# Psychedelic therapy for smoking cessation: Qualitative analysis of participant accounts

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# Psychedelic therapy for smoking cessation: Qualitative analysis of participant accounts

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**Abstract**

**Background:** Recent pilot trials suggest feasibility and potential efficacy of psychedelic-facilitated addiction treatment interventions. Fifteen participants completed a psilocybin-facilitated smoking cessation pilot study between 2009 and 2015.

**Aims:** The aims of this study were as follows: (1) to identify perceived mechanisms of change leading to smoking cessation in the pilot study; (2) to identify key themes in participant experiences and long-term outcomes to better understand the therapeutic process.

**Methods:** Participants were invited to a retrospective follow-up interview an average of 30 months after initial psilocybin sessions. Semi-structured interviews were conducted with 12 of the 15 participants. Data were analysed using thematic analysis.

**Results:** Participants reported gaining vivid insights into self-identity and reasons for smoking from their psilocybin sessions. Experiences of interconnectedness, awe, and curiosity persisted beyond the duration of acute drug effects. Participants emphasised that the content of psilocybin experiences overshadowed any short-term withdrawal symptoms. Preparatory counselling, strong rapport with the study team, and a sense of momentum once engaged in the study treatment were perceived as vital additional factors in achieving abstinence. In addition, participants reported a range of persisting positive changes beyond smoking cessation, including increased aesthetic appreciation, altruism, and pro-social behaviour.

**Conclusions:** The findings highlight the value of qualitative research in the psychopharmacological investigation of psychedelics. They describe perceived connections between drug- and non-drug factors, and provide suggestions for future research trial design and clinical applications.

**Keywords**

Qualitative research, smoking cessation, addiction, psilocybin, psychedelic

## Introduction

Recent research with classic serotonin 2A receptor agonist hallucinogens (i.e. psychedelics) has generated renewed interest in these drugs as a potential avenue for developing novel addiction treatments (Bogenschutz and Johnson, 2016; Garcia-Romeu et al., 2016; Krebs and Johansen, 2012; Sessa and Johnson, 2015). Pilot studies have shown safety and feasibility of psilocybin, a naturally occurring psychedelic found in so-called 'magic mushrooms,' as a therapeutic tool in the treatment of tobacco (Johnson et al., 2014) and alcohol use disorders (Bogenschutz et al., 2015). These findings add to a body of converging evidence suggesting psychedelics may have therapeutic potential.

Laboratory studies administering psychedelics to carefully screened and prepared individuals suggest these substances can occasion lasting changes in mood, behaviours, and attitudes (Doblin, 1991; Griffiths et al., 2006, 2008, 2011; MacLean et al., 2011). Epidemiological data show significant associations between psychedelic use and reduced recidivism in formerly incarcerated, substance-involved individuals (Hendricks et al., 2014), and reduced psychological distress and suicidality in a national United States sample (Hendricks et al., 2015). A meta-analysis investigating the psychedelic lysergic acid diethylamide (LSD) in the treatment of alcoholism found significantly greater reductions in alcohol misuse at initial follow-up in patients treated with LSD compared with control conditions (Krebs and Johansen, 2012). Observational studies have found decreased rates of alcohol and other drug misuse among religious users of ayahuasca, which contains the psychedelic dimethyltryptamine (Doering-Silveira et al., 2005; Fábregas et al., 2010; Halpern et al., 2008).

In a recent open-label pilot study, 15 treatment-seeking smokers completed a smoking cessation intervention combining two to three administrations of psilocybin with cognitive behavioural

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therapy (CBT) (Johnson et al., 2014). Of the 15 participants, 80% ($n = 12$) were biologically verified as smoking abstinent 6 months post-treatment (Johnson et al., 2014), 67% ($n = 10$) were abstinent at 12 months post-treatment, and 60% ($n = 9$) were abstinent at a long-term follow-up an average of 30 months post-treatment (Johnson et al., 2016). Although results from an open-label study cannot demonstrate efficacy, the most effective current pharmacotherapies for smoking cessation typically show success rates ⩽35% at 6 months and beyond (Cahill et al., 2014; Hays et al., 2008; Mottillo et al., 2009; Tønnesen et al., 2003).

The psychological mechanisms of action of psychedelic-facilitated treatments remain poorly understood. Preliminary quantitative analyses suggest that acute mystical-type drug effects are significantly associated with therapeutic outcomes in psilocybin-facilitated addiction treatment (Bogenschutz et al., 2015; Garcia-Romeu, et al., 2014). Recent double-blind, controlled studies of psilocybin in patients with life-threatening cancer diagnoses also found lasting antidepressant and anti-anxiety effects that were mediated by psilocybin-occasioned mystical-type experiences (Griffiths et al., 2016; Ross et al., 2016). Such findings are consistent with earlier researchers' assertions that the subjective effects of psychedelics play a pivotal role in generating lasting therapeutic benefits (e.g. Osmond, 1957; Pahnke and Richards, 1966; Savage and McCabe, 1973).

Psychological insight, increased personality openness, changes in beliefs and values, increased motivation and enhanced self-efficacy have been hypothesised as possible psychological mechanisms of psychedelic-facilitated addiction treatment (Bogenschutz and Pommy, 2012). Recent novel qualitative research has offered additional insights into potential psychological mechanisms of psilocybin-facilitated treatment. One such study found that cancer patients with symptoms of depression and anxiety reported a range of positive effects from psilocybin-assisted psychotherapy, including greater relational embeddedness, emotional range and wisdom, as well as revised life priorities, alterations to identity, and movements from feelings of separateness to interconnectedness (Belser et al., 2017). A second recent study on patients' accounts of psilocybin-assisted therapy for treatment-resistant depression reported shifts from disconnection (to self, others and the world) to connection, and from avoidance of difficult memories and emotions to acceptance (Watts et al., 2017).

The primary aim of this qualitative study was to characterise the perceived mechanisms of change attributed to a structured psilocybin-facilitated smoking cessation treatment. A secondary aim was to identify themes emerging from participant accounts of their experience undergoing psychedelic-facilitated addiction treatment, including perceptions of the separate facets of treatment and the overall intervention, and any additional long-term outcomes. As clinical research with psychedelics is still in its early stages, such experiences can offer insights for improving best practice in the emerging field of psychedelic research and psychotherapy for substance use disorders.

## Methods

This retrospective follow-up study was approved by the Johns Hopkins University School of Medicine Institutional Review Board. All 15 individuals who completed an earlier psilocybin-facilitated smoking cessation pilot study were contacted via email or telephone and invited to participate in this supplementary qualitative study.

In the original study treatment, participants attended four weekly counselling meetings with two trained study guides (see Johnson et al., 2014). These meetings consisted of a standardised evidence-based CBT treatment for smoking cessation (Marks and Sykes, 2002; Sykes and Marks, 2001), and specialised preparation for psilocybin sessions. In addition, participants received mindfulness training in the form of a short body-scan meditation (Kabat-Zinn, 1990), developed a mantra or motivational statement toward quitting smoking, and used a scented oil and brief guided imagery to aid in their efforts. On their target quit date (TQD) in week 5, participants were administered a moderate dose (20 mg/70 kg) of psilocybin. During all psilocybin sessions a program of music was played. Participants were instructed to focus their attention inward, and with regards to their experiences, to 'trust, let go, and be open.'

