

# Descriptive assemblage of psychedelic microdosing: Netnographic study of Youtube™ videos and on-going research projects

Aleksi Hupli<sup>a,\*</sup>, Moritz Berning<sup>b</sup>, Ahnjili Zhuparris<sup>c</sup>, James Fadiman<sup>d</sup>

<sup>a</sup> University of Tampere, Faculty of Social Sciences (SOC), 33014 University of Tampere, Finland

<sup>b</sup> University of Amsterdam, Department Anthropology, PO Box 15509, 1001 NA Amsterdam, the Netherlands

<sup>c</sup> Radboud University, Comeniuslaan 4, 6525 HP Nijmegen, PO Box 9102, 6500 HC Nijmegen, the Netherlands

<sup>d</sup> Sophia University, 1069 East Meadow Circle, Palo Alto, CA 94303, USA

## ARTICLE INFO

### Article history:

Received 1 March 2018

Received in revised form

31 December 2018

Accepted 4 January 2019

Available online 2 April 2019

### Keywords:

Pharmacological neuroenhancement

Psychedelics

Microdosing

Digital methods

Youtube

## ABSTRACT

**Background:** Despite increasing clinical and neuroscientific research, pharmacological neuroenhancement literature rarely discusses psychedelic drugs. However, psychedelic microdosing, the ingestion of sub-perceptual doses of psychedelics like psilocybin, has gained increasing public and scientific attention. Published research on the topic is scarce and systematic studies of the digital milieus surrounding psychedelic microdosing are currently non-existent.

**Methods:** In this netnographic study, we explore psychedelic microdosing by focusing on Youtube™ and listing current research projects as a descriptive assemblage. We used the Youtube Data Tool (YDT) for data extraction from the YouTube™ platform. We selected videos that specifically focused on microdosing with a psychoactive substance and descriptively analysed the ecology of practices of the six most viewed videos focusing on definitions, dosages per substance and claimed effects.

**Results:** Our initial data extraction, completed in 2016, resulted in total of 115 Youtube™ videos. Additional data extractions done in 2017 and 2018 showed a 290% increase of “microdosing” videos between 2016 and 2018, indicating that the phenomenon is growing, at least online. The digital milieu of microdosing in 2016 included 48 videos (41.7%) which mentioned a psychoactive substance. The six most viewed videos comprised 92% (N = 934,819) of the total view count and the ecology of practices depicted psychedelic microdosing as beneficial, but the claimed effects and dosing require critical evaluation. Contrary to how typical users of illicit drugs are often portrayed in the media and science, these videos revolved around themes like research, experiments, self-monitoring and the imperative of sharing results. As our descriptive assemblage demonstrates several psychedelic microdosing research projects are under way, potentially influencing user practices and knowledge.

**Conclusion:** This type of online drug research can be used to gather knowledge of under-researched topics, like psychedelic microdosing. However, further digital and non-digital drug research is needed to investigate this potentially rising phenomenon.

© 2019 Elsevier Ltd. All rights reserved.

## 1. Introduction

The use of drugs for human enhancement is increasingly researched and debated (e.g. Jotterand & Dubljević, 2016; Ter Meulen et al., 2017). “Pharmacological neuroenhancement” (PNE) (Maier & Schaub, 2015) literature has mainly focused on prescription pharmaceuticals, like stimulants for cognitive enhancement (e.g. methylphenidate and modafinil), antidementives for memory enhancement (e.g. piracetam and donepezil) and antidepressants for mood enhancement (e.g. selective serotonin reuptake inhibitors) (De Jongh, Bolt, Schermer, & Berend, 2008; Repantis, Schlattmann, Laisney, & Heuser, 2010). Psychedelic drugs (Rucker, Iliff, & Nutt, 2017) are rarely discussed in the literature (Anderson, 2006; Langlitz, 2011). This is despite a newly emerging “psychedelic renaissance” (Sessa, 2017) in clinical psychiatry and neuroscientific research, which has explored the potential therapeutic effects of i.e. psilocybin in treating mental disorders such as end-of-life anxiety (Grob et al., 2011), treatment-resistant depression (Carhart-Harris, Bolstridge, & Rucker, 2016) and addiction (Bogenschutz et al., 2015; Johnson, Garcia-Romeu, Cosimano, & Griffiths, 2014).

While the PNE literature rarely discusses psychedelic drugs, “the betterment of well people” (Council of Spiritual Practice, 2018) has been a topic in the psychedelic (research) commu-

\* Corresponding author.

E-mail addresses: [HupliAleksi.M@student.uta.fi](mailto:HupliAleksi.M@student.uta.fi) (A. Hupli), [e.m.berning@uva.nl](mailto:e.m.berning@uva.nl) (M. Berning), [ahnjili@gmail.com](mailto:ahnjili@gmail.com) (A. Zhuparris), [jfadiman@gmail.com](mailto:jfadiman@gmail.com) (J. Fadiman).

nity (Langlitz, 2011). Researchers have explored the role of psychedelics in improving scientific problem-solving and creativity (Sessa, 2008; Sweat, Bates, & Hendrick, 2016), personality trait openness (MacLean, Johnson, & Griffiths, 2011), self-knowledge (Móro et al., 2011), sense of wellbeing and life satisfaction (Griffiths, Richards, McCann, & Jesse, 2006; Richards, 2015) and pro-environmental behaviour (Forstmann & Sagioglou, 2017). According to a review by Elsey (2017:5) “current empirical findings indicate that psychedelics have the potential to significantly improve wellbeing among otherwise healthy individuals, and may also help foster novel perspectives, supporting the resolution of professional and personal challenges.”

A topic that has recently received attention from researchers and the public is psychedelic “microdosing” (e.g. Fadiman, 2011; Winstock & Carhart-Harris, 2017). Microdosing has become to refer to the ingestion of sub-perceptual dosages of “classical psychedelics” every few days for an extended period of time to improve cognitive and affective processes (Johnstad, 2018; Mishra, 2018). In pharmacokinetic studies, microdosing is a method to investigate new chemical entities (NCE) where one of the rationales is that microdoses “would be too small to cause any major side effect after a single dose” (Tewari & Mukherjee, 2010:61).

In this study, we explore the “descriptive assemblage” (Savage, 2007) of psychedelic microdosing. Savage argues that “the descriptive involves a process of assemblage, where processes of creativity, conceptual innovation, and observation can be used to mobilize novel insights” (Savage, 2007:170). We observe the “ecology of practices” of psychedelic microdosing in a specific “digital milieu” (Boothroyd & Lewis, 2016), namely the online video sharing website Youtube™. We see Youtube™ as “an archive awaiting curator” (Gehl, 2009) and methodologically explore the Youtube Data Tool (YDT, 2018) which is “A collection of simple tools for extracting data from the YouTube platform via the YouTube API v3” (YDT, 2018; see *The Politics of Systems*, 2018) developed in the Digital Methods Initiative (Digital Methods Initiative, 2018). Our empirical research questions are: 1) what is the digital milieu of microdosing on Youtube™ and 2) what is the ecology of practices of psychedelic microdosing in the six most viewed Youtube™ videos regarding definitions, dosages per substance, and claimed effects?

As psychedelic microdosing is a novel area of research, this paper offers one of the first digital investigations into the topic. However, we view the YDT as part of a broader methodological approach, namely netnography (Kozinets, 2010). Like ethnographic research, netnography combines a mixture of methods based on the topic (Kozinets, 2010). We view the collection and analysis of digital data (videos) and “offline” ethnography as complimentary. Methodologically, an approach purely based on “digital methods/data” would not “mobilize novel insights” (Savage, 2007) into current practices and scientific understandings of psychedelic microdosing. Therefore, we briefly present early history and current microdosing research projects as part of our “descriptive assemblage” which have been discovered by on-going netnography. This has included participant observation at psychedelic conferences and (online) events around psychedelic microdosing.

Savage (2007:155) states that the descriptive assemblage “is dramatically enhanced by the infrastructure of information technology and more particularly the digitalization of social relations”. More generally, Savage (2007) argues that “this descriptive turn is dramatically affecting the nature of contemporary expertise, in ways which challenge academic authority.” Boothroyd and Lewis (2016:295, *italics in the original*) also argue “that not only do peer-to-peer Internet communications around drugs and drug use produce alternative knowledges and forms of expertise, but that it is possible to discern across various *digital milieus* the emergence of forms of “practical wisdom” about drugs and drug use.” Barratt, Allen, and Lenton (2014) also describe informal online drug exper-

iments as a form of counter public health discourse, taking place outside the scientific community. This challenges the established expert-lay dichotomy (Coveney, Gabe, & Williams, 2011), which is arguably present in previous Youtube™ drug research (Hess, 2009; Manning, 2013) and in our empirical findings, where contrary to how typical users of “illicit substances” are portrayed in the media and science, the most viewed psychedelic microdosing videos revolved around themes like research, self-experiments and -monitoring. We see that the internet not only enables collective online experimentation and sharing “practical wisdom”, but it can be used to monitor these experiments and to integrate their preliminary results (trip reports, videos and forum content) in “offline” field research (e.g. Krieg, Berning, & Hardon, 2017).

