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ORIGINAL ARTICLE



A comparison of reactivation experiences following vaporization and intramuscular injection (IM) of synthetic 5-methoxy-N,N-dimethyltryptamine (5-MeO-DMT) in a naturalistic setting

 MALIN V. UTHAUG^{1*} , R. LANCELOTTA²,
 A. M. ORTIZ BERNAL³, A. K. DAVIS^{4,5} and
 JOHANNES G. RAMAEKERS^{1*}
¹ Department of Neuropsychology and Psychopharmacology, Faculty of Psychology and Neuroscience, Maastricht University, The Netherlands

² Innate Path, Lakewood, CO, USA

³ School of Human Ecology, Human Development and Family Studies, University of Wisconsin, Madison, WI, USA

⁴ College of Social Work, The Ohio State University, Columbus, 43210, OH, USA

⁵ Center for Psychedelic and Consciousness Research, Department of Psychiatry and Behavioral Sciences, Johns Hopkins University, Baltimore, 21224, MD, USA

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ABSTRACT

Background: Previous research suggests a therapeutic potential of 5-methoxy-N,N-dimethyltryptamine (5-MeO-DMT). However, online anecdotal reports have described a phenomenon following cessation of the acute effects of 5-MeO-DMT use which has been termed *reactivation* (i.e., re-experiencing [“flashback”]). To date, no research has investigated whether different routes of administration may confer different reactivation rates, effects and experiences.

Aims: We aimed to assess whether intramuscular injection (IM) and vaporization of 5-MeO-DMT conferred different reactivation rates, changes in satisfaction with life as well as ratings of the experience with ego dissolution and the mystical.

Methods: Using internet-based advertisements, 27 respondents ($M_{age} = 32$. Somatic Experiencing (SE) = 1.43; males = 18; North America = 19) completed an online-based survey.

Results: Of the 14 participants in the IM group, 3 (21%) reported reactivations; in contrast, of the 13 participants in the vaporization group, 9 (69%) reported reactivations. Redosing (more than 1 dose) occurred more frequently in the vaporization group ($N = 8$) (1–6 times with 3–35 mg of 5-MeO-DMT), relative to the IM group ($N = 2$) (1–5 times with 5–10 mg of 5-MeO-DMT). All participants in the IM group experienced release of physical tension, compared to 8 participants in the vaporization group. Participants in the IM group reported longer time of onset of acute effects (between 1 and 3 [$N = 6$] and 4–6 min [$N = 6$]), relative to the vaporization group where the majority ($N = 11$) reported a rapid onset of 1–50 s.

Conclusion: Findings suggest that compared to vaporization, the IM route of administering 5-MeO-DMT is associated with lower and less doses, lower frequencies of reporting reactivation, a higher frequency of physical tension release, and longer onset of acute effects

KEYWORDS

5-methoxy-N,N-dimethyltryptamine, intramuscular injection, reactivation, clinical consideration

*Corresponding authors. Department of Neuropsychology and Psychopharmacology, Faculty of Psychology and Neuroscience, Maastricht University, Universiteitssingel 40, 6229 ER, Maastricht, The Netherlands. E-mail: malin.uthaug@maastrichtuniversity.nl (Malin V. Uthaug); j.ramaekers@maastrichtuniversity.nl (Johannes G. Ramaekers)

