding and instructions these kind of issues could be passed by unnoticed in a session. As another detail, Watanabe et al. wrote that abnormal perceptual priors involved in psychotic false perception have an affective nature, and noted that in healthy people a feeling of presence usually arises in association with spatial perception of external stimuli but under the influence of an anxious mood people feel a presence even without external stimuli (Watanabe et al., 2018). In the present case, this feeling of presence was experienced by the teenager in the last LSD session which he interrupted due to an overwhelming anxiety.

Although schizophrenia and bipolar disorder have vastly different neurobiological underpinnings, their clinical features overlap (Cattarinussi et al., 2022), and both are typically considered contraindications to psychedelic therapy. Regardless, Mudge has investigated the use of ayahuasca for bipolar disorder (Mudge, 2016). According to him, due to its short binding time to 5-HT 2A receptor, DMT does not induce mania in people with bipolar disorder but acts as a mood enhancer/stabilizer instead (Mudge, 2016). The teenager in this case described the effect of psycholytic doses of DMT in the same way. Even prolonged daily use did not trigger a psychosis but produced a calming effect instead. Large doses had not triggered psychotic symptoms either.

In the context of bipolar disorder, ideas similar to the open dialog model for psychosis have been presented by for example Grof (1990), Blackwell (2011), and Mudge (2021). In addition, many indigenous cultures conceptualize psychoses very differently from the current biomedical model, largely aligning with the views of the above mentioned authors.

In the present case psychedelics, even unsupervised, appeared to produce integrative effects by lifting subconscious, i.e. embodied, traumas into consciousness for processing. The perceived nature of auditory hallucinations first transformed from neutral into threatening and finally into helpful. While the emergence of psychotic symptoms may have been due to genetic predisposition and cannabis use, psychedelics may have helped in reinterpreting the meaning of these symptoms in a similar manner as, for example, cognitive-behavioral therapy for psychosis.

In the present case, the history of illness and anti-psychotic medication was comparatively short. In the short term, there is evidence that antipsychotics improve the quality of life, functioning, and disability, reduce psychopathology, the severity of illness, compulsive behavior, and improve cognitive insight (Verma et al., 2020). On the other hand, in a 19-year follow-up, moderate and high cumulative antipsychotic maintenance treatment within the first five years after first-episode psychosis was consistently associated with a higher risk of adverse outcomes (continuing use of antipsychotics, psychiatric treatment, disability allowances, mortality), as compared to low or zero exposure (Bergström et al., 2020). This suggests that antipsychotics should be used temporarily or intermittently instead of as a prophylaxis.

Antipsychotics also present a cardiometabolic burden, suggesting the need for alternatives with more favorable side effect profiles (Khandker et al., 2022). Psychedelics, for example with psycholytic dosing, in case they would consistently produce the mentioned 'calming effect' and/or promotion of positive reinterpretation of the meaning of symptoms, could be studied as possible alternatives to antipsychotics.

Some benefits and risks related to various models of psychedelic therapy

Concerning self-treatment protocols, the most significant risk in self-treatment is the uncertainty related to the purity of substances. As mentioned in the introduction, at times designed drugs with an unknown safety profile are sold in place of classical psychedelics. A proper harm reduction approach might involve a state-organized supply of certified substances. A certified, affordable supply with proper education and protocols together with psychotherapists and clinicians educated in the substances and post-treatment integration work would eliminate the majority of risks, allowing broader access to the significant benefits of psychedelic therapy. As also mentioned in the introduction, in extreme sports, psycholytic doses has successfully been used to enhance safety. Therefore, it would be essential for societies to not fall into the trap of holding the current, possibly not fully evidence-based notion of safety as 'sacred' while ignoring significant trade-offs demanded by other practical and moral concerns. These concerns involve the fact that many severely traumatized people currently receive no support at all, and if current practices continue, never will. Subsequently, they traumatize their surroundings, leading to a never-ending spiral of destruction and suffering. Wars and climate change are the two most prominent examples of consequences of this phenomena.

