

# **Salience, Sensemaking, and Setting in Psilocybin Microdosing: Methodological Lessons and Preliminary Findings of a Mixed Method Qualitative Study**

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## **Salience, Sensemaking, and Setting in Psilocybin Microdosing: Methodological Lessons and Preliminary Findings of a Mixed Method Qualitative Study**

There are profound methodological challenges facing microdosing research. One way we can address some of these methodological issues is by understanding how psilocybin microdosing fits in the broader existential context of people's lives. We recruited participants who underwent psilocybin microdosing on their own and consented to being monitored for harm mitigation purposes. We combined momentary ecological assessment and detailed retrospective interviews. Participants reported loosening of mental structures (i.e., less intense strength of thoughts, tangential stream of consciousness), increased salience of external stimuli (varyingly associated with greater interest in otherwise mundane

activities, as well as sensory overload), an increase in flexible cognition, a decrease in stable cognition, and various ego-dystonic contents Highly structured environments were conducive to positive appraisal of experience and vice versa). Momentary ecological assessment and retrospective interviews yielded diametrically opposite accounts of microdosing experience. We relate our findings to stable and cognitive cognition, as well as the notion of salience. We point out the necessity for systematic mixed methods studies to better characterize the lived experience of psilocybin microdosing.

Keywords: psilocybin, microdosing, momentary ecological assessment, qualitative phenomenology, network model

## **Introduction**

Following a lively period of “pre-modern” research after the invention of LSD, a shift in public opinion and prohibition, research of psychedelics remained dormant, but since the 1990s, the scientific interest in psychedelics has been increasing. (Letheby, 2021). Due to findings from the fields of psychedelic psychotherapy, as well as reports of positive effects on cognition, creativity and mindfulness, psychedelics may also represent a potential novel treatment for various psychiatric disorders, most notably, mood and anxiety disorders, and substance dependence (Bonnieux et al., 2023; Hartong & Van Emmerik, 2023; Hutten et al., 2019b; Irizarry et al., 2022; Ryan et al., 2023). Despite legal constraints, the use of psychedelics is also wide-spread in the general population (Anderson et al., 2019; Johnstad, 2018). One of the way psychedelics are used is through microdosing. Microdosing refers to the frequent use of psychedelic substances in a dose that is below or close to the threshold otherwise required to produce psychedelic effects in a person. The recommended doses vary, as there is no scientific consensus for what constitutes a “microdose.”

The relationship between microdosing and acute psychedelic effects of psilocybin are quite complex. Acute effects of microdosing psilocybin develop between 20 and 70 minutes after oral ingestion (Lowe et al., 2021; Preller, 2019). At that point, blood plasma level of psilocin (a metabolite of psilocybin) rapidly increases and plateaus for approximately an hour. (Kaertner et al., 2021). Recommendations for psilocybin are typically between 100 to 300 mg of dried psilocybin mushrooms per day (Hutten et al., 2019b, 2019a) .

In a survey of the reasons for engaging in microdosing (Hutten et al. (2019a), majority of microdosers cited performance enhancement followed by mood enhancement, symptom relief, and curiosity. Anecdotal and case studies report an overall beneficial effect of microdosing on psychiatric symptoms, particularly on treatment-resistant disorders (Anderson et al., 2019; Irizarry et al., 2022; Johnstad, 2018; Kinderlehrer, 2023; Ryan et al., 2023). In a study where individuals compared self-reported effects of microdosing in comparison to traditional treatments, microdosing was perceived as significantly more effective in ADHD and anxiety (Hutten et al., 2019b)

It is crucial to acknowledge the methodological challenges of the use of psychedelic research in psychiatry (Petranker et al., 2024). These challenges arise from both legal limitations, as most commonly studied psychedelics are classified as controlled substances in the majority of countries, and from the significant subjective experiences and behavioral changes induced by these substances. These effects pose challenges in terms of blinding and inherently elevate the risk of bias in research studies (Goldberg et al., 2020; Kaertner et al., 2021). The issue of blinding was highlighted in a recent study reporting on the participants' retrospective identification of the substance

where psilocybin or LSD were reportedly correctly identified and distinguished from placebo in 96% of the sessions (Holze et al., 2022)

While in controlled, clinical settings, the use of psychedelics reportedly has an excellent safety profile (for a comprehensive review, see Chapter 2.3 in Letheby, 2021), a recent narrative review of the methodological problems in this field of research (Hartong & Van Emmerik, 2023) points out reasons for concern regarding the potential underestimation of adverse events resulting from psychedelic drugs. Firstly, the review highlights that studies often utilize largely non representative samples of volunteers, which may introduce a positive bias towards interpretations in favor of alleged beneficial effects of psychedelics. Secondly, there is no clear consensus on the delineation between "normal" or expected experiences that are considered part of the process and those that should be classified as adverse reactions. Finally, if the use of psychedelics becomes widely accepted within psychiatry, it is crucial that we understand how these substances fit into the broader existential situation of patients (De Haan, 2020). Therefore, we present a pilot study in which we apply detailed phenomenological methods to gain a better understanding of people's lived experiences of psilocybin microdosing. This paper presents phenomenological data that constitute a proof-of-concept for a larger research project on naturalistic observation of psilocybin microdosing (pre-registration available here: [link removed by the authors]). The overarching goal of the project is to determine how microdosing is used naturalistically by the general population as well as individuals seeking to ameliorate psychiatric issues, as well as identifying potential risks that could allow for the development of harm mitigation strategies. In this pilot study, we seek to demonstrate how detailed qualitative material, which focuses both on a moment-to-moment experience as well as detailed, retrospective examination, can be used to identify positive and negative effects of

psilocybin microdosing, as well as contextual factors that may influence the overall efficacy of this practice.