After the first psilocybin session (i.e. TQD), weekly follow-up meetings were held for 10 weeks to discuss psilocybin session experiences, provide support for ongoing abstinence, and track smoking status. A second, higher dose (30 mg/70 kg) of psilocybin was administered approximately 2 weeks after the TQD. Participants were required to maintain at least four consecutive days of abstinence between the first and second psilocybin sessions to continue receiving the study treatment. The rationale for this was to ensure that participants' intention to quit smoking was sincere and not merely a desire to receive psilocybin. A third high-dose psilocybin session was available approximately 8 weeks after the TQD, with 3 of the 15 participants opting out of this final psilocybin session. All participants returned for follow-up meetings 6 and 12 months after the TQD.

This study presents new retrospective qualitative interview data regarding participants' experiences in the aforementioned treatment study. Twelve individuals (80%) agreed to participate, provided written informed consent, and attended a single face-to-face interview. Interviews occurred on average 30 months (range = 16–57 months) after the TQD (i.e. first psilocybin session). On the interview day, participants completed some brief questionnaires regarding their smoking behaviour since their last visit and provided breath and urine samples to verify current smoking status (Johnson et al., 2016). Afterwards, the interviews were conducted and audio recorded in the psilocybin session room used in the original intervention (in part to increase context-dependent recall). One member of the team (TN) who had had no prior contact with the participants conducted interviews with all 12 participants.

The interview (see Appendix 1) was designed by the authors to inquire into participants' experiences of the study treatment, and the ways it may have helped them quit smoking. In total, the interview was comprised of 43 questions probing participants' current and prior smoking habits, overall study treatment experiences, psilocybin session experiences, and mechanisms hypothesised to play a role in smoking cessation outcomes (e.g. Bogenschutz and Pommy, 2012; Gasser et al., 2014; Halpern, 1996; Ross, 2012). To conclude the interview, several open-ended items asked participants to propose alternative mechanisms of action not queried, potential future research regarding psilocybin, and possible improvements to the study treatment.

### Data analysis

Interviews were transcribed by researchers and listened to a second time to check for accuracy. Interview transcripts were subjected to thematic analysis using three approaches to triangulate findings.

First, two researchers (TN and AG-R) coded transcripts using Dedoose (2016) qualitative data analysis software (SocioCultural Research Consultants, Los Angeles, CA). Codes were derived both top-down from interview questions, and bottom-up from emerging patterns agreed upon in regular research analysis meetings. To test for inter-rater reliability, two interview transcripts were concurrently coded by both raters using the final codebook, and submitted to a pooled Cohen's kappa test (Cohen, 1960; De Vries et al., 2008).

Second, a table listing 31 of the most objective items was distilled from transcripts. This provided data for each participant based on their interview responses (e.g. the participant's current smoking status; key elements of the study that led to changes in participants' smoking habits; most profound psilocybin session experience, etc.), and allowed for convenient comparisons within and between subjects.

Third, one-page summaries were written to outline the main turning points in each participant's narrative of their experience in the research study. Each coder created summaries of the interviews they coded, and these summaries were subsequently shared between the coders to ensure coders' interpretations of participants' experiences were congruent.

Using these three complementary methods, interview data were analysed for patterns concerning how participants experienced the study treatment, the treatment's overall effects on participants and the mechanisms by which these effects were perceived to occur. Participant quotes have been edited to remove filler utterances.

### Participants

Table 1 shows demographics for the 12 participants who completed this study. Five of the participants (41.7%) had never used a classic hallucinogen before the treatment study, and the remaining seven had a mean (SD) of 10.1 (4.4) lifetime occasions of classic hallucinogen use prior to the study, a mean (SD) of 29.9 (11.5) years before intake to the treatment study. Hereafter, participants are referred to by their anonymous study identification numbers (e.g. 402).

**Table 1.** Demographic and smoking characteristics at treatment study intake, $N = 12$.

| Categories | Mean (SD) | Range |
|---|---|---|
| Sex[a] | 7 M, 5 F | |
| Age (years) at Interview | 54 (11.1) | 31–67 |
| Education[a] | | |
| ---Some college | 3 (25.0) | – |
| ---Bachelor's degree | 7 (58.3) | – |
| ---Graduate degree | 2 (16.7) | – |
| Cigarette dependence (FTCD)[b] | 5.1 (1.0) | 3–6 |
| Years smoking | 31 (10.6) | 10–49 |
| Cigarettes per day | 18 (2.4) | 15–22 |
| Previous quit attempts | 7 (3.7) | 3–12 |

FTCD: Fagerström Test for Cigarette Dependence; SD: standard deviation.
[a]Mean (SD) does not apply to sex or to education. Educational achievement is represented as *n* (%) of total study sample.
[b]Fagerström Test for Cigarette Dependence (Fagerström, 2012; Heatherton, 1991). Possible scores on the FTCD range from 0 to 10, with higher scores indicating greater dependence.

## Results

### Inter-rater reliability

Interviews were a median of 1 h 48 min in duration (range: 1.2–4.2 h). For analysis of inter-rater reliability across the two transcripts and both raters, Cohen's kappa was calculated at 0.75, indicating good-to-excellent inter-rater agreement (Cicchetti, 1994; Fleiss, 1971).

### Current smoking behaviour

For a detailed report of quantitative long-term smoking cessation outcomes, see Johnson et al. (2016). Briefly, 10 participants (67%) were biologically confirmed as smoking-abstinent 12 months post-treatment, and 9 participants (60%) were confirmed abstinent at the long-term follow-up interview. A tenth participant (402) identified as a non-smoker, but tested positive for recent smoking, consistent with her admission that she occasionally smokes at parties. Of the two remaining participants who were interviewed, Participant 424 did not quit smoking at the time of the treatment and continued smoking through long-term follow-up, and Participant 405 relapsed between the 12-month and long-term follow-ups.

Among the three individuals who did not complete the long-term follow-up interview, all three were males. Two did not quit smoking during the treatment and continued smoking through the 12-month follow-up, and one quit smoking through the 6-month follow-up, but relapsed between the 6- and 12-month follow-ups. At the final 12-month follow-up completed by these three individuals, all considered their psilocybin experiences to have been personally meaningful and spiritually significant, and none considered their experiences in the study to have decreased their well-being or life satisfaction in any way (see Johnson et al., 2016).

### Prior experiences of smoking

Participants were asked about their relationship to smoking before they enrolled in the treatment study. For five participants (402, 403, 406, 416 and 424), smoking was described as offering a space, time and means for experiencing and transforming emotions. As Participant 402 explained, 'You would just reach for it [a cigarette] whenever without thinking really. If you felt…any emotion at all.' Four individuals described smoking as an unthinking and compulsive habit, often tied to an earlier era when smoking was common (participants 403, 410, 417 and 421). In another three cases, smoking was considered a central facet of participants' self-identities (participants 402, 405 and 406).

A sub-theme that emerged regarding six participants' prior experiences with smoking was its ability to produce strong feelings of connection. For participants 402, 422 and 427, cigarettes were described as 'friends' that offered a sense of solace or companionship. For instance,

> There was one point where I got so sad, where I realised, 'oh my God, these cigarettes are my friends', and it made me really depressed to think about it that way (Participant 402).

Participant 406 described his connection to cigarettes as stronger than his spousal relationships. Four participants (402, 405, 410 and 417) reported smoking as a way of connecting with other people. For participants 405 and 417, resuming smoking after attempts at quitting was explicitly tied to seeking connection with people with whom participants used to smoke – for Participant 417, this connection was with his late father:

> [When] I initially started smoking again, it was really in relating to my dad…it was part of our relationship, in very connecting ways. And I think I wanted that connection.

