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MICRODOSING PSYCHEDELICS UNDER LOCAL, STATE, AND FEDERAL LAW

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ABSTRACT

Microdosing psychedelic substances ("microdosing") is a growing trend that has gained significant media and scientific attention. The practice typically involves consuming low doses of psychedelics, such as psilocybin or lysergic acid diethylamide ("LSD"), two or three times per week, over the course of weeks or months. Many claim that microdosing improves attention, creativity, or mood. Some say it reduces pain as well as symptoms of anxiety, depression, and migraine or cluster headaches. Others fear it has not been proven safe or effective by randomized controlled trials. Nevertheless, the microdosing trend is growing against the backdrop of a broader psychedelic renaissance characterized by increasing interest in researching, legalizing, consuming, and commercializing psychedelics. This Article is the first to address the legal status of microdosing under local, state, and federal law. It analyzes the national trend toward psychedelic legal reform and how it affects the legal status of people who microdose.

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Since 2019, over a dozen U.S. cities have decriminalized psychedelics, making their possession in each city a low priority for law enforcement. The following year, during the 2020 presidential election, the psychedelic renaissance reached a turning point. Through ballot initiatives, the District of Columbia partially decriminalized psychedelics, and Oregon became both the first state to decriminalize psychedelics and the first to legalize the production, sale, and supervised adult use of psilocybin. In 2022, Colorado became the second state to partially decriminalize psychedelics and create a legal market for their supervised administration. Related legislation has been proposed in about a dozen other states, including California, New York, Massachusetts, Illinois, and New Hampshire. However, despite the growing popularity of microdosing, these jurisdictions have largely overlooked the practice and thus raised numerous equity and public health concerns. This Article analyzes available scientific evidence for microdosing, summarizes its risks and benefits, and analyzes how existing and proposed legislation affect the practice. It concludes with recommendations for the safe and equitable integration of microdosing into existing, proposed, and future psychedelics regulation. As more jurisdictions decriminalize or legalize psychedelics, they can use the Article as a resource and guide.

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INTRODUCTION

Psychedelics are a diverse class of substances known to promote feelings of openness and connection.[1] Some naturally occurring psychedelics, derived from plants and fungi, have been used by Indigenous communities for millennia in healing and religious ceremonies.[2] Others were first synthesized by chemists in the early twentieth century.[3] Though studied by Western scientists during the 1950s and 1960s, Congress effectively banned most uses for psychedelics when it passed the Drug Abuse Control Amendments of 1965 and the Controlled Substances Act of 1970.[4] Research largely came to a halt, and psychedelic use went underground.[5]

Fifty years later, we are witnessing a resurgence of interest in the spiritual, recreational, and therapeutic use of psychedelics.[6] Since the early 1990s, some researchers have gained permission to conduct small or modestly sized clinical trials, and in the past few years, these efforts have multiplied.[7] There is now significant interest in commercializing psychedelics, and hundreds of millions

[1] *See* Mason Marks, *Psychedelic Medicine for Mental Illness and Substance Use Disorders: Overcoming Social and Legal Obstacles*, 21 N.Y.U. J. LEGIS. & PUB. POL'Y 69, 80-86 (2018) [hereinafter Marks, *Psychedelic Medicine for Mental Illness*] (defining psychedelic substances and discussing several examples).

[2] *See* Jamilah R. George, Timothy I. Michaels, Jae Sevelius & Monnica T. Williams, *The Psychedelic Renaissance and the Limitations of a White-Dominant Medical Framework: A Call for Indigenous and Ethnic Minority Inclusion*, 4 J. PSYCHEDELIC STUD. 4, 4-6 (2020) (describing ceremonial and therapeutic use of psychedelics by Indigenous peoples of Africa, North America, Central America, and South America).

[3] *See* Albert Hofmann, *The Discovery of LSD and Subsequent Investigations on Naturally Occurring Hallucinogens*, *in* DISCOVERIES IN BIOLOGICAL PSYCHIATRY 91, 91 (Frank J. Ayd, Jr. & Barry Blackwell eds., 1970); Roland W. Freudenmann, Florian Öxler & Sabine Bernschneider-Reif, *The Origin of MDMA (Ecstasy) Revisited: The True Story Reconstructed from the Original Documents*, 101 ADDICTION 1241, 1242 (2006); Georges Mion, *History of Anaesthesia: The Ketamine Story—Past, Present and Future*, 34 EUR. J. ANAESTHESIOLOGY 571, 572 (2017).

[4] *See* Franz X. Vollenweider & Michael Kometer, Opinion, *The Neurobiology of Psychedelic Drugs: Implications for the Treatment of Mood Disorders*, 11 NATURE REVS. NEUROSCIENCE 642, 642 (2010); Shaunacy Ferro, *Why Doctors Can't Give You LSD (But Maybe They Should)*, POPULAR SCI. (Apr. 16, 2013, 10:00 PM), http://www.popsci.com/science/article/2013-04/new-science-lsd-therapy [https://perma.cc/V9CK-QQ54].

[5] *See* Ferro, *supra* note 4 (explaining that once LSD was placed in Schedule I, research became severely restricted and funding was difficult to receive).

[6] *See* Donna Lu, *'Psychedelics Renaissance': New Wave of Research Puts Hallucinogenics Forward To Treat Mental Health*, GUARDIAN (Sept. 25, 2021, 4:00 PM), https://www.theguardian.com/society/2021/sep/26/psychedelics-renaissance-new-wave-of-research-puts-hallucinogenics-forward-to-treat-mental-health [https://perma.cc/B2PB-LXF6].

[7] *See* David Nutt, *Psychedelic Drugs—A New Era in Psychiatry?*, 21 DIALOGUES CLINICAL NEUROSCIENCE 139, 141 (2019).

of dollars are flowing into emerging psychedelic markets.[8] The Food and Drug Administration ("FDA") designated three psychedelic "breakthrough therap[ies]" for treating drug-resistant depression or post-traumatic stress disorder ("PTSD"), which means they may offer substantial improvements relative to existing therapies.[9] Meanwhile, since 2019, at least fifteen U.S. cities have essentially decriminalized various psychedelics, making their possession low on the list of the cities' law enforcement priorities.[10] In 2020, Oregon voters legalized the adult use of psilocybin, a psychedelic produced by many species of fungi, when they approved Measure 109, and partially decriminalized possession by approving Measure 110.[11] In 2022, Colorado voters enacted comparable legislation by approving Proposition 122.[12] About a dozen other states have proposed or enacted related bills to promote psychedelic decriminalization, supported adult use, medical use, clinical research, or policy analysis.[13] What may initially have been regarded as a West Coast phenomenon has grown into a wave of psychedelic policy reform that has washed over the nation.

Despite significant medical and commercial interest in psychedelics and accelerating legal reform, very few legal scholars have addressed the psychedelic renaissance, a relatively recent phenomenon that remains heavily stigmatized. In 2019, one of us analyzed the social and legal obstacles to using psychedelics as mental health therapies and the importance of increasing access to address the worsening American mental health crisis.[14] In 2022, two of us

[8] *See* Shayla Love, *Is It Possible To Create an Ethical Psychedelics Company?*, VICE: MOTHERBOARD (Apr. 6, 2021, 10:30 AM), https://www.vice.com/en/article/m7amw4/is-it-possible-to-create-an-ethical-psychedelics-company [https://perma.cc/3MKC-CXYP].

[9] *See* Erin E. Kepplinger, *FDA's Expedited Approval Mechanisms for New Drug Products*, 34 BIOTECHNOLOGY L. REP. 15, 22 (2015).

[10] *See Psychedelic Legalization & Decriminalization Tracker*, PSYCHEDELIC ALPHA, https://psychedelicalpha.com/data/psychedelic-laws (last updated Feb. 5, 2023).

[11] *See Oregon Measure 109 Election Results: Legalize Psilocybin*, N.Y. TIMES, https://www.nytimes.com/interactive/2020/11/03/us/elections/results-oregon-measure-109-legalize-psilocybin.html (last visited Feb. 10, 2023); *Oregon Measure 110 Election Results: Decriminalize Some Drugs and Provide Treatment*, N.Y. TIMES, https://www.nytimes.com/interactive/2020/11/03/us/elections/results-oregon-measure-110-decriminalize-some-drugs-and-provide-treatment.html (last visited Feb. 10, 2023).

[12] *Colorado Proposition 122 Election Results: Decriminalize and Regulate Certain Psychedelics*, N.Y. TIMES, https://www.nytimes.com/interactive/2022/11/08/us/elections/results-colorado-proposition-122-decriminalize-and-regulate-certain-psychedelics.html (last visited Feb. 10, 2023).

[13] Mason Marks, *The Varieties of Psychedelic Law*, 226 NEUROPHARMACOLOGY (forthcoming Mar. 2023) (manuscript at 1, 4) [hereinafter Marks, *Varieties of Psychedelic Law*], https://reader.elsevier.com/reader/sd/pii/S0028390822004580?token=95BF755D6617EC5A88BA3AEB16499A6ADDAC3D12B4BACF7B40C29A4C473EA29A84120349B0840547531C53B1AE185A35&originRegion=us-east-1&originCreation=20230211211606 [https://perma.cc/U8PY-ZPT6] (describing five varieties of psychedelic law in United States).

[14] *See generally* Marks, *Psychedelic Medicine for Mental Illness*, *supra* note 1 (describing social and legal obstacles); Mason M. Marks, *Controlled Substance Regulation for the*

analyzed ongoing legal and ethical disputes over patenting psychedelic substances and related technologies.[15] Other legal scholars have framed the psychedelic renaissance in terms of social justice or explained the legality of doctors prescribing psychedelics off-label once they become FDA approved.[16] However, no legal scholars have addressed the legality of microdosing psychedelics ("microdosing") or its role in the mental health crisis and evolving psychedelic renaissance.

Microdosing is a growing national phenomenon in which people consume small amounts of psychedelic substances such as psilocybin or lysergic acid diethylamide ("LSD") on a schedule lasting weeks or months. People report microdosing to improve cognitive performance or enhance physical or mental health.[17]

This Article analyzes the ethical, legal, and social implications of microdosing. It describes the available evidence regarding its risks and benefits and explains how existing psychedelics legislation and regulation have largely overlooked the practice. The Article analyzes how microdosing is currently affected by local, state, and federal law. It concludes with recommendations for safely and equitably integrating microdosing into existing regulatory frameworks and charts a path for addressing the practice in proposed and future psychedelics legislation.

Compared to traditional approaches to wellness and mental healthcare, and the growing practice of administering or consuming larger doses of psychedelics ("standard dosing"), microdosing can potentially save significant time, money, and healthcare resources. It may also be safer. Although microdosing is not yet well understood from a scientific perspective, there is experimental evidence to support its safety and benefits, and despite legitimate concerns, there is little reason to believe that it poses significant risks to individuals or public health, especially when done in moderation. As jurisdictions at all levels of government contemplate psychedelics legal reform, they should consider how new legislation will impact microdosing.

COVID-19 Mental Health Crisis, 72 ADMIN. L. REV. 649, 717-18 (2020) [hereinafter Marks, *Controlled Substance Regulation*] (arguing for increased access to psychedelics to address worsening mental health crisis).

[15] *See generally* Mason Marks & I. Glenn Cohen, *Patents on Psychedelics: The Next Legal Battlefront of Drug Development*, 135 HARV. L. REV. F. 212 (2022).

[16] *See* Matt Lamkin, *Legitimate Medicine in the Age of Consumerism*, 53 U.C. DAVIS L. REV. 385, 389 (2019) (analyzing legality of prescribing psychedelics off-label once they are FDA approved); Dustin Marlan, *Beyond Cannabis: Psychedelic Decriminalization and Social Justice*, 23 LEWIS & CLARK L. REV. 851, 884-92 (2019) (arguing for decriminalization of psychedelics as means of achieving social justice).

[17] Ben D. Rifkin, María J. Maraver & Lorenza S. Colzato, *Microdosing Psychedelics as Cognitive and Emotional Enhancers*, 7 PSYCH. CONSCIOUSNESS: THEORY RSCH. & PRAC. 316, 316-17 (2020); *see also* Lindsay P. Cameron, Angela Nazarian & David E. Olson, *Psychedelic Microdosing: Prevalence and Subjective Effects*, 52 J. PSYCHOACTIVE DRUGS 113, 113 (2020) (finding these results in anonymous online survey of 2,347 respondents).

The Article proceeds in four parts. Part I describes the legal reforms that have allowed the psychedelic renaissance to accelerate as well as the national mental health crisis and past injustices associated with the war on drugs that propel the renaissance forward. Part II defines microdosing, describes its history and why people do it, and explains its role within the psychedelic renaissance and ongoing attempts to mitigate the mental health crisis. Part III summarizes the evidence for supporting microdosing, which is derived from population-based and experimental studies. Part III also describes concerns regarding microdosing and the evidence to support and refute them. Part IV addresses how microdosing is regulated under existing local, state, and federal law and makes recommendations for better integrating the practice into current, proposed, and future legislation.