Whilst various websites and (digital) media articles offer information about psychedelic microdosing (e.g. thethirdwave.co; microdosing.nl), published empirical research is limited (Sessa, 2017:276; Johnstad, 2018; Prochazkova, Lippelt, Calzato et al., 2018). Also, the use of psychedelics and other “drugs” (Tupper, 2012), even in “microdoses”, remain illegal in most parts of the globe. Despite theoretical speculations on how to legally regulate enhancement use of Ritalin™ and Adderall™ in the bioethical literature (e.g. Dubljević, 2013) there has not been discussions on the (inter)national drug policy level to allow access to psychedelic substances for “enhancement” purposes as even clinical research is heavily restricted (Nutt, King, & Nichols, 2013). Current drug policy situation, however, is often neglected in the bioethical literature around pharmacological neuroenhancement (President’s Council of Bioethics, 2003; Jotterand & Dubljević, 2016).

### 1.1. Psychedelic microdosing: descriptive assemblage of research projects

Albert Hofmann, who discovered lysergic acid diethylamide (LSD-25) in 1943, mentioned “very small doses, perhaps 25 µg, could be useful as a euphoriant or antidepressant” (Horowitz, 1976). As the “common” recreational dose of LSD ranges from 50 to 150 µg (Passie, Halpern, Stichtenoth, Emrich, & Hintzen, 2008), the “very small dose” of 25 µg is considered a “microdose”, as described by James Fadiman. Fadiman’s book introduced the term to the public (Fadiman, 2011) and a book by Waldman (2017) also sparked public interest into the topic. Fadiman continues to gather reports from users who practice microdosing with psychedelics at even lower doses of about 10 µg of LSD (Fadiman & Korb, 2017; Fadiman, 2011). Although Fadiman noted in 2011 that the results were preliminary and mainly anecdotal, he stated that “everyone said their experiences were positive and valuable” without experiencing harmful effects. According to Fadiman “as several reports stated, someone taking a dose this low functions [...] a little better than normal”, echoing similar kind of sentiments found in the PNE literature (Elliot, 2003).

Although psychedelic microdosing seems to be a relatively new phenomenon (Passie, 2018) there has been a similar approach to dosing psychedelics in the field of psycholytic therapy (Passie, 1997). In psycholytic therapy doses were “low” (30–200 mcg of LSD; 3–18 mg of psilocybin, Passie, 1997, p.13) compared to psychedelic therapy, in which “high” doses of psychedelic drugs (up to 1500 mcg of LSD) were used to evoke “peak experiences” (Grof, 2016). The major differences between earlier psycholytic dosing and contemporary psychedelic microdosing are the psychotherapeutic “setting” (Hartogsohn, 2017), and that in psycholytic therapy doses were “low” but aimed to be psychoactive (Passie, 1997), an attribute that is explicitly avoided in contemporary microdosing regimes (Fadiman & Korb, 2017; Fadiman, 2011).

According to Fadiman, Hofmann called microdosing “an under-researched area” (Fadiman, 2011:211), and this remains to be the case. In addition to self-reports collected by Fadiman (2011)

and Sophia Korb (Microdosing Psychedelics, 2018), only two peer-reviewed research articles on non-clinical psychedelic microdosing practices and effects exist to our knowledge. Johnstad (2018) conducted online interviews with 21 experienced male psychedelic users about their microdosing practices and discovered that the reported therapeutic and enhancing effects were mostly positive, although the users also faced challenges especially with dosing, and experienced unwanted effects like insomnia. Also, a cognitive psychology team at Leiden University are conducting a longitudinal placebo-controlled microdosing field study with healthy volunteers using legally available psilocybin containing truffles (Prochazkova, Lippelt, Colzato et al., 2018). Preliminary results show increases in creativity performance (Prochazkova, Lippelt, Calzato et al., 2018). However, some psychedelic researchers are sceptical about microdosing, also due to potential cardiovascular risks (Nichols, Roseman, & Timmermann, 2018:83), while others acknowledge that “[t]his role of psychedelics as cognitive enhancers is certainly an area in need of more research” (Sessa, 2017:276; also Carhart-Harris & Nutt, 2017). In addition to the peer-reviewed articles, there are currently several ongoing research projects that are currently examining psychedelic microdosing (e.g. Anderson, Petranker, & Dinh-Williams, 2018; Beckley / Maastricht Psychedelic Programme, 2018; Winstock & Carhart-Harris, 2017).

This descriptive assemblage of early history and contemporary research projects, while not exhaustive, reflects the increasing interest towards psychedelic microdosing among researchers in different fields. Despite the lack of published empirical research there are numerous (digital) media reports on microdosing with psychedelics that often depict the practice as increasingly common (e.g. Koebler, 2015; Glatter, 2015), especially within the tech industry (Mishra, 2018). As media reports often focus on positive effects when it comes to “smart drug” use (Partridge, Bell, Lucke, Yeates, & Hall, 2011), empirical research is needed to provide a more in-depth understanding of the potential benefits and harms of psychedelic microdosing (Johnstad, 2018). How knowledge of, and from, various research projects and media articles influence user practices, and vice versa, requires observational studies of different digital milieus (Boothroyd & Lewis, 2016) around psychedelic microdosing.

## 2. Digital methodology

### 2.1. Digital technologies around drugs and previous Youtube drug research

Digital technologies are acknowledged to play a significant role, especially for young people, in accessing (alternative) knowledge and substances (EMCDDA, 2016). Contemporary drug research primarily focuses on drug related online forums and websites (e.g. Murguía, Tackett-Gibson, & Lessem, 2007; Berning & Haddon, 2016) and on the legal (Hillebrand, Olszewski, & Sedefov, 2010) and illegal (Van Hout & Bingham, 2014; European Monitoring Agency for Drugs & Drug Addiction (EMDCCA), 2016) online drug markets. In the biomedical field, the intertwining between (psychedelic) drugs and the web has been described both as a public health risk (Halpern & Pope, 2001) and as a potential prevention for risks associated with substance use by enabling informed use (Boyer, Shannon, & Hibberd, 2005). The potential to identify emerging drug trends has been demonstrated by using online data about substances that have not yet been monitored in any form (Deluca et al., 2012). A rapid identification of both new drugs and new patterns of use becomes increasingly important due to the increase in availability of drugs and drug knowledge via social media, apps, as well as legal and illegal online markets (Barratt et al., 2014; European

Monitoring Agency for Drugs & Drug Addiction (EMDCCA), 2016; Hillebrand et al., 2010).

Previously Youtube™ has been utilized to investigate *Salvia divinorum* use (Casselmann & Heinrich, 2011; Lange, Daniel, Homer, Reed, & Clapp, 2010), the sharing of polydrug risk experiences (Katata, Hakkarainen, Koivula, & Hautala, 2018) as well as more general content analysis of “drug videos” in relation to drug discourses and education (Hess, 2009; Manning, 2013). The studies used different data extraction techniques to produce generalizable samples. However, as the ecology of Youtube™ changes by the minute, it would be difficult to replicate them (Manning, 2013). Therefore, combining various netnographic (Kozinets, 2010) methods is needed to explore contemporary knowledge around psychedelic microdosing. Previous Youtube™ drug research have only observed or “lurked” the phenomenon they researched without engaging or informing their research participants (e.g. Lange et al., 2010; Manning, 2013). This raises questions about Internet Research Ethics (Association of Internet Researchers (AoIR), 2012). These ethical aspects, however, will be explored in another article. In short, we view ethical research as a process in which “[t]rust with research participants is established and then maintained over time” (Ramcharan & Cutcliffe, 2001:363), requiring reflexivity from the researchers. That is why we notified, when possible, the makers of the videos of the present study and about their contribution to our research.

## 3. Material and methods

To extract data from Youtube, we used the Youtube Data Tool (YDT, 2018) developed by Bernhard Rieder (The Politics of Systems, 2018) from the Digital Methods Initiative (Digital Methods Initiative, 2018). The first step was to use the term “microdosing” in the YDT “Video list” search query ranked by the view count<sup>1</sup>. The search was done on June 7th 2016 providing a list of 115 videos, which can be found online (10.17632/7pkbvjtnxm.1).

The “digital milieu” (Boothroyd & Lewis, 2016) of psychedelic microdosing on Youtube™ is presented in Results 3.1. We manually inspected the 115 videos to ensure they focused on microdosing with psychoactive substances. This was done by reading the title and description of the video, and if those were unclear, we watched the video in question. Results 3.2 contains descriptive content analysis of the “ecology of practices” (Boothroyd & Lewis, 2016) of the six most viewed videos as they comprised 92% of the total view count (N=934,819 views; see Image 2). We focused our analysis on 1) definitions of psychedelic microdosing, 2) dosages per substances used and 3) claimed effects.