## **Method**

### *Participants*

With the help of a non-governmental organization dedicated to drug risk reduction, we recruited 13 participants (nine women) who took microdoses of psilocybin on their own initiative and agreed to be observed. The study was conducted according to the Declaration of Helsinki and all participants signed an informed consent. The participants engaged in microdosing for a variety of reasons, falling into four groups: a) alleviating symptoms of depression; b) cognitive enhancement; c) alleviating symptoms of somatic illness; and d) greater self-knowledge. Three participants did not undergo the entire protocol. MP-04 had an intensely negative experience with sudden occurrence of suicidal ideations and has thus discontinued microdosing and she was accordingly directed towards appropriate mental health professionals (hers as well as MP-10's adverse experience is described in more detail elsewhere). MP-08 was excluded due to poor sampling adherence. MP-13 discontinued participation due to a flare-up of Crohn's disease and found constant prompts to reflect on his body distressing.

Three participants (MP-04, MP-07 and MP-10) have difficulties with reproductive organs. MP-04 reports long and irregular periods, MP-07 reports extremely painful periods, and MP-10 suffers chronic pain following dyspareunia after an infection caused by a retained tampon. MP-04 and MP-07 report that their difficulties with reproductive organs constitute a considerable negative effect on their

mental health, whereas MP-10 has accepted her difficulties. Participant information is summarized in Table 1.

### ***Protocol***

Participants were sampled using the M-Path app (Mestdagh et al., 2023). The app delivered a prompt to the participants to report on their experience at the moment of sampling. Participants were sampled according to the relevant aspects of experience developed in our lab with the goal of general purpose monitoring of patients by [name removed by the authors] [reference removed by the authors]. The prompt guided participants towards reporting on their general experience, mood, social interactions, cognitive difficulties, ruminations, stream of consciousness, bodily feelings, as well as exercise, food, and the intake of psychoactive substances.

The experiential descriptions from the samples were further developed with a phenomenological interview. The phenomenological interview was derived from psychopathological tradition (Jaspers, 1997; Oyebode, 2015; Stanghellini & Mancini, 2017). As such, we focused on participants' lived experience, their emotions, values, their experience of space, time, others, and their own embodiment. Throughout the interview, the participants were asked specific questions that allowed the researchers to emphatically attune themselves to their experience.

Participants who were interested in being monitored during their period of microdosing, came in for an initial assessment. During the assessment we conducted a phenomenological interview that is derived from the methodological framework of lifeworld analysis (Stanghellini & Mancini, 2017). The goal of this interview is to obtain a general sense of a person's experiential baseline that is grounded in their values.

Following the initial interview, we collected information on the participants' baseline experience prior to microdosing. Participants underwent momentary ecological assessment for four days, spread out over two weeks. On each sampling they received five prompts to report on their experience. After the sampling period, another interview was conducted exploring various aspects of their experience in more detail.

When participants started with microdosing, they contacted the researchers who again collected information about their experience using momentary ecological assessment. The participants were sampled on the day before (off-days) and on the day of microdosing (on-days). Since the participants were following different microdosing regimens, the intervals between on- and off-days varied. After two on-days, a follow-up interview was conducted. After four on-days, a debriefing interview was conducted to obtain information about participants' experience of microdosing. Figure 1 represents the data collection protocol.

### *Analysis*

In total, 49 interviews were conducted with the participants. The samples and audio recordings of the interviews were analyzed using grounded theory (Charmaz, 2014). The primary analytic tool was coding: more general descriptive tags were assigned to sections of raw data. The codes were then grouped together based on their conceptual similarity (i.e., we formed themes). We followed guidelines from De Haan (2020) and constructed a network model describing the relationships between these themes. The themes were grouped into phenomenology, sensemaking, biological factors, and social factors.

## **Results**

Participants reported mixed effects of microdosing. They reported considerable improvement in what can analytically be considered flexible cognition, most notably manifesting in increased creativity, as well as mindfulness and salience of otherwise mundane events. On the other hand, multiple participants reported experiences that can be analytically considered symptoms of psychosis, as well as a decrease in stable cognition. The latter is most apparent in a tangential stream of consciousness and poor inhibitory control. Regarding social cognition, participants reported an increased salience of otherwise implicit social dynamics. Participants reported a loosening of inhibitions, resulting in new (and sometimes ego-dystonic) affective states and adopted social roles. Other than one participant (MP-03) who experienced three days of intense physiological symptoms of anxiety at the end of the microdosing period, no physical changes were reported.