I. LAW AND THE PSYCHEDELIC RENAISSANCE

The psychedelic renaissance is characterized by increasing interest in researching, legalizing, consuming, and commercializing psychedelics. It includes the proliferation of psychedelic research centers at leading universities, the influx of hundreds of millions of dollars of venture capital into psychedelic companies, the increased patenting of psychedelic substances and related technologies, and the rapid expansion of psychedelic legal reforms at state and local levels.[18] This Part provides an overview of the legal reforms underlying the renaissance.

A. *Federal Law*

This Section describes federal drug laws and their impact on microdosing. Part IV returns to these topics while making recommendations for safer and more equitable microdosing regulation.

[18] *See* Marks & Cohen, *supra* note 15, at 216 (discussing increased patenting of psychedelic substances); Ryan Basen, *Academic Centers Start To Take Psychedelics Seriously*, MEDPAGE TODAY (Nov. 24, 2021), https://www.medpagetoday.com/special-reports/exclusives/95865 (discussing proliferation of academic research centers); Emmy M. Cho, *Harvard Law School Launches First-Ever Research Initiative on Psychedelics and the Law*, HARV. CRIMSON (July 2, 2021), https://www.thecrimson.com/article/2021/7/2/law-school-psychedelics-research-initiative/ [https://perma.cc/SX4H-F5KG] (discussing launch of one such academic research center at Harvard Law School); Sam Shead, *Peter Thiel Backs Berlin Start-Up Making Psychedelics in $125 Million Round*, CNBC: HEALTHY RETURNS (Nov. 23, 2020, 10:40 AM), https://www.cnbc.com/2020/11/23/peter-thiel-backs-psychedelics-startup-atai.html [https://perma.cc/NF38-MJ3F] (discussing influx of hundreds of millions of dollars in venture capital); *Psychedelic Legalization & Decriminalization Tracker*, *supra* note 10.

Prior to the 1960s, psychedelics were unregulated in the United States.[19] Swiss chemist Albert Hoffman first synthesized LSD in 1936.[20] In contrast, about 200 species of naturally occurring fungi produce psilocybin,[21] and Hoffman was the first to isolate it in 1958.[22] Five years later, Hoffman and Franz Troxler became the first to synthesize it.[23]

During the 1950s and 1960s, researchers studied psilocybin and LSD as therapeutic aids, and they published their discoveries in hundreds of peer-reviewed articles.[24] However, in the 1960s, the psychedelics became associated with the countercultural movement and opposition to the Vietnam War.[25] During that time, Timothy Leary and Ram Dass (formerly known as Richard Alpert) founded the Harvard Psilocybin Project.[26] But their experiments were widely criticized and eventually the university shut them down.[27] After being expelled from Harvard, Leary and Dass popularized psychedelics' use and acquired a cult following.[28]

In the late 1960s, President Nixon submitted a new federal drug law to consolidate a patchwork of existing regulations.[29] In 1970, Congress passed Nixon's legislation as the federal Controlled Substance Act ("CSA"), which created a five-tiered schedule called the controlled substances list.[30] Most commonly used psychedelics were placed in Schedule I, which is the most heavily restricted category.[31] According to the CSA and the Drug Enforcement

[19] *See* Marlan, *supra* note 16, at 865-69.

[20] Trina Calderon, *Flashback: LSD Creator Albert Hofmann Drops Acid for the First Time*, ROLLING STONE (Apr. 19, 2018), https://www.rollingstone.com/culture/culture-news/flashback-lsd-creator-albert-hofmann-drops-acid-for-the-first-time-629085/.

[21] Gaurav Dubey, *Are There Different Kinds of Psychedelic Fungi? A Guide to the Many Unique Species of Magic Mushrooms*, MICRODOSE (Aug. 30, 2021), https://microdose.buzz/news/are-there-different-kinds-of-psychedelic-fungi-a-guide-to-the-many-unique-species-of-magic-mushrooms/ [https://perma.cc/8Z3A-9734].

[22] *Psilocybin*, AM. CHEM. SOC'Y (Oct. 2, 2017), https://www.acs.org/content/acs/en/molecule-of-the-week/archive/p/psilocybin.html [https://perma.cc/8M5A-QDD6].

[23] *Id.*

[24] *See* Vollenweider & Kometer, *supra* note 4, at 642; Ferro, *supra* note 4.

[25] MICHAEL POLLAN, HOW TO CHANGE YOUR MIND: WHAT THE NEW SCIENCE OF PSYCHEDELICS TEACHES US ABOUT CONSCIOUSNESS, DYING, ADDICTION, DEPRESSION, AND TRANSCENDENCE 205-18 (2018); Marlan, *supra* note 16, at 869.

[26] DON LATTIN, THE HARVARD PSYCHEDELIC CLUB: HOW TIMOTHY LEARY, RAM DASS, HUSTON SMITH, AND ANDREW WEIL KILLED THE FIFTIES AND USHERED IN A NEW AGE FOR AMERICA 37-51 (2010).

[27] POLLAN, *supra* note 25, at 185-218.

[28] *Id.*; LATTIN, *supra* note 26, at 107-18.

[29] *See* David T. Courtwright, *The Controlled Substances Act: How a "Big Tent" Reform Became a Punitive Drug Law*, 76 DRUG & ALCOHOL DEPENDENCE 9, 11 (2004).

[30] *Drug Scheduling*, U.S. DRUG ENF'T ADMIN., https://www.dea.gov/drug-information/drug-scheduling [https://perma.cc/E682-YERD] (last visited Feb. 10, 2023).

[31] *See* 21 U.S.C. §§ 801, 812.

Administration ("DEA"), they have no currently accepted medical use and a high potential for abuse.[32]

Following passage of the CSA, research on psychedelics came to an abrupt halt, and there was little or no progress for decades.[33] That started to change in the early 1990s, when a small group of researchers gained permission from the DEA to conduct small clinical studies.[34] Since then, these studies have proliferated, and in the past few years, the pace of research has dramatically increased.[35] However, significant barriers to research remain. The DEA requires manufacturers to hold Schedule I licenses before producing psychedelics, and researchers must be registered with the agency before studying them.[36] Moreover, the DEA significantly limits the total amount of each substance that can be produced each year.[37] Outside of clinical trials, possession and use of psychedelics remain federal crimes.[38] Consequently, microdosing outside the research context is illegal at the federal level, and people who engage in the practice risk arrest and prosecution.

Some experts have argued for federal rescheduling of psilocybin and other psychedelics because the available science does not support their categorization in Schedule I.[39] Rescheduling can occur through three different pathways. First, anyone can submit a rescheduling petition to the DEA.[40] However, these petitions are rarely successful.[41] Second, if the DEA rejects a petition, a petitioner can sue the DEA and ask the court to compel rescheduling, which is also unlikely to succeed.[42] Third, Congress can amend the CSA to reschedule psychedelics or remove them from the list of controlled substances completely.[43] If the DEA decides to reschedule a controlled substance, it must seek guidance from the FDA, which conducts a scientific evaluation to estimate the public health risk associated with the proposed change.[44] In making its

[32] *Drug Scheduling*, *supra* note 30.

[33] POLLAN, *supra* note 25, at 216-18.

[34] *Id.* at 60-63.

[35] *Id.* at 78.

[36] Marks, *Psychedelic Medicine for Mental Illness*, *supra* note 1, at 87-106.

[37] *Id.*

[38] 21 U.S.C. § 844(a).

[39] *See* Mason Marks & Carmel Shachar, Comment, *Drug Scheduling Limits Access to Essential Medicines and Should Be Reformed*, NATURE MED. (Jan. 27, 2023), https://www.nature.com/articles/s41591-022-02169-4 [https://perma.cc/5DZ2-NT7R] (explaining why Schedule I status of common psychedelics is incompatible with growing body of evidence and describing efforts to reschedule psilocybin).

[40] Marks, *Controlled Substance Regulation*, *supra* note 14, at 672-79.

[41] *See id.* at 673.

[42] *See id.* at 688-91.

[43] *Id.* at 679-88.

[44] 21 U.S.C. § 811(c).

recommendations, the FDA performs an eight-factor scientific analysis required by the CSA.[45]

The FDA also regulates psychedelics when they are evaluated in clinical trials or administered as medical therapies.[46] The federal Food, Drug, and Cosmetics Act ("FDCA") restricts the marketing of medical products that have not been FDA approved.[47] Because psychedelics have not yet met the requirements for FDA approval, their medical use violates the FDCA, regardless of the dose. However, under the investigational new drug process, the pharmaceutical company Compass Pathways Limited has legally completed the largest Phase 2 clinical trial of psilocybin therapy, and most experts believe that FDA-approved psilocybin therapy is only a few years away.[48]

If the FDA approves psilocybin therapy, then, at least in theory, psilocybin microdoses could be prescribed off-label, or for nonapproved purposes, to treat a variety of medical conditions.[49] However, even if that occurs, the FDA retains the ability to impose restrictions on the use of psychedelics after they become approved. These conditions, called Risk Evaluation and Mitigation Strategy ("REMS"), are imposed on therapies that the FDA believes pose special risks.[50] For instance, an injectable drug called Zyprexa Relprevv is used to treat schizophrenia in adults.[51] However, it can cause serious reactions upon injection characterized by severe sleepiness, confusion, and coma within three hours of

[45] *Id.*

[46] *Id.* § 505.

[47] *Id.* § 355(a).

[48] Press Release, COMPASS Pathways, COMPASS Pathways Announces Positive Topline Results from Groundbreaking Phase IIb Trial of Investigational COMP360 Psilocybin Therapy for Treatment-Resistant Depression (Nov. 9, 2021), https://ir.compasspathways.com/news-releases/news-release-details/compass-pathways-announces-positive-topline-results [https://perma.cc/9NQ3-8WCQ]; Letter from Miriam E. Delphin-Rittmon, Assistant Sec'y for Mental Health & Substance Use, Substance Abuse & Mental Health Servs. Admin., to Madeleine Dean, Rep., U.S. House of Reps. (May 13, 2022), https://s3.documentcloud.org/documents/22121426/exhibit-3-response-to-rep-dean-et-al.pdf [https://perma.cc/FZ8G-7ZA4].

[49] *See* Lamkin, *supra* note 16, at 390-91 (describing off-label prescribing of psychedelics after FDA approval).

[50] REMS are "required risk management plan[s] that use[] risk minimization strategies beyond professional labeling to ensure that the benefits of the drug outweigh the risks." ELAINE LIPPMANN, U.S. FOOD & DRUG ADMIN., RISK EVALUATION AND MITIGATION STRATEGIES (REMS) 3 (2017), https://www.fda.gov/media/105565/download [https://perma.cc/C3B5-VL4K]. REMS programs may include restrictions on distribution or require enhanced communication to patients or healthcare providers. *See* 21 U.S.C. § 355-1(c), (e)-(f). Each approved REMS program must also include a timetable for the manufacturer's provision of reports to the FDA to assess the effectiveness of REMS requirements. *Id.* § 355-1(c)-(d).

[51] *See Risk Evaluation and Mitigation Strategies | REMS*, U.S. FOOD & DRUG ADMIN., https://www.fda.gov/drugs/drug-safety-and-availability/risk-evaluation-and-mitigation-strategies-rems [https://perma.cc/8KKZ-A9Z9] (last updated Dec. 17, 2021).

treatment.[52] Consequently, the FDA implemented REMS that require Zyprexa Relprevv to be administered only in healthcare facilities that can monitor patients for three hours after they receive the injection.[53] The agency will undoubtedly impose REMS on psilocybin-assisted therapy and therapies involving other psychedelics such as 3,4-methylenedioxymethamphetamine ("MDMA"), which is being tested in clinical trials for treating PTSD. According to the Multidisciplinary Association for Psychedelic Studies ("MAPS"), which is conducting the trials with MDMA, the FDA will likely implement REMS that require health professionals who offer MDMA-assisted therapy through a MAPS protocol to complete an MDMA therapy training program offered by MAPS.[54] Other possible REMS include limits on the dose of a psychedelic and the number of doses administered, restrictions on who can administer the substance and the type of facilities and settings in which it may be administered, and requirements regarding distribution, storage, and patient surveillance for adverse events after the therapy becomes FDA approved.[55] When the FDA issues final REMS on psilocybin therapy, these restrictions could make microdosing impractical or impossible in healthcare settings. The implications of this probable outcome are discussed further below.[56]

B. *State Law*

This Section describes proposed and recently enacted state-level psychedelics laws and their impact on microdosing. Part IV returns to these topics while making recommendations for safer and more equitable microdosing regulation.

Existing state psychedelic laws can be divided into five general categories, including decriminalization, supported adult use, medical use, clinical research, and policy analysis.[57] Laws in the first category decrease or eliminate criminal penalties associated with producing, possessing, selling, or consuming psychedelics.[58] The approaches are not uniform among jurisdictions that

[52] *Id.*

[53] *Id.*

[54] *See Therapy Training Program Application Requirements*, MAPS PUB. BENEFIT CORP., https://mapspublicbenefit.com/training/program-application-requirements/ [https://perma.cc/F6MJ-WJPE] (last visited Feb. 10, 2023).