## 4. Results

### 4.1. Digital milieu of microdosing on Youtube™

As shown in Image 1 below, “microdosing” videos peaked in popularity on Youtube™ in 2015, about a year prior to the initial data extraction. A second data extraction of “microdosing” done with the YDT in November 2017 provided a list of 351 videos, and a third one done in October 2018 listed 447 videos, indicating that “microdosing” has grown by almost 290% between 2016 and 2018 on Youtube™. This growing popularity is also evident in Google Trends (2018), but this increasing digital trend requires more detailed research which is outside the scope of this article.

Of the 115 videos, 41,7% (N=48) were about microdosing with psychoactive substances. The 48 videos mentioned not only LSD

<sup>1</sup> The YDT (2018) has several other features which were not utilized in this study.

Popularity of MD videos over time

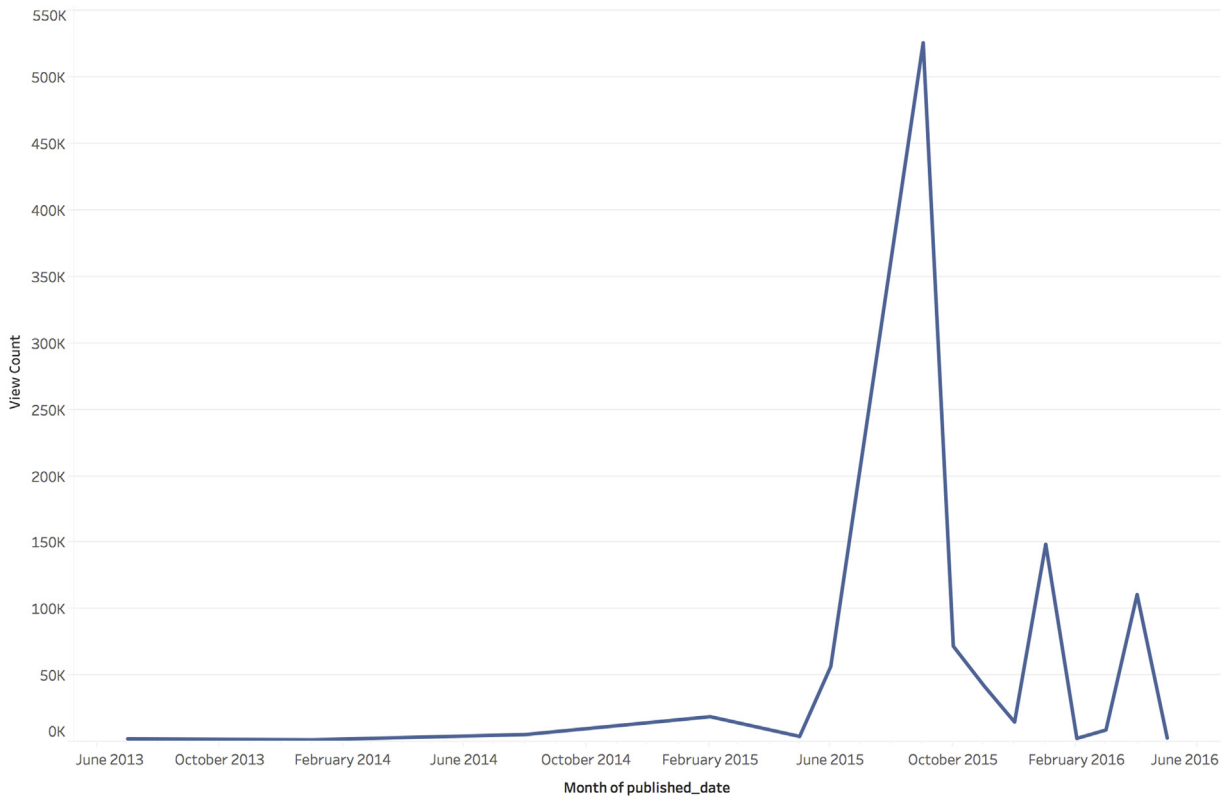


Image 1. Popularity of “microdosing” videos by view count over time.

Views per Channel

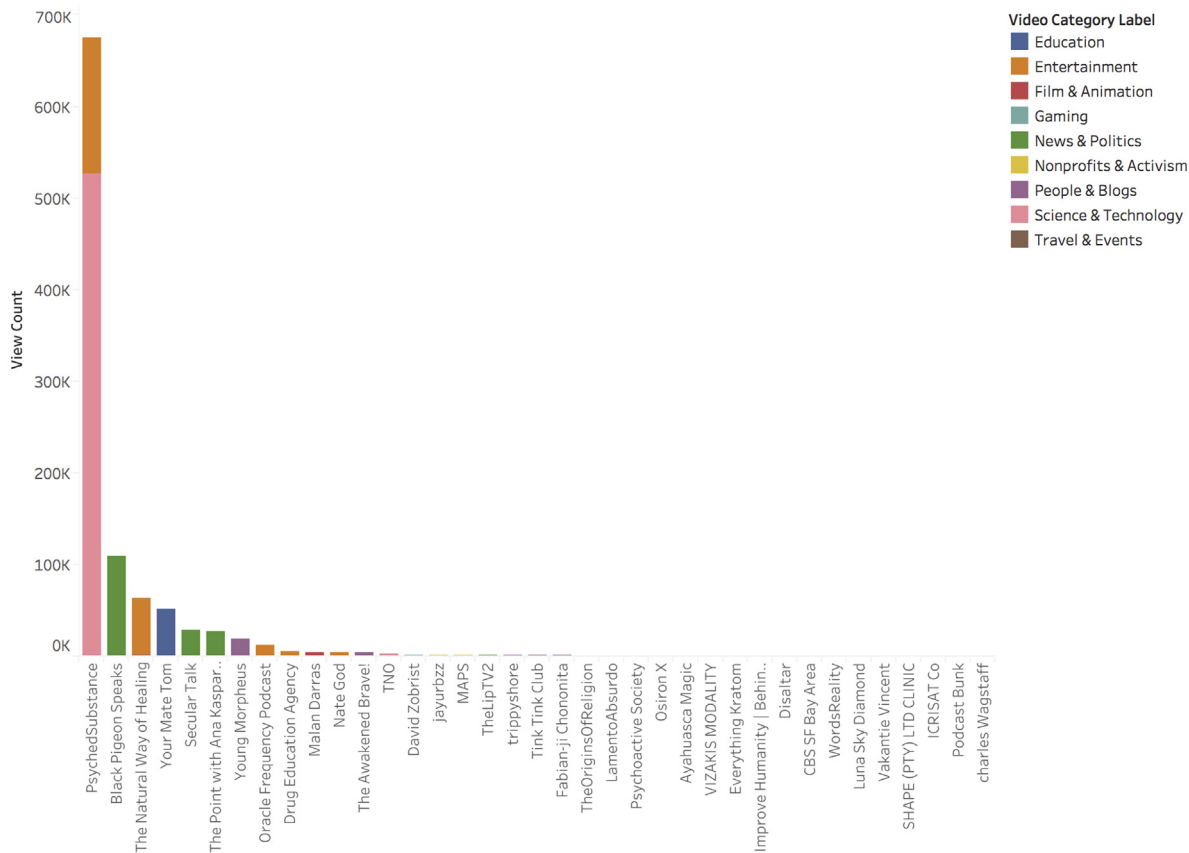


Image 2. Amount of views per channel and video category label.



and psilocybin, but also mescaline, dimethyltryptamine (DMT), 2,5-dimethoxy-4-bromophenethylamine (2CB) and cannabis as well as non-psychedelic substances such as kratom, anabolics/testosterones and alcohol, expanding the variety of substances usually discussed in the literature (Fadiman, 2011; Johnstad, 2018). This demonstrates that “microdosing” has multiple meanings in this digital milieu. Furthermore, at the time of the data extraction, these 48 videos had been viewed 1,017,406 times, and had 19,070 likes and 1570 dislikes. The videos had in total 8696 comments, which deserve further analysis of the participatory culture on Youtube™ (see Burgess & Green, 2009).

#### 4.2. Ecology of microdosing practices

The six most viewed videos amounted to 92% of the total view count (N=934,819) and they included in total 58,2 min of video material, the longest one being 13,4 min (PsychedSubstance) and shortest 7,4 min (Your Mate Tom). The two most viewed psychedelic microdosing videos were from the same channel, *PsychedSubstance*, which focuses on creating content around psychoactive substances. The two videos comprised approximately half of the 934,819 views as seen in Image 2.

The appearance of the young man in the first video, with a long white jacket, eyeglasses and prints of human anatomy on the walls represents the pop cultural idea of a scientist. This science theme is also found in several self-experimentation videos, as described below. Early in the video *PsychedSubstance* states that “This video is made for harm reduction. I do not promote the use of legal or illegal substances. Always do your own research and never do anything just because you saw it in a Youtube video.” *PsychedSubstance*, and other “drug” content creators on Youtube™ have reported increased content restrictions (e.g. Codrea-Rado, 2017) and as of beginning of 2018, some of the most viewed videos are unavailable for viewing. Thus, harm reduction disclaimers are one of the strategies used to avoid such restrictions. We have marked unviewable videos with an \* in Table 1 which provides details of the self-defined category, channel info and descriptive statistics including number of views, likes, dislikes and comments. While most of the videos can be categorized as “reflective discourses” (Manning, 2013), with a “harm reduction ethos” (Boothroyd & Lewis, 2016), the third and sixth most viewed Youtube™ videos were more in the “news or documentary” category (Manning, 2013).