Multidisciplinary Association for Psychedelic Studies (MAPS) provided a protocol for psychedelic therapy sessions (Mithoefer, 2021). The protocol includes preparatory therapy and post-session integration with trained therapists, as well as 'non-directive' empathic support from therapists during dosing sessions. These features are considered to be a large factor in the overall efficacy of the protocol. Some clinical trials have not included a therapy component, for example a RCT ($n = 29$) in Brazil investigating the rapid antidepressant effects of ayahuasca in treatment-resistant depression (Palhano-Fontes et al., 2018). In this trial, investigators remained in a room next door, offering assistance when needed. In one documented example of a traditional indigenous context, persons undergoing long-term psychedelic training were visited three times a day by a supervisor but were otherwise socially isolated (Berlowitz et al., 2017; 2022).

The self-administration practice utilized in the present case did not include external support during most sessions, although there appeared to have occasionally been friends present during psycholytic DMT sessions, and he utilized and benefited from online peer support. The patient did not feel the need for supervision during sessions, and in retrospect appeared to have been correct in his estimation. He did not experience adverse events or any inconvenience that he could not overcome by himself. However, due to his history of multiple drug use he already had experience of altered states of mind, and he was also familiar with handling psychotic states. With regard to the assumed worst-case risks of psychosis and/or suicidality, he was already psychotic and suicidal; there was thus little room for getting worse.

A balanced discussion about self-administration requires the taking into account of not only the perspective concerning benefits of control and regulation, but also other points of view. While high dosing and inexperienced people certainly present a volatile combination and significant risks, the risks involved in psycholytic dosing appear low. The concepts of trauma, control, risk and safety are deeply interconnected, influencing attitudes towards self-treatment. Porges has studied the relationship between traumatic experiences, the autonomic nervous system, and feelings of safety and threat, noting these feelings are subjective interpretations based on the body's state (Porges, 2022).

As psychedelic therapy trials are gaining mainstream attention but access to such therapy or psychiatric treatment in general remains unavailable, self-treatment attempts will unavoidably increase, and it is unlikely that they could be prevented. Unresolved questions about resources and scaling are central to the demand for such practice (Nutt and Carhart-Harris, 2021). For example in Europe, additional trauma is currently being produced at an unprecedented scale while resources were insufficient for handling even the preceding situation. Obsessing about threats and risks might exacerbate instead of reducing them. Many societies have become dangerously unstable. In order to prevent worldwide chaos it would be essential to swiftly reduce the prevalence of severe trauma in societies, especially in people in leadership positions.

A more constructive approach would involve a balanced evaluation of the situation as a whole, as a society, instead of only from the point of view of existing psychiatric care system. A harm-reduction approach has been widely and successfully adopted for conditions such as opioid addiction. It could be extended also to the issue of self-treatment with psychedelics. This approach would involve development of proper self-treatment protocols, first with psycholytic dosing, for example. An extended psycholytic dosing strategy such as illustrated by the present case might produce many of the benefits of regular or high dose sessions while avoiding most of their risks.

Contrary to common preconceptions, people are rarely rendered into uncontrollable states by psychedelics. As described in the introduction, the prevalence of psychosis due to LSD use appeared low (Vallersnes et al., 2016). A properly planned unsupervised self-therapy setting might be unlikely to produce such an outcome, as exemplified by the present case. In case of doubt, psycholytic dosing could be utilized as long as needed to build confidence in the process.

Patient outcomes are known to depend on the quality of therapeutic alliance (Murphy et al., 2022). There are many reasons why this alliance might not exist or could not be built in to clinical or hospital settings. The only alternatives given in such a situation should not be the enforcement of inefficacious treatment, or denial of treatment. Also, many lack even access to these settings.

Excessive control and lack of trust may contribute to the emergence of mental disorders. The teenager's childhood family and the hospital system were low-trust environments. When the highly structured and regulated system failed to protect this patient, his application of individual agency and his subsequent *surrender to uncertainty* resulted in a reorganization of his thought system, or his default mode network (Doss et al., 2021). Safety was acquired through giving up safety.