[55] Matthew W. Johnson, Roland R. Griffiths, Peter S. Hendricks & Jack E. Henningfield, *The Abuse Potential of Medical Psilocybin According to the 8 Factors of the Controlled Substances Act*, 142 NEUROPHARMACOLOGY 143, 144 (2018).

[56] *See infra* Section IV.D.

[57] Marks, *Varieties of Psychedelic Law*, *supra* note 13 (manuscript at 1).

[58] *See, e.g.*, Drug Addiction Treatment and Recovery Act, ch. 2, § 11, 2021 Or. Laws 1, 5-6 (codified as amended at OR. REV. STAT. § 475.752 (2022)) (partially decriminalizing psychedelics and other controlled substances by reducing possession of small amounts to civil infraction); S. 519, 2021-2022 Reg. Sess. (Cal. 2021) (eliminating criminal penalties for possession of certain psychedelics and sharing or giving them away without compensation); H.R. 1392-FN, 2022 Sess. (N.H. 2022) (proposing reducing possession of small amounts of

decriminalize, and decriminalization efforts fall along a spectrum from partial to full decriminalization.[59] Portugal took a decriminalization approach to drug policy in 2001 when it partially decriminalized the possession of most drugs, including psychedelics.[60] In the United States, Oregon's Measure 110, which voters passed by ballot initiative on November 3, 2020, was the first enacted state law of this kind.[61] More recently, other states such as California, Washington, Vermont, and New Hampshire have proposed similar types of decriminalization bills.[62] On November 3, 2022, Colorado voters passed Proposition 122, the Natural Medicine Health Act.[63] Proposition 122 partially decriminalized the personal cultivation, possession, consumption, and sharing of five psychedelic compounds and the plants and fungi that contain them.[64] However, Proposition 122 did not decriminalize sales, and it limits possession of psychedelics to amounts "necessary to share" with others in specific contexts, such as "spiritual guidance" and "beneficial community-based use and healing."[65] To date, no state laws have fully decriminalized psychedelics, and though some may allow for microdosing, none have specifically addressed it.

A second type of bill involves creating a legal framework for the supported adult use of psychedelics, which entails their controlled administration by

psychedelics to civil infraction); H.R. 1349-FN, 2022 Sess. (N.H. 2022) (proposing decriminalization of psilocybin mushrooms in New Hampshire).

[59] *See infra* Sections I.B.2, I.B.3, I.C.

[60] Naina Bajekal, *Want To Win the War on Drugs? Portugal Might Have the Answer*, TIME (Aug. 1, 2018, 6:09 AM), https://time.com/longform/portugal-drug-use-decriminalization/.

[61] *See* OR. REV. STAT. § 475.752(3); MICHAEL LANTZ & BRIAN NIEUBUURT, LEGIS. POL'Y & RSCH. OFF., MEASURE 110 (2020): BACKGROUND BRIEF 1 (2020), https://www.oregonlegislature.gov/lpro/Publications/Background-Brief-Measure-110-(2020).pdf [https://perma.cc/6LVL-Q8YF].

[62] *See* Ben Adlin, *Washington Senate Replaces Drug Decriminalization Bill with Revised Measure To Reinstate Penalties*, MARIJUANA MOMENT (Apr. 16, 2021), https://www.marijuanamoment.net/washington-senate-replaces-drug-decriminalization-bill-with-revised-measure-to-reinstate-penalties/ [https://perma.cc/KA2A-BPTQ]; Kyle Jaeger, *Vermont Lawmakers File Drug Decriminalization Bill with Hopes of Promoting Harm Reduction*, MARIJUANA MOMENT (Jan. 14, 2022), https://www.marijuanamoment.net/vermont-lawmakers-file-drug-decriminalization-bill-with-hopes-of-promoting-harm-reduction/ [https://perma.cc/R6S2-ARRZ]; Kyle Jaeger, *New Hampshire Lawmakers File Psilocybin and Broader Drug Decriminalization Bills for 2022*, MARIJUANA MOMENT (Dec. 29, 2021), https://www.marijuanamoment.net/new-hampshire-lawmakers-file-psilocybin-and-broader-drug-decriminalization-bills-for-2022/ [https://perma.cc/3G5K-FBYY]; Hannah Wiley, *Bill To Decriminalize Psychedelics in California Gutted by Lawmakers*, L.A. TIMES (Aug. 12, 2022, 7:32 PM), https://www.latimes.com/california/story/2022-08-12/bill-to-decriminalize-psychedelics-in-california-gutted-by.

[63] *Colorado Proposition 122 Election Results: Decriminalize and Regulate Certain Psychedelics*, *supra* note 12.

[64] 2022 Colo. Legis. Serv. Init. Pet. 122 (West) (creating regulatory framework for supervised administration of psilocybin).

[65] *Id.*

trained facilitators who support clients during the experience.[66] Supported adult use is legal in the Netherlands, where companies like the Synthesis Institute and Red Light Holland offer the service.[67] They are part of a thriving psychedelic tourism industry in which people travel to countries like the Netherlands, Jamaica, and Peru for supported adult-use experiences with psilocybin, ibogaine, or ayahuasca.[68] In the United States, Oregon's Measure 109 will allow the supported adult use of psilocybin in 2023. Further, lawmakers in other states, such as Washington and Florida, have proposed similar bills with subtle variations on Oregon's legislation.[69]

A third type of psychedelic law focuses on the supervised medical use of these substances.[70] Lawmakers in New York and Pennsylvania have proposed this variety of legislation, which puts licensed healthcare providers in control and limits use to the treatment of medical conditions that are often specified by the law.[71]

Colorado's Proposition 122 may fall somewhere between supported-adult-use and medical-use legislation. It will allow people over twenty-one years of age to access psilocybin at licensed "healing centers."[72] Unlike Oregon's Measure 109, which prohibits the state from requiring a medical diagnosis or doctor's prescription, Colorado's Proposition 122 lacks these limitations and has the potential to become a medical-use law during its eighteen-month

[66] Marks, *Varieties of Psychedelic Law*, *supra* note 13 (manuscript at 5); *see also* Mason Marks, *Warning: Oregon Legalized Supported Adult Use of Psilocybin, Not Psychedelic Therapy*, CHACRUNA (Dec. 14, 2021) [hereinafter Marks, *Warning: Oregon Legalized Supported Adult Use of Psilocybin*], https://chacruna.net/oregon-legalized-psilocybin-supported-adult-use/ [https://perma.cc/NST5-GW8M].

[67] *About*, SYNTHESIS INST., https://www.synthesisinstitute.com/about?hsLang=en [https://perma.cc/Q8BJ-EZTN] (last visited Feb. 10, 2023); *Products*, RED LIGHT HOLLAND, https://redlight.co/products/ [https://perma.cc/QL2X-QG6H] (last visited Feb. 10, 2023).

[68] Debra Kamin, *The Rise of Psychedelic Retreats*, N.Y. TIMES (Dec. 1, 2021), https://www.nytimes.com/2021/11/25/travel/psychedelic-retreat-ayahuasca.html.

[69] *See* H.R. 549, 2021 Sess. (Fla. 2021); Assemb. A08569A, 2021-2022 Reg. Sess. (N.Y. 2022); S. 5660, 67th Leg., Reg. Sess. (Wash. 2022).

[70] Marks, *Varieties of Psychedelic Law*, *supra* note 13 (manuscript at 5).

[71] *Id.* (manuscript at 5-6).

[72] 2022 Colo. Legis. Serv. Init. Pet. 122 (West).

implementation period.[73] Proposition 122 also has characteristics of a fourth variety of psychedelics legislation that focuses on clinical research.[74]

A third type of state psychedelics legislation focuses solely on clinical research.[75] Lawmakers in Florida, Pennsylvania, and Texas have enacted or filed this type of legislation.[76] Though research on microdosing could be conducted under this regulatory model, which would be an important step toward better understanding the practice, research-oriented legislation would be less likely to increase safe and equitable access to microdosing.

At least so far, no psychedelic laws have specifically addressed microdosing. However, the flexibility of Oregon's framework allows for it. Moreover, the governing agency, the Oregon Health Authority ("OHA"), has finalized rules that allow for limited approaches to microdosing.[77]

Some approaches to microdosing might also be possible under laws that promote psychedelic decriminalization, medical use, and clinical research. However, as discussed below, those laws could just as easily impede or prohibit the practice. The following discussion introduces Oregon's Measure 109 and Measure 110 and describes how they affect microdosing. Part IV makes

[73] *See* Oregon Psilocybin Services Act, ch. 1, 2021 Or. Laws 1, 9-10 (codified as amended at OR. REV. STAT. § 475A.325(4) (2022)); Marks, *Varieties of Psychedelic Law*, *supra* note 13 (manuscript at 6) (explaining how governing agencies can shift laws from one category, such as supported adult use, into another, such as medical use and how Colordo's governing agency could shift Colorado's law into medical-use category during its eighteen-month implementation period); Kyle Jaeger, *Colorado Voters Approve Psychedelics Legalization Ballot Initiative*, MARIJUANA MOMENT (Nov. 9, 2022), https://www.marijuanamoment.net/colorado-voters-approve-psychedelics-legalization-ballot-initiative/ [https://perma.cc/2JB6-T7C2] (stating Proposition 122 creates option for regulators to add DMT, ibogaine, and mescaline to Colorado's supported adult-use framework in 2026).

[74] *See* Mason Marks, *Seeking Psychedelics? Check the Data Privacy Clause*, WIRED (Nov. 2, 2022, 9:00 AM), https://www.wired.com/story/colorado-psychedelics-health-privacy-surveillance/ (explaining Proposition 122 requires governing state agency, Department of Regulatory Agencies, to collect outcomes data from Colorado healing centers, which act's drafters hope to utilize for medical research); *see also* Marks, *Varieties of Psychedelic Law*, *supra* note 13 (manuscript at 6) (describing characteristics of clinical research category of psychedelic legislation and how elements of Proposition 122 fit this description).

[75] Marks, *Varieties of Psychedelic Law*, *supra* note 13 (manuscript at 6).

[76] Act of June 18, 2021, ch. 983, 2021 Tex. Gen. Laws (authorizing study of psilocybin therapy for veterans with PTSD); H.R. 193, 2022 Sess. (Fla. 2022) (proposing research and clinical studies of psilocybin); H.R. 1959, 2021 Reg. Sess. (Pa. 2021) (same).

[77] *See* Letter from André Ourso, Adm'r, Ctr. for Health Prot., and Angie Allbee, Section Manager, Or. Psilocybin Servs., to Members of the Pub. (Dec. 27, 2022), https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/Documents/December-2022-Letter-to-Public.pdf [https://perma.cc/88PB-SB8S] (announcing finalization of rules governing psilocybin use in Oregon); *see also* OR. ADMIN. R. 333-333-5250(1)(a) (2022) (permitting clients who consume 2.5 milligrams or fewer of psilocybin to leave psilocybin service center after thirty minutes, allowing them to microdose without having to be supervised for extended periods required of clients who consume higher doses).

recommendations for the interpretation, implementation, and modification of each law to promote safe and equitable access to microdosing.

1. The Oregon Psilocybin Services Act

On November 3, 2020, Oregon voters passed the Oregon Psilocybin Services Act, also known as Measure 109, with nearly fifty-six percent of Oregonians voting in favor of the measure.[78] Psilocybin services entail the supported adult use of psilocybin in a controlled setting.[79] They are typically delivered in three stages comprising preparation, administration, and integration sessions.[80] During preparation sessions, potential clients meet with licensed facilitators to assess clients' goals and explain what clients should expect during a psilocybin experience.[81] Facilitators establish ground rules for the psychedelic session, identify significant health or safety risks clients may face, and obtain informed consent for psilocybin services.[82] The administration session, which can last thirty minutes to six hours under current rules,[83] is the stage in which clients consume psilocybin under a facilitator's supervision. The optional integration session is a stage in which clients contemplate their psychedelic experiences with a facilitator's support and attempt to integrate the lessons learned into their lives.[84] This session may take many forms, including creative writing and other forms of artistic expression.

Passage of Measure 109 triggered a two-year development period and required Governor Kate Brown to assemble a body called the Oregon Psilocybin Advisory Board ("Oregon Board"), which was formed on March 16, 2021, and first convened on March 31, 2021.[85] The Oregon Board makes recommendations

[78] *See Ballot Measures: Measure 109*, OR. LIVE, https://gov.oregonlive.com/election/2020/general/measures/ [https://perma.cc/EV6S-SS2H] (last visited Feb. 10, 2023). *See generally* Oregon Psilocybin Services Act, ch. 1, 2021 Or. Laws 1 (codified as amended at OR. REV. STAT. §§ 475A.200-.722 (2022)).

[79] Marks, *Warning: Oregon Legalized Supported Adult Use of Psilocybin*, *supra* note 66.

[80] *Oregon Psilocybin Services Information*, PSILOCYBIN ASSISTED THERAPY ASS'N, https://pata-us.org/or-psilocybin-services [https://perma.cc/XPG2-3MKQ] (last visited Feb. 10, 2023) (explaining that under Oregon's Measure 109, integration sessions are optional).