INTRODUCTION

The serotonin 5-HT_{1A}/5-HT_{2A} receptor agonist *5-methoxy-N,N-dimethyltryptamine* (5-MeO-DMT) is a lesser known psychedelic substance (Hoshino & Shimodaira, 1936; Shen, Jiang, Winter, & Yu, 2010; Szabo, 2015), and can be found naturally in plants and the secretion (i.e., bufotoxin) from the *Incilius alvarius* toads skin and parotid glands (Pachter, Zacharias, & Ribeiro, 1959; Weil & Davis, 1994). 5-MeO-DMT is known to be orally inactive as it is metabolized by monoamine oxidase (MAO) enzymes in the gut and liver (Shen et al., 2010). Therefore, 5-MeO-DMT is usually administered parenterally, most commonly via inhalation of smoke or vapor, and less commonly via intravenous, intramuscular, rectal, sublingual, or intranasal application (Davis, Barsuglia, Lancelotta, Grant, & Renn, 2018; Weil & Davis, 1994). Interestingly, previous research demonstrate that inhalation of 5-MeO-DMT is known to evoke a rapid onset of psychedelic effects within seconds which can last for 15–20 min (Weil & Davis, 1994), with subjective effects described as ‘*being shot out of a cannon*’ (Oroc, 2009). This contrasts with intramuscular injection (IM) which is anecdotally reported to be more subtle, with a slower onset and a more gradual return from the psychedelic experience (5-Hive, 2017; InnerExplorer, 2017a, 2017b, 2017c). It is worth highlighting that although IM is known to place an additional burden on manufacturing a sterile product, Sherwood et al. (2019) identified IM as the most favorable route of administration 5-MeO-DMT for the following reasons; it avoids first pass metabolism, has high bioavailability, precise control of dosage, and evokes a gentle onset with slightly longer duration of effects. This contrasts with vaporization which, although avoids first pass metabolism, and is a more accepted and easier route of administration, induces a rapid onset of effects through a much more complex drug delivery and finally makes it challenging to control dose.

Recently, use of 5-MeO-DMT has become increasingly popular in naturalistic settings as a means for spiritual exploration and is associated with enhanced well-being (Davis et al., 2018; Davis, So, Lancelotta, Barsuglia, & Griffiths, 2019; Uthaug, Lancelotta, Szabo, Riba, & Ramaekers, 2019a; Uthaug et al., 2019b). Although many people claim benefits from the use of 5-MeO-DMT, there are some who report experiencing “after-effects” following 5-MeO-DMT ingestion. In fact, anecdotal reports on online forums and Facebook support groups indicate that in certain cases, especially with vaporization (5-Hive, 2018a, 2018b), naturalistic use of 5-MeO-DMT is associated with the incidence of a complex and not well understood phenomenon that has been termed *reactivation*, referred to as the re-experiencing of some of the effects induced by 5-MeO-DMT intake at some point after the drug’s acute effects have worn off. From that description, reactivations could be analogous to the LSD flashback phenomenon referred to as “*a re-experiencing of certain elements of the drug induced state after the drug’s effects have worn off and a relative period of normalcy has*

been experienced” (Heaton, 1975; Heaton & Victor, 1976; Matefy & Krall, 1974; Matefy, Hayes, & Hirsch, 1978). Nevertheless, it is worth highlighting that at the current time no scientific research can explain why reactivations (or LSD flashbacks) occur.

Recent unpublished reports from an online survey on the patterns of use of 5-MeO-DMT indicate that prevalence rates of reactivations (which lasts for 1–2 weeks) are as high as 72% in a subset of respondents using 5-MeO-DMT in a structured ritualized setting (Davis et al., 2018; Ortiz Bernal, 2019). However, up to 96% of these users report their reactivation as being a positive or neutral experience, and only 3% report their reactivation experiences as being negative (Davis et al., 2018; Ortiz Bernal, 2019). With regard to reactivation following 5-MeO-DMT, participants of the recent survey study reported that common precipitating triggers of reactivations tend to be smoking marijuana, falling asleep, states of deep relaxation, deep meditation and certain smells and sounds that remind individuals of their experience (Davis et al., 2018; Ortiz Bernal, 2019).

Although both reactivations and flashbacks are a recurrence of the users’ acute psychedelic experience(s) and triggered by similar factors (i.e., relaxation), LSD flashbacks can occur for up to several years (Abraham, 1983), and more often are rated as a negative experience (Naditch & Fenwick, 1977). This is in contrast to 5-MeO-DMT reactivations which are reported to occur for 1–2 weeks, and more frequently rated to have a positive or neutral valence (Davis et al., 2018; Ortiz Bernal, 2019). Nevertheless, one’s experience of a reactivation is likely dependent on the context within which it occurs, and it is likely that the reactivation data from the ceremonial group is influenced by the fact that the group provides robust support for preparation and integration of 5-MeO-DMT experiences which could explain the positive valence of these retrospective reports.