##### 4.2.1. Definitions

*PsychedSubstance* defined microdosing as “taking very small amounts of a psychedelic substance. We are talking about threshold to below threshold doses”. The third most viewed video from the channel *Black Pigeon Speaks* defines microdoses as “...taking 10–15 micrograms [of LSD], instead of the larger doses used for drug trips”. Definition of microdosing in the fifth most viewed video by *Your Mate Tom* “is taking sub perceptual doses while keeping up with once daily activities, engaging in extreme sports, appreciating nature or enhancing one’s spiritual practice”.

In the sixth most viewed video, from the channel *Secular Talk*, the vlogger quotes parts of an article published on Alternet.org: “Microdosing refers to taking extremely small doses of psychedelics, so small that the effects usually associated with such drugs are not evident or are sub-perceptual; while going about one’s daily activities. It’s being done by anyone from harried professionals to extreme athletes to senior citizen businesswomen, and they’re claiming serious benefits from it.”

As clinical studies have shown that even 5 mg of psilocybin (Griffiths et al., 2011) and 20 mcg of LSD (Gasser, Holstein, & Michel, 2014) are pharmacologically active, question is what are “small” and “sub perceptual” dosages in psychedelic “microdosing”

in relation to the various substances mentioned in the most viewed videos?

##### 4.2.2. Dosages per substance

In the *Secular Talk* video, the vlogger quotes from the same Alternet.org article mentioned above:

“To trip brains (or have a transcendental experience) on LSD, a dose of 400 µg or more is called for; to explore your inner self, take 200 µg; for creative problem solving, try 100 mikes; but for microdosing, take only 10–15 micrograms [of LSD]. Similar microdoses for other psychedelics would include 0.2–0.5 g of dried mushrooms (about one-fifth the normal dose) or about 50–75 micrograms of mescaline.”

In the other most viewed videos, the microdoses for LSD and dried psilocybin mushrooms are similar as mentioned in the above quote (10–30 mcg of LSD, 200–500 mg of dried psilocybin mushrooms, see Table 2). However, for mescaline, the mentioned microdose by *PsychedSubstance* is 75–80 milligrams, which is significantly larger than the micrograms depicted above. Threshold dose of mescaline on the online drug archive Erowid (erowid.org) is also depicted as milligrams (100 mg) so it is possible that there is an (unintentional) confusion between the two measures in the quote used by *Secular Talk*.

While this kind of error is potentially less harmful when stating milligrams while meaning micrograms, the potency of psychedelic drugs requires careful dosing accuracy to reduce potential harm. For instance, the video by *Your Mate Tom* starts with a tale of caution in which he described how he recently ingested more than a microdose. He took “three little mushrooms” on his way to the university to study for an exam and he “started to feel a bit funny”, anxious and having mild visual distortions. He stated that “that’s what I get for not actually getting scales and measuring it. That’s what I get for just estimating”. In the video, the recommended dose of microdosing, taken from shroomery.org and other YouTube™ channels, is 0.2 to 0.5 g. He measures 0.37 g of dried mushrooms and states that at a previous time the three mushrooms he consumed most likely measured beyond the 0.5 g limit. For non-traditional psychedelics, such as 2CB, a microdose is stated as 2–6 milligrams. This is almost identical as the common threshold dose shown in Table 2 which provides info on substances and dosages in comparison to threshold doses found on the online drug archive Erowid (erowid.org)

The most viewed video from *PsychedSubstance* also provided advice on how to microdose, which has potentially influenced user practices. First step is finding a threshold dose using online sources such as Erowid.org. Then, according to the video, one should take half of the threshold amount, and if you don’t feel anything, increase by 25–50% “until you hit 1.5 x of the threshold”. He pointed out that the dose varies in individuals, so the key to finding a personal optimal dose is by tinkering. As mentioned, he also shared his own experience and dosages and recommended using the test kit that is linked in the video description to verify the purity of the LSD. He mentioned that there are test websites where one can send samples to know the purity, but they are expensive and work with uncertainty. He then explained how to cut a “blotter” of LSD into small pieces and how to conduct volumetric dosing using vodka or distilled water which is said to be more precise method as the amount of LSD can vary from one area to another on blotter papers. Further, due to the heightened sensitivity of LSD which can be affected by oils from finger prints and light exposure, this volumetric procedure preserves the quality of the dosage. This kind of systematic approach, borrowing from chemistry, is very similar to one found in the “research culture” around experimenting with New Psychoactive Substances (see Berning & Hardon, 2016).

Regarding the dosing regime, *PsychedSubstance* recommended that dosing every other day would be ideal, since the body builds a tolerance to classical psychedelics immediately. In addition, this

**Table 1**  
Channel info, and number of views, likes, dislikes, comments of the six most viewed videos.

Channel	1. PsychedSubstance	2. PsychedSubstance	3. Black Pigeon Speaks	4. The Natural Way of Healing	5. Your Mate Tom	6. Secular Talk
Category	Science & Technology	Entertainment	News & Politics	Entertainment	Education	News & Politics
Subscribed	976694	976694	~290,000	~14,000	~67,000	~519000
No of Videos	90	90	230	278	142	11069
Total No of Views	~60 million	~60 million	~36 million	~880,000	~4.5 million	~406 million
Joined Youtube	20/01/2015	20/01/2015	13/11/2011	06/05/2012	24/02/2015	21/04/2008
Video title	* Microdosing LSD or any Psychedelic	* Mescaline microdose video	LSD: Microdosing & the SUPERNATURAL	* MICRODOSING MUSHROOMS: The Benefits of Microdosing Psilocybin!	Microdosing PSILOCYBIN Mushrooms Experiment   DAY 1	'Microdosing' Psychedelic Drugs Has Positive Effects
Video Published	15/09/2015	30/01/2016	23/04/2016	10/10/2015	10/11/2015	17/06/2015
Views	~500,000	~140,000	~100,000	~59,000	~36,000	~28,000
Comments	~1700	~1200	~3600	~500	~170	~330
No of likes	~7000	~3700	~4300	~870	323	868
No of dislikes	~250	~1200	~990	~35	12	26

**Table 2**  
Substances and doses mentioned in the 6 most viewed videos.

Video	PsychedSubstance	PsychedSubstance	Black Pigeon Speaks	The Natural Way of Healing	Your Mate Tom	Secular Talk
Substance & Dosage	2CB: 2–6 mg Psilocybin: 200–500 mg LSD: 10–30 mcg Mescaline: 50–75 mg	Mescaline: 80 mg	LSD: 10–15 mcg	Psilocybin: No Mention of Dose	Psilocybin: 200–500 mg (dried) 370 mg for his own experiment	LSD: 10–15 mcg Psilocybin: 200–500 mg (dried) Mescaline: 50–75 mcg
Threshold dose for comparison (from Erowid.org)	2CB: 2 – 5 mg	Mescaline: 100 mg	LSD: 10–20 mcg	Psilocybin: 250 mg (dried)		

provides time for the user to observe his or her own thinking, emotions, behaviour etc. However, if there are any residual effects after one day remains unclear. The dosing regimen explained in the video by the *Natural way of Healing* includes two to three capsules a day, not everyday, but every other day. Time of consumption is usually in the morning or early afternoon as later it might induce sleep problems (see [Johnstad, 2018](#)). Actual dose, however, remains unclear.

As the *Secular Talk* video contained errors on dosages that required closer description, the third most viewed video had potentially harmful claims on the effects of psychedelic microdosing on insomnia and anxiety reduction. As seen below, many of the videos depict microdosing with psychedelics as having mainly positive effects. Scarce scientific knowledge is used, re-used and even created through self-experimentation throughout this digital milieu.

#### 4.2.3. Claimed effects

According to *PsychedSubstance*, the benefits of microdosing include but are not limited to increased creativity, focus, mood and energy. He adds; “think of it in the same way as people take addictive performance enhancing drugs such as Adderall” which is referred to as “lab-grade speed” and “very addictive”. Microdosing LSD, however, is portrayed as having less side effects compared to methylphenidate (Ritalin) and dextroamphetamine (Adderall) and the video refers to James Fadiman’s book (2011) where Albert Hofmann is quoted to say “LSD, would have gone to be used as Ritalin if it wasn’t so harshly scheduled.” Reports gathered by Fadiman’s are mentioned as a “success” and the area is depicted as under-researched but potentially beneficial.