[81] *Id.*

[82] *Id.*

[83] *See* OR. ADMIN. R. 333-333-5250 (2022); *cf.* Adrienne Santos-Longhurst, *How Long Do Shrooms Stay in Your System?*, HEALTHLINE (May 25, 2022), https://www.healthline.com/health/how-long-do-shrooms-stay-in-your-system [https://perma.cc/Y6CE-T9PF] ("Shroom trips typically last between 3 and 6 hours, though some people may feel effects a lot longer.").

[84] *See* David Bronner, *Why We Support the 2020 Ballot Measure That Would Legalize & Regulate Psilocybin Therapy in Oregon*, DR. BRONNER'S (Sept. 21, 2019), https://www.drbronner.com/all-one-blog/2019/09/psi-2020/ [https://perma.cc/4S78-RPUD].

[85] Lizzy Acker, *Governor Appoints Board To Oversee Oregon's New Psychedelic Mushroom Program*, OR. LIVE (Mar. 16, 2021, 6:53 PM), https://www.oregonlive.com/pacific-northwest-news/2021/03/governor-appoints-board-to-oversee-oregons-new-psychedelic-mushroom-program.html [https://perma.cc/CBT5-TSZN].

to the state's public health agency, the OHA, regarding rules for administering the emerging psilocybin industry.[86] Under Measure 109, the Oregon Board's recommendations were due on June 30, 2022.[87]

After convening in March 2021, the Oregon Board quickly formed five subcommittees focused on psilocybin research, health equity, training, products, and professional licensure.[88] Measure 109 required the Oregon Board to assemble and publish a summary of available research on the safety and efficacy of using psilocybin to treat a variety of mental health conditions.[89] The Research Subcommittee published the Oregon Board's Rapid Evidence Review and Recommendations on July 30, 2021.[90] This report primarily summarized data from clinical trials designed to evaluate the safety and efficacy of psilocybin for treating depression, PTSD, substance-use conditions, and anxiety.[91] It mentioned microdosing only once and cited none of the surveys or clinical trials that evaluated its safety or efficacy.[92] We now turn to Oregon's Measure 110, the first state law to partially decriminalize psychedelics.

2. The Oregon Drug Decriminalization and Addiction Treatment Act

On November 3, 2020, Oregon voters passed Measure 110, a citizen-initiated ballot measure that partially decriminalized many controlled substances, including the most common psychedelics, and established a treatment-and-recovery program for people with substance-use conditions.[93] Section 11 amends Oregon's Uniform Controlled Substances Act by removing criminal penalties for the possession of specified quantities of psychedelics and other controlled substances such as cocaine and heroin.[94]

[86] OR. REV. STAT. § 475A.230 (2022).

[87] *Oregon Psilocybin Services—Oregon Psilocybin Advisory Board*, OR. HEALTH AUTH., https://www.oregon.gov/oha/ph/preventionwellness/pages/psilocybin-advisory-board-meetings.aspx [https://perma.cc/HSU5-MC7U] (last visited Feb. 10, 2023).

[88] Or. Psilocybin Advisory Bd., Meeting Minutes (Apr. 28, 2021) (on file with the *Boston University Law Review*).

[89] *Id.*

[90] *See generally* ATHEIR I ABBAS, ANGELA CARTER, THOMAS JEANNE, RACHEL KNOX, P. TODD KORTHUIS, ALI HAMADE, CHRISTOPHER STAUFFER & JESSIE UEHLING, OREGON PSILOCYBIN ADVISORY BOARD RAPID EVIDENCE REVIEW AND RECOMMENDATIONS (2021), https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/Documents/Psilocybin%20evidence%20report%20to%20OHA%206-30-21_Submitted.pdf [https://perma.cc/S3KC-DXCN].

[91] *Id.* at 4-5.

[92] *Id.* at 10 (stating microdosing might require further study).

[93] LANTZ & NIEUBUURT, *supra* note 61, at 1.

[94] Drug Addiction Treatment and Recovery Act, ch. 2, § 11(3), (7), 2021 Or. Laws 1, 6 (codified as amended at OR. REV. STAT. § 475.752 (2022)).

With respect to psilocybin and LSD, Measure 110 creates possession limits of less than twelve grams and less than forty "user units," respectively.[95] Though grams are an easily understood unit of measurement, neither Measure 110 nor Oregon's Uniform Controlled Substances Act defines "user units."[96] However, context from Oregon legislation and case law suggests that "user unit" refers to a typical standard dose.[97]

Under Measure 110, possessing fewer than twelve grams of psilocybin or forty user units of LSD carries no risk of arrest or prosecution.[98] Instead, as noncriminal Class E violations—a category created by Measure 110—the maximum punishments are a $100 fine or completion of a health assessment with an addiction treatment professional.[99] Individuals found in possession of psychedelics may choose between these options.[100] Additionally, individuals who possess more than the allowed limits of LSD or psilocybin are no longer guilty of Class B felonies, because Measure 110 reduces those offenses to Class A misdemeanors punishable by up to 364 days of imprisonment and a fine up to $6,250.[101] This means that, under Oregon law, a person could possess dozens of microdoses of psilocybin or LSD without risking state criminal penalties. However, one must still assume the risk of receiving a fine for a civil infraction. Further, possessing microdoses remains a crime under the federal CSA.[102] However, federal law enforcement will likely lack the resources and motivation to enforce relevant provisions of the federal CSA against those who choose to

[95] *Id.* Note also that, in both cases, Oregon law does not refer to these units or weights of LSD or psilocybin specifically, but rather to "mixture[s] or substance[s] containing a detectable amount of psilocybin[,] . . . psilocin," or LSD. *Id.* § 11(7)(b)(A)-(B).

[96] *See id.*; OR. REV. STAT. §§ 475.005, .035, .055, .065.

[97] *See* OR. REV. STAT. § 475.814(2)(b)(B) (including "user units" in list with "pills, tablets[, and] capsules" in state-controlled substances legislation provision regarding hydrocodone); State v. Robertson, 412 P.3d 223, 224 (Or. Ct. App. 2018) (stating twenty-seven grams of methamphetamine is 138 "user units"); State v. Slovik, 71 P.3d 159, 162 n.7 (Or. Ct. App. 2003) (referring to "user units" as "dosage units"); SACRAMENTO CNTY. PROB. DEP'T, METHAMPHETAMINE TRENDS IN THE PROBATION DEPT. 4 (2020), https://dhs.saccounty.gov/BHS/Documents/SUPT/Methamphetamine/Coalition-2020/MA-ADS-2020-02-13-Methamphetamine-Trends-in-the-Sacramento-County-Probation-Department.pdf [https://perma.cc/G2EM-BRZX] (stating average dose of methamphetamine is one-fifth of one gram). A "tab"—that is, a small square of absorbent paper—is often viewed as a standard dose of LSD. Kimberly Holland, *How Long Does Acid Last? What To Expect*, HEALTHLINE (July 24, 2022), https://www.healthline.com/health/how-long-does-acid-last [https://perma.cc/JR4T-ZPAB]. One tab can contain thirty to one-hundred micrograms. *How Can We Reduce the Harms Associated with Using LSD?*, DRUG POL'Y ALL., https://drugpolicy.org/drug-facts/reduce-harms-lsd [https://perma.cc/5KK5-2PS7] (last visited Feb. 10, 2023).

[98] OR. REV. STAT. § 475.752(7)(a).

[99] *Id.* §§ 153.018(2), .019(2), .062(1).

[100] LANTZ & NIEUBUURT, *supra* note 61, at 1.

[101] OR. REV. STAT. §§ 161.615, .635; *see also* LANTZ & NIEUBUURT, *supra* note 61, at 1.

[102] 21 U.S.C. §§ 801-802, 812, 844.

microdose, and state and local law enforcement would not enforce the federal CSA on their behalf.[103]

In the wake of Oregon's historic 2020 ballot measures, many other states have drafted or enacted related legislation, which we address in the following Section.

3. Proposed Legislation in Other States Following Oregon's Historic Votes

The following discussion describes other proposed state psychedelics laws and explains how they differ from Oregon's Measure 109 and Measure 110. Though many states are producing psychedelics legislation, this discussion focuses on bills introduced in New Hampshire, California, and Washington.

In 2022, New Hampshire legislators refiled two psychedelics-related decriminalization bills, which were ultimately unsuccessful. The first, New Hampshire House Bill 1349, would have decriminalized the possession and use of psilocybin mushrooms and other fungi containing "hallucinogenic alkaloids,"[104] such as Amanita muscaria, which contains a psychoactive compound called muscimol.[105] If enacted, any person aged eighteen or older who knowingly possessed twelve grams or fewer of psychedelic fungi would have been guilty only of a civil violation—not a criminal offense—carrying a penalty of a $100 fine for a first or second offense and a fine of up to $300 for subsequent offenses.[106] In addition, the bill would have instructed courts to waive the fine for any single civil violation "within a 3-year period upon proof that person has completed a substance abuse assessment by a licensed drug and alcohol counselor within 60 days of the conviction."[107]

If New Hampshire had enacted House Bill 1349, people could have possessed dozens of microdoses of psilocybin without risking state or local criminal penalties. Like law enforcement officers in Oregon, New Hampshire state and local police would not have enforced the federal CSA.[108] However, the possession or use of microdoses of psilocybin or LSD would have remained felonies under federal law.[109]

The second proposed psychedelics-related New Hampshire bill was House Bill 1392, which sought to decriminalize all "nonviolent drug offenses and [to] eliminate[] the prohibitions and penalties for the possession, use, or sale of drug

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[103] *See* Robert A. Mikos, *The Evolving Federal Response to State Marijuana Reforms*, 26 WIDENER L. REV. 1, 10-13 (2020) (discussing softer federal response to state marijuana reform since 2008).

[104] H.R. 1349-FN, 2022 Sess. (N.H. 2022).

[105] Povl Krogsgaard-Larsen, Lotte Brehm & Kjeld Schaumburg, *Muscimol, a Psychoactive Constituent of* Amanita Muscaria*, as a Medicinal Chemical Model Structure*, 35B ACTA CHEMICA SCANDINAVICA 311, 311-12 (1981).

[106] N.H. H.R. 1349-FN § 3.

[107] *Id.* § 3.IV(a).

[108] *See* Mikos, *supra* note 103, at 10-14 (discussing federal response to state marijuana reform).

[109] *Id.*

paraphernalia."[110] The bill specified that where a person knowingly possesses cocaine, heroin, methamphetamine, LSD, or phencyclidine ("PCP") they would be penalized with a fine of forty dollars per gram.[111] Where a person knowingly possessed any other substance prohibited by New Hampshire's controlled substance laws, such as psilocybin, they would be penalized with a fine of twenty dollars per gram.[112] Violating House Bill 1392 would not have resulted in arrest or prosecution.[113] If New Hampshire had enacted HB 1392, people could have possessed microdoses of psilocybin, LSD, and other psychedelics without risking state or local criminal penalties.

Like Oregon's Measure 110 and New Hampshire's House Bills 1349 and 1392, California's Senate Bill 519 would have removed criminal penalties associated with possessing certain psychedelic substances.[114] However, the original draft of Senate Bill 519 went further: it would have removed *all* penalties associated with possessing certain psychedelics as well as penalties associated with cultivating and sharing them without compensation.[115] Consequently, for a certain range of criminalized activities, the original version would have been a form of full decriminalization, at least with respect to state law.

If California had maintained and enacted the original draft of Senate Bill 519, state and local law would have allowed people twenty-one years of age or older to cultivate, obtain, possess, share, or consume certain quantities of psychedelics.[116] The allowed substances would have included "psilocybin, psilocyn, dimethyltryptamine (DMT), ibogaine, mescaline, lysergic acid diethylamide (LSD), and 3,4-methylenedioxymethamphetamine (MDMA)."[117] Possession limits for psilocybin and LSD would have been "[t]wo grams of psilocybin or four ounces of a plant or fungi containing psilocybin" and one hundredth of a gram of LSD, which equals ten milligrams or 10,000 micrograms.[118]

Senate Bill 519 would not have allowed commercial distribution or sale of psychedelic substances.[119] However, though the bill would have created no regulatory framework for supported adult use of psychedelics, it would have allowed facilitators to charge "reasonable fees for counseling, spiritual guidance, or related services" provided in conjunction with supported adult use.[120]

[110] H.R. 1392-FN, 2022 Sess. (N.H. 2022).
[111] *Id.* § 2.
[112] *Id.*
[113] *See id.*
[114] S. 519, 2021-2022 Reg. Sess. (Cal. 2021).
[115] *See id.* at 12, 15-16, 18-19, 21.
[116] *Id.* at 18.
[117] *Id.*
[118] *Id.* at 20.
[119] *Id.* at 12.
[120] *Id.* at 2.