## *Psilocybin-related factors contributing to smoking cessation*

Psilocybin session experiences were perceived as an essential factor contributing to smoking cessation for the 11 participants who quit smoking at the TQD. All 11 participants reported gaining profound insights into their self-identity or smoking behaviour. Themes of interconnectedness, awe, and curiosity were identified as additional features of psilocybin sessions that helped participants quit smoking. Finally, all participants who successfully quit after their TQD reported marked post-session reductions in cigarette withdrawal symptoms in comparison with previous quit attempts.

*Insights into self-identity.* Seven of the 12 participants (402, 405, 406, 410, 416, 424 and 427) reported valuable insights into their understanding of themselves occurring during their psilocybin experiences that were directly relevant to their efforts to quit smoking. Session experiences were described as revealing a deeper, better, or more essential self that either led to a decreased desire to smoke, or to smoking not making sense anymore. These psilocybin-occasioned insights into self-identity were reported by all of the five female interview participants, while only two of the seven male participants.

For instance, Participant 427 described seeing a beautiful 'Technicolor' vine rising during her second psilocybin session:

> I used to hide sitting on the air conditioning unit on the side of my house, when I used to smoke. And so the image was me sitting there, smoking, all hunched over, stupid, smoking. And the vine just rising up and this purply flower face thing looking down at me like, 'how ridiculous!' And then I'm not really that [person], I'm really this vine, that's really me, and the Goddess within me…how silly to think that [smoking]… was going to do anything or solve anything. So it was really just that rising up feeling, and that powerful feeling, and it just filled me with such beauty and strength and life.

She described this experience as reawakening an inner power that she had lost touch with since her youth some two decades prior. The experience produced a sense of strength and beauty that revealed smoking to be incongruous with the person she 'really' was.

Participant 402 reported coming to a profound realization during her second psilocybin session that smoking did not have to define who she was:

> For a few seconds, it was just like 'I'm me, and there are no defining characteristics!'… that made me realise that I'm not a 'smoker'.

In Participant 405's first session, she described encountering a powerfully agential 'goddess' figure whom she watched, admired and finally came to realise was an aspect of herself. By the end of her sessions, she explained,

> It felt like I'd died as a smoker and was resurrected as a non-smoker. Because it's my perception of myself, and that's how I felt. So I jumped up and I said 'I'm not a smoker anymore, it's all done'.

Participant 406 described ending his second session 'emerging out of a cocoon', shaking out a pair of 'magnificent wings'. He interpreted this as

> me revealing myself, like actually showing myself to the world. This is who I am, this is who I *really* am.

Similarly, Participant 410 said she felt the session experiences brought out her 'better side', and that to smoke would be to undo that work.

Among five participants (405, 410, 413, 417 and 427), psilocybin-related insights into self-identity were characterised by a sense of reconnecting with core values that had in some way faded over the years. These included acknowledging the importance of health, breathing, taking breaks, and affirmation of the beauty and simplicity of existence. Such core values were contrasted with learning something new. For instance, Participant 410 reflected,

> Did I learn anything new? Have I done anything totally different than I ever did before? No! But I'm sort of going back into my…earlier life when I probably was a better person, to be honest with you.

Similarly, Participant 427 remarked,

> I don't know if I really *learned* – it was more like letting back in stuff that I had blocked out?… I don't think I changed my values, just remembered more of them. Or just remembered to honour them more, or…*allow* them more.

*Insights into smoking behaviour.* Seven participants (402, 405, 406, 413, 416, 424 and 427) reported specific smoking-related insights during psilocybin sessions that they perceived as helpful for quitting. Four participants (405, 406, 416 and 424) described insights revealing how anxiety and fear contributed to their smoking. Participant 405 remarked, 'I realised that my health problems today are due to chronic anxiety.' Participant 406 reported his session experiences brought to light the constant 'clutter' he carried around in his mind, and believed this insight helped him gain clarity as to why he smoked. Participant 416

reported recalling memories of childhood abuse during her psilocybin sessions, which she had not previously dealt with therapeutically, and which she believed were directly responsible for her smoking and other self-destructive behaviours.

Participants 402 and 427 both described realising that smoking even one cigarette entailed an ongoing commitment to smoking. A specific image from her first session led Participant 402 to the insight that to smoke at all was to be 'a smoker':

> It was me in the red coat, lighting up a cigarette, and then it spread into a grid. So it was like that one cigarette was 1000 cigarettes.

Similarly, participant 427 explained,

> Cigarettes don't seem like a short-term solution anymore. They seem exhausting to me. Like…oh my god – just, having a cigarette now and opening up this whole thing all over again?! To have one cigarette would be a long-term commitment.

*Experiences of interconnectedness.* Eight participants (403, 405, 406, 410, 413, 417, 422 and 424) described experiencing a profound sense of unity and interconnectedness during their psilocybin session experiences.[1] Participant 417 described this experience of interconnectedness during a session as evoking a strong sense of peace:

> I approached the border where existence began, and on the other side of this border was nothing… there was no beginning, no end, no nothing…I think that's really rare and it would be healing to humanity for us to open to those roots, and to our connectedness with everything, and each other in a brotherly, sister kinda way.

Participant 405 described a unitive feeling of love for everything around her:

> I was in love with everything. In love with the couch, in love with the whole room, the people in it … Love is a pretty big distraction from addiction and … my attention kept going back to it, that great feeling of love and acceptance.

For two participants (410 and 424), experiences of interconnectedness recast smoking as an act of harming or contaminating the purity of the universe. For instance, Participant 410 explained,

> I had always had the sense of everything being connected. And [the psilocybin session] reinforced that, very strongly… [If I were to smoke] I would be a polluter…ashtrays and butts all over the place, and you're causing harm to other people's health as well. And so you were re-looking at your place in the universe and what you were doing to help or hinder it. The universe as such. And by smoking, you wouldn't be helping.

Similarly, Participant 424 remarked, 'Your body or your "vessel" is supposed to be treated much like the way you're supposed to treat people or the Earth, and you shouldn't be contaminating that with cigarettes.'

*Sustained feelings of awe and curiosity.* Six participants (403, 406, 413, 417, 422 and 427) reported that the profound significance of the psilocybin session experiences made smoking seem trivial in comparison.[2] These participants described psilocybin sessions as evoking a powerful, sustained sense of awe and a lingering curiosity into unsolvable life mysteries, all of which diminished the relative importance of smoking. For example, Participant 413 described his experience during one session as,

> ...beyond what I have ever been to or any place I ever thought about going to…I was just totally inundated, mentally and emotionally, by that experience. So the smoking was like, 'who cares!', you know? Somewhere that's so special and so unique and it's shown me so much in such a brief period of time…[after that] smoking is not important anymore!

Participant 417 described his session experiences as a 'jubilation in the preciousness of existence' that rendered quitting smoking 'not a big deal' in relation to a greatly expanded awareness of what 'is'. He felt subsequent withdrawal symptoms and cravings were 'more quizzical than burdensome', prompting him to examine his cravings, and life in general, with greater curiosity.

Participant 427 stated that after her second session,

> …smoking just seemed like this miniscule flick of the – pshh, like that, it was nothing compared to everything that I was feeling and thinking, and it was all coming together in this holistic picture of everything, past, present and future. And smoking – whatever! – like just so pointless, it's just nothing to do with anything. Like a little pebble in your shoe – just brush it off and then you… you know, the world is so much bigger!