Figure 2 depicts different aspects of participants' experience as well as the analytically determined relationships between them. Meaningful alterations in participants' lifeworlds will be discussed individually in the following subsections. We observed two kinds of themes: methodological reflections and aspects of lived experience.

### ***Methodological reflections***

#### *Contrasting with baseline experience*

Already during the baseline sampling, we observed phenomena that could - in isolation - be interpreted as altered states of consciousness, psychopathological experience, etc. As such, it is imperative that alterations to these aspects of participants' lifeworld not be interpreted as being related to microdosing as such. Rather, they should

be seen as a person's idiosyncratic way of experiencing the world, which may or may not be amplified by microdosing,

MP-04 decided to engage in microdosing psilocybin so as to alleviate anhedonia. MP-04 is distrustful of psychiatry. As such, our insight into her clinical picture is limited. However, she exhibits symptoms of bipolar disorder with periods of hypomania and depression. During baseline sampling, MP-04 was painting a picture as a form of self-therapy, during which she became deeply immersed in a single color, to the point where she lost the sense of her own body, environment and time (phenomenologically, this experience is similar to both dissolution experience, as well as intense synesthesia, reported in [reference removed by the authors]). During microdosing, MP-04 experienced an intensified version of this phenomenon: "I got completely lost in the color red. nothing else existed. It was only the redness and these intense feelings that I was working through. [...] A long time passed. I was surprised when I looked at the clock." (MP-04)

In absence of baseline sampling, it would thus be possible to interpret MP-04's immersion in the colors as a dissolution experience or a synesthetic experience related to microdosing. However, it merely reflects an amplification of an aspect of experience that she is familiar with from her daily life.

#### *Well VS loosely structured context*

As a rule, highly structured, well-ordered contexts (e.g., a desk job, studying at the library) were conducive to positive experience. On the other hand, loosely structured contexts with unpredictable events and tactical decisions that had to be made were related to negative experiences. The latter were primarily characterized by overwhelming mental contents and a sense of cognitive capacity having been reached:

The shrooms are giving me a great set of thoughts and a good flow; I am more coherent. But only for myself. When I come in contact with the expectations from the outside world, I am just, like, nope. (MP-09)

Both MP-02 and MP-06 felt overwhelmed during microdosing. They were both experiencing long-lasting episodes of depression, characterized by dysphoria, anhedonia, cognitive problems, and general difficulties with engaging with the world. MP-06 reported that an acute loosening of mental structures made him anxious while at work: “I am confused. I am not as attentive.” However, in another situation, he elaborated: “I am very confused. I think I took too large a dose. When I am in a stressful situation like this one, it’s uncomfortable having taken this kind of a dose. I can really feel it.”

On the first sampling day, MP-02 reports that she had a full day planned with various activities. She took a microdose with the intention of experiencing them more fully. She describes having an immensely positive experience, with improvements in symptoms of anxiety and depression, being more present in the moment, and experiencing enhanced social connection and verbal expression. However, on the last sampling day, she reported having an uneventful day with a negative valence. She was full of “empty feelings” and “didn’t know what to do with [herself].”

The shift between contexts is apparent in MP-12’s experience as well, where she felt overwhelmed by several tasks she had to perform at work. This continued until she adopted a divide-and-conquer strategy, structuring her time:

I was stuck in this in-between place, where I was like: wait, what?! Everything was happening at the same time. [...] So, I picked up a notebook, and wrote down all the things that I have to do. I looked at the big picture and saw what it makes sense to do. [...] It became clear to me where I was directed. (MP-12)

At the time of sampling, MP-10 was renovating a country house and experienced a considerable distress at failing to focus on the task at hand:

My mind is constantly racing. I am starting to cry. I constantly feel bad. I am angry at myself for taking the mushrooms. [...]. I am struggling to find words. I am confused. I can't remember what I've just been doing. [...] I am experiencing everything as negative. (MP-10)

MP-10's cognitive difficulties culminated in a panic attack where she had to remove herself from the situation in order to cry. On the other hand, both MP-01 and MP-03 worked in stable environments. They similarly report tangential structure to their thoughts. However, they were able to productively engage with their work:

I don't have as many obligations in terms of lectures. So, I can allocate four hours in the morning for sitting in the library and trying to focus on studying. [...] [T]here are these effects of clear-headedness. I can sit still and focus on the task at hand. Unlike on typical days, there's this awareness of how I am sitting and the people around me. [...] But I can focus back on the task. (MP-01)

### *Aspects of lived experience*

#### *Momentary ecological assessment VS retrospective interview*

In this study, we employed a dual strategy for data collection: momentary ecological assessment (Shiffman et al., 2008) and detailed retrospective interviews. When contrasting these data, we observed a striking difference between them. Judging from sampling data alone, the experience of microdosing appeared overwhelmingly negative. However, during retrospective reports, participants appraised the microdosing period as broadly positive.