Additionally, Senate Bill 519 would have taken several other steps to broaden legal protection for those who consume psychedelics. For instance, it would have repealed California's prohibition on relevant drug paraphernalia.[121] The bill also makes clear that if federal law were "to permit physician[s], pharmacist[s], or other authorized healing arts licensee[s]" to "prescribe, furnish, or dispense" one of the listed psychedelic substances, such conduct would simultaneously become decriminalized under California state law.[122] Finally, Senate Bill 519 would have required the State Department of Public Health to convene a working group to conduct research and make recommendations to the legislature regarding "public education, public health, and harm reduction, and possible regulatory systems that California could adopt to promote safe and equitable access to" the decriminalized psychedelic substances, including for facilitated group use.[123]

Though Senate Bill 519 would have allowed Californians to possess, share, and consume psychedelic microdoses for personal use, its text did not explicitly mention microdosing. Consequently, if Senate Bill 519 had passed, it would have remained unclear whether microdosing would be considered by the state working group and included in its recommendations. Moreover, if in the future federal law allows healthcare providers to prescribe psychedelics, it is uncertain whether microdosing would be decriminalized under Senate Bill 519. These issues are discussed further in Part IV. Although the bill advanced from the California Senate to the State Assembly, it ultimately stalled in the Assembly Appropriations Committee in August 2021.[124] When this committee reconsidered the bill in 2022, it gutted the proposal, turning it into a policy analysis bill instead of a psychedelic decriminalization bill.[125] The bill's sponsor, California State Senator Scott Wiener, vowed to reintroduce it the following year.[126] In December 2022, he filed a revised version titled SB 58.[127]

Over a dozen other states have proposed legislation that decriminalizes or legalizes psychedelic use.[128] Yet Oregon and Colorado remain the only states to

[121] *Id.* at 20.

[122] *Id.* at 2, 10.

[123] *Id.* at 24.

[124] *The Future of the Psychedelic Decriminalization Bill in California, Its Potential Impact on Patient Care*, PHARMACY TIMES (Oct. 4, 2021), https://www.pharmacytimes.com/view/the-future-of-the-psychedelic-decriminalization-bill-in-california-its-potential-impact-on-patient-care [https://perma.cc/V4RV-SYZG].

[125] *See* Wiley, *supra* note 62.

[126] *Id.*

[127] *Senator Wiener Reintroduces Legislation To Decriminalize Psychedelics*, SCOTT WIENER REPRESENTING SENATE DISCT. 11, https://sd11.senate.ca.gov/news/20221219-senator-wiener-reintroduces-legislation-decriminalize-psychedelics [https://perma.cc/D2CK-6YNF] (last visited Feb. 10, 2023).

[128] *See* Michael Ollove, *More States May Legalize Psychedelic Mushrooms*, PEW (July 15, 2022), https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2022/07/15/more-states-may-legalize-psychedelic-mushrooms [https://perma.cc/2NRP-9DNG].

have enacted laws that create regulated psychedelic markets.[129] On January 4, 2022, two Washington senators prefiled Senate Bill 5660, which was modeled largely after Oregon's Measure 109.[130] Though the Washington bill does not mention microdosing, it contains several improvements that could make the practice more accessible compared to Measure 109.[131] However, following a hearing with the Senate Health and Long Term Care Committee, Senate Bill 5660 failed to advance for consideration by the full Senate.[132] Its sponsors subsequently proposed a state working group, housed within the Washington Health Care Authority, to research psilocybin services and make recommendations to improve Senate Bill 5660 prior to its reintroduction.[133] The bill's primary sponsor, Washington State Senator Jesse Salomon reintroduced the bill as SB 5263 in January 2023.

C. *Local Ordinances and Resolutions*

Though Oregon and Colorado are the only states to have decriminalized psychedelics, at least fifteen U.S. cities have decriminalized them or deprioritized the enforcement of related criminal penalties, including Denver, Colorado; Oakland, Berkeley, San Francisco, Santa Cruz, and Arcata City, California; Detroit and Ann Arbor, Michigan; Cambridge, Somerville, Northampton, and Easthampton, Massachusetts; Seattle and Port Townsend, Washington; and the District of Columbia.[134] The following Sections describe the policies implemented by two of the first cities to decriminalize and how those policies affect microdosing.

1. Denver Decriminalization Ordinance

On May 7, 2019, Denver voters passed a city ordinance by ballot initiative, which effectively decriminalized the personal possession and use of psilocybin mushrooms by prohibiting the city from spending resources to arrest or prosecute people for possession or use of psilocybin mushrooms.[135] Called the Denver Psilocybin Mushroom Decriminalization Initiative, the ordinance decriminalized psilocybin-producing mushrooms by prohibiting the city from

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[129] *Psychedelic Legalization & Decriminalization Tracker*, *supra* note 10.

[130] Marks, *Warning: Oregon Legalized Supported Adult Use of Psilocybin*, *supra* note 66.

[131] *Id.* (describing how Washington Senate Bill 5660 allows for home administration of psilocybin when clients are medically unable to travel to service center).

[132] Rich Smith, *Washington Bill To Legalize Psilocybin Mushroom Treatment Centers Won't Pass*, STRANGER (Feb. 2, 2022, 1:55 PM), https://www.thestranger.com/slog/2022/02/02/65940566/bill-to-regulate-psilocybin-mushrooms-in-washington-wont-pass [https://perma.cc/E2D8-7EYK].

[133] *Id.*

[134] *Psychedelic Legalization & Decriminalization Tracker*, *supra* note 10.

[135] Marks, *Varieties of Psychedelic Law*, *supra* note 13 (manuscript at 4); Nicole Chavez & Ryan Prior, *Denver Becomes the First City To Decriminalize Hallucinogenic Mushrooms*, CNN (May 9, 2019, 4:25 PM), https://www.cnn.com/2019/05/08/us/denver-magic-mushrooms-approved-trnd/index.html [https://perma.cc/US75-J9ZV].

spending resources to impose criminal penalties for this conduct and by making personal possession by individuals twenty-one years or older the city's "lowest law enforcement priority."[136] Denver is the only U.S. city to have passed an ordinance, which carries the force of law.[137] By comparison, all other cities that have decriminalized psychedelics have passed resolutions, which are mere statements of city policy that are more easily ignored or reversed than ordinances.[138]

The Denver ordinance includes "propagation"—that is, the production of a new plant or fungus[139]—in its definition of "personal possession."[140] However, it excludes "the sale of psilocybin mushrooms for remuneration" from the definition, specifying that such conduct remains subject to prosecution under existing state laws.[141] The provision does not include a cap on how much psilocybin an individual can possess before being subject to prosecution, though possession of large amounts could be interpreted by law enforcement and prosecutors as possession for a commercial purpose.[142] Thus, in Denver, people can possess microdoses of psilocybin without risking criminal or other penalties under state and local law. The city ordinance also suggests people do not risk arrest or prosecution for cultivating their own psilocybin mushrooms, sharing them, or giving them away without compensation.

2. Oakland Decriminalization Resolution

On June 4, 2019, the City of Oakland, California effectively decriminalized entheogenic plants, which includes mushrooms containing psychoactive substances, by City Council resolution.[143] Like Denver's ordinance, Oakland's resolution aims to decriminalize by defunding law enforcement activities related to the possession and use of the relevant substances by adults.[144] Also like Denver's ordinance, Oakland's resolution states that investigations and arrests

[136] DENVER, COLO., REV. ORDINANCES tit. 1, ch. 28, art. IX (2019).

[137] *See* 5 EUGENE MCQUILLIN, THE LAW OF MUNICIPAL CORPORATIONS § 15:2, at 122-25(3d ed. 2022) (discussing differences between ordinances and resolutions).

[138] *Id.*

[139] *Propagate*, MERRIAM-WEBSTER, https://www.merriam-webster.com/dictionary /propagating [https://perma.cc/P8B2-ENX6] (last visited Feb. 10, 2023).

[140] *See* DENVER, COLO., REV. ORDINANCESTit.1, ch. 28, art. IX, § 28-301.

[141] *Id.*

[142] *Id.*

[143] Merrit Kennedy, *Oakland City Council Effectively Decriminalizes Psychedelic Mushrooms*, NPR (June 5, 2019, 4:57 PM), https://www.npr.org/2019/06/05/730061916 /oakland-city-council-effectively-decriminalizes-psychedelic-mushrooms [https://perma.cc /8CNX-FGX5].

[144] Oakland City Council, Res. No. 87731 (June 4, 2019), https://oakland.legistar.com /View.ashx?M=F&ID=7321042&GUID=2661C980-0A36-45A2-A687-545A5F9C9D85 [https://perma.cc/2DPR-83QD] (barring City of Oakland from using funds "to assist in the enforcement of laws imposing criminal penalties for the use and possession of Entheogenic Plants by adults").

related to the possession of the relevant substances "shall be amongst the lowest law enforcement priority for the City of Oakland."[145] However, because it is a resolution instead of an ordinance, Oakland's resolution merely reflects City Council policy and does not carry the force of law. Though Oakland police and prosecutors may be unlikely to violate the policy, they technically could do so, and the city's resolution could be changed more easily than an ordinance.

Despite being a resolution, Oakland's measure goes further than Denver's by addressing a longer list of psychedelic substances and by stating that the investigation of and arrest for growing, buying, and distributing the listed substances is also among the city's lowest law enforcement priorities.[146] Thus, in Oakland, arguably a person could possess microdoses of psilocybin and other psychedelics without risking arrest or prosecution so long as local police and prosecutors abide by the resolution.[147]

D. *Foreign Jurisdictions*

Despite an international treaty that heavily restricts psychedelics,[148] legal prohibitions are softening around the world. Many foreign jurisdictions, including Canada, Portugal, Jamaica, and the Netherlands, have moved away from criminalizing psychedelics toward public-health-oriented approaches.[149]

The Canadian approach to psychedelics is most like that of the U.S. federal government. In Canada, the Controlled Drugs and Substances Act prohibits the production, sale, and possession of psychedelic substances.[150] MDMA and ketamine are listed on Canada's Schedule I, which carries the most severe criminal penalties.[151] The other psychedelics, including psilocybin and LSD, are listed on Schedule III.[152] Despite these restrictions, the Canadian Minister of Health has discretion to grant exemptions for scientific or other purposes in the

[145] *Id.*

[146] *Id.*

[147] Wayne A. Logan, *After the Cheering Stopped: Decriminalization and Legalism's Limits*, 24 CORNELL J.L. & PUB. POL'Y 319, 327-30 (2014) (discussing police evasion and disregard of cannabis decriminalization measures); *see also* Marisa Demarco, *State Police Ignore Decriminalization Law in Albuquerque*, KUNM (May 31, 2019, 5:42 PM), https://www.kunm.org/local-news/2019-05-31/state-police-ignore-decriminalization-law-in-albuquerque [https://perma.cc/2M7X-56KM] (explaining how state police began making arrests for cannabis possession in parts of Albuquerque after city decriminalized that conduct and Albuquerque police stopped making arrests for it).

[148] *See generally* Convention on Psychotropic Substances, Feb. 21, 1971, 1019 U.N.T.S. 175.

[149] *See Psilocybin Laws: A Country-by-Country Magic Mushrooms Legal Guide*, PSILOCYBIN, https://psilocybin.net/laws/ [https://perma.cc/9JKU-5L3R] (last visited Feb. 10, 2023).

[150] Hilary Ball, *What Is the Future of the "Psychedelic Renaissance" in Canada?*, MCGILL J. OF L. & HEALTH (Nov. 1, 2021), https://mjlh.mcgill.ca/2021/11/01/what-is-the-future-of-the-psychedelic-renaissance-in-canada/ [https://perma.cc/YM6Z-Z4ZY].

[151] *Id.*

[152] *Id.*

public interest, and the number of exemptions regarding psychedelics has been growing.[153] For example, the Minister of Health granted religious exemptions for ayahuasca import and administration, starting in 2017, and medical exemptions for palliative psilocybin therapy for people with life-threatening cancer diagnoses, starting in 2020.[154] Health Canada has said it will consider requests for medical exemptions for psychedelic-assisted therapy on a case-by-case basis for a "serious or life-threatening condition" when conventional treatments have failed, are not suitable for the patient, or are not available in Canada.[155] In addition, doctors in Canada, like those in the United States, can already prescribe and administer ketamine-assisted therapy off-label for a variety of mental health conditions, because the Canadian government has approved the medical use of ketamine as an anesthetic.[156] Consequently, private ketamine clinics are opening throughout Canada.[157] Finally, Vancouver and Toronto—two of Canada's largest cities—decriminalized the personal possession of controlled substances, including psychedelics.[158]

For now, the jurisdiction that best mirrors U.S. state and local efforts to decriminalize substances is Portugal, a pioneer of this approach. Faced with an intractable substance use and HIV crisis that impacted all segments of society, Portugal became the first country to partially decriminalize personal possession of all drugs in 2001.[159] The country also increased the social services, medical services, and treatment opportunities available to people who use substances.[160]

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[153] *Id.*

[154] *Id.*

[155] Fakiha Baig, *Canada Approving Psychedelics for Therapy Is a Positive Step, Experts Say*, GLOB. NEWS (Jan. 15, 2022, 9:10 PM), https://globalnews.ca/news/8514429/psychedelic-drugs-therapy-canada/ [https://perma.cc/F4PK-W2ZV].