To date, although reactivation is commonly reported following use of 5-MeO-DMT through vaporization (5-Hive, 2018a, 2018b), no research has investigated whether different routes of administration may confer different reactivation rates, effects and experiences. Thus, the present study employed an internet-based survey to investigate and compare the phenomenon of reactivation, as well as other effects and experiences of synthetic 5-MeO-DMT after vaporization and IM. Specifically, the first objective of the present study was to assess the prevalence of reactivations (i.e., “(flashbacks/re-experiencing [parts of] the experience)”) following vaporization and IM of 5-MeO-DMT in the natural environment. The second objective was to examine whether there were differences in the following characteristics of one’s synthetic 5-MeO-DMT experience as a function of the route of administration: redosing, time of onset of acute effects, release of physical tension, satisfaction with life, and ratings of the experience with the mystical and ego dissolution. We expected as per anecdotal reports, that reactivations following use of vaporization would occur more frequently than following use of IM (5-Hive, 2018a, 2018b). Moreover, as IM is anecdotally known to induce a similar 5-MeO-DMT

experience to vaporization, but with a slower onset and gradual return from the psychedelic experience (5Hive, 2017; InnerExplorer, 2017a, 2017b, 2017c), we expected that ratings of satisfaction with life as well as the ratings of the experience with the mystical and ego dissolution would not differ between the two routes of administration.

METHODS

Study procedure

From November 2018 through June 2019 we posted written recruitment advertisements on different Facebook group pages related to 5-MeO-DMT, in addition to using snowball recruiting via messages and other websites. All recruitment advertisements contained information regarding the purpose of the study, the estimated amount of time required to complete the survey (approximately 10–15 min), and the anonymity of completing the survey. Upon clicking on any of our links to the survey in the advertisements, potential respondents were sent to the secure survey site (hosted by Qualtrics), where they viewed the informed consent document which repeated the purpose of the study and described eligibility criteria (being at least 18 years old, able to read and understand English, and having used synthetic 5-MeO-DMT at least once in their lifetime through either administration routes). No personal identifying information was collected in the survey.

A total of 50 participants began the survey. Of these, twenty-two participants were excluded because they did not complete the entire survey, and one participant was excluded due to reported non-synthetic 5-MeO-DMT. Thus, the final sample was comprised of 27 participants, 14 participants in the IM group and 13 participants in the vaporization group. Participation was voluntary, and no incentives to participate were provided. All study procedures were approved by the Ethical Review Committee Psychology and Neuroscience (ERCPN), in Maastricht, the Netherlands.

Measures

5-MeO-DMT survey. We used a prior published 5-MeO-DMT survey (Davis et al., 2018), and former naturalistic observational research on the effects of psilocybin, ayahuasca and 5-MeO-DMT (Mason, Mischler, Uthaug, & Kuypers, 2019; Uthaug et al., 2018; Uthaug et al., 2019a, 2019b) as basis to inform the current survey. We began the survey by describing the two common types of administration routes of 5-MeO-DMT, namely: vaporization and IM. Then we asked the participants to write about their experience in a way that did not reveal their identity. Other questions asked about demographics (age, gender, origin, previous experience with psychedelics, and 5-MeO-DMT), redose, onset of experience, and finally release of physical tension during and after the session. Finally, to get a better understanding of the subjective experiences between the two

administration routes, we encouraged those who had experience with both administration routes to write a comparison of the two.

Reactivation. The survey also included items that asked whether participants had had a reactivation which we defined as “(flashbacks/re-experiencing [parts of] the experience)”, and if so, when and during what activity did the reactivation occur.

Subjective measures. The survey also included three validated measures assessing the experience with ego dissolution, mystical experience, and satisfaction with life;

Ego Dissolution Inventory (EDI). EDI is an 8-item self-report scale that assesses the participant’s experience of ego dissolution, (Nour, Evans, Nutt, & Carhart-Harris, 2016). The participants answered the scale with making a mark on a line from either “No, not more than usually” (0%) to “Yes I experience this completely/entirely” (100%). The total EDI is scored by calculating the mean percentage of all the eight items, and ranges from 0 to 100%. The higher the total score, the stronger the experience of ego dissolution. The scale has demonstrated sensitivity in assessing the experience of ego dissolution following ingestion of ayahuasca (Uthaug et al., 2018), and 5-MeO-DMT (Uthaug et al., 2019a, 2019b) in a naturalistic setting. The internal consistency of the total scale in the current sample was good (Cronbach’s alpha = 0.87).