In the samples, MP-01 reported feeling distressed due to having to sign an insurance contract. This was followed by a period of reported cognitive difficulties while he was studying at the library. The samples for the day were full of descriptions of poor focus and tangential thoughts. In the follow-up interview, however, he reported: “I felt completely average. [...] It wasn’t turbulent at all.”

Similarly, MP-02 reported pervasive feelings of “loneliness,” “disconnect” and “alienation” in her samples. Her mood was consistently reported as low. However, in the follow-up interview, she reported that occasionally, she felt “anxious and overwhelmed” while microdosing, but she was thankful for the shift, as then she “at least felt something.”

MP-07 remarked in a sample: “I [expletive] hate my thoughts. [...] My thoughts are either everywhere or nowhere. The microdose increasing this sense of openness really doesn’t suit me at this moment.” (MP-07) In a follow-up interview, however, MP-07, who is herself trained in psychedelic psychotherapy, experienced this openness as well as the accompanying anger as beneficial as it promoted reflection.

This dynamic was perhaps the clearest in MP-12. From her day-to-day sampling, we analytically assumed that she experienced no experiential change during microdosing. She reports being “immersed in her work task,” and “not being aware of [herself] and the field of attention,” however these descriptions were continuous with her baseline samples. During the debriefing interview, however, she describes her overall experience of microdosing:

[Microdosing] definitely gives me an additional element of observing myself. It is not very intense. [...] I didn’t have any mystical experience, but there were a lot of these beautiful, grounded moments. [...] There were these gentle insights. (MP-12).

### *Intention-setting, expectancy, and preconceived notions*

Prior to microdosing, all participants exhibited a generally positive attitude towards psychedelics. Participant MP-10 succinctly expressed this sentiment, stating, "I really wanted it to work. I really believe in mycelium!"

Participants had a tendency to frame the “near-altered state of consciousness” experienced during microdosing psilocybin in terms of experiential concepts that they were familiar with. The most common conceptual framework that was ascribed to their experience was mindfulness meditation. Participants experienced an easier engagement with the outside world, presence of pleasant feelings in their body, as well as a “soft” and “fluid” quality to their thoughts. Importantly, these alterations were consistently experienced as passive (i.e., participants report these changes happening to them, rather than them actively constructing them). The above mentioned increase in perceived mindfulness was reported by MP-10:

There’s no deep thoughts. Or rather, even the negative thoughts that are trying to force themselves into my mind, do not pass through this veil that is between me and the world, or between me and the reaction to this thought. It is sort of the inverse of before, where I had no filter.” (MP-10)

These experiences were commonly framed as being “present in the here and now” (MP-09).

Another common domain with which participants compared the “near-altered” state of consciousness that occurred during microdosing psilocybin was their experience with recreational drugs. Participants compared the changes they experienced with cannabis, cocaine, MDMA and a full dose of psychedelics.

I just threw myself into work without a clear goal. In the moment, it really felt like I was doing something meaningful, rearranging the text, writing and rewriting. At one point, I deleted three pages of text and I ended up with

nothing. Now, looking back, it's kind of like [laughs] when you take cocaine at a party and you are just talking. [...] [I]n the moment, you feel like a champion, but when you wake up next morning, you cringe at how annoying you were.

(MP-07)

Another participant experienced an excess of energy, positive affect, and an inability to procrastinate. He compared these experiences to taking MDMA:

It was a contained, unspecific kind of high. [...] It was exactly the same experience as when you take Molly [MDMA] and you are walking towards a party. [...] You can feel it in this purposeful way of walking and there is also something in the shoulders, but there is none of the spectacular effects of the drug. (MP-03)

#### *Threshold dosing, sensory distortions, and psychosis-like experience*

Throughout the sampling, we recorded considerable evidence that our participants were not microdosing, but experienced low-level psychedelic experience or what MP-03 referred to as “meso-dosing” and MP-12 as “threshold dosing.” These were associated with pronounced altered states of consciousness. One of the most apparent alterations of participants’ lifeworlds that we observed during this study were experiences that can be analytically related to psychotic symptoms.

MP-01 is a computer scientist who underwent microdosing psilocybin for the purposes of cognitive enhancement. During the sampling period, he was studying for exams in the second year of undergraduate education. Prior to sampling, he had been engaging in microdosing for a period of six months wherein he gradually increased the number of on-days from two to six days per week. MP-01 reports being aware of novel “irrational” aspects of his thinking. Most pronounced of these was a loss of linguistic common sense. For example, recently, MP-01 had been engaged in a number of

romantic relationships. Whenever a name of one of his former partners had been mentioned, he started thinking about whether his interlocutors were secretly communicating to him about them. Notably, one of the names in questions (Ena) is the same as a common feminine morpheme in Slovene and thus forms a part of many words (e.g., “izgubljena” [she who is lost], “razdeljena” [she who is divided]). MP-01 reports regularly thinking about whether his interlocutors were employing such words so as to communicate to him about her. Similarly, he would overthink contextually appropriate words. For example, on a skiing trip, his friend referred to the slope as “smooth” and MP-01 started wondering whether this statement contained sexual connotations.