In many indigenous traditions, psychedelics are considered externally controllable: a skilled psychedelic guide can direct the patient's experience by singing (Beyer, 2009), in a manner similar to how a parent would sing to a child (patients are typically in regressed states). In the clinical context, the use of playlists is based on the same principle. In contrast, another plant medicine, wild tobacco (Nicotiana rustica) (Narby and Pizuri, 2021), is often considered uncontrollable by either the patient or the guide. Regardless, the controllable medicine is considered to only reveal issues in order to allow for later processing or 'integration' of the experience. The uncontrollable medicine, in turn, is often considered to resolve disorders. This may indicate the role of relaxing control as the actual 'healing force', possibly by releasing em-

bodied trauma that cannot be released in the presence of self-inhibition, i.e. control.

With regard to supervised settings, just as there are numerous ways in which the therapist can positively influence patient outcomes, there are also numerous ways in which the presence or the subtlest behaviors of another person may unconsciously and inadvertently adversely influence a person in a hyperaware-hypersensitive state. These mechanisms are usually no different from the ones present in ordinary states but due to hyperawareness, observations are typically conscious instead of unconscious, and due to hypersensitivity, reactions to these observations may be amplified. Due to these two factors, a successful therapeutic intervention may thus result in somewhat miraculous outcomes, and vice versa.

Patients with early complex trauma suffering from depression have often been conditioned to default to a 'fawn response', i.e. to attempt to please aggressors and authorities (Walker, 2013). In a supervised psychedelic session, their relationship to the supervisor will often default to the same response. This may disallow recognition and resolution of this response pattern and subsequently prevent resolution of the related trauma. Also patients presenting with extreme distrust or social phobia, or with paranoia like the patient in the present case, will likely present with similar transference, and may proceed better in the absence of direct observation.

Supervision is also likely to maintain an idea of dependence on a therapist or an 'expert'. An article which focused on the issue of agency in schizophrenia noted that recovery involved recapturing a sense of agency (Lysaker and Leonhardt, 2012). The present case may be considered to reflect this recapturing of personal agency over one's life, with a massive positive effect on his self-esteem and openness to social interaction. Based on his experiences, the young man concluded that 'doctors are not always right'.

Another complication of supervised sessions may be a reversal of the position of power. If the intention of the supervisor is to maintain an idea of 'controlling the situation', significant personal experience of psychedelics and learned skill is required. Fisher pointed out an issue 'generally not addressed in the literature': the vulnerability of the psychedelic therapist (Fisher, 1997). A patient, due to being in a state of expanded awareness of the surroundings, gains 'intimate knowledge of the therapist and his state of grace - or lack thereof; the therapist cannot hide from being "seen"'. This easily results in the patient being in control, rendering the idea of supervision futile. To reduce the probability of such disconnection between the therapist and the patient, a Swiss psychotherapist who organized group sessions with psychedelics in the early 2000s recommended that supervisors should utilize a psycholytic dosing strategy for themselves while supervising a session (Meckel Fischer, 2015). The hyperawareness of patients in conjunction with a more restricted awareness of 'sober' therapists is an actual, under-appreciated problem that should be taken into account when designing supervised psychedelic therapy protocols.

All in all, it would be misleading or an oversimplification to state that a supervised setting would always be preferable to an unsupervised setting. A supervised setting is simply more complicated due to the possibility of interpersonal interaction. This interaction can be either beneficial or harmful; Read et al. have discussed therapist countertransference and projective identification (Read and Papaspyrou, 2021). Therefore, both models may have their uses and deserve to be studied in detail. Unsupervised use may be applicable to patients in later stages of psychedelic therapy who have already attended individual and/or group sessions, and are familiar with both the substances as well as their reactions to them. It is not recommendable for patients with little or no experience. However, when used as intended, protocols combining individual, group and self-treatment may provide superior cost-efficiency and scalability.

With regard to group sessions, a preprint by the author described a case of small-group treatment of complex trauma and treatment-resistant depression due to domestic violence and sexual abuse, illustrating the potential of this model (Turkia, 2022b). The patient first underwent an individual session, then attended small-group sessions, and further proceeded to sessions with a friend. No adverse events occurred. In similar cases, later sessions could also be psycholytic self-therapy. A similar group protocol developed in Switzerland was mentioned in the introduction (Oehen and Gasser, 2022).