Participants 403 and 422 also described how lingering contemplative, philosophical questions emerging from session experiences became associated with the goal of stopping smoking, displacing any thoughts of withdrawal or cravings. For instance, Participant 422 described a joyous curiosity that superseded the desire to smoke:

> It was all about searching for answers to questions that are age-old. Maybe we have the answer to some of it, maybe we'll never have the answer to it. But none of it had to do with addiction to cigarettes. It all had to do with stretching space and time, and asking questions like, 'Why is there something rather than nothing?' And, 'What happened before the Big Bang?'… All those things that had nothing, absolutely nothing – at least in the conscious thinking of it – with stopping smoking.…every time I think of a cigarette, it brings me back to the three sessions of the psilocybin trip, where you're trying to ask questions that there may not be answers to. So, that's more fun than smoking!

*Reduced withdrawal and cravings.* The first psilocybin session was followed by marked reduction in the reported intensity and frequency of withdrawal symptoms for 11 of the 12 participants when compared with their previous experiences attempting to quit smoking. These individuals went on to maintain abstinence between their first and second psilocybin sessions. In contrast, the

remaining participant (424) reported similar withdrawal symptoms after his first psilocybin session as compared with previous quit attempts,[3] and went on to have several smoking lapses prior to his second psilocybin session.

Of the 11 participants reporting reduced withdrawal symptoms, seven reported no symptoms whatsoever, whereas the remaining 4 of the 11 participants (402, 405, 422 and 427) experienced significantly attenuated symptoms. In all 11 participants, changes in withdrawal symptoms as compared with previous quit attempts were attributed to their ongoing reflection on the psilocybin sessions and contemplation of the session contents. For example,

> I have smoked for a number of years, and I have attempted to quit on numerous occasions, and I always would go through withdrawal. I didn't with psilocybin…I didn't wake up in the middle of the night [after the session], I slept like a log. My mind was preoccupied with the psilocybin experience, so, it [withdrawal] didn't really affect me. (Participant 413)

> I was so confused about where my withdrawals left off and how much of this is just excitement from the aftermath of this intense psychedelic experience. Nothing was perceived as bad, it was all interesting as hell! (Participant 405)

> Every time I think I craved the cigarette I had to tell myself why I'm doing this, and remind myself that there's a lot riding on this. And [then] I would occupy myself with things, and think about the trip we just had. Because it was so overwhelming. Yeah. You know when you're so close to it you could just pull it right up! (Participant 422)

The affective quality of the first psilocybin session appeared to play a key role in mediating participant withdrawal. The first psilocybin sessions of ten participants were characterised by generally positive mood and overall tone, and 9 of these individuals (402, 403, 405, 406, 410, 413, 417, 421 and 422) did not experience overwhelming cravings or withdrawal symptoms after their first psilocybin sessions. The tenth participant (424) who had a positive first session was an exception, experiencing normal withdrawal and reporting smoking after his psilocybin session.

By contrast, the two participants whose first psilocybin sessions were generally negative in mood and tone reported wanting to smoke immediately afterwards.[4] Participant 416's session experience brought up painful childhood memories, and she reflected that had she not had support through regular check-ins from the study team, she would have smoked in order to cope. Participant 427 described how she struggled to fully surrender to her first psilocybin experience, feeling that she had 'failed' to approach the session correctly, preceding two weeks of painful, difficult abstinence before her second session.

## *Non-psilocybin factors contributing to smoking cessation*

Participants endorsed several elements of the overall study treatment as crucial factors in supporting their success in smoking cessation. These included the preparatory counselling, rapport with the study team, a sense of momentum gained after giving up smoking for the 8-hour duration of the first psilocybin session, and their therapeutic intent in entering the study. These factors were largely viewed by participants as working synergistically with one another and with the psilocybin sessions, to create a coherent therapeutic structure that fostered ongoing success over and above what any of these elements in isolation would be able to achieve.

*Preparatory counselling.* The initial four weeks of preparation and counselling were regarded as important by all participants. More specifically, seven participants (417, 421, 413, 427, 410, 406 and 416) cited the mantra (a brief, self-generated mission statement encompassing key motivations to quit smoking) as a major factor in quitting. Participants were encouraged to repeat their mantra during times of stress or craving after the TQD. For example, Participant 421's mantra was, 'For the love of life, I will quit forever.'

Six participants (402, 410, 416, 403, 421 and 427) found that keeping a smoking diary enhanced awareness of their smoking behaviour, with one individual (Participant 421) speculating that this alone may have been sufficient to get him to quit smoking. Five of the 12 participants (402, 403, 413, 410 and 416) cited the scented oil as a useful way to recall the study and the research team when craving cigarettes. Two participants (405 and 413) remarked that during the preparatory CBT, it was helpful to consider that their identities were not fixed as 'smokers', because this reframed their relationship to cigarettes in ways that were later reinforced, or 'cemented' (405), during the psilocybin sessions.

*Rapport with study team.* All participants recognised the importance of trusting and developing rapport with their session guides as necessary preparation for navigating experiences in psilocybin sessions. Moreover, ten participants (403, 405, 406, 410, 413, 417, 421, 422, 424 and 427) identified rapport with the study team during the preparatory counselling as a crucial factor in stopping smoking. Participant 406 remarked, 'it's not just the psilocybin sessions [but] it's that human connection, and the support that comes with that human connection, that ultimately leads to success at the end of the day.'

Ten of the 12 participants reported being very comfortable around their guides by the time of the first psilocybin session. The two who did not (participants 402 and 424) were markedly younger than the other participants, in their 20s and 30s respectively.

Eight participants viewed the guides as vital for ensuring the safety and usefulness of their psilocybin experiences (402, 403, 406, 413, 416, 417, 421 and 427). Participants variously described their guides as 'co-creators' of the session experiences (Participant 417), 'advisors' (Participant 403), and as 'looking after me, making sure I was safe. So no matter how scary it was, I always knew that it was a drug that was doing it' (Participant 406).

Eleven of 12 participants (all except Participant 402) described a deepening of their relationship with the guides as a result of their involvement in the psilocybin sessions. For example,

> The bonding is significant…I wouldn't smoke cos I wouldn't wanna hurt their feelings. It actually got that deep. (Participant 413)

Participant 406, who temporarily lapsed one month after his second session, explained,

> When I did have [my first] cigarette, the first thing that came in my mind was how I was letting Mary and Matt down. So yeah absolutely, there's definitely a connection there.

Two participants (410 and 422) singled out the rapport with the study team as the single most important factor in their successful quit attempts. Participant 410 described the rapport as non-judgemental care and understanding throughout her study involvement. For Participant 422,

> I think if you didn't have that [the rapport] I'm not sure if it would work. I don't know. And then the trust with the people, the folks in this clearly – when you know that people want you to do well…want this to work for you…and then you don't want to let them down. Because there's so much invested.

*Momentum.* By the end of the initial psilocybin session day, participants had been abstinent for upwards of eight hours, creating a sense of momentum towards long-term abstinence. This was perceived as important for four participants (402, 410, 413 and 427) in their efforts to maintain their abstinence. Once the first session was over, they reported wanting to keep the momentum going, both having not smoked for a whole day, and knowing that they needed to remain abstinent for at least four consecutive days in the next two weeks in order to undergo the next treatment session. For example, Participant 413 explained,

> I was very eager to do the second session, cos the first session was very interesting to me, personally. And I did not want to jeopardise that by smoking again, so that was part of my impetus. (Participant 413)

> The only reason I didn't [smoke after my first session] was because I had a second session – I had to hold on for 2 weeks, otherwise they were like, 'if you smoke, you can't come back for the second session'. So if I didn't have the sessions, I think I would have been like, well this counseling has been great, but… I don't know if it really would have lasted, you know? (Participant 427)

*Therapeutic intent.* During interviews, three participants spontaneously observed that without the appropriate therapeutic intent, psilocybin session experiences could have paradoxically led them to continue smoking (405, 417 and 422). For these individuals, their success in smoking cessation was seen as predicated on a clear intention to quit as they went into the psilocybin sessions. As Participant 417 explained:

> The sessions would not have caused me to quit in and of itself – in fact, just the opposite…the experience provides a perspective that in a way makes trivial much of the meanings that we normally engage in everyday existence…including smoking! It was like, it doesn't really matter.