MP-03 also experimented with various dosages. Having taken 300 mg of dried mushroom, he experienced a clear alteration in consciousness. He reports time slowing down for him: “I was looking at some code compiling. I saw it counting down the seconds. And I thought to myself that the second seemed to go slower.” While time slowing down is difficult to accurately estimate, what is further interesting is the state of hyper-awareness that followed. He kept checking whether time is passing at normal speed for him in a state that resembles to hyperreflexivity (Parnas & Sass, 2001):

I became super interested in this time passing thing. I was pacing up and down the office, checking whether it was true. At some point, I set a timer and I looked at it and marveled about how the seconds actually felt slower. (MP-03)

MP-07 typically microdosed with  $\approx 100$  mg of psilocybin. On the final day of sampling, however, she ingested  $\approx 200$  mg. The first two hours of the episode were associated with pronounced sensory distortions: “The paintings on my wall moved.” she reported, “And they were not just a little bit wobbly. They were really moving!” (MP-07)

We observed apparent changes in the salience of various events in the lifeworld of our participants. Increased saliency of external events is primarily apparent in mundane and otherwise boring tasks suddenly appearing interesting and engaging. On studying for exams, MP-01 reports: “Actually, I found it interesting to read these papers. Nothing was really new. I enjoyed reading them, but I wouldn’t know how to tell you back what I had read.” (MP-01)

On the other hand, the increased salience could feel overwhelming. MP-13 reports having “organized clutter” at her job - her desk is full of stick-it notes and various notebooks. However, on a microdosing day, her experience of it was uncomfortable:

Usually, I can be very focused on individual elements of this clutter. Now, it just felt like there were 100 little pieces of paper. [...] [M]y attention didn't automatically go towards anything logical. [...] I was passing from one information to another without a direction. (MP-13)

### *Self-presence, openness, and ego-dystonic contents*

Our participants observed a number of ego-dystonic thoughts. These varied in intensity. MP-09 who is otherwise a very open and extraverted person, perhaps best characterized by her willingness to volunteer information about her sexual activities in the samples, reports: “I really hope that I won’t have any interactions with [a family member]. I am not very social and I am feeling kind of awkward, slightly irritated.” (MP-09) Similarly, she adds: “I feel I am judgmental and thrown off.” (MP-09)

MP-03 reports two dramatic shifts in his persona. In some interactions, he felt like a daycare employee towards a client: “I am interacting with a client who is very annoying to me. I am adopting a very patronizing stance towards her. [...] I am feeling giddy. [...] It’s as if she is a child at a kindergarten and I am taking care of her.” (MP-

03) In a different moment, he experienced an outburst of anger at his coworker that he, already in the moment of the experience, found uncharacteristic of himself.

The most dramatic example of ego-dystonic alteration of presence comes from MP-10. She reports noticeable changes in her lived experience of psychophysical unity: “. Usually, this is all pretty much one thing. Now, I feel as if my mind is separate from my body.” On a sampling day, MP-10 was engaged in conflicts with both her partner of five years and her lifelong friend: ”I am very much without a filter. I say what I feel. I am having a hard time controlling my emotions and words. [...] I feel a little bit upset, but at the same time powerful. [...] I feel I am more right than others.” (MP-10)

For MP-10, the alteration in self-presence was apparent not only in her outward behavior and feelings of mind-body split, but a persistent sense of “incongruence” and “internal conflict”:

I would rather be doing something than sitting. But when I start talking, I just can't stop. I am still pretty unfiltered. I say things. [...] I also have mood swings. Both in my mind and my reactions. (MP-10)

Interpreting this alteration of self-presence as ego-dystonic is not unproblematic. On the one hand, when asked about this in the interview, MP-10 claims these feelings were “honest” and “authentic.” However, during the sampling period, she also very unquestioningly broke up a lifelong friendship that she later regretted.

### *Cognitive performance*

Qualitative material revealed mixed effects on perceived cognitive performance. Importantly, a subset of participants highlighted challenges in maintaining focus and executing tasks requiring heightened levels of concentrated attention, such as solving complex problems. Conversely, participants alluded to potential positive effects in terms of altered perceptions of otherwise frustrating tasks. For example, while preparing

for exams, MP-01 reported: “I am a bit scattered. For about an hour, I’ve been failing at focused learning.”

Similarly, MP-09 reported: “I am feeling murky. My brain feels like a boiling soup where I cannot discern individual thoughts from one another.” Tangential cognition was apparent to her also in her perception of external stimuli: “All of a sudden, I heard all the sounds at once. And they were all amplified. I also really heard [my friend]. All I could do was listen. But it was good. I was just soaking it in. I wasn’t thinking about anything much.” Another participant wrote in a sample: “I am trying to focus on actually having cognition. It is as if there is an emptiness inside of me; a space in which nothing much is happening.” (MP-07)

This experience was further consolidated by MP-12:

I am feeling very directionless. My mind is wandering from one topic to another. Nothing concrete stays in my mind. The only common thread is that every once in a while, I say to myself that I will get out of the bed at any moment now, but I just keep lying down. (MP-12)

In another sample, MP-09 described: “I think my cognition is normal, mushrooms-wise. However, I am detecting a lot of stimuli at once. I can feel how they are scratching at my brain. Today, I am simply accepting it and going with it.” Furthermore, otherwise boring activities are commonly experienced as interesting and even entertaining. MP-01 reports: “Studying [for an exam in signal processing] is above-average fun.” He also reports: “I don’t see any repulsion from solving [the homework]. It’s actually excellent.”