In the second most viewed video, *PsychedSubstance* states in the beginning that he took 80 mg of Mescaline hydrochloride (HCL) 2 h prior to recording. He reports feeling “overall pretty damn cool”, with senses heightened, skin feeling more sensitive, hearing more sensitive and smell “really” heightened. Visual functioning

was the least sensitive which he found “weird”. The vlogger has had former experience with microdosing LSD, psilocybin, 2CB, and mescaline, as would be evident from the first video. He found LSD and mescaline the most beneficial, and the experience between them interchangeable “I can speak from personal experience being on mescaline microdose right now that it feels extremely similar to being on LSD microdose”. He reported that regarding workflow, his thoughts would run a lot smoother. However, there is no increase in physical capability when exercising (4 h after intake). He noted that there is more auditory enhancement when using mescaline versus more visual enhancement when microdosing LSD. Enhancement of smell and taste is almost indistinguishable between the compounds. There is a slight increase of touch sensitivity with mescaline although according to him it could be a memory distortion.

Similar self-experimentation is in the fourth and fifth most viewed videos. Your Mate Tom eats (psilocybin) mushrooms on camera, which were “props” according to the disclaimer in the description. 15 min after consumption he reported feeling “a bit chill, a bit calm, like I had one little tiny drag of a joint”. He reported not feeling high but instead calm, despite his heart rate being slightly elevated. In his experiment he intended to stay as unbiased and objective as possible, noting it to be challenging as he also wants it to work. In his experiment *Your Mate Tom* tested microdosing across multiple categories including physical capability, creativity, focus, awareness and social interaction. He performed various activities on five separate days to test all five categories before making a summary. The results of this experiment were that “microdosing definitely does not help with physical capabilities” as mushrooms usually makes his body feel “heavy”. He did feel heightened awareness, greater introspection, increased focus and social interaction. He acknowledged that it is not the most scientific study there is (“not a double-blind, peer-reviewed study”) but in the absence of such studies, “as anecdotal as this might be, at least

it is something. It's a guide map. At the end of the day, the most scientific research you can possibly do is trying it yourself", echoing the practices of the first psychedelic researchers in the West at the turn of the 19th and 20th century (see [Rucker et al., 2017](#)).

In the video from the channel *The Natural Way of Healing*, the vlogger presents pulverized, dried up psilocybin mushrooms contained in veggie caps. Similar to above, he also explained his motivation as gaining first-hand experience: "This way you get true knowledge". The vlogger mentioned that he would go running and his cardio-vascular output seems to be "off the charts". His mental focus, cognitive function and mood improved. Other benefits from microdosing psilocybin mentioned in the video included "mental clarity", "emotional balance", "positive mental attitude", "improved overall well-being", "better workouts", "better focus" and "increased mood and outlook on life." The vlogger also makes a comparison between "nature's medicine" versus synthetic pharmaceuticals, which are said to only mask symptoms and suppress emotions. Psilocybin mushrooms, on the other hand, are said to address the root cause and "works on your psyche" both in higher and microdoses so one can move forward in a more rapid pace regarding personal development.

We argue that sharing results from these self-experimentations is essential for understanding the motivations and the "ecology of practices" ([Boothroyd & Lewis, 2016](#)) around psychedelic microdosing on YouTube™. We further argue that the experiments on YouTube™ should be seen in the context of other experiments with microdosing, like written trip reports ([Berning & Hardon, 2016](#)). As seen above, the ad-hoc lay-experiments found both on YouTube™ videos and trip reports include lived experiences, as well as measurements of vital indexes such as blood pressure, and references to biological physiology and pharmacology ([Hardon & Moyer, 2014](#)). Thus, the depiction of experiments on YouTube™ can be seen in a wider context of experimental setups, generated by users themselves.

However, these claimed effects require critical evaluation. In the video from *Secular Talk*, the vlogger states that microdosing psychedelics was previously unfamiliar to him but "so far the results are very positive." In the video from *Black Pigeon Speaks*, the narrator stated how "a famed psychedelics researcher, Dr. James Fadiman, who worked with LSD until it got banned in the 1960s, found that he gave up Facebook after he started taking tiny doses of LSD for breakfast." After this erroneous claim he continues that he [Fadiman] has said of ingesting small doses of LSD "People do it and they're eating better, sleeping better, they're often returning to exercise or yoga or meditation. It's as if messages are passing through their body more easily." After this quote, that Fadiman had given in an interview with Vice a year earlier, the narrator further emphasized that "a growing movement of people are now microdosing LSD in the morning" while on the screen there is an image of the website IFLScience report on microdosing titled "Researcher Claims Small Doses Of LSD Can Alleviate Anxiety And Depression". The video also claims that microdosing LSD can cure both anxiety and insomnia, while according to user reports psychedelic microdosing can induce insomnia ([Johnstad, 2018](#)) and worsen existing severe anxiety ([Fadiman & Korb, 2017](#)).

## 5. Discussion

After decades of almost no research, partly due to strict scheduling of psychedelic drugs ([Rucker et al., 2017](#)), classical psychedelics are again being explored for their potential therapeutic effects. These clinical studies have investigated the safety and efficacy of psychedelic substances in clinical settings and the active doses have ranged from 5 to 30 mg (mg) of psilocybin ([Bogenschutz et al., 2015](#); [Griffiths et al., 2011](#); [Johnson et al., 2014](#)) and 20 to

200 µg (mcg) of LSD (e.g. [Gasser et al., 2014](#)). This "psychedelic renaissance" ([Sessa, 2017](#)) is discussed in mainstream literature and media ([Waldman, 2017](#)), and the findings point to several new avenues for research. For instance, microdosing psychedelics, like psilocybin, could be explored to maintain the therapeutic effects of a high-to-moderate dose of psilocybin for depression, initiated in the clinical setting ([Carhart-Harris & Nutt, 2017](#); [Carhart-Harris et al., 2016](#); [Prochazkova, Lippelt, Calzato et al., 2018](#)). However, lack of (governmental) funding and strict scheduling, serve as a major obstacle for psychedelic research ([Nutt et al., 2013](#)), although the push for "an emerging new paradigm" ([Nichols, Johnson, & Nichols, 2017](#)) remains persistent.

In this study we focused our descriptive assemblage on psychedelic microdosing and as we demonstrated, several psychedelic microdosing research projects are under way or planned, potentially influencing user practices and knowledge. A challenge with psychedelic microdosing is that it has mainly been evaluated by self-reports, using indicators such as performance and mood, and the role of the placebo effect has not yet been determined. As our descriptive assemblage demonstrates, this potential placebo effect is something current microdosing studies are aiming to explore, in a placebo-controlled open field study with legal psilocybin truffles ([Prochazkova, Lippelt, Colzato et al., 2018](#)) and in LSD microdosing studies assessing short-term acute effects ([Beckley / Maastricht Psychedelic Programme, 2018](#); [Yanakiyeva et al., 2018](#)).

We also used the Youtube Data Tool to explore 1) the digital milieu of Youtube™ and 2) ecology of practices in the most viewed videos. These Youtube™ channels often focus on drug-related content and cover a wide variety of topics, and while they are not "mainstream", they've attracted a wide audience on Youtube™. Already in 2016, the videos had over a million views, thousands of "likes" and comments ([Table 1](#)), which arguably indicate potential impact of the videos on spreading user knowledge and practices. Overall, the substances mentioned in the videos discuss a wider range of psychedelic and psychoactive substances than typically discussed within contemporary psychedelic microdosing research ([Fadiman, 2011](#); [Johnstad, 2018](#)).

The six most viewed videos comprised over 92% of the total view count of microdosing videos on Youtube™ in 2016, and some depicted microdosing with psychedelics as a growing phenomenon. Similar data extractions of "microdosing" videos done with the YDT in November 2017 and October 2018 provided data lists of 351 and 447 videos, respectively (compared to the initial 115), indicating that the microdosing phenomenon has grown by almost 290% on Youtube™ in the last two years (see also [Google Trends, 2018](#)). [Casselmann and Heinrich \(2011:663\)](#) also found that "Salvia divinorum specifically on YouTube™ and more generally on the WWW, is a growing phenomenon". However, whether user prevalence of psychedelic microdosing is increasing requires further contextualization of these findings outside the digital milieu of Youtube™, but published epidemiological studies on psychedelic microdosing are currently lacking.

The Youtube™ videos we analysed portrayed effects of psychedelic microdosing in a positive way, and the videos in general received more "likes" than "dislikes" ([Table 1](#)). Both [Casselmann and Heinrich \(2011\)](#) and [Lange et al. \(2010:140\)](#) discovered that "experiences portrayed on YouTube™, are rarely negative". Although generally in line with scarce published research ([Fadiman, 2011](#); [Johnstad, 2018](#); [Prochazkova, Lippelt, Calzato et al., 2018](#)), some of these videos had either unsubstantiated claims on effects, or the recommended doses were larger (or exponentially smaller) than what current microdosing researchers have estimated to be optimal. While these estimations might change when more research on this topic is conducted, and while the errors might not physically endanger viewers who may act on the information, "offline" field research is demonstrating that certain



populations might experience negligible or possibly even negative effects from psychedelic microdosing (Fadiman & Korb, 2017; Johnstad, 2018). For instance, preliminary results from a recent data sample (1850 subjects from 59 countries) illustrated that while benefiting most participants, some reported no effects and a few groups (e.g. those with serious anxiety and people who were red-green color-blind) reported negative effects and stopped microdosing (Fadiman, personal communication, 12th of February, 2018; Fadiman & Korb, 2017). Therefore, Fadiman and Korb do “not recommend that people with colorblindness, who live with diagnoses of psychotic disorders or along the autism spectrum try microdosing” (Microdosing Psychedelics, 2018).