[156] *See* Rani Sheen, *Would You Try a Ketamine-Enhanced Therapy Session?*, KIT (Oct. 30, 2020), https://thekit.ca/health/ketamine-therapy-canada/ [https://perma.cc/5XMY-5VPL]; Julian Uzielli, *Ketamine-Assisted Therapy Lifted Me out of Depression. But It Remains Costly—And Controversial*, CBC: RADIO (Sept. 5, 2021), https://www.cbc.ca/radio/docproject/ketamine-assisted-therapy-lifted-me-out-of-depression-but-it-remains-costly-and-controversial-1.6068333 [https://perma.cc/WQU9-42G4].

[157] *See* Sheen, *supra* note 156.

[158] *See* Rachel Browne, *Vancouver Just Voted To Decriminalize All Drugs*, VICE: WORLD NEWS (Nov. 25, 2020, 10:59 PM), https://www.vice.com/en/article/z3v4gw/vancouver-just-voted-to-decriminalize-all-drugs [https://perma.cc/H6SQ-4CJY]; Rachel Gilmore, *Is the 'War on Drugs' Over? Canada Is Seeing a 'Shift' in Its Approach to Drugs, Experts Say*, GLOB. NEWS (Dec. 8, 2021, 5:21 PM), https://globalnews.ca/news/8428115/drug-laws-canada-mandatory-minimums-war-on-drugs-over/ [https://perma.cc/79FM-WUGD]; Kirthana Sasitharan, *Toronto Board of Health Votes To Decriminalize Possession of Small Amounts of Illegal Drugs*, CBC: NEWS (Dec. 7, 2021, 5:00 AM), https://www.cbc.ca/news/canada/toronto/toronto-board-of-health-votes-yes-process-decriminalization-small-drug-posession-illegal-1.6275501 [https://perma.cc/R2KC-BRAZ].

[159] Bajekal, *supra* note 60.

[160] Austin Frakt, *Pointers from Portugal on Addiction and the Drug War*, N.Y. TIMES: THE UPSHOT (Oct. 6, 2020), https://www.nytimes.com/2020/10/05/upshot/portugal-drug-legalization-treatment.html.

Nevertheless, substance manufacture and sale remain criminal offenses.[161] In Portugal, possessing less than a ten-day supply of any substance results in a hearing before a local commission that includes a doctor, a lawyer, and a social worker. These professionals attempt to learn about the individual's relationship with substances and inform them of available medical services.[162] The panel can refer individuals to drug treatment programs, impose fines, or require community service.[163] Although psychedelics and people who use them were not among the primary concerns that prompted Portuguese drug policy reform, they benefit from this less punitive form of substance regulation.[164]

Other countries have taken more idiosyncratic approaches to psychedelics law and regulation. For example, unlike Portugal, Canada, the United States, and most countries around the world, Jamaica never outlawed psilocybin.[165] Accordingly, Jamaicans can legally grow, sell, and consume psilocybin mushrooms.[166] Western tourists frequently travel to Jamaica for legal psilocybin retreats.[167] Recently, Jamaica took steps to alter the substance's unregulated status—not by criminalizing it but by seeking to maximize the substance's potential through both government collaboration with industry and investors and promulgation of health and safety regulations.[168] In 2021, the Jamaican Minister of Agriculture and Fisheries announced that the government had put interim protocols in place to facilitate the cultivation and processing of psilocybin mushrooms.[169]

The Dutch approach to psychedelics law and regulation may be the most idiosyncratic. The Netherlands is famous for its "coffee shops," where locals and tourists have long been able to openly buy and consume cannabis.[170] The country is becoming increasingly famous for its "smartshops," which often sell

[161] Bajekal, *supra* note 60.

[162] *Id.*

[163] Frakt, *supra* note 160.

[164] *See* Linnae Ponté, *Decriminalization and Harm Reduction in Portugal: An Interview with Dr. João Goulão*, MULTIDISCIPLINARY ASS'N PSYCHEDELIC STUD., Spring 2015, at 18, 19.

[165] Nickieta Sterling, *Protocols in Place for 'Magic Mushrooms,'* JAM. INFO. SERV. (July 18, 2021), https://jis.gov.jm/protocols-in-place-for-magic-mushrooms/ [https://perma.cc/3XQE-9DZJ].

[166] *Id.*

[167] *Id.*

[168] *Id.*

[169] *Id.*

[170] *See* Holly Ellyatt, *Amsterdam's Coffeeshops, Already Hit by Covid, Fear a Clampdown on Tourists*, CNBC: EUR. ECON. (Sept. 9, 2021, 2:33 AM), https://www.cnbc.com/2021/09/09/amsterdams-coffeeshops-reel-from-low-tourist-numbers-this-summer.html [https://perma.cc/L4LZ-RJ79].

psilocybin "truffles."[171] However, despite being sold over the counter, cannabis and psilocybin truffles have distinct legal statuses in the Netherlands.

Although Dutch law enforcement tolerates the possession, consumption, and retail sale of cannabis, it and other "soft drugs" are technically illegal.[172] The Dutch "Opium Act"—the country's drug prohibition legislation—distinguishes between hard and soft drugs.[173] Hard drugs include heroin, cocaine, various synthetic psychedelics (such as LSD), and extracts of certain naturally occurring psychedelics, such as psilocybin, mescaline, and dimethyltryptamine ("DMT").[174] Soft drugs include not only cannabis but plants and fungi containing psychedelic substances, including psilocybin, 5-MeO-DMT, and ibogaine.[175] Despite technically prohibiting soft drugs, the Netherlands has long followed a policy of toleration where the government does not prosecute the possession of small quantities of cannabis (five or fewer grams) or its sale by coffee shops holding the relevant government license.[176] The Dutch government's website indicates that its policy of toleration extends to other soft drugs as well, including psychedelics, which locals and tourists can purchase online and in smart shops.[177]

Unlike soft drugs, psilocybin mushrooms—the fruiting bodies that break through the soil when fungi reproduce—have been prohibited since 2008.[178] However, sclerotia ("truffles"), which represent a dormant stage of the fungal life cycle, are available for purchase in smart shops.[179]

Truffles and the commerce surrounding them remain largely unregulated in the Netherlands.[180] The lack of regulation has led some psychedelic facilitators

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[171] *See Amsterdam Smartshops*, AMSTERDAM.INFO, https://www.amsterdam.info/smartshops/ [https://perma.cc/5TKN-8ZH5] (last visited Feb. 10, 2023).

[172] *See Difference Between Hard and Soft Drugs*, GOV'T OF THE NETH., https://www.government.nl/topics/drugs/difference-between-hard-and-soft-drugs [https://perma.cc/S6DD- 3Y7R] (last visited Feb. 10, 2023).

[173] *See id.*

[174] *See* Opiumwet van 12 mei 2021, Stb. 2021, https://wetten.overheid.nl/BWBR0001941/2021-10-28#BijlageII [https://perma.cc/LN8T-WFKD]; *Are Psychedelics Legal in the Netherlands?*, DRUG SCI. (Aug. 23, 2021), https://www.drugscience.org.uk/are-psychedelics-legal-in-the-netherlands/ [https://perma.cc/Q2T3-LLKR]; *Amsterdam Drugs Laws*, AMSTERDAM.INFO, https://www.amsterdam.info/drugs/ [https://perma.cc/LCX5-LKQU] (last visited Feb. 10, 2023).

[175] Opiumwet van 12 mei 2021, Stb. 2021; *Are Psychedelics Legal in the Netherlands?*, *supra* note 174.

[176] *See Difference Between Hard and Soft Drugs*, *supra* note 172 (stating this policy on government website); *Amsterdam Smartshops*, *supra* note 171 (noting coffee shop licensing requirement).

[177] *Difference Between Hard and Soft Drugs*, *supra* note 172.

[178] *See id.*; Alberto Cantizani López, *Truffle Therapy in the Netherlands Is Running Ahead of the Science*, OPEN FOUND. (May 7, 2021), https://open-foundation.org/truffle-therapy-in-the-netherlands-is-running-ahead-of-the-science/ [https://perma.cc/W48S-PNYC].

[179] *See* López, *supra* note 178; *Difference Between Hard and Soft Drugs*, *supra* note 172.

[180] López, *supra* note 178; *Difference Between Hard and Soft Drugs*, *supra* note 172.

to found a professional association called the "Guild of Guides" to develop ethical standards and promote best practices.[181] Among the few laws regulating Dutch commerce in psilocybin truffles is an effective ban on advertising them as medical treatments.[182] Once medical claims are made, the Dutch Health and Youth Care Inspectorate ("IGJ") may assert that truffles fall under the Dutch Medicines Act, which would subject them to extensive regulations.[183] The IGJ may impose fines for violations.[184] Despite this risk, truffle sellers and retreat companies are increasingly making medical claims.[185]

II. THE ART AND SCIENCE OF MICRODOSING

Part I analyzed local, state, and federal laws that pertain to microdosing. Part II further defines microdosing and explains why people engage in the practice.

A. *Microdosing Defined*

The modern trend of microdosing is relatively new,[186] and there has been little standardization of the practice.[187] Nevertheless, generalizations can be drawn from the growing literature on the topic. At its core, microdosing is the practice of consuming very small doses of psychedelic substances, usually on a schedule consisting of "on days," during which people consume a microdose, interspersed with "off days," during which they do not.[188]

In his influential writing on microdosing, James Fadiman refers to "sub-perceptual" doses in the range of one-tenth to one-twentieth of a standard dose.[189] The idea behind this term is that microdoses are below the "perceptual threshold," meaning that people who consume subperceptual doses do not

[181] López, *supra* note 178; *Difference Between Hard and Soft Drugs*, *supra* note 172; *Professional Association for Facilitators of Psychedelic Experiences*, GUILD OF GUIDES, https://www.guildofguides.nl [https://perma.cc/TG5G-Z7XJ] (last visited Feb. 10, 2023).

[182] López, *supra* note 178; *Difference Between Hard and Soft Drugs*, *supra* note 172.

[183] López, *supra* note 178; *Difference Between Hard and Soft Drugs*, *supra* note 172.

[184] *Monitoring the Quality and Safety of Medicines*, GOV'T OF THE NETH., https://www.government.nl/topics/medicines/monitoring-the-quality-and-safety-of-medicines [https://perma.cc/4AD7-EMSH] (last visited Feb. 10, 2023).

[185] *See* López, *supra* note 178; *Difference Between Hard and Soft Drugs*, *supra* note 172.

[186] *See infra* Section II.B (discussing history of microdosing).

[187] *See* Kim P.C. Kuypers, Livia Ng, David Erritzoe, Gitte M. Knudsen, Charles D. Nichols, David E. Nichols, Luca Pani, Anaïs Soula & David Nutt, *Microdosing Psychedelics: More Questions than Answers? An Overview and Suggestions for Future Research*, 33 J. PSYCHOPHARMACOLOGY 1039, 1039 (2019) ("[T]here is no agreed scientific consensus on what microdosing entails.").

[188] *See infra* notes 189-220 and accompanying text.

[189] JAMES FADIMAN, THE PSYCHEDELIC EXPLORER'S GUIDE: SAFE, THERAPEUTIC, AND SACRED JOURNEYS 198 (2011) [hereinafter FADIMAN, THE PSYCHEDELIC EXPLORER'S GUIDE]; *see also* Kuypers et al., *supra* note 187, at 1040 ("[Fadiman's book] is often referred to as a protocol for those practising microdosing.").

perceive any effect.[190] Several researchers, writers, and other commentators have adopted this description,[191] though Fadiman himself acknowledges that it could be something of a misnomer because one can "almost always" tell that one has taken a microdose."[192] Other authors have used the term "sub-threshold" dose, though it too appears to reference the perceptual threshold, at which people feel some kind of mental or physical effect.[193] Some refer to microdoses as "sub-hallucinogenic" rather than "sub-perceptual."[194] This term is also something of a misnomer because many psychedelic experiences do not involve hallucinations.[195] Semantic issues aside, though microdoses may be considered psychoactive—because they may alter one's neurochemistry and may facilitate behavioral change—they do not typically produce psychedelic effects such as changes in visual, auditory, spatial, or temporal perception.[196] Microdoses may have subtle physical effects—for instance, people have reported increased perspiration[197]—however, they do not typically impair one's ability to function normally at home or at work.[198]

[190] *See* Kuypers et al., *supra* note 187, at 1040 (defining microdosing psychedelics as "use of a low dose below the perceptual threshold that does *not impair* 'normal' functioning of an individual").

[191] *See, e.g.*, Nadia R.P.W. Hutten, Natasha L. Mason, Patrick C. Dolder & Kim P.C. Kuypers, *Motives and Side-Effects of Microdosing with Psychedelics Among Users*, 22 INT'L J. NEUROPSYCHOPHARMACOLOGY 426, 426 (2019) [hereinafter Hutten et al., *Motives and Side-Effects*]; Rifkin et al., *supra* note 17, at 316; Daniel Rosenbaum, Cory Weissman, Thomas Anderson, Rotem Petranker, Le-Anh Dinh-Williams, Katrina Hui & Emma Hapke, *Microdosing Psychedelics: Demographics, Practices, and Psychiatric Comorbidities*, 34 J. PSYCHOPHARMACOLOGY 612, 612 (2020).

[192] James Fadiman & Sophia Korb, *Might Microdosing Psychedelics Be Safe and Beneficial? An Initial Exploration*, 51 J. PSYCHOACTIVE DRUGS 118, 118 (2019).