Mystical Experience Questionnaire 30 items (MEQ-30). MEQ is a 30 item self-report scale of mystical experience (Barrett, Johnson, & Griffiths, 2015; MacLean, Leoutsakos, Johnson, & Griffiths, 2012). The scale has four factors (mystical [which includes unitive experiences, noetic quality, and sacredness], positive mood, transcendence of time/space, and ineffability) described in (Barrett et al., 2015). Each item was rated on a six-point scale (0 = none, not at all; 1 = so slight cannot decide; 2 = slight; 3 = moderate; 4 = strong [equivalent in degree to any previous strong experience]; and 5 = extreme [more than ever before in my life and stronger than four]). Scores ranged from 0 to 100%. Higher scores indicate stronger mystical experiences. A “complete mystical experience” is counted when $\geq 60\%$ of the max possible score is endorsed on all four MEQ subscales. The MEQ-30 has demonstrated sensitivity in assessing the effects of a range of psychedelic compounds, including LSD (Schmid & Liechti, 2018), MDMA (Lyvers & Meester, 2012), psilocybin (Barrett et al., 2015), ayahuasca (Schenberg, Tofoli, Rezinovsky, & Silveira, 2017), and 5-MeO-DMT (Barsuglia, Davis, & Palmer, 2017; Barsuglia et al., 2018; Davis et al., 2018). The internal consistency of the total scale in the current sample was excellent (Cronbach’s alpha = 0.96).

Satisfaction with Life (SWL). SWL is a 5-item self-report scale, assessing someone’s subjective satisfaction with life (Diener, Emmons Larsen, & Griffin, 1985; Pavot & Diener, 2009). The SWL has possible score-range of 5–35, with 5–9 indicating an extreme dissatisfaction with life, while scores between 31 and 35 indicating the respondent is extremely satisfied. The items are answered on a Likert-scale ranging

from 1 “Strongly disagree” to 7 “Strongly agree”. The total score is obtained by adding points on each item. The scale has demonstrated sensitivity to assess satisfaction with life in participants who consumed ayahuasca (Uthaug et al., 2018), psilocybin (Mason et al., 2019) and 5-MeO-DMT (Uthaug et al., 2019a, 2019b). The internal consistency of the total scale in the current sample was excellent (Cronbach’s alpha = 0.91).

Statistical analysis

First, frequency counts and a descriptive analysis were performed. Then, a Pearson’s Chi-Square and t-test analysis was conducted to assess the similarities and/or differences between the reported demographics and subjective experiences using either administration routes. The alpha level of significance was set at 0.05. Phi was calculated to estimate effect sizes of significant frequency differences in outcome measures between administration routes. The data was analyzed with the Statistical Package for the Social Sciences 24.0 (SPSS) (SPSS, 2016).

RESULTS

Sample characteristics

There were no significant group differences concerning their reported demographics (age, gender, origin, previous experience with psychedelics). Across both groups, the mean age of the 27 participants was 32 years of age (SE = 1.43). Out of those 18 were males, seven females. Furthermore, one participant preferred not to report their gender, and one participant reported that his/her gender was not listed. Most participants were from North America ($N = 19$), while the

rest was from Europe ($N = 7$), and Australia ($N = 1$). Many participants had previous experience with psychedelics; i.e. psilocybin ($N = 25$), LSD ($N = 22$), ayahuasca ($N = 16$), mescaline ($N = 16$), DMT ($N = 14$), 2C-B ($N = 14$), ketamine ($N = 12$), others ($N = 12$), and iboga ($N = 2$), while all ($N = 27$) had previous experience with 5-MeO-DMT through either toad secretion from *I. alvarius*, synthetic- or plant form. While most participants ($N = 7$) in the IM group had experience with both administration routes, only one in the vaporization group had experience with IM administration, see Table 1 for their individual comparisons of each administration route.