However, the reported positive effects of psychedelic microdosing warrant increased empirical research and bioethical discussion also in the pharmacological neuroenhancement literature (Pieters & Snelders, 2009). The potential breakthroughs stemming from clinical findings of recent psychedelic research also require further attention, as one of the main research areas of contemporary psychedelic research has focused on reducing anxiety among terminally ill cancer patients with psilocybin-assisted psychotherapy (e.g. Grob et al., 2011) and inducing meaningful experiences in healthy volunteers (Elsey, 2017; Griffiths et al., 2006). Ability to have reduced anxiety when facing death and meaningful experiences when alive is argued to be not only “human enhancement”, but close to a human right (Krebs, 2015), especially from the standpoint of cognitive liberty (Walsh, 2016).

Microdoses mentioned in the videos have some variation and are not significantly lower than common threshold doses and even overlap with them (Table 2). Also, these “microdoses” are often larger compared to what “microdosing” means in pharmacokinetic studies (Tewari & Mukherjee, 2010). Miniscule doses of psychedelics like LSD and psilocybin required to achieve pharmacological effects demands psychedelic microdosers to experiment with various doses to achieve intended effects (Berning & Hardon, 2016). One of the difficulties for many microdosers is to identify the optimal dose that ranges between the *minimum effective dose* (MED), the minimal amount to create a desired effect, and the maximum of a microdose, a dose that remains subperceptual, all varying between individuals.

Safety measures to avoid “overdose”, which is rarely harmful with psychedelic microdosing (Johnstad, 2018), are nonetheless difficult to obtain outside clinical studies as the chemical consistency and potency of the (illegal) substances are practically impossible to know for certain (Haden, Emerson, & Tupper, 2016). Despite the relative safety of psychedelics, such as psilocybin (Van Amsterdam, Opperhuizen, & van den Brink, 2011) especially in clinical and research settings (Johnson, Richards, & Griffiths, 2008), “the criminalization of psychedelics has generated significant harms, particularly as illegal markets produce and distribute psychoactive substances that range widely in quality and potency, resulting in unpredictable toxic effects” (Haden et al., 2016: 245), potentially even in “mini-doses” (see Johnstad, 2018). Therefore, various experts have called for a global drug policy reform to regulate drugs, including psychedelics, from a public health perspective (Haden et al., 2016).

The illegality of many psychoactive substances not only complicates public health policies and harm reduction approaches (Haden et al., 2016) but also serves as a major hurdle for clinical researchers (e.g. Nutt et al., 2013). This might encourage “lay people” to facilitate their own self-experimentation, and in contrast to how users of “illicit substances” are oftentimes portrayed in media and science, many videos revolved around themes like research, experiments, self-monitoring and the imperative of sharing results and relevant information. This type of “research culture” (Berning & Hardon, 2016) is not unique in microdosing communities as this trend can be found among new psychoactive substance (NPS) users (ibid.;

Boothroyd & Lewis, 2016). In general, young drug users use creative means to minimize possible risks and maximize benefits (Van Schipstal, Mishra, Berning, & Murray, 2016) and experiment by “adjusting dosage[s] and mixing substances, with knowledge of the (mostly positive) ‘lived effects’ of drugs spreading through collective experimentation and word of mouth” (Hardon & Moyer, 2014:110), and through various digital milieus (Boothroyd & Lewis, 2016).

Several of the most viewed videos are no longer viewable, and their creators have recently reported that they are “being targeted” or “censored” by Youtube™ due to drug-related content (Codrea-Rado, 2017). This warrants further research and bioethical discussion about biomedical knowledge hegemony and knowledge production (Coveney et al., 2011) especially as the generation of online knowledge and the mechanisms of its circulation have been highlighted as a possibility to monitor drug use trends from early on (e.g. Deluca et al., 2012; Berning & Hardon, 2016; Krieg et al., 2017). The videos for instance compared psychedelic microdosing to “cognitive enhancers” like methylphenidate and dextroamphetamine, and ADHD and depression have been the most common self-reported medical indications (Fadiman & Korb, 2017). Anecdotal evidence also demonstrates that as people are microdosing psychedelics, they are weaning off from their pharmaceutical medications (Waldman, 2017, Fadiman & Korb, 2017). Thus, as researchers have also pointed out (Prochazkova, Lippelt, Calzato et al., 2018; Sessa, 2017) investigating psychedelic microdosing as a form of “cognitive enhancement” (Coveney et al., 2011) is an area requiring further research.

### 5.1. Benefits and limitations

Previous Youtube™ drug research has noticed the potential of this type of digital research (e.g. Casselman & Heinrich, 2011). For instance, the analysis conducted by Lange et al. (2010:138) illustrated that Youtube™ videos on Salvia users “provides a unique opportunity to observe people using salvia in settings of their choosing.” Future online drug research could utilize the digital milieu found on Youtube™, and other online sharing facilities, to map the various contexts of psychedelic and other types of drug use as the effects of this “setting” (Hartogsohn, 2017) is often deemed as important as the psychological profile or mind “set” of the person and the substance consumed. According to Lange et al. (2010:138–139) another benefit of this type of research is that due to Salvia’s rapid onset and short duration “many user video-posts may actually contain the entire drug experience.” Their study provided measurable effects of Salvia experiences, mainly the significantly dissociative impact, and “the demonstration of the utility of YouTube videos as a resource for behavioral observation research” (Lange et al., 2010:140).

The utility of Youtube™ drug research, however, needs to be evaluated according to specific substances and use practices. Classical psychedelics, for instance, have often considerably longer duration of action than inhaled Salvia Divinorum. The visual material available also limits this type of retrospective digital research (Lange et al., 2010:140) and based on the data at hand, estimating the practical impact of the videos on “offline” microdosing practices is difficult to determine. Also, as our current data analysis provides insight into the phenomenon only within a limited time window, further longitudinal research is needed. As we focused only on “microdosing” on Youtube, other digital milieus, languages and types of dosing regimens remained outside of our empirical analysis. Digital Methods Initiative (2018) provides various digital tools that could be used to explore other digital milieus (e.g. Facebook™, Twitter™, Instagram™).



## 6. Conclusions

The effects of psychedelic microdosing in our Youtube™ data are depicted as positive and the practice is often portrayed as increasingly common. Using a similar approach of data extraction, we found that 16 and 26 months after the initial extraction done in July 2016 the phenomenon is growing, at least on Youtube™ and Google Trends (2018). However, both the epidemiology and efficacy of psychedelic microdosing need further “offline” studies. In addition, the role of psychedelics as pharmacological enhancers and therapeutic agents require bioethical evaluation and drug policy discussion.

We intend to utilize the novel insights we gathered through our descriptive assemblage to continue netnographic research on psychedelic microdosing in the future. We argue that the YDT is a useful method to research online drug knowledge as it allows the collection of relative videos for further analysis in a systematic and cost-effective way. The other features of the YDT require further exploration for this digital milieu and the comment section on Youtube™ deserves its own empirical analysis. Also, methodologically, only observing digital data, without “offline” interaction with the object of study, is the reason we have focused on a more “netnographic” (Kozinets, 2010) approach compared to previous Youtube™ drug research (e.g. Lange et al., 2010; Kataja et al., 2018). This type of online drug research can be used to gather knowledge of under-researched topics, like psychedelic microdosing, to monitor emerging trends and even function as an early warning system for public health services (e.g. Krieg et al., 2017), although limitations like the ones described above need consideration.

## Conflict of interest

None.

## Funding source declaration

Aleksi Hupli has been funded for his work by the Finnish Academic of Science and Letters / Jutikkala Fund (2016–2018). During the preparation of the manuscript Moritz Berning has been part of the European Research Council funded (Advanced Grant) Chemical Youth project, led by Professor Anita Hardon. Ahnjili Zhuparris and James Fadiman declare no received funding for their work on this manuscript.