MP-03 spent the majority of the week working on a coding problem. On an off-day, he reported considerable frustration at not being able to find a solution to the task at hand. On an on-day, prior to taking psilocybin, he reports: “I am working on the same

image-analytics thing as yesterday. The code isn't working. I am feeling a lot of frustration about it." After experiencing clear effects of psilocybin, however, he reports:

I am looking at the results of the clustering algorithm. It's pretty engaging to me. [...] I am looking at how to interpret these clusters and there are various ideas coming to my mind about what to do next. [...] I am very submerged in work. (MP-03)

## **Discussion**

This paper aims to qualitatively explore the lived experiences of microdosing psilocybin, with a specific focus on systematically underreported potential negative experiences and effects. Simultaneously, it addresses the methodological challenges of researching microdosing. The analysis of the qualitative material yielded seven central themes, three of which are methodological in nature, and four provide insight into the lived experience of microdosing. The methodological themes are: a) contrasting with baseline experience, b) well VS loosely structured context, and c) momentary ecological assessment VS retrospective interview. Lived experience of microdosing is reflected in a) intention-setting, expectancy, and preconceived notions, b) threshold dosing, sensory distortions, and psychosis-like experience, c) self-presence, openness, and ego-dystonic contents, and d) cognitive performance. We wish to direct the reader's focus to two primary fields of interest: how sensemaking influences reports on microdosing experience, and the effects of microdosing psilocybin on cognition.

### ***Sensemaking***

Previous studies have predominantly focused on the potential positive effects of microdosing psychedelics (Cavarra et al., 2024; Ryan et al., 2023). However, there are also reports documenting negative psychological and physiological effects, including increased anxiety, fear, and frustration, as well as anecdotal accounts of intensified baseline symptoms (Anderson et al., 2019). A recent large-scale study by Hutten et al.

(2019b) gathered data on perceived side effects of microdosing with various psychedelics through online questionnaires administered to a total of 1116 respondents. Results from this study indicated that 20.2% of respondents reported negative experiences, with the majority occurring acutely while under the active influence of the substance. Interestingly, all participants included in the present study reported experiencing at least some negative effects potentially associated with microdosing. However, any conclusions regarding causality are not applicable given the small sample size and subjective nature of the reports. It is important to note, however, that participants were recruited at random, and in terms of generally positive attitudes towards psychedelic microdosing at baseline, they did not differ significantly from participants included in the aforementioned studies.

In the present study, we used a dual methodology to investigate our participants' lived experience: momentary ecological assessment and retrospective interviews. As a rule, sampling-based descriptions of the experience of microdosing were predominantly negative, whereas retrospective interviews yielded predominantly positive descriptions. We previously employed such dual methodology when investigating the sense of realness ([reference removed by the authors]). We observed differences between various methodologies; however, they were minor and centered on the specifics of individual data collection techniques (e.g., momentary ecological assessment was characterized by a smaller sense of agency than retrospective reports). Thus, the stark difference in the appraisal of microdosing experience in the present study was unexpected.

We can interpret the discrepancy between negative momentary and positive retrospective reports in light of theoretical discussions on temporality in contemporary qualitative phenomenology. Typically, techniques for collecting phenomenological reports focus on descriptions of lived experience as it occurs in a single moment

(Høffding et al., 2022; Hurlburt, 2011; Petitmengin, 2006). However, it has been recently argued (Depraz, 2022) that such a limited view of phenomenology may be unsuitable for investigating psychopathology as it is always situated in a broader context of a person's life (De Haan, 2020; Jaspers, 1997; Stanghellini & Mancini, 2017). A person's self-narrative, however, is subject to retrospective re-interpretation due to the constructive nature of human memory. As such, broad-scale descriptions of experience are always affected by a person's patterns of sensemaking (for an epistemological analysis of this phenomenon in qualitative phenomenology, see [reference removed by the authors]). Furthermore, Kahneman and Riis (2005) have demonstrated that there is a difference between the experiencing and the remembering self, wherein when we are remembering some experience, its valence might be different to when we lived through it.

This dynamic thus allows us to address why our study yielded detailed descriptions of negative effects of microdosing psilocybin, whereas other qualitative and self-report-based studies provided predominantly positive effects, and negative effects, when described, were relatively vague (Anderson et al., 2019; Johnstad, 2018). Existing studies relied primarily on anonymous, retrospective reports (Anderson et al., 2019; Johnstad, 2018; Ryan et al., 2023). Due to the known problem of self-selected samples of participants in psychedelic research, it is likely that these reports (much like our retrospective interviews) were impacted by positively-skewed patterns of sensemaking. Based on our findings, it is therefore imperative to supplement retrospective reports with examining the lived experience as it was present in the moment, so as to obtain a more comprehensive view of the subjective effects of microdosing.