Similarly, Participant 422 suggested,

> The logical extension of the melancholy [during the psilocybin session] is that I should go out and smoke again…because this is all there is. See, there is a dichotomy there. I haven't gone to the other side. But that is the logical extension of that train of thought.

## *Reflections on the research protocol*

*Addictiveness of psilocybin.* Participants were asked whether they thought psilocybin might be addictive in a manner similar to tobacco. All 12 participants unequivocally stated that they believed psilocybin was not addictive, finding no similarity between the addictive nature of cigarette smoking and their experiences during psilocybin sessions. For example,

> There is no comparison. One is an addiction. The other is, um, psilocybin...I don't know how to describe it. But it's almost a therapeutic journey. An inner journey. (Participant 422)

Four participants (403, 406, 413 and 421) expressed an interest in undergoing further psilocybin experiences, but only under supervised and legal circumstances, whereas a fifth (Participant 417) remained ambivalent to such a prospect. All those expressing an openness to further psilocybin experiences were male. Another two participants (402 and 405) described not having the time for regular psilocybin experiences even if they were made available. The five remaining participants reported not wanting to experience psilocybin again.

*Psilocybin session music.* The music was perceived as central to all 12 participants' psilocybin experiences. Participant 427 explained,

> You're lying there and you have headphones on and your eyes are covered and there's nothing to see… So all you had was the music. And so the music was melding with what I was feeling, and it was all mixing up to create images in my mind…the music was the whole script, the whole movie, the whole everything.

The agential character of the music in the psilocybin sessions also emerged in several participant accounts. For example, Participant 416 remarked, 'The music was alive!' while Participant 405 stated, 'I was in love with the music. But I felt like it was [also] in love with me. That's a great feeling.' Six participants (403, 405, 413, 416, 421 and 424) reported that certain musical pieces from the sessions still overwhelmed them with positive emotions whenever they heard them, even at the time of interview an average of 30 months post-TQD.

*Meaning-making across sessions.* Participants were asked if one session stood out as the most significant. Nine of the 12 participants indicated an order of significance. Amongst them, six participants identified their second session as the most significant (402, 403, 406, 416, 424 and 427), two identified their third session as the most significant (417 and 421), and one identified the first and third sessions as equally significant (413). No participants identified the first session as the single most significant.[5]

Interview data suggest mechanisms for how the significance of experiences may build over the course of multiple psilocybin sessions. Six participants described insights unfolding across psilocybin sessions, rather than being confined to a single session (participants 405, 406, 410, 417, 424 and 427). Participant 417 described becoming more relaxed and comfortable from his first to third session, and learning how to better navigate psilocybin experiences:

> There was an increasing opening at each experience…[in] the very first one, I remember feeling turbulence as it started and holding hands with one of the guides. You know cos I was feeling nauseous and ungrounded. And it didn't last long, maybe two, three minutes…The third one, I just went!…I do think that whatever happens, at least from a consciousness standpoint, for me did expand and become deeper, in this progression. I do think familiarity somehow…once you've had it, you're just more comfortable with it.

In some cases participants intentionally worked to prepare for subsequent sessions after encountering the psychological material raised in the first session. Participant 406 described his two sessions unfolding like successive chapters in a 'hero's journey' (Campbell et al. 1990). In his first session he described seeing faces in clouds everywhere he looked, which he turned away from, terrified. At the time he found little meaning in this difficult experience. Afterwards, he explained:

> I actually sat down and meditated, for a week, with the intention of 'I'm going to face up to these images'… [In] the second session there were faces coming at me, but I looked at them. So I actually saw the face coming and these – all these scary faces that just turned out to be nothing… Even when I looked at the photos of my kids it would be a demon starting, and then it would just dissipate… At the end of that session, I felt like a butterfly. Very clearly, there was this whole experience of me coming out of a cocoon. And actually shaking my wings out, like [makes whooshing noise]…just shaking out these massive big wings. Yeah, it was crazy!…it felt like taking a scalpel to every incident in my life where I had been hurt, or caused hurt…[and] opened up every one of those wounds. It was crazy, it was so relieving. It was like this whole thing had just like [makes whooshing noise, conveying a release] off me. It was powerful!

Support from session guides was also considered important in meaning-making across session experiences. After Participant 427 had a challenging first psilocybin experience where she described feeling 'manipulated' by the music and then frustrated that she had 'wasted' her session, she was reminded in her debrief by her guides to 'go with' the experience the next time, using breathing techniques whenever necessary. Entering her second session with much trepidation, she recalled a moment early in the session when she breathed out deliberately and a guide said 'good'. The participant reported feeling validated by this, and that this launched her into a profoundly positive and highly meaningful experience, after which she remained abstinent with relative ease.

## *Effects beyond smoking*

Quitting smoking was often reported as one of the *least* important effects of the study for participants in retrospect. As Participant 405 put it,

> This is about a smoking study, I keep forgetting that. Because there's so much more that happened… [Smoking] just seems so petty compared to some of the stuff that was happening.

Table 2 highlights other persisting long-term changes identified through interviews. In general, all participants reported that psilocybin sessions led to long-term changes in thoughts, affects, desires or behaviours at an average of 30 months post-TQD. These can broadly be categorised into two domains: increased aesthetic appreciation, and heightened altruism and pro-social attitudes.

*Aesthetic appreciation.* Six participants in this study reported an ongoing enhancement of their sense of aesthetic appreciation and natural wonder. For example, since involvement in the study, Participant 410 reported buying 15 books of poetry, something she had not done for years prior to her psilocybin sessions. Participant 403 began working with a visual artist to recreate mental images from his psilocybin experiences. Participants 410 and 413 described taking up musical hobbies such as playing instruments.

Participants also described integrating some key images from psilocybin into their everyday lives. Participant 427 reported ongoing use of an adaptation of her mantra that she devised with her children, reminding each other to breathe during stressful situations – to 'smell the flowers and blow out the candle'.

Discussing the ongoing impact of the psilocybin sessions, Participant 424 explained,

> Yesterday was kinda cloudy and a little overcast, and I was driving home and there was this one small patch of clouds that was lit up bright by the sun, and it was all surrounded by these dark clouds. And I was like, 'that's amazing'… And then I caught that, because prior to the psilocybin I probably would never have noticed that. But, I'm always on the lookout for those kinds of things. So yeah, that's a pretty good example of me being more aware.

*Altruism and pro-social effects.* In addition, participants described greater openness to altruistic and pro-social activities. For instance, Participant 410 described her increased involvement in volunteering since her study participation:

> I've been involved with the local literacy council all the time now … And then the other thing is I've become very involved with this environmental group as well … instead of sitting around and just watching television and smoking and doing nothing, I'm putting all this extra time I have to good use. Cos that was one thing about smoking, was the amount of time you wasted!