Redosing

It should be noted that five participants from the vaporization group reported they were unsure or did not know the weight of the dose they were administered during their session. For an overview of dosing schedules as reported by the participants, see Table 2. Moreover, redosing occurred significantly more frequently in the vaporization group (eight out of 13 participants), who overall received from 1 to 6 doses ranging from 3 to 35 mg, compared to the participants in the IM group (two out of 14 participants) who received 1–5 doses ranging from 5 to 10 mg, (Pearson’s Chi-Square = 6.454, Phi = 0.489, $P = 0.018$), see Table 3.

Acute effects of 5-MeO-DMT

All participants in the IM group reported that they experienced a relief of physical tension ($N = 14$). This was significantly different from the vaporization group where only eight out of 13 reported a relief of physical tension, (Pearson’s Chi-Square = 6.608, Phi = 0.489, $P = 0.016$), see Table 3.

Table 1. Overview of subjective evaluation of administration routes of participants who experienced both IM and vaporization

Vaporisation ($N = 1$)	
PPT	
21	Did not experience any difference
Intramuscular injection ($N = 7$)	
PPT	
14	IM felt more relaxing and immersive. Vaporized felt more “powerful”, quick, and disorienting.
16	The 5-MeO-DMT experience IM felt like a vaporized experience in slow motion that is more gentle and richer in content.
17	IM injection come on was very gradual in comparison the almost immediate blast off of vaporization. Experiences of fear, overwhelm, dread, and confusion were greatly reduced, allowing for enhanced presence during the experience. Preferred route of administration.
18	Physical distress in IM injection was subtle, experience felt deeper and had time to appreciate the whole momentum.
19	Vaporized was like jumping into the deep end of the mystical pool head first. IM was like slowly stepping into a pool down the steps. Vaporized I experienced completely ego-death and then a reconstitution. IM was an approach of ego-death, where I hovered at the precipice. Because it was so gradual there was no confusion.
31	It felt like a completely different drug. When I had smoked it, it just felt like lightness, gentleness in my body. Whereas, the injection felt like another entity being present with me.
49	Vaporization is a lot of a faster come up – which feels a bit scary and like a bit of a shock. Also, the time in the “space” is much shorter, and in an unconscious way - which doesn’t really give a lot of release of trauma, but feels more like an experience. IM injection on the other hand had a smoother come up which allowed me to comfortably enter the “space”, have a longer time there while simultaneously stay connected to this world and my guide through talking about what was coming up for me and be guided and cheered for in my experience.

Table 2. An overview of reported dose information and ratings of the experience of ego dissolution (as assessed by EDI) per participant, per group

PPT	Dose 1 (in mg)	Dose 2 (in mg)	Dose 3 (in mg)	Dose 4 (in mg)	Dose 5 (in mg)	Dose 6 (in mg)	Total doses (N)	Redose	EDI (%)
Intramuscular injection (IM)									
1	5	10					2	Yes	20,75
3	7						1	No	62,5
6	5						1	No	66,13
7	5						1	No	34,5
8	10						1	No	83,5
9	5						1	No	72,5
10	5						1	No	13,75
11	5						1	No	72,13
15	5						1	No	87,5
17	5						1	No	22,38
18	5						1	No	42,63
25	5	5	5	5	5		5	Yes	43,88
26	5						1	No	81,25
27	5						1	No	40,88
Vaporization									
2	3	6	9	14			4	Yes	0
4	6	19					2	Yes	79,5
5	7	15	23				3	Yes	60,63
12	3	3	6	6	9	12	6	Yes	20,63
13	–	–					2	Yes	62,5
14	–						1	No	22,63
16	13						1	No	62
19	15	15					2	Yes	76,13
20	–						1	No	42,88
21	–	–					2	Yes	75,88
22	3						1	No	17,88
23	–						1	No	93,75
24	20	35					2	Yes	62,88

Onset of effects of 5-MeO-DMT

The majority of the vaporization group reported that it took about 1–50 s ($N = 11$) for the acute effect to start after vaporizing the substance. This was significantly different from the time of onset of acute effects reported in the IM group where participants reported that it took 1–3 min (six out of 14 participants) and 4–6 min (six out of 14 participants) for the acute effects to start after IM (Pearson's Chi-Square = 13.305, $\Phi = 0.703$, $P = 0.001$), see Table 3.