[193] *See, e.g.*, Kuypers et al., *supra* note 187, at 1040.

[194] *See, e.g.*, Thomas Anderson, Rotem Petranker, Adam Christopher, Daniel Rosenbaum, Cory Weissman, Le-Anh Dinh-Williams, Katrina Hui & Emma Hapke, *Psychedelic Microdosing Benefits and Challenges: An Empirical Codebook*, HARM REDUCTION J., July 2019, at 1, 1; Cameron et al., *supra* note 17, at 114.

[195] *See* Katrin H. Preller & Franz X. Vollenweider, *Phenomenology, Structure, and Dynamic of Psychedelic States*, *in* 36 BEHAVIORAL NEUROBIOLOGY OF PSYCHEDELIC DRUGS 221, 223 (Adam L. Halberstadt, Franz X. Vollenweider & David E. Nichols eds., 2018) ("At the present time, the term *hallucinogen* is the most common designator in the scientific literature, although it is somewhat of a misnomer because true hallucinations rarely occur at low-to-medium doses.").

[196] *See* Fadiman & Korb, *supra* note 192, at 118 (stating Fadiman's intention in using term subperceptual "was to say that microdosing did not cause visual or perceptual changes usually associated with psychedelics" like visual distortions and internal visions); Petter Grahl Johnstad, *Powerful Substances in Tiny Amounts: An Interview Study of Psychedelic Microdosing*, 35 NORDIC STUD. ON ALCOHOL & DRUGS 39, 44 (2018) (distinguishing microdose from minidose); Kuypers et al., *supra* note 187, at 1040 (stating microdose "can be seen as being somewhat below a very low dose").

[197] Cameron et al., *supra* note 17, at 118.

[198] Rifkin et al., *supra* note 17, at 316.

Microdosing psychedelics also differs from standard dosing because rather than having a single psychedelic experience or a series of experiences separated by weeks or months, as is typical of standard dosing, people who microdose usually do so periodically—at predefined intervals—over the course of weeks or months.[199] For example, Fadiman popularized the "one-day-on, two-days-off" schedule in his 2011 book *The Psychedelic Explorer's Guide: Safe, Therapeutic, and Sacred Journeys*.[200] This dosing schedule appears to be one of the most common.[201] Another popular schedule involves alternating between on days and off days.[202] A third popular schedule is the "Stamets Stack," which refers to American mycologist Paul Stamets, who patented the protocol, and the process of "stacking" or combining nonpsychoactive substances with a psychedelic microdose to boost the effects.[203] The Stamets Stack involves consuming 100 to 200 milligrams of dried psilocybin mushrooms, 500 to 1000 milligrams of nonpsychedelic Lion's Mane mushroom extract powder, and 50 to 200 milligrams of niacin (vitamin B3) on four consecutive days followed by three off days. This pattern is repeated over four consecutive weeks followed by a two- to four-week "reset" period, during which the individual abstains from microdosing.[204] Despite the popularity of the Stamets Stack and other

[199] *See* Cameron et al., *supra* note 17, at 114 (defining microdosing as "practice of taking chronic, sub-hallucinogenic doses of psychedelic compounds on an intermittent schedule"); Kuypers et al., *supra* note 187, at 1040 (including "multiple dosing sessions" as definitional component of microdosing); Rifkin et al., *supra* note 17, at 316 (defining microdosing as "semiregular administration of small, subhallucinogenic doses of psychedelics to enhance performance during regular daily life"). *But see* Katrin H. Preller, Commentary, *The Effects of Low Doses of Lysergic Acid Diethylamide in Healthy Humans: Demystifying the Microdosing of Psychedelics*, 86 BIOLOGICAL PSYCHIATRY 736, 736 (2019) ("[M]any recreational microdosers seem to be taking a low dose a few times a year and do not follow a regular dosing schedule.").

[200] FADIMAN, THE PSYCHEDELIC EXPLORER'S GUIDE, *supra* note 189, at 199-202, 210-11 (describing and discussing case report of man who used that protocol); *see also* Rosenbaum et al., *supra* note 191, at 617 (stating popularity of this protocol may have its basis in Fadiman's 2011 book). Note that Fadiman now recommends a one-day-on, three-days-off schedule. James Fadiman, *Microdose Research: Without Approvals, Control Groups, Double-Blinds, Staff or Funding by Dr James Fadiman*, PSYCHEDELIC PRESS (Nov. 16, 2017) [hereinafter Fadiman, *Microdose Research*], https://psychedelicpress.co.uk/blogs/psychedelic-press-blog/microdose-research-james-fadiman. This schedule is also popular. Rosenbaum et al., *supra* note 191, at 616 (finding twenty percent of respondents who microdosed did so every fourth day, while thirty-six percent did so every third day).

[201] *See, e.g.*, Kuypers et al., *supra* note 187, at 1041 (finding, in search of microdosing protocols that included books, online fora, and surveys, that this was among three most common protocols); Rosenbaum et al., *supra* note 191, at 613, 617 (finding this result in anonymous online survey of 909 respondents recruited primarily from Reddit).

[202] *See* Kuypers et al., *supra* note 187, at 1041.

[203] *Stamets Stack (Stacking Lion's Mane and Psilocybin Mushrooms)*, MICRODOSING INST., https://microdosinginstitute.com/microdosing-101/substances/lions-mane-stacking/ [https://perma.cc/7XW9-SY64] (last visited Feb. 10, 2023).

[204] *Id.*

microdosing protocols, one recent survey found that approximately half of 1,116 respondents followed microdosing schedules of their own design.[205]

Most microdosing protocols share several common features. For example, they usually include off days, because people who microdose attempt to avoid developing a tolerance to the psychedelic they are consuming.[206] Tolerance refers to a person's diminished response to a substance after repeated ingestion.[207] When developing a tolerance to a substance, individuals must take higher doses to achieve the same effects.[208] Scientific research regarding standard doses of psilocybin and LSD suggest that people can develop tolerances to those substances, however, many relevant studies are decades old.[209] In addition, there are conflicting reports from people who microdose regarding whether the practice leads to tolerance.[210] Further research could shed additional light on this phenomenon.

Microdosing schedules share other common features. Regardless of the protocol, people typically integrate microdosing into their daily routines.[211]

[205] Hutten et al., *Motives and Side-Effects*, *supra* note 191, at 430.

[206] *See* Johnstad, *supra* note 196, at 44 ("[R]espondents typically dosed one to three times per week, although some reported dosing on a daily basis."); Rifkin et al., *supra* note 17, at 316 ("Generally, microdoses of psychedelics are recommended to be administered only 'semiregularly'—not on consecutive days—but approximately every third day, to prevent the development of tolerance.").

[207] Shalini S. Lynch, *Tolerance and Resistance to Drugs*, MERCK MANUAL (Sept. 2022), https://www.merckmanuals.com/home/drugs/factors-affecting-response-to-drugs/tolerance-and-resistance-to-drugs [https://perma.cc/U963-8ZZY].

[208] *Id.*

[209] *See* Rosenbaum et al., *supra* note 191, at 617 (first citing Harris Isbell, A.B. Wolbach, A. Wikler & E.J. Miner, *Cross Tolerance Between LSD and Psilocybin*, 2 PSYCHOPHARMACOLOGIA 147, 155-57 (1961); then citing Harris Isbell, R.E. Belleville, H.F. Fraser, Abraham Wikler & C.R. Logan, *Studies on Lysergic Acid Diethylamide (LSD-25)*, 76 A.M.A. ARCHIVES NEUROLOGY & PSYCHIATRY 468, 475-77 (1956); and then citing Louis S. Cholden, Albert Kurland & Charles Savage, *Clinical Reactions and Tolerance to LSD in Chronic Schizophrenia*, 122 J. NERVOUS & MENTAL DISEASE 211, 211 (1955)); *see also* T. Buchborn, G. Grecksch, D.C. Dieterich & V. Höllt, *Tolerance to Lysergic Acid Diethylamide: Overview, Correlates, and Clinical Implications*, *in* 2 NEUROPATHOLOGY OF DRUG ADDICTIONS AND SUBSTANCE MISUSE 846, 846 (2016) ("Tolerance to LSD was first described systematically in the mid-1950s . . . yet, . . . there are hitherto virtually no reviews specifically dedicated to this topic.").

[210] *See* Hutten et al., *Motives and Side-Effects*, *supra* note 191, at 427 (stating people who microdose have reported "tolerance to the desired effects after daily use"); Johnstad, *supra* note 196, at 44 ("There were conflicting reports on tolerance build up from daily microdosing and about the impact of microdose tolerance on full doses. Some frequent microdose users experienced a build up of tolerance, while others found no such effect . . . .").

[211] *See* Johnstad, *supra* note 196, at 45 ("Besides the effects on health issues, respondents commonly reported what they regarded as a positive influence from microdosing on energy, mood, and cognition. This allowed them to function better in everyday life even when they had no specific health issues."); Rosenbaum et al., *supra* note 191, at 620 ("Psychedelic microdosing, on the other hand, appears more akin to conventional pharmacotherapy: regular

Many even engage in the practice to improve occupational or academic performance.[212] Notably, people who microdose often report experiencing benefits during off days and for extended periods after completing a microdosing cycle.[213] Fadiman and coauthor Sophia Korb write that people often report noticing sustained mood enhancement after about two weeks of microdosing.[214]

Despite these common practices and experiences, there appears to be little uniformity in the duration of a microdosing cycle.[215] Though cycles are often limited to weeks or months, survey participants have reported following protocols ranging from one week to two years.[216] Fadiman and Korb suggest that after an initial month of microdosing on an intermittent schedule, individuals should decide whether they prefer microdosing once a week or once a month thereafter.[217] Others claim that microdosing cycles tend to be counted in weeks or months rather than years.[218]

Survey data indicates that the most common psychedelic substances for microdosing are psilocybin and LSD.[219] However, some have reported using

consumption of a substance for some intended benefit(s) without significant or disruptive life-interfering acute effects.").

[212] *See* Fadiman & Korb, *supra* note 192, at 120 (stating people who have positive experiences microdosing tend to report "hav[ing] an easier time getting their work done on time and leaving the office in a timely way"); Hutten et al., *Motives and Side-Effects*, *supra* note 191, at 430 ("One-half of the microdosers (47.6%) indicated to have microdosed while working, of which studying and computer/office work were the most prevalent daily occupations."); Megan Webb, Heith Copes & Peter S. Hendricks, *Narrative Identity, Rationality, and Microdosing Classic Psychedelics*, 70 INT'L J. DRUG POL'Y 33, 34 (2019) (finding, in "semi-structured interviews with 30 people who had microdosed," that many did so as "means to become better people and workers").

[213] *See* Webb et al., *supra* note 212, at 37 ("It was common for participants to talk about the long-term mood enhancement of microdosing. While the effects were not immediate and dramatic, they all discussed the presence of a subtle, but positive, enhancement in their mood over time.").

[214] Fadiman & Korb, *supra* note 192, at 120.

[215] *See* Kuypers et al., *supra* note 187, at 1041.

[216] *See Id.* at 1041 (finding, in review of various microdosing protocols, that "[d]osing periods ranged from 1 week to 2 years").

[217] Fadiman & Korb, *supra* note 192, at 120.

[218] *See* Toby Lea, Nicole Amada, Henrik Jungaberle, Henrike Schecke & Michael Klein, *Microdosing Psychedelics: Motivations, Subjective Effects and Harm Reduction*, 75 INT'L J. DRUG POL'Y 1, 3 (2020) ("Most participants had been microdosing for 6 months or less (65.0%)."); *see also* Johnstad, *supra* note 196, at 44 ("For experienced microdosers, the practice was usually regarded as a cyclic activity, with microdosing periods lasting from a few weeks to a few months.").

[219] *See* Anderson et al., *supra* note 194, at 3; Hutten et al., *Motives and Side-Effects*, *supra* note 191, at 430; Kuypers et al., *supra* note 187, at 1039; *see also* Fadiman, *Microdose Research*, *supra* note 200 ("Most people microdose with LSD or psilocybin mushrooms.").

other psychedelics, including DMT and mescaline,[220] as well as other psychoactive substances, such as cannabis.[221] Microdosing is also a process used to assess pharmacokinetics—how drugs are absorbed, broken down, and eliminated by the body—during drug development.[222] Regulatory guidelines in the United States and Europe allow human studies using microdoses—defined as one hundredth of the expected pharmacological dose—very early in the drug development process.[223] In this Article, we refer to doses administered in this range and context as "microdosing trials." Such low doses are unlikely to cause major side effects, which allows them to be administered to humans before conducting expensive preclinical toxicology studies using animals.[224] Consequently, before investing in costly animal studies, drug companies can use microdosing trials to screen out drugs that show suboptimal human pharmacokinetics.[225] Because microdosing trials occur before Phase 1 trials, some refer to them as "Phase 0" studies.[226]

During routine medical care, some healthcare providers implement a variation on microdosing called off-label low-dose prescribing.[227] For instance, at doses of approximately fifty milligrams, a drug called naltrexone can be used to treat alcohol dependence.[228] It can also be injected monthly as a treatment for opioid

[220] *See* Hutten et al., *Motives and Side-Effects*, *supra* note 191, at 430 tbl.3 (enumerating other substances that survey respondents had used, such as 5-MeO-DMT, ayahuasca, DMT, MDMA, mescaline, etc.).