Hartong and Van Emmerik (2023) report a cross-sectional study investigating the relationship between trait mindfulness, trait anxiety and microdosing psilocybin. They found that decreased trait anxiety and increased trait mindfulness are significantly associated with microdosing psilocybin. However, this effect was not significant when excluding individuals with previous experience with psychedelics. They posit three possible explanations for this: i) it may be that non-naive participants have previously had psychedelic-induced mystical experience that meaningfully affected their mindfulness and anxiety; ii) the presence of placebo effect; and iii) the observation that drug naive individuals mostly consisted of first-year female undergraduates, who are known to exhibit higher degree of trait anxiety than the general population. Kaertner et al. (2021) conducted a prospective survey on psychological well-being of individuals who have undergone microdosing on their own. They found statistically significant improvements in psychological well-being, as well as symptoms of depression and anxiety. However, improvement in all three domains was significantly associated with positive baseline expectancy.

Psilocybin is commonly reported to be used for alleviating symptoms of psychiatric disorders (Anderson et al., 2019; Goldberg et al., 2020; Hutten et al., 2019b; Irizarry et al., 2022; Johnstad, 2018; Kinderlehrer, 2023). Among our participants who have been suffering from depression, the reports were mixed. None of the participants reported a clear improvement on tier symptoms. However, novel experiences, although initially unpleasant, were appreciated by the participants struggling with anhedonia in retrospect as they demonstrated the possibility of a different way of being. These findings suggest that the beneficial effects of microdosing on psychiatric symptoms may be associated with demand characteristics and positive bias. Lea et al. (2020) performed a study on the reports on microdosing experiences on Reddit. Such investigations are

valuable as they can help us elucidate a “folk psychiatry” of psychedelics (i.e., the set of beliefs and preconceived notions circulating among the lay public). It is crucial to acknowledge that while preconceived notions and expectations evidently exert a significant influence on both the measurable and reported effects of psychedelics, this should not automatically be viewed as a counterargument against their potential role and efficacy. Adopting a strictly biomedical perspective may overlook the transformative potential of the lived experience of either microdosing or above-threshold dosing of psychedelics, particularly when integrated retrospectively. In this context, an individual's preconceived attitudes and expectations play an important role in the sensemaking processes. Rather than dismissing these factors, we propose considering the transformative potential of psychedelic experiences as they are lived and later integrated, with recognition of the nuanced interplay between subjective expectations and objective outcomes.

In short, going forward, qualitative research of microdosing psilocybin should be mindful of these three methodological lessons. Firstly, it is imperative to collect data on participants' baseline experience (e.g., for the purpose of separating individual idiosyncrasies from the genuine effects of microdosing). Here, frameworks such as lifeworld analysis (Stanghellini & Mancini, 2017) with its focus on value structures might be particularly useful in identifying individuals' preconceptions about psychedelics. Second, we must develop knowledge of “folk psychiatry” of psychedelics (i.e., the set of culturally mediated narratives about psychedelics developed by the lay public). This will provide us insight into what are the expectancies and patterns of sensemaking that inform the lived experience of microdosing. Finally, we should take into account the observation that momentary sampling and retrospective reports provide different accounts of microdosing. We are not claiming that either perspective is

epistemically superordinate. Rather, both should be taken into consideration. We have consolidated these methodological lessons in a pre-registration for future research on microdosing psilocybin, which is available here: [link removed by the authors].

### *Cognition*

Among our participants we saw a clear pattern in cognitive changes that was observed in almost all participants. They report a sense of loosening of mental structures (i.e., they generally experience their thoughts as occurring in the background), and an increase in salience of their environment (which is associated with greater creativity, appreciation of nature, as well as easier distractibility).

These findings can be interpreted through the ideas of stable and flexible cognition, which represent two distinct aspects of executive control (Dosenbach et al., 2008). Stable cognition in this case refers to the consistent and enduring patterns of cognitive processing, such as long-term memory, habitual behaviors, and deeply ingrained cognitive schemata. Flexible cognition, on the other hand, involves the ability to adapt and adjust cognitive processing in response to changing environmental demands or novel situations. (Botvinick et al., 2001; Braver, 2012; Cole et al., 2013; Politakis et al., 2022) This includes cognitive functions such as problem-solving and inhibitory control. Broadly speaking, the participants reported an increase in flexible cognition and a decrease in stable cognition. We propose that the shift in cognition, reported by our participants, can be understood by reported psilocybin induced alterations in salience.

Salience refers to the quality of a stimulus being noticeable or prominent, often influenced by factors such as novelty, emotional relevance, or personal significance and is aberrantly altered in hypothetically hyperdopaminergic states, as for example in psychosis or in psychedelic experience (Berridge & Robinson, 1998; Kapur, 2003).