Similarly, Participant 421 reflected:

> I like being this way, and…I just think it just opened my mind to maybe more possibilities of stuff? I don't know. I'm not real deep, I'm not like this meditative guy… I've always been

> very considerate, opening doors…but now I'm even more of that, too. Gentlemanly. Lot more 'thank you's'… I just feel good all the time… I'm not in a big rush. It just takes another second to hold the door, say thank you, or give up my seat on the train. So, I do all that, and it just makes me feel good. I've always been *nice*, but now I feel like I'm…really nice! [laughter] And I can blame that on the psilocybin.

Along these lines, 11 participants reported the psilocybin sessions broadly affected their sense of interconnected within themselves, with others and the world. For some, this translated to more explicitly pro-social attitudes towards people in general. Regarding the way her psilocybin experience affected her view of humanity, Participant 410 said,

> I've always in the past, despite my temper and everything else, [tried] to see and believe the good in everybody. [And] failed, of course sometimes, but when I was 'under the influence' [of psilocybin] I suppose you could say, I could see that everybody was essentially good.

### *Future research*

Participants were asked to provide suggestions based on their experience for possible future research with psychedelics. Participants 402 and 427 reported that their study experiences helped them overcome an underlying sadness driving their smoking habits, and suggested research with psilocybin for conditions characterised by feelings of sadness such as grief or depression.

Regarding the research space and protocol, participants were in general very satisfied with their experiences. However, participants did recommend making the study space less 'office-like' (Participant 406), more 'zen-like' (Participant 417), and including natural light if possible (Participant 402). Participants also made various suggestions on the session music, including spending more time tailoring the music to each participant (Participant 410), allowing space for periods of silence (Participant 417) and incorporating more 'repetitive harmonics' (Participant 422).

Finally, participants 403, 421 and 424 suggested restructuring the period immediately after the psilocybin sessions to reduce the obligation to describe experiences to researchers verbally and through questionnaires, until participants have time to think about and better articulate what they experienced.

In addition, Participant 424 described feeling uncomfortable with the degree of 'ritual' involved in the psilocybin sessions, singling out in particular the chalice that contained the psilocybin pill and the large crystal glass of water. In contrast, participants 422 and 405 explicitly commended the use of ritual in constructing a therapeutic container.

## Discussion

This qualitative analysis of participant accounts of psilocybin-facilitated treatment for smoking cessation identifies several perceived mechanisms of change requiring further investigation and elucidation. It should be noted that there may be appreciable overlap between the mechanisms presented here, as psilocybin was administered in the context of a structured treatment.

Regarding their psilocybin experiences, participants reported powerful insights into self-identity and smoking behaviours that in turn diminished desire to smoke. Experiences of interconnectedness, awe and curiosity, and positive affect persisting beyond the period of acute drug action attenuated subsequent withdrawal and craving to smoke. Non-drug mechanisms participants cited as useful for smoking cessation included preparatory CBT, which helped participants gain a greater awareness of their smoking habits (e.g. through use of a smoking diary) and explore their motivations to smoke through counselling. Preparatory counselling facilitated development of a strong rapport and trust in session guides that was viewed as integral to maintaining a sense of safety during psilocybin sessions, and ultimately to quitting smoking. Furthermore, the study treatment design, which necessitated an 8–10 hour period of smoking abstinence during the first psilocybin session on the TQD, provided an initial sense of momentum toward long-term abstinence.

Participants' perceptions of their smoking habits in the period leading up to the study revealed the complex roles cigarette smoking played in their lives, oftentimes woven into their previous self-identities as smokers. For the majority of participants, the study treatment elicited insights into their self-identity and smoking behaviour that resulted in smoking no longer being appealing or congruent with their previous senses of self, consistent with previous literature (Belser et al., 2017; Bogenschutz and Pommy, 2012; Swift et al., 2017). In particular, the psychological insights reported in this study highlight the epistemic potential of psilocybin-facilitated experiences embedded within a structured therapeutic intervention. Moreover, these insights were in several cases not radically 'new', but largely seen as a 'returning' or 'remembering' of something that was in some sense already known to participants (compare with Sedgwick, 2003). Similarly, recent qualitative findings on psilocybin-assisted therapy in cancer patients reported reconnecting with long-held core values and beliefs as insights that helped reduce anxiety (Swift et al., 2017).

Persisting feelings of interconnectedness, awe, and curiosity had a direct bearing on smoking cessation outcomes. These qualities of participant psilocybin experiences correspond to several criteria of the mystical-type experience, which has been characterised by dimensions of unity and interconnectedness, sacredness or awe, noesis, transcendence of time and space, deeply felt positive mood, ineffability, and paradoxicality (Pahnke, 1969; Pahnke and Richards, 1966; Stace, 1960). Three interviewees specifically endorsed psilocybin experiences in occasioning smoking cessation, but insisted they must be linked to an explicit therapeutic structure and intention to be efficacious.

Participants reported that feelings of interconnectedness experienced in the study, and in psilocybin sessions, overshadowed prior feelings of connectedness to cigarette smoking. These experiences also appeared to carry forward to participants' lives after the study, and to extend beyond smoking to include persisting connection to loved ones and to the world at large (compare with recent findings by Watts et al., 2017). Related to interconnectedness, sub-themes of purity and contamination were also highlighted, and may be useful to incorporate into the preparatory sessions of future psychedelic-facilitated addiction treatment. Together these findings highlight unity as the hallmark of the mystical experience (Pahnke and Richards, 1966), and bring to mind the observation that, 'The opposite of addiction isn't sobriety. It's connection' (Hari, 2015, p. 293).

**Table 2.** Participants' current smoking status and non-smoking-related persisting effects attributed to psilocybin session experiences.