## References

- Anderson, B. (2006). *Psychedelic psychotherapy: The ethics of medicine for the soul*. *Penn Bioethics Journal*, 11(1).
- Anderson, T., Petranker, R., & Dinh-Williams, L.-A. (2018). *Demography of microdosing community survey*. Accessed 23rd July 2018. <https://osf.io/g5cwv/>
- Association of Internet Researchers (AoIR). (2012). *Ethical decision-making and internet research recommendations from the AoIR ethics working committee (Version 2.0)*. Accessed 28th February 2018. <http://www.aoir.org/reports/ethics2.pdf>
- Barratt, M. J., Allen, M., & Lenton, S. (2014). “PMA sounds fun”: negotiating drug discourses online. *Substance Use & Misuse*, 49(8), 987–998.
- Beckley / Maastricht Psychedelic Programme. (2018). *Beckley / maastricht psychedelic programme*. Accessed 23rd July 2018. <http://beckleyfoundation.org/science/collaborations/maastricht-university-netherlands/>
- Berning, M., & Hardon, A. (2016). Educated guesses and other ways to address the pharmacological uncertainty of designer drugs. An exploratory study of experimentation through an online drug forum. *Contemporary Drug Problems*, 43(3), 277–292. <http://dx.doi.org/10.1177/0091450916662164>
- Bogenschutz, M. P., Forchimes, A. A., Pommy, J. A., Wilcox, C. E., Barbosa, P., & Strassman, R. J. (2015). *Psilocybin-assisted treatment for alcohol dependence: A proof-of-concept study*. *Journal of Psychopharmacology*, 29, 289–299.
- Boothroyd, D., & Lewis, S. (2016). Online drug scenes and harm reduction from below as phronesis. *Contemporary Drug Problems*, 43(3), 293–307. <http://dx.doi.org/10.1177/0091450916654266>
- Boyer, E., Shannon, M., & Hibberd, P. L. (2005). *The Internet and psychoactive substance use among innovative drug users*. *Pediatrics*, 115(2), S. 302–305.
- Burgess, J., & Green, J. (2009). *Youtube. Online video and participatory culture. With contributions from Henry Jenkins and John Hartley*. Polity Press.
- Carhart-Harris, R., & Nutt, D. (2017). Serotonin and brain function: A tale of two receptors. *Journal of Psychopharmacology*, 31(9), 1091–1120.
- Carhart-Harris, R. L., Bolstridge, M., Rucker, J., et al. (2016). *Psilocybin with psychological support for treatment-resistant depression: An open-label feasibility study*. *The Lancet Psychiatry*, 3, 619–627.
- Casselmann, I., & Heinrich, M. (2011). Novel use patterns of Salvia divinorum: Unobtrusive observation using YouTube. *Journal of Ethnopharmacology*, 138(662), 667.
- Codrea-Rado, A. (2017). Drug safety YouTubers face a quiet crisis at the mercy of algorithms. In *Wired*. Accessed 8th of October 2018. <https://www.wired.co.uk/article/youtube-drug-safety-harm-reduction-videos>
- Council of Spiritual Practice. (2018). *Council of spiritual practice*. Accessed 17th April 2018. <http://www.csp.org/about.html>
- Coveney, C., Gabe, J., & Williams, S. (2011). The sociology of cognitive enhancement: Medicalisation and beyond. *Health Sociology Review*, 20(4), 381–393.
- De Jongh, R., Bolt, I., Schermer, M., & Berend, O. (2008). Botox for the brain: Enhancement of cognition, mood and pro-social behavior and blunting of unwanted memories. *Neuroscience and Biobehavioral Reviews*, 32(4), 760–776.
- Deluca, P., Davey, Z., Corazza, O., Di Furia, L., Farre, M., Flesland, L., et al. (2012). Identifying emerging trends in recreational drug use; outcomes from the Psychonaut Web Mapping Project. *Progress in Neuro-psychopharmacology & Biological Psychiatry*, 39(2), S. 221–226.
- Digital Methods Initiative. (2018). *Digital methods initiative*. Accessed 17th April 2018. <https://wiki.digitalmethods.net/Dmi/WebHome>
- Dubljević, V. (2013). Prohibition or coffee shops: Regulation of amphetamine and methylphenidate for enhancement use by healthy adults. *The American Journal of Bioethics*, 13(7), 23–33.
- Elliot, C. (2003). *Better than well. American medicine meets the American dream*. Foreword by Peter D. Kramer. New York: W.W. Norton & Company.
- Elsej, J. (2017). *Psychedelic drug use in healthy individuals: A review of benefits, costs, and implications for drug policy*. *Drug Science, Policy and Law*.
- European Monitoring Agency for Drugs and Drug Addiction (EMDDCA). (2016). *The internet and drug markets* Hg. v. Mounteney, Jane, Oteo, Alberto and Griffiths, Paul. Luxembourg.
- Fadiman, J. (2011). *The psychedelic explorers guide. Safe, therapeutic and sacred journeys*. Park Street Press.
- Fadiman, J., & Korb, S. (2017). *Microdosing - the phenomenon, research results & startling surprises*. Oral presentation at psychedelic science, Oakland USA April, Viewable at: <https://www.youtube.com/watch?v=JbGKRyRCVFM>
- Forstmann, M., & Sagioglou, C. (2017). Lifetime experience with (classic) psychedelics predicts pro-environmental behavior through an increase in nature relatedness. *Journal of Psychopharmacology*, 31(8), 975–988.
- Gasser, P., Holstein, D., Michel, Y., et al. (2014). Safety and efficacy of lysergic acid diethylamide-assisted psychotherapy for anxiety associated with life-threatening diseases. *The Journal of Nervous and Mental Disease*, 202, 513–520.
- Gehl, R. (2009). YouTube as archive: Who will curate this digital Wunderkammer? *International Journal of Cultural Studies*, 12(1), 43–60.
- Glatter, R. (2015). *LSD microdosing: The new job enhancer in Silicon Valley and beyond?* November 27, retrieved from. The Forbes. <https://www.forbes.com/>
- Google Trends. (2018). *Google trends*. Accessed 8th of October 2018. <https://trends.google.nl/trends/explore?date=today%205-y&gprop=youtube&q=microdosing>
- Griffiths, R. R., Richards, W. A., McCann, U., & Jesse, R. (2006). Psilocybin can occasion mystical-type experiences having substantial and sustained personal meaning and spiritual significance. *Psychopharmacology*, 187(3), 268–283.
- Griffiths, R. R., Johnson, M., Richards, W. A., Richards, B., McCann, U., & Jesse, R. (2011). Psilocybin occasioned mystical-type experiences: Immediate and persisting dose-related effects. *Psychopharmacology*, 218(4), 649–655.
- Grob, C., Danforth, A., Chopra, G., Hagerty, M., McKay, C., Halberstadt, A., et al. (2011). Pilot study of psilocybin treatment for anxiety in patients with advanced-stage cancer. *Archives of General Psychiatry*, 68(1), 71–78.
- Grof, S. (2016). *Realms of the human unconscious. Observations from LSD research*. London: Souvenir Press.
- Haden, M., Emerson, B., & Tupper, K. (2016). A public-health-based vision for the management and regulation of psychedelics. *Journal of Psychoactive Drugs*, 48(4), 243–252.
- Halpern, J. H., & Pope, H. G. (2001). Hallucinogens on the Internet: A vast new source of underground drug information. *The American Journal of Psychiatry*, 158(3), S. 481–483.
- Hardon, A., & Moyer, E. (2014). Medical technologies: Flows, frictions and new socialities. *Anthropology & Medicine*, 21(2), 107–112.
- Hartogsohn, I. (2017). *Constructing drug effects: A history of set and setting*. *Drug Science, Policy and Law*. pp. 1–17.
- Hess, A. (2009). Resistance up in smoke: Analyzing the limitations of deliberation on YouTube. *Critical Studies in Media Communication*, 26(5), 411–434. <http://dx.doi.org/10.1080/15295030903325347>
- Hillebrand, J., Olszewski, D., & Sedefov, R. (2010). Legal highs on the internet. *Substance Use & Misuse*, 45(3), S. 330–340.
- Horowitz, M. (1976). *Interview with albert hofmann* Accessed: 17th April 2018. pp. 11. High Times. <https://www.erowid.org/culture/characters/hofmann.albert/hofmann.albert.interview1.shtml>
- Johnson, M., Richards, W. A., & Griffiths, R. R. (2008). Human hallucinogen research: Guidelines for safety. *Journal of Psychopharmacology*, 22, 603–620.