Reactivation

Participants in the vaporization group reported significantly more frequent occurrences of reactivation ($N = 9$) following ingestion compared to participants in the intramuscular injection group where 3 out of 14 participants reported having a reactivation, (Pearson's Chi-Square = 6.238, $\Phi = 0.481$, $P = 0.021$), see Table 3. In the vaporization group 1 (7.7%) participant reported that reactivations occurred “during the day”, 1 (7.7%) “during the afternoon”, 2 (15.4%) “during the night”, 4 (30.8%) “other times”. Additionally, 1 (7.7%) participant reported that the reactivation occurred “during meditation”, 1 (7.7%) “when trying to sleep”, 1 (7.7%) “during sleep” and 5 (38.5%) participants reported “other activities”, see Table 4.

Concerning the IM group, 1 (7.1%) participant reported that reactivations occurred “during the morning”, and 2 (14%) “other times”. Furthermore, 3 (21.4%) reported “other activities”, see Table 4.

Subjective measures of (acute) effects of 5-MeO-DMT

It should be noted that there was no significant difference between the groups concerning the scores of SWL, as well as EDI, and MEQ.

Satisfaction with life. The mean (SE) ratings of the satisfaction with life scale, ranging from 0 to 35 was 25.35 (1.57) for the IM group, and 23.23 (2.34) for the vaporization group.

EDI. The mean (SE) ratings of EDI, ranging from 0% to 100%, was 53.16% (6.68) for IM group, and 52.09% (7.94) for vaporization group.

MEQ-30. The mean (SE) ratings of the total score of the MEQ-30, ranging from 0% to 100%, was 65.47% (4.70) for the IM group, and 57.43% (6.95) for vaporization group. Moreover, the mean (SE) ratings of the different sub-scales of the MEQ-30 (i.e. transcendence, positive mood, ineffability, and mystical), also ranging from 0 to 100% was 41.90% (4.40), 74.28% (4.90), 43.57% (1.99), and 67.04%

Table 3. An overview of the differences between the two administration routes with regard to redosing, time of onset, reactivation and relief of physical tension

	Intramuscular injection (N = 14)	Vaporisation (N = 13)	Pearson's Chi-Square	P	Phi
Redosing			6.45	0.018	0.489
Yes	2	8			
No	12	5			
Total	14	13			
Time of onset			13.35	0.001	0.703
1–50 s	2	11			
1–3 min	6	1			
4–6 min	6	1			
Total	14	13			
Reactivation			6.23	0.021	0.481
Yes	3	9			
No	11	4			
Total	14	13			
Relief of physical tension			6.60	0.016	0.495
Yes	14	8			
No	–	5			
Total	14	13			

Table 4. An overview of when and during what activity the reactivation occurred, from each group

When	N (%)	Activity	N (%)
Vaporisation (N = 13)			
During the morning	–	During meditation	1 (7.7%)
During the day	1 (7.7%)	When trying to sleep	1 (7.7%)
During the afternoon	1 (7.7%)	During sleep	1 (7.7%)
During the night	2 (15.4%)	Other activity	5 (38.5%)
Other times	4 (30.8%)		
Intramuscular injection (N = 14)			
During the morning	1 (7.1%)	During meditation	–
During the day	–	When trying to sleep	–
During the afternoon	–	During sleep	–
During the night	–	Other activity	3 (21.4%)
Other times	2 (14%)		

(6.16) for the IM group, and 50.25% (4.42), 59.23% (7.61), 35.64% (3.81) and 56.82% (9.25) for vaporization group.

DISCUSSION

This study sought to investigate the prevalence of reactivations (i.e., “flashbacks/re-experiencing [parts of] the experience”) following vaporization and IM of synthetic 5-MeO-DMT in a naturalistic environment. The second objective was to examine whether there were differences in the following characteristics of participants’ synthetic 5-MeO-DMT experience as a function of the route of administration: redosing, time of onset of acute effects, release of physical tension, satisfaction with life, and ratings of the experience with the mystical and ego dissolution.