| | | |
|---|---|---|
| **402** | **Smoking status** | ***Not smoking, aside from occasional cigarette at party*: A few short lapses in first six months post-TQD,[a] including one week of smoking between six months and one year (following relationship breakup)** |
| | Non-smoking-related effects | *Identity*: 'Primarily I would say it made me understand that my identity is this construct' |
| | | *Self time*: '[Now I am] always making time in my day to just go for a walk or something like that' |
| **403** | **Smoking status** | ***Not smoking*: No lapses** |
| | Non-smoking-related effects | *Gratitude*: 'I've learned how to be more grateful, which is probably the biggest thing' |
| | | *Nature*: 'Being outdoors is much more important…I spend a lot of time outdoors now' |
| | | *Breathing*: 'Being more conscious of breath is something that I experienced after the study' |
| **405** | **Smoking status** | ***Smoking*: Started again 3 years and 3 months after TQD (approximately 8 months before interview) after death of brother, though intends to quit again soon (with friend who is pregnant)** |
| | Non-smoking-related effects | *Consciousness augmentation*: 'I can get deeper into different states of consciousness just by meditation, breath work' |
| | | *Relationship*: '[M]y relationship with my mother has improved. It's been a turbulent process, but that's what was necessary. But if I look back at how our relationship is now compared to how it was 5 years ago, it's so much better…it's so much better' |
| | | *Habits*: '[A]nother side effect is I don't watch TV any more. I like to pick and choose what I put in my head' |
| | | *Depression insight*: 'I was given all these lessons in that session telling me, "here's what you need to do so you don't get depressed"' |
| **406** | **Smoking status** | ***Not smoking*: Lapsed 6 weeks after TQD and continued smoking for 2 years and 10 months before quitting again approximately 6 months before interview with a distinct sense of connection to the ease with which he quit on the TQD** |
| | Non-smoking-related effects | *Living in the present*: 'In trying to live in the present, there are a lot of gremlins that force you to live in the past!… But I think that those sessions took a lot of those gremlins away, helped me put those gremlins into the present, into present context as well. I think that was a really big changing point in my life' |
| | | *Psychological 'baggage'*: 'The first session, there was the insight that I was carrying a lot of shit around in my head. The second was like that insight of…I didn't need to be carrying that shit around with me. So there was a big shift in who I was between the first session and after' |
| | | *Authenticity*: '[It was] me revealing myself, actually showing myself to the world. This is who I am, this is who I *really* am…[it] was just a really powerful experience' |
| **410** | **Smoking status** | ***Not smoking*: No lapses** |
| | Non-smoking-related effects | *Parents' expectations*: 'I was just me, I wasn't my parent's child. I was me. Yeah! I think finally, I was just me, the individual. Not somebody who had to be kowtowing, or think about what their parent might think or whatever' |
| | | *Interconnectedness*: '[T]he other thing too was the recognition that, that you were just part of something greater. Enormously. Vastly. You know, the sort of, the universe' |
| | | *Tolerance*: 'I'm much more tolerant of others…when I was "under the influence" [of psilocybin] I suppose you could say, I could see that everybody was essentially good' |
| | | *Prosocial behaviour*: 'I saw all the people that needed help. So I have become involved with the local literacy council all the time now…And then the other thing is I've become very involved with this environmental group as well' |
| | | *Aesthetic appreciation*: 'I must have bought 15 books of poetry since. And I've gone to see every major poet that has come down to the Library of Congress since then as well' |
| | | *Music*: '[T]here was music playing, of course, it was that lute-type music. And that's one of the things I want to learn to play, and I actually went in one day recently – well it was almost 6 months ago – to inquire about purchasing one of those' |
| **413** | **Smoking status** | **Not smoking: No lapses** |
| | Non-smoking-related effects | *Simple life*: 'I would say my life remains and continues to be simpler. My decisions, easier. I'm generally happier' |
| | | *Emotions*: '[I]t kinda made me more emotional' |
| | | *Priorities*: 'I did feel very grounded and filled with common sense, and I thought problems that were problems before are no longer problems' |
| | | *Music*: '[T]he music is like a tour guide for me. That's something else that I've done – I am so into music now!' |
| **416** | **Smoking status** | ***Not smoking*: Lapsed three months before interview after niece suicided, but stopped again approximately two months later** |
| | Non-smoking-related effects | *Positive activities*: 'I'm pretty happy now. I cook – I love to cook, I cook a lot' |

**Table 2.** (Continued)

| | | |
|---|---|---|
| | | *Social situations*: '[A] woman was yelling at me, we're driving and, beeped her horn… leaned out the window yelling at me, and that would bother me a lot before and now I'm thinking well…so what!' |
| | | *Family history*: 'It was a wonderful experience and a terrible experience…during the three sessions I found out I'd been abused as a child' [Note: the ultimate veracity of this memory is unknown to the researchers] |
| **417** | **Smoking status** | ***Not smoking*: No lapses** |
| | Non-smoking-related effects | *Awe*: 'Seeing that which happened during the psilocybin experiences and being reminded of, and understanding, life as an unspeakably marvelous adventure of existence' |
| | | *Preciousness of existence*: 'It was definitely…an exploration and tangible attunedness to the possibilities of being human and just how fortunate it is to be!…There was a preciousness to the fact that [the Universe] is' |
| **421** | **Smoking status** | ***Not smoking*: No lapses** |
| | Non-smoking-related effects | *Emotions*: 'I feel much deeper into everything now, everything I see and do. I react differently to everything' |
| | | *Aesthetics and nature*: 'I can go back and remember how it felt. And it kinda gives me a little…charge? And it could be a little charge of psilocybin maybe, or whatever they wanna call it. It's not a flashback, I'm not seeing colours but, it just gives me a like a little "ooh", like "oh yeah, that sun is pretty nice right there." So yeah, I get a little residue when I look at the sunset or the rainbow.' |
| | | *Prosocial behaviour*: 'I've always been *nice*, but now I feel like I'm…really nice. [laughter] And I can blame that on the psilocybin' |
| **422** | **Smoking status** | ***Not smoking*: No lapses** |
| | Non-smoking-related effects | *Self-acceptance*: 'I'm more accepting of myself' |
| | | *Honesty and openness*: 'I've become a lot more honest with myself and a lot more open about things, and people' |
| | | *Simplicity*: '[T]he after-effect I think is almost more important than the actual trip itself… I think one of the things that is so fascinating is that there's so much we don't know about ourselves. But when you get to a certain point, it becomes so simple' |
| | | *Authenticity*: 'One of the things that happened to me that was important was the magnification of how important it was to be true to yourself and have integrity about it' |
| **424** | **Smoking status** | ***Smoking*: Lapsed and returned to chronic smoking a few days after first psilocybin session** |
| | Non-smoking-related effects | *Self-appraisal and anxiety*: '[T]he self-defeating talk is gone, the extremely negative talk is gone, the depression [and] the anxiety is gone, the sleeplessness is gone … I learned just to be me. And that it's ok to be me. I learned that I'm gonna make mistakes and everybody makes mistakes' |
| | | *Aesthetics and nature*: 'Prior to the psilocybin I probably would never have noticed [an 'amazing' sky]. But [now], I'm always on the lookout for those kinds of things' |
| | | *Gratitude*: 'The wanting for a better life and knowing I can have a better life is there, gratitude is exceptionally high. I used to not like my life, and now I really love my life' |
| | | *Death*: 'I'm not afraid of death anymore, at all. I wouldn't say I look forward to it, but I'm not afraid of it happening. I know that everything's gonna be ok' |
| **427** | **Smoking status** | ***Not smoking*: No lapses** |
| | Non-smoking-related effects | *Integrated self*: 'It affected my whole life. It affected me, seeing my image of myself, and who I was a long time ago when I was at college and I had no kids. And then who I'd become, as a mom… It's just kinda like, this is who I am now, and it's all part of the same ball of me – it's all integrated. There wasn't a bad me and a good me. So, allowing all of it was really helpful' |
| | | *Self-efficacy*: '…it was that rising up feeling, and that powerful feeling, and it just filled me with such beauty and strength and life and it was just really good, a really strong feeling' |

[a]TQD = target-quit date.

Withdrawal symptoms were consistently described as being less frequent and intense after psilocybin sessions as compared with participants' previous quit attempts, in line with recent survey data on psychedelics and smoking cessation (Johnson et al., 2017). Reduced withdrawal symptoms were attributed directly to psilocybin experiences, supporting prior hypotheses to this effect (Bogenschutz and Pommy, 2012). This study further suggests contemplation of psilocybin session experiences, and insights gained therein, as a mechanism through which withdrawal symptoms may be diminished.

Participant responses indicate that the rapport with, and trust in, the guides may have interacted with the psilocybin sessions in two distinct and complementary ways. First, the degree of trust in, and connection with, the session guides may have allowed participants to go deeper into their psilocybin experiences without undue fearfulness or restraint. To this our analysis reveals a second possible mechanism: profound session experiences can deepen participants' therapeutic alliance with their guides, in turn reinforcing smoking abstinence in order not to 'let the team down' (Participant 422). This may prove significant for future

trial designs where participant follow-ups are abbreviated, or conducted with personnel other than the participant's session guides.