Salient stimuli or events capture attention and are more likely to be processed deeply and remembered. Notably, the participants reported experiences that could be considered descriptions of altered salience.

Overall, psychedelic alterations of salience very likely play a role in shaping both stable and flexible cognitive processes by influencing attentional priorities and cognitive resource allocation. This is similar to previous anecdotal reports claiming that microdosing psilocybin could lead to enhanced cognition and creativity (Bonnieux et al., 2023; Lea et al., 2020). It is of note, however, that findings from research in this area are mixed, with modern placebo-control studies finding no significant changes on cognitive processes (Rucker et al., 2022; Yanakieva et al., 2019). Our participants, primarily those who were microdosing for the purpose of self-understanding and cognitive enhancement, experimented with what they termed “threshold dosing,” i.e., taking a high enough dose to experience “near-altered” states of consciousness. It is likely that the reported changes in cognition are associated with early stages of psychedelic experience.

The loosening of mental structures was the most common change in cognition. Interestingly, it could have been experienced both as positive and negative depending on the context in which the participants were experiencing it. These findings are in line with recent trends in psychopathology research, emphasizing that various aspects of cognitive functioning, traditionally appraised as adaptive or maladaptive, can, in fact, be both, depending on environmental demands (Aldao & Nolen-Hoeksema, 2012). Further, our participants’ reports point to the importance of set and setting in microdosing. Set and setting is a term of art in psychedelic psychotherapy. This primarily includes preparing the patients for a longer period of time for the psychedelic experience. Secondly, special attention is placed on the context in which psychedelic experience

takes place (e.g., shaded room, carefully selected music). The idea of set and setting is being increasingly recognized as playing an important role in microdosing as well (Anderson et al., 2019; Hartogsohn & Petranker, 2022). Better understanding of how environmental factors influence microdosing experience may help both in treatment outcomes as well as in mitigating risk among recreational users.

## **Conclusion**

In this paper, we presented a proof-of-principle qualitative phenomenological study that aims at systematically investigating the lived experience of microdosing in people who decide to engage in this practice for a variety of reasons. We combined momentary ecological assessment (i.e., moment-by-moment sampling of lived experience) as well as detailed retrospective interviews. Participants reported loosening of mental structures (i.e., less intense strength of thoughts, tangential stream of consciousness), increased salience of external stimuli (varyingly associated with greater interest in otherwise mundane activities, as well as sensory overload), an increase in flexible cognition, a decrease in stable cognition, and various ego-dystonic contents. Importantly, we could not make a clear-cut distinction between positive and negative effects of microdosing psilocybin in these data. Rather, appraisal was influenced by context (i.e., highly structured environments were conducive to positive appraisal of experience and vice versa) and the patterns of sensemaking that were available to the participants.

What was striking was that momentary ecological assessment and retrospective interviews yielded diametrically opposite accounts of microdosing experience. This finding necessitates larger scale mixed methods studies as it may turn out that sensemaking (which is part and parcel of retrospective methods) is related to

underreporting of negative effects of microdosing psilocybin. Furthermore, the dynamic nature of momentary ecological assessment allows for investigating how context shapes experience (thereby addressing the often overlooked role of set and setting in microdosing research).

### **Acknowledgments**

The authors would like to thank [name removed by the authors] for her help with the figures. We would like to thank [name removed by the authors] for engaging discussions on the contents of the paper.

### **Declaration of interest**

The authors declare no conflict of interests.

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Table 1. Table 1. Participant Properties. Formal psychiatric diagnoses are marked with ICD-10 codes. Asterisks next to the diagnosis refer to stable remission. Under drug experience, participants' experience with microdosing is described. Naïve refers to no experiences with microdosing, whereas PP means that participants have formally completed training in psychedelic psychotherapy and thus their experiences with microdosing are difficult to quantify. Intention refers to the reason why they engaged in microdosing (CE = cognitive enhancement; D = alleviating symptoms of depression; SK = self-knowledge, and SI = alleviating symptoms of somatic illness. Doses are approximate and are based on participants' reports as no testing of blood levels of psilocybin was conducted. Regimen refers to how often they microdosed (Fadiman refers to one on-day, being followed by two off-days). Sampling adherence refers to how many samples they responded to during momentary ecological assessment.

Figure 1. Data collection protocol. The data were collected over a period of a month. The first two weeks were dedicated to collecting data about a person's baseline experience. The second two weeks were dedicated to collecting data on microdosing psilocybin. Pins with circles denote interviews (preliminary interview, two follow up-interviews about the samples, and a debriefing interview at the end). Pins with diamond denote off-days (w/o microdosing psilocybin). Pins with triangles denote on-days (w/ microdosing psilocybin).

Figure 2. Network model of microdosing psilocybin. Network structure is adopted from de Haan (2020, 249). Lines denote what aspects of experience are connected. Direction of the arrows denotes which aspects of experience are perceived to influence which. The + sign refers to a specific category upregulating (i.e., making more present) another category. The - sig refers to a specific category down-regulating another category. Curved lines represents interactions of three different aspects of experience.