This study yielded some important findings. Firstly, participants in the vaporization group reported significantly more occurrences of reactivation compared to participants in the IM group. As previously stated, reactivations are said

to be analogous to LSD, but are different in the sense that they are not long-lasting, and mostly rated as a positive or neutral experience (Davis et al., 2018; Ortiz Bernal, 2019). Although there is currently no scientific explanation as to why reactivations occur, nor why they are triggered, there are reasons to suspect that they are triggered by different activities of relaxation (Davis et al., 2018; Ortiz Bernal, 2019). Additionally, non-pharmacological factors such as expectation, preparation and intention (set) are known to shape the response to psychedelics (Hartogsohn, 2014; Hartogsohn, 2016; Hartogsohn, 2017). Specifically expectations are built from previous experience with the psychedelic substance, and on general knowledge of its effects on affect and well-being (Metzner, Litwin, & Weil, 1965; Haijen et al., 2018), and modeled through verbal suggestions and instructions (Bartels et al., 2014; Kirsch, 1985; Kirsch, 2004; Martin-Pichora, Mankovsky-Arnold, & Katz, 2011; Van Oorsouw & Merckelbach, 2007). With this in mind, and the fact that all participants had previous experience with 5-MeO-DMT, together with the many anecdotal reports available online of 5-MeO-DMT experiences, it is plausible

that participants from either group formed different expectations of the reactivation phenomenon based on anecdotal reports online (5-Hive, 2017; InnerExplorer, 2017a, 2017b, 2017c; 5-Hive, 2018a, 2018b). All in all, the present findings demonstrate that reactivations occur more frequently following use of 5-MeO-DMT through means of vaporization.

Secondly, relief of physical tension occurred significantly more often in the IM group (14/14 participants) relative to the vaporization group (8/13 participants). A possible explanation for this is the context in which the 5-MeO-DMT was taken in (Hartogsohn, 2016; Carhart-Harris et al., 2018). One can speculate whether the facilitator who guided the session was doing so in a way that allowed for, and encouraged the participant to connect with their body, and so too their emotions. Perhaps, some of the facilitators have focussed more on the physical experience of 5-MeO-DMT whereas other may have focussed on the mental experience. Unfortunately, we do not know the settings in which both formulations of 5-MeO-DMT were taken or whether and how these may differ between both formulations, if at all. It follows that further research of the specific setting around naturalistic use of 5-MeO-DMT, in addition to instructions and guidelines from the facilitator is warranted. Another possibility is that relief of physical tension is simply related to the route of administration. IM may evoke more muscle activation than vaporisation, which could produce a larger relief of physical tension when the drug is cleared from the body (Legrand et al., 2019). Either way, relief of physical tension following 5-MeO-DMT through IM can be relevant to further investigate. Especially as Somatic Experiencing (SE), an experimental therapy approach developed by Dr. Peter Levine (2012), aimed at focusing on the client's perceived body sensations to bring about resolution of symptoms of mood related disorders is gaining scientific attention, and shows to positively impact people with mood disorders, especially Post-Traumatic Stress Disorder (PTSD) (Andersen, Lahav, Ellegaard, & Manniche, et al., 2017; Brom et al., 2017; Gupta, 2013; Heller & Heller, 2004; Levine, 1976; Levine & Frederick, 1997; Levine, 2010; Parker, Doctor, & Selvam, 2008; Payne, Levine, & Crane-Godreau, 2015; Whitehouse & Heller, 2008; Winblad, Changaris, & Stein, 2018). Notably, SE is also an essential part of the current protocol of MDMA in treatment for PTSD run by the The Multidisciplinary Association for Psychedelic Studies (MAPS) (Mithoefer, Designee, Doblin, & Emerson, 2008). Taken together, the result of the present study suggests that that release of physical tension that felt therapeutic (analogous to somatic release) occurred more frequently following IM compared to vaporization.