- Johnson, M., Garcia-Romeu, A., Cosimano, M. P., & Griffiths, R. R. (2014). Pilot study of the 5-HT<sub>2A</sub>R agonist psilocybin in the treatment of tobacco addiction. *Journal of Psychopharmacology*, 28(11), 983–992.
- Johnstad, P. G. (2018). Powerful substances in tiny amounts. An interview study of psychedelic microdosing. *Nordic Studies on Alcohol and Drugs*, 35(1), 39–51. <http://dx.doi.org/10.1177/1455072517753339>
- Jotterand, F., & Dubljević, V. (Eds.). (2016). *Cognitive enhancement: Ethical and policy implications in international perspectives*. Oxford University Press.
- Kataja, K., Hakkarainen, P., Koivula, P., & Hautala, S. (2018). Sharing risk experiences of polydrug use on YouTube. *Drugs and Alcohol Today*, 18(3), 188–197. <http://dx.doi.org/10.1108/DAT-03-2018-0013>
- Koebler, J. (2015). A brief history of microdosing. *Vice* November 24, retrieved from. <https://motherboard.vice.com/en-us>
- Korb, S., & Fadiman, J. (2018). Microdosing psychedelics. What's all the fuss about? Oral presentation at beyond psychedelic, Prague Czech Republic Viewable at. <https://slideslive.com/38909029/microdosing-psychedelics-whats-all-the-fuss-about>
- Kozinets, R. (2010). *Netnography. Doing ethnographic research online*. Sage Publications.
- Krebs, T. (2015). Protecting the human rights of people who use psychedelics. *The Lancet Psychiatry*, 2, 294.
- Krieg, L. J., Berning, M., & Hardon, A. (2017). Anthropology with algorithms? An exploration of online drug knowledge using digital methods. *Medicine Anthropology Theory*, 4(3), 21. <http://dx.doi.org/10.17157/mat.4.3.458>
- Lange, J. E., Daniel, J., Homer, K., Reed, M. B., & Clapp, J. D. (2010). Salvia divinorum: Effects and use among YouTube users. *Drug and Alcohol Dependence*, 108, 138–140.
- Langlitz, N. (2011). Political neurotheology. Emergence and revival of a psychedelic alternative to cosmetic psychopharmacology. In F. Ortega, & F. Vidal (Eds.), *Neurocultures. Glimpses into an expanding universe*. Peter Lang.
- MacLean, K., Johnson, M., & Griffiths, R. (2011). Mystical experiences occasioned by the hallucinogen psilocybin lead to increases in the personality domain of openness. *Journal of Psychopharmacology*, 25(11), 1453–1461.
- Maier, L., & Schaub, M. (2015). The use of prescription drugs and drugs of abuse for neuroenhancement in Europe. Not widespread but a reality. *European Psychologist*, 1, 1–12.
- Manning, P. (2013). YouTube, 'drug videos' and drugs education. *Drugs: Education Prevention and Policy*, 20(2), 120–130.
- Microdosing Psychedelics. (2018). *Microdosing psychedelics*. Accessed 17th April 2018. <https://sites.google.com/view/microdosingpsychedelics/home>
- Mishra, S. (2018). *Microdosing at Work: Reworking Bodies and Chemicals*. Essay part of an online supplement to the Openings collection on "Chemo-Ethnography" edited by Nicholas Shapiro and Eben Kirksey in the November 2017 issue of *Cultural Anthropology*. Accessed 28th February 2018. <https://culanth.org/fieldsights/1307-microdosing-at-work-reworking-bodies-and-chemicals>
- Móro, L., Simon, K., Bard, I., & Rác, J. (2011). Voice of the psychonauts: Coping, life purpose, and spirituality in psychedelic drug users. *Journal of Psychoactive Drugs*, 43(3), 188–198.
- Murguía, E., Tackett-Gibson, M., & Lessem, A. (2007). *Real drugs in a virtual world. Drug discourse and community online*. Lanham: Lexington Books.
- Nichols, D., Roseman, L., & Timmermann, C. (2018). Psychedelics: From pharmacology to phenomenology. An interview with David Nichols. *ALIUS Bulletin*, 2, 75–85. [https://www.aliusresearch.org/uploads/9/1/6/0/91600416/nichols\\_-\\_psychedelics.pdf](https://www.aliusresearch.org/uploads/9/1/6/0/91600416/nichols_-_psychedelics.pdf)
- Nichols, D. E., Johnson, M. W., & Nichols, C. D. (2017). Psychedelics as medicines: An emerging new paradigm. *Clinical Pharmacology & Therapeutics*, 101, 209–219. <http://dx.doi.org/10.1002/cpt.557>
- Nutt, D., King, L. A., & Nichols, D. E. (2013). Effects of schedule I drug laws on neuroscience research and treatment innovation. *Nature Reviews Neuroscience*, 14(8), 577–585.
- Partridge, B. J., Bell, S. K., Lucke, J. C., Yeates, S., & Hall, W. D. (2011). Smart drugs "as common as coffee": Media hype about neuroenhancement. *PloS One*, 6(11), e28416 <http://dx.doi.org/10.1371/journal.pone.0028416>
- Passie, T. (1997). *Psycholytic and psychedelic therapy research 1931–1995: A complete international bibliography*. Hannover: Laurentius Publishers.
- Passie, T. (2018). *The science of microdosing*. UK: PsyPress.
- Passie, T., Halpern, J. H., Stichtenoth, D. O., Emrich, H. M., & Hintzen, A. (2008). The pharmacology of lysergic acid diethylamide: A review. *CNS Neuroscience & Therapeutics*, 14, 295–314.
- Pieters, T., & Snelders, S. (2009). *Psychotropic drug use: Between healing and enhancing the mind*. *Neuroethics*, 2, 63–73.
- President's Council of Bioethics. (2003). *Beyond therapy: Biotechnology and the pursuit of happiness*. Accessed 7 February 2018. <https://repository.library.georgetown.edu/handle/10822/559341>
- Prochazkova, L., Lippelt, D. P., Calzato, L. S., Kuchar, M., Sjoerds, Z., & Hommel, B. (2018). Exploring the effect of microdosing psychedelics on creativity in an open-label natural setting. *Psychopharmacology*. <http://dx.doi.org/10.1007/s00213-018-5049-7>, first online
- Prochazkova, L., Lippelt, D. P., Calzato, L. S., Kuchar, M., Sjoerds, Z., & Hommel, B. (2018). *Exploring the effect of microdosing on cognition: Longitudinal randomized placebo-controlled study*. Leiden, The Netherlands: Leiden University, Cognitive Psychology Unit & Leiden Institute for Brain and Cognition. Personal communication with the first author.
- Ramcharan, P., & Cutcliffe, J. R. (2001). Judging the ethics of qualitative research: Considering the 'ethics as process' model. *Health & Social Care in the Community*, 9(6), 358–366.
- Repantis, D., Schlattmann, P., Laisney, O., & Heuser, I. (2010). Modafinil and methylphenidate for neuroenhancement in healthy individuals: A systematic review. *Pharmacological Research*, 62, 187–206.
- Richards, W. A. (2015). *Sacred knowledge: Psychedelics and religious experiences*. New York: Columbia University Press.
- Rucker, J. J. H., Iliff, J., & Nutt, D. (2017). Psychiatry & the psychedelic drugs. Past, present & future. *Neuropharmacology*. <http://dx.doi.org/10.1016/j.neuropharm.2017.12.040>
- Savage, M. (2007). Contemporary sociology and the challenge of descriptive assemblage. *European Journal of Social Theory*, 12(1), 155–174.
- Sessa, B. (2008). Is it time to revisit the role of psychedelic drugs in enhancing human creativity? *Journal of Psychopharmacology*, 22(8), 821–827.
- Sessa, B. (2017). *Psychedelic renaissance. Reassessing the role of psychedelic drugs in 21st century psychiatry and society* (2nd ed.). Muswell Hill Press.
- Sweat, N., Bates, L., & Hendrick, P. (2016). The associations of naturalistic classic psychedelic use, mystical experience, and creative problem solving. *Journal of Psychoactive Drugs*, 48(5), 344–350.
- Ter Meulen, R., Mohammed, A., & Hall, W. (Eds.). (2017). *Rethinking cognitive enhancement*. Oxford University Press.
- Tewari, T., & Mukherjee, S. (2010). Microdosing: Concept, application and relevance. *Perspectives in Clinical Research*, 1, 61–63. Accessed 19 October 2018. <http://www.piconline.org/text.asp?2010/1/2/61/71853>
- The Politics of Systems. (2018). *The politics of systems* Accessed 17 April 2018. <http://thepoliticsofsystems.net/2015/05/exploring-youtube/>
- Tupper, K. (2012). Psychoactive substances and the English language: Drugs, discourses, and public policy. *Contemporary Drug Problems*, 39, 461–492.
- Van Amsterdam, J., Opperhuizen, A., & van den Brink, W. (2011). Harm potential of magic mushroom use: A review. *Regulatory Toxicology and Pharmacology*, 59, 423–429.
- Van Hout, M. C., & Bingham, T. (2014). Responsible vendors, intelligent consumers: Silk Road, the online revolution in drug trading. *The International Journal of Drug Policy*, 25(2), 183–189.
- Van Schipstal, I., Mishra, S., Berning, M., & Murray, H. (2016). Harm reduction from below: On sharing and caring in drug use. *Contemporary Drug Problems*, 43(3), 199–215. <http://dx.doi.org/10.1177/0091450916663248>
- Waldman, A. (2017). *Really Good Day. How microdosing made a mega difference in my mood, my marriage, and my life*. New York, NY: Knopf.
- Walsh, C. (2016). Psychedelics and cognitive liberty: Reimagining drug policy through the prism of human rights. *The International Journal of Drug Policy*, 29, 80–87.
- Winstock, A., & Carhart-Harris, R. (2017). *Can psychedelics make you smarter and more creative*. Accessed 28 February 2018. <https://www.globaldrugsurvey.com/gds2017-launch/can-psychedelics-make-you-smarter-and-more-creative/>
- Yanakieva, S., Polychroni, N., Family, N., Williams, L., Luke, D., & Terhune, D. (2018). The effects of microdose LSD on time perception: A randomised, double-blind, placebo-controlled trial. *Psychopharmacology*. <http://dx.doi.org/10.1007/s00213-018-5119-x>
- Youtube Data Tool. (2018). *Youtube data tool* Accessed 17 April 2018. <https://tools.digitalmethods.net/netvizz/youtube/>