Participants reported a sense of momentum towards abstinence gained from the TQD onwards, suggesting the importance of acute psilocybin effects may lie, in part, in providing an initial supervised period of abstinence to interrupt the habitual cycle of drug use. The time interval between first and second psilocybin sessions also appears to be important – long enough that participants are encouraged to remain abstinent to undergo a second session, although not so long that participants relapse. The two-week period between first and second psilocybin sessions in this study was an encouragement for three participants to maintain abstinence between sessions, suggesting the time interval between sessions is an important factor to consider in future research.

These findings indicate that the significance of psilocybin sessions may increase across sessions, suggesting investigation of individual psilocybin session content may be inadequate to grasp therapeutic effects occurring across sessions. Moreover, the specific content of significant or meaningful experiences – for instance, the releasing of personal 'demons' (Participant 406), re-emergence of traumatic memories (Participant 416), or more general distress and discomfort throughout a session (Participant 427) – signal therapeutic mechanisms distinct from the universal qualities posited by the mystical-type experience alone. This raises wider questions concerning the potential value of challenging experiences in psychedelic-facilitated clinical interventions. While mystical-type experience may confer therapeutic benefit, procedures for maximising the meaningfulness and benefit of other types of psilocybin experiences warrant independent investigation.

Recent anonymous online survey data from individuals endorsing a challenging experience with psilocybin found that 84% of respondents considered their most psychologically difficult psilocybin experience to be beneficial in retrospect (Carbonaro et al., 2016). In this study, three participants (406, 416, 427) reported acutely challenging experiences that nevertheless were associated with subsequent positive outcomes, both through focused personal practices such as meditation (Participant 406), and skilful support and integration. Future psychedelic research may benefit from implementing similar aftercare measures taken in the smoking cessation pilot trial, particularly in relation to challenging experiences. These included daily phone calls or text messages from study guides (conducted daily for at least a week in the smoking cessation trial), development of a written or mixed media (e.g. collage, drawing, etc.) session narrative by the participant in the days following the session, and systematic unpacking and revisiting of this material at regular in-person integration meetings in the weeks following the session.

Additionally, the building of meaningfulness across sessions suggests interventions offering a single psilocybin session may be sub-optimal for achieving a lasting therapeutic effect. Previous research on ketamine-assisted therapy for heroin dependence found significantly greater long-term abstinence in individuals receiving three as opposed to one therapeutic ketamine administration (Krupitsky et al., 2007). Given also that in this study, more mystical-type experiences were observed in participants' second sessions than in their third (Garcia-Romeu et al., 2014), and that one-quarter of our sample did not feel at the time that they needed a third session to successfully quit smoking, two sessions using ascending doses may represent a good middle-ground for future clinical research in psychedelic-assisted addiction treatment.

Consistent with previous research in healthy volunteers (Griffiths et al., 2008; MacLean et al., 2011), participants reported a range of persisting positive effects beyond smoking cessation, including increased openness, altruism and pro-social behaviour. Like smoking cessation, these other perceived benefits were largely attributed to psilocybin experiences, sometimes in concert with preparatory and integrative counselling. Aesthetic appreciation, fantasy-proneness and tolerance of different ideas and values, have been conceptualised as sub-dimensions of the personality trait of openness to experience (McCrae and Costa, 1985). This supports earlier findings that personality openness increases after psilocybin-occasioned mystical experiences (MacLean et al., 2011), and such openness may conversely play an important role in effecting the major behavioural changes inherent to successful addiction treatment (Bogenschutz and Pommy, 2012).

Participant feedback on the protocol design offers a useful glimpse into potential improvements to the study from the perspective of participants. A quarter of participants found the expectations on them to fill out paperwork immediately after psilocybin sessions to be excessive, despite acknowledging its importance for research purposes. The impact of musical selection, setting, and ritualistic components in future research administering psychedelics will need to be examined more closely in order to optimise therapeutic procedures and environment.

Finally, psilocybin was perceived by participants as not at all addictive, consistent with research showing that psilocybin and other classic psychedelics serve as poor reinforcers in nonhumans (Fantegrossi et al., 2004), and the consensus that classic psychedelics do not lead to compulsive drug seeking (O'Brien, 2006). Participant responses in this study about the potential addictiveness of psilocybin are remarkably similar to qualitative comments made by participants in a study examining LSD in the treatment of heroin addiction (Savage and McCabe, 1973). Comparing LSD to heroin, participants in that study expressed '… a uniform view that the LSD experience provided a confrontation with one's problems rather than an escape from them.' Given the dangers in providing an addictive drug as a therapeutic to addicted patients, the present qualitative data complement previous research in allaying such concerns regarding addiction treatment using classic psychedelics.

## Study limitations

Three of the 15 participants declined invitation to be interviewed. Two of these individuals did not successfully stop smoking as part of the study, and the third relapsed between the 6- and 12-month follow-ups. These participants could have yielded useful data on why the study did not lead to successful smoking cessation in some cases. As a qualitative retrospective study of 12 participants that was based on an open-label pilot study, no definitive conclusions regarding efficacy can be drawn.

For example, the role of the supportive pair of guides was considered central by all participants, and yet cannot be controlled for. However, by identifying themes in participant responses, we have highlighted relationships between various elements of the study protocol and participant experiences, in the

hope of contributing to the development of best practice in relation to psychedelic psychotherapy. Moreover, it is not evident how one may assess the relative contribution towards safety and efficacy of supportive guides without compromising key ethical considerations (see Johnson et al., 2008).

## Conclusion

This retrospective qualitative analysis of participant interviews from an open-label pilot study of psilocybin-facilitated smoking cessation revealed key themes in participant experiences and potential mechanisms of change, contributing to an understanding of the therapeutic process as well as considerations for future research in the nascent field of clinical psychedelic psychotherapy. Conducting psilocybin sessions within a structured therapeutic protocol led to psychological insights, experiences of interconnectedness, feelings of awe and curiosity, and reduced withdrawal symptoms, all reported by participants as central mechanisms of change leading to their successful smoking cessation. Preparatory counselling and rapport-building with session guides were also highlighted as important contributors to smoking cessation.

In addition to smoking cessation, the psilocybin-facilitated smoking cessation intervention produced a range of auxiliary persisting positive effects, including increased aesthetic appreciation, altruism and pro-social behaviour.

For psychedelic psychotherapy to be feasible at scale, streamlining treatment protocols without compromising efficacy will be crucial, and qualitative investigation can contribute considerably to this endeavour. In addition to randomised trials, future research into psilocybin-facilitated addiction treatment should examine the optimal number of psilocybin treatment sessions, the window of time between sessions, and the ways in which meaning is derived from session experiences independent of mystical-type effects. Further elucidation of the variety of psychedelic-facilitated experiences, and the role of different study factors, will be valuable in developing novel psychedelic-assisted addiction treatment interventions going forward.

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### Notes

1. Five of these participants had complete mystical experiences, as assessed by quantitative measures (Garcia-Romeu et al., 2014). Participants 403, 405 and 422 did not.
2. Four of these participants had complete mystical experiences, as assessed by quantitative measures (Garcia-Romeu et al., 2014). Participants 403 and 422 did not.
3. These reports were consistent with previously published quantitative measures of craving and withdrawal (Johnson et al., 2014), on which 424 scored highest among interviewees in the week after the first psilocybin session.
4. Quantitative assessments of craving and withdrawal in the week after the first psilocybin session showed that among interviewees who quit smoking, 416 and 427 scored highest.
5. These data are generally consistent with quantitative ratings of personal meaning and spiritual significance, which showed an overall increase on average from session 1 to 3 (Johnson et al., 2014).

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