The reported time of onset of the acute effects was significantly slower in the IM group (i.e., 1–3 and 4–6 min) compared to the vaporization group (1–50 s). This is consistent with previous research, demonstrating that onset of effects depend on administration route of 5-MeO-DMT, and occur more rapidly following vaporization (Shen et al., 2010; Weil & Davis, 1994). Generally, the present study demonstrates that participants who had 5-MeO-DMT

through IM experienced that the time of onset of effects was much slower than those in the vaporization group.

The present findings indicate that dose-ranges were larger in the group that used 5-MeO-DMT through vaporization (3–35 mg), compared to the IM group (5–10 mg), and that redosing occurred significantly more frequently in people that vaporized 5-MeO-DMT ($N = 8$) than in people that used 5-MeO-DMT through IM ($N = 2$). A possible explanation for this may be related to the fact that the vaporization route of administration engenders an experience that lasts, on the average, 15–20 min (Weil & Davis, 1994), whereas the IM produces an experience that can extend well past 40–60 min (5-Hive, 2017; InnerExplorer, 2017a, 2017b, 2017c). One could speculate that individuals who are having the extended experience afforded by IM may feel a stronger sense of completion, or therapeutic closure at the end of the session that leaves them feeling a re-dose is not necessary, whereas those partaking of the substance via the vaporization route are left feeling their process is inconclusive, leading them to re-dose more often. However, this warrants further research. In sum, these results demonstrate that doses are larger, and that redosing occurs more often when people vaporize 5-MeO-DMT, compared to those who received 5-MeO-DMT through IM.

There was no significant difference between the ratings of the psychedelic experience (as assessed by EDI and MEQ-30) or satisfaction with life in retrospect of the experience between the two groups. As per previous research, 5-MeO-DMT through either administration route generated an experience of ego dissolution, mystical experience and satisfaction with life like that of previous (naturalistic) research (Barsuglia et al., 2017; Davis et al., 2018; Uthaug et al., 2019a, 2019b). Specifically, EDI scores as well as total of MEQ-30 for both groups was moderately high, and in line with previous research assessing the psychedelic experience following use of ayahuasca (Uthaug et al., 2018) and 5-MeO-DMT (Barsuglia et al., 2017; Barsuglia et al., 2018), and has been shown to be an important factor for therapeutic effect (Roseman, Nutt, & Carhart-Harris, 2018). As previously stated, both groups reported similar ratings of satisfaction with life (as assessed by SWL). The findings of average to high scores of SWL are consistent with previous studies reporting psychological changes after psychedelic use (Garcia-Romeu, Griffiths, & Johnson, 2014; Lawn et al., 2017; Mason et al., 2019; Uthaug et al., 2018; Uthaug et al., 2019a, 2019b). Taken together, the present findings suggest that 5-MeO-DMT, through either administration route, evoked similar ratings of experiences of ego dissolution and mystical experiences as well scores of satisfaction with life.

This study is not without limitations. Limitations include the lack of a placebo-control, and control for non-pharmacological factors such as for example 'set' and 'setting'. Furthermore, the respondents may have been inclined to report positive associations due to having a favorable view on the substance which in turn could have biased the results. The use of self-report measures is another limitation as participants are subject to retrospective recall bias (Coughlin, 1990). Moreover, there is no assurance that 5-MeO-

DMT was consumed by the participants as no samples were collected for confirmation. Finally, this substance is illegal in most countries, thus participants who chose to fill out the online survey may not be representative of the overall group of users.

Though the findings of the present study are not conclusive, they add to the current clinical considerations of 5-MeO-DMT through IM by Sherwood et al., (2019). In sum, the present findings suggest there are no significant differences in subjective experiences of ego dissolution, mystical experience and satisfaction with life between groups that used 5-MeO-DMT through vaporization or IM. However, it was found that IM may not require a high dose, or many re-doses, compared to vaporization. Additionally, IM evoked the phenomenon of reactivations less frequently, had a slower onset of acute effects, and had a strong potential to bring about release of physical tension (analogous to somatic release). Further research is warranted on the therapeutic effects of 5-MeO-DMT, especially through IM, as well as the topic of reactivation and SE.

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