A more detailed example of psycholytic self-therapy was presented in another preprint by the author about self-treatment of complex trauma (Turkia, 2022a). Also in this case, initial sessions were high-dose and latter sessions psycholytic. The latter sessions were described as 'exposure therapy'. Under the influence of a psycholytic dose of LSD, a young man with social phobia due to bullying attended social events. LSD produced a feeling of being slightly distanced from his automated reactions. He could better observe his behavior and thoughts as well as change his response consciously, introducing and reinforcing new, more adequate behavioral patterns. He could observe himself objectively, 'as another person', detached from his personal issues. Slight 'hyperawareness' of the internal functioning of his mind which allowed processing of social trauma 'in real time'. There were no adverse events.

With regard to possible models of psychedelic therapy, there are also other overlooked models. Current clinical trials only study a model in which the patient consumes a psychedelic while the therapists do not. In some traditional indigenous contexts (e.g. Shipibo Gonzalez et al., 2021), the situation was reversed: in order to enhance their diagnostic skills the therapist utilized a psycholytic dosing while the patient was not under the influence of anything. An experienced therapist would likely be more capable of utilizing the benefits of the hyperaware-hypersensitive state than a patient with no previous experience of it. This model might immensely enhance the efficacy of psychotherapeutic practice, for example. It could be claimed that in the currently studied model, much of the potential might be 'wasted on the patients' while the potential of the therapists will be underutilized. It would therefore be essential to study also this model deemed better in some of the traditions.

Case studies and evidence based medicine

Concerning the reliability and applicability of case studies, Flyvbjerg has studied their role in science in depth (Flyvbjerg, 2006). He commented that the common concept of case studies being arbitrary and subjective, only useful for generation of hypotheses, and not generalizable was 'so oversimplified as to be grossly misleading'. He stated that formal generalization was overvalued as a source of scientific development, whereas 'the force of a single example' was underestimated. Concerning general vs. context-dependent knowledge, he commented that the latter is 'at the very heart of expert activity'. He did not find greater bias than in other forms of research. The evidence found could often be generalized. Also, case studies were to be read as narratives in their entirety. The problems in summarizing were more often due to the properties of the reality studied than to the case study as a research method. As an example, the present case 'generalizes' and 'summarizes' many aspects of other, undocumented, observed cases that presented with similar features and outcomes.

Modern biomedicine is currently based on a paradigm of evidence-based medicine (Solomon, 2011). One of its core features is a grading system for assessing the quality of evidence. For example, the Centre for Evidence-Based Medicine gives the following order of preference, from highest to lowest (Burns et al., 2011): systematic reviews of randomized controlled trials (RCTs), an individual RCT, all or none study, systematic review of cohort studies, individual cohort study or low quality RCT, outcomes research or ecological studies, systematic review of case-control studies, individual case-control study, case series or poor quality cohort and case-control studies, and expert opinion. Single case studies are not even mentioned but are considered comparable to expert opinion, and are as such of little value in treatment decisions. It should therefore be clear that this case description is not to be taken as a treatment guideline or as a recommendation. Even though the described

methods produced a feasible result for this person, a degree of unpredictability lies in the nature of psychedelics, and the same approach might not produce the same result in another person with a different background and characteristics.

Conclusions

The case illustrates that a diagnosis of a psychotic disorder may not necessarily need to be a contraindication to the treatment of early complex trauma, depression, suicidality or other mental disorders with psychedelics. As psychedelics are gaining mainstream attention, self-treatment attempts will unavoidably increase. Unsupervised self-administration of regular and high doses by inexperienced people carries high risks and should not be encouraged at this point. Risks related to low-dose psycholytic self-administration may be more tolerable. In order to avoid risks related to uncertified substances and lack of guidance, a harm reduction approach to self-therapy could be adopted. Suitable protocols including pre- and post-session support for psycholytic self-therapy could be developed to overcome otherwise insurmountable issues related to the availability and scaling of psychedelic therapy. Further research on these issues is warranted.

Authors' contributions

The author was responsible for all aspects of the manuscript.

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Ethics approval and consent to participate

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Consent for publication

A written consent from the patient was obtained.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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