[221] *See* Sara Davidson, *Why Microdosing Is Taking over Medical Marijuana*, ROLLING STONE (Apr. 20, 2017), https://www.rollingstone.com/culture/culture-features/why-microdosing-is-taking-over-medical-marijuana-114462/.

[222] Kuypers et al., *supra* note 187, at 1040. Pharmacokinetics is the branch of pharmacology concerned with how the body interacts with a drug, including the drug's movement into, through, and out of the body. Jennifer Le, *Overview of Pharmacokinetics*, MERCK MANUAL (Sept. 2022), https://www.merckmanuals.com/professional/clinical-pharmacology/pharmacokinetics/overview-of-pharmacokinetics [https://perma.cc/XHL8-SAL4].

[223] Tushar Tewari & Shoibal Mukherjee, *Microdosing: Concept, Application and Relevance*, 1 PERSPS. CLINICAL RSCH. 61, 61 (2010).

[224] *Id.*

[225] *Id.*

[226] *Id.*

[227] *What You Need To Know About Low Dose Naltrexone*, WEILL CORNELL MED. (Sept. 2, 2020), https://weillcornell.org/news/what-you-need-to-know-about-low-dose-naltrexone [https://perma.cc/6YBU-BFXQ].

[228] Alex Smith, *In Tiny Doses, an Addiction Medication Moonlights as a Treatment for Chronic Pain*, NPR (Sept. 23, 2019, 4:02 PM), https://www.npr.org/sections/health-shots/2019/09/23/741783834/in-tiny-doses-an-addiction-medication-moonlights-as-a-treatment-for-chronic-pain [https://perma.cc/CD6S-P3GL]. In this context, doctors frequently prescribe a fifty-milligram dose once daily, though they will sometimes prescribe a higher dose (100-150 mg) to be taken every two to three days under a healthcare professional's supervision. *Naltrexone HCL—Uses, Side Effects, and More*, WEBMD, https://www.webmd.com/drugs/2/drug-7399/naltrexone-oral/details [https://perma.cc/C9FM-7B3C] (last visited Feb. 10, 2023).

dependence.[229] However, doctors also prescribe low-dose naltrexone to treat persistent pain, which is an off-label use because naltrexone is not FDA approved for that purpose.[230] In this context, naltrexone is administered in a microdose that is less than one tenth the size of doses administered for treating alcohol dependence.[231] Similarly, providers sometimes prescribe microdoses of the antipsychotic medication quetiapine and the antidepressant mirtazapine as off-label treatments for insomnia.[232]

The use of microdoses in drug development and off-label prescribing illustrates how microdosing is not a monolithic practice. Doses of varying sizes administered in different contexts can be considered microdoses. In the psychedelic context, microdoses should not exceed the threshold beyond which individuals experience psychedelic effects, such as noticeable perceptual changes or significant physical effects. For this reason, one should think of microdoses as a narrow range of doses at the end of a continuum. Psychedelic microdoses usually constitute about one twentieth to one tenth of a standard dose,[233] or five to ten times the doses used in microdosing trials.[234]

Beyond this approximate range, doses begin to produce psychedelic effects, and should not be considered microdoses. For example, people with cluster headaches, a severe pain-related condition, report that doses of up to one gram of dried psilocybin mushrooms—about half of a standard dose—are most

[229] *See* Smith, *supra* note 228; *What You Need To Know About Low Dose Naltrexone*, *supra* note 227; *Naltrexone HCL—Uses, Side Effects, and More*, *supra* note 228.

[230] Smith, *supra* note 228. In this context, doctors prescribe the small doses to be taken once daily. John Knab & Jaklyn Drew McCauley, *The Use of Low Dose Naltrexone in the Management of Chronic Pain*, PRAC. PAIN MGMT. (May 29, 2020), https://www.practicalpainmanagement.com/treatments/pharmacological/non-opioids/use-low-dose-naltrexone-management-chronic-pain [https://perma.cc/9X9Y-VPSK].

[231] *See What You Need To Know About Low Dose Naltrexone*, *supra* note 227 (explaining that, for chronic pain, some patients report relief at doses below five milligrams, and doctors might prescribe doses ranging from 0.01 milligrams to eight milligrams); *see also* Smith, *supra* note 228 (stating low doses of Naltrexone help patients with complex chronic pain).

[232] Jeanine Kamphuis, Katja Taxis, Catharina C.M. Schuiling-Veninga, Richard Bruggeman & Marike Lancel, *Off-Label Prescriptions of Low-Dose Quetiapine and Mirtazapine for Insomnia in the Netherlands*, 35 J. CLINICAL PSYCHOPHARMACOLOGY 468, 468 (2015).

[233] *See* Rifkin et al., *supra* note 17, at 316. Note that, in pharmacology, a microdose is defined as "a dose of drug that is 1% of the pharmacologically active dose, up to a maximum of 100 μg." Kuypers et al., *supra* note 187, at 1040. Note also that several sources approximate that a microdose of psychedelics is one-tenth of a standard dose, rather than providing the one-tenth-to-one-twentieth range. Hutten et al., *Motives and Side-Effects*, *supra* note 191, at 426; Johnstad, *supra* note 196, at 44; Rosenbaum et al., *supra* note 191, at 612.

[234] *See* Lea et al., *supra* note 218, at 3 ("Among participants who were microdosing with LSD/1P-LSD . . . the mean microdose was 13 micrograms . . . ."); *see also* Anya K. Bershad, Scott T. Schepers, Michael P. Bremmer, Royce Lee & Harriet de Wit, *Acute Subjective and Behavioral Effects of Microdoses of Lysergic Acid Diethylamide in Healthy Human Volunteers*, 86 BIOLOGICAL PSYCHIATRY 792, 792-97 (2019) (using LSD doses up to twenty-six micrograms as "microdoses" in placebo-controlled study on microdosing).

effective at alleviating their symptoms.[235] Doses of this size are more accurately called "small" or "minidoses," rather than microdoses. In most psychedelic clinical trials, participants consume standard doses.[236] For instance, in psilocybin studies, a standard dose may be within the range of twenty to forty milligrams.[237]

Outside the lab and clinical context, people often consume psilocybin, whether microdoses, standard doses, or otherwise, using fresh or dried mushrooms or other fungal material. Psilocybin-producing fungi can be cultivated as mushrooms, which are the reproductive structures of the organisms, and they can also be cultivated as sclerotia, which are small, dense root-like structures that constitute the dormant phase of the fungi.[238] The psilocybin content of naturally occurring fungi varies widely,[239] which makes it difficult to standardize the dose of psilocybin consumed. Because psilocybin content can vary significantly from batch to batch, or even mushroom to mushroom, it is difficult to maintain a consistent dose throughout a microdosing cycle. These variables become important when contemplating regulation because the availability of isolated psilocybin, which can be more accurately and consistently dosed, may allow for safer and more effective microdosing.

Regardless, because all doses of psychedelic substances can be said to sit along a continuum, and different circumstances call for different doses and dosing schedules, understanding the distinctions between various doses and schedules is essential for crafting effective legislation, which will be discussed further in Part IV.

B. *History of Microdosing*

Although the modern trend of microdosing is relatively new, the practice itself is not. This history includes Indigenous microdosing and experimentation with microdoses by Swiss chemist Albert Hofmann, the scientist credited with first synthesizing LSD and extracting natural psilocybin from fungi.[240] However, like

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[235] *Busting Protocol—The Dosing Method*, CLUSTERBUSTERS, https://clusterbusters.org/resource/the-dosing-method/ [https://perma.cc/GYC2-BCKQ] (last visited Feb. 10, 2023).

[236] *See, e.g.*, sources cited *supra* note 209.

[237] Nicholas Levich, *Psychedelic Dosage Guide: How Much of Each Substance To Take*, PSYCHEDELIC PASSAGE (July 20, 2020), https://www.psychedelicpassage.com/psychedelic-dosage-guide-how-much-of-each-substance-to-take/ [https://perma.cc/E2ES-8QQS].

[238] ABBAS ET AL., *supra* note 90, at 13.

[239] Theresa M. Carbonaro, Matthew P. Bradstreet, Frederick S. Barrett, Katherine A. MacLean, Robert Jesse, Matthew W. Johnson & Roland R. Griffiths, *Survey Study of Challenging Experiences After Ingesting Psilocybin Mushrooms: Acute and Enduring Positive and Negative Consequences*, 30 J. PSYCHOPHARMACOLOGY 1268, 1277 (2016) (describing wide variation in psilocybin content with and across species of fungi).

[240] Stephie Grob Plante, *LSD Microdoses Make People Feel Sharper, and Scientists Want To Know How*, VERGE (Apr. 24, 2017, 8:00 AM), https://www.theverge.com/2017/4/24/15403644/microdosing-lsd-acid-productivity-benefits-brain-studies [https://perma.cc/D5PN-PJYX].

the science of microdosing, the history of microdosing is poorly understood when compared to the history of standard psychedelic dosing.

Some sources trace the history of microdosing to Franciscan friar Bernardino de Sahagún's *Historia General de las Cosas de la Nueva España*, a sixteenth-century source that documents the Aztec consumption of psilocybin mushrooms, which they called "teonanacatl."[241] Documenting life among the Aztecs for a Spanish audience during Spain's conquest of the Americas, Sahagún reports that one use of teonanacatl was the treatment for fevers and rheumatism, which required only two or three mushrooms.[242] This dosage may be classified as smaller than a standard dose because modern descendants of the Aztecs—such as members of the Mazatec Tribe—reportedly consume six to twelve mushrooms as a standard dose.[243] However, Sahagún reports that consumption of two or three mushrooms produced visions and a faintness of the heart.[244] This suggests that the doses Sahagún describes most likely constituted standard doses.[245]

Other sources note that, although there is evidence of Indigenous microdosing, the earliest occurrence of the practice is unknown.[246] Existing evidence of Indigenous microdosing appears to include reports that the Mazatec have used psilocybin microdosing to "support the healing of physical conditions and emotional states such as sadness, anger, envy, isolation and agitation."[247] There is also evidence of microdosing among practitioners of the Bwiti religion in Gabon, West Central Africa.[248] Adherents consume ibogaine, a psychedelic produced by the Iboga shrub, in both large ceremonial doses and in microdoses.[249]

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[241] Kuypers et al., *supra* note 187, at 1039; Richard Evans Schultes, *Teonanacatl: The Narcotic Mushroom of the Aztecs*, 42 AM. ANTHROPOLOGIST 429, 429 (1940) (providing historical records to describe Aztec uses of psychedelic substances).

[242] Kuypers et al., *supra* note 187, at 1039.

[243] Schultes, *supra* note 241, at 435-36.

[244] Kuypers et al., *supra* note 187, at 1039.

[245] *Id.*

[246] Vince Polito & Richard J. Stevenson, *A Systematic Study of Microdosing Psychedelics*, PLOS ONE, Feb. 2019, at 1, 2 (stating Indigenous groups have used psychedelic substances at "lower doses as an aphrodisiac, to reduce hunger, inspire courage, nullify pain, and to treat ailments such as gout and syphilis"); *see also* Fadiman & Korb, *supra* note 192, at 118 ("Even though it is likely that Indigenous people have used microdoses historically and currently, such evidence rarely appears in the anthropological literature.").

[247] Joseph M. Rootman, Pamela Kryskow, Kalin Harvey, Paul Stamets, Eesmyal Santos-Brault, Kim P.C. Kuypers, Vince Polito, Francoise Bourzat & Zach Walsh, *Adults Who Microdose Psychedelics Report Health Related Motivations and Lower Levels of Anxiety and Depression Compared to Non-microdosers*, SCI. REPS., Nov. 2021, at 1, 1.

[248] Michael Winkelman, *Psychedelics as Medicines for Substance Abuse Rehabilitation: Evaluating Treatments with LSD, Peyote, Ibogaine and Ayahuasca*, 7 CURRENT DRUG ABUSE REVS. 101, 105 (2014).

[249] *Id.* (noting practice of iboga consumption in West Central Africa to enhance hunting skills).

Microdosing is not a new practice in Western society, either. For example, years after Hofmann synthesized LSD, he accidentally consumed a dose and famously experienced its effects while riding a bicycle. He then began experimenting with low doses of the substance.[250] Hofmann also expressed regret that his employer, Sandoz, had declined his suggestion to look more closely at the effects of very low doses of LSD.[251]

Despite this history, microdosing, as practiced today, is a relatively new trend that traces its roots to James Fadiman's 2011 book, which contains several case reports from people who report having microdosed.[252] The practice was also popularized by Ayelet Waldman in her autobiographical book, *A Really Good Day: How Microdosing Made a Mega Difference in My Mood*, *My Marriage, and My Life*.[253] Though people have likely microdosed for centuries in Mexico and elsewhere throughout the world, Fadiman and Waldman brought this mode of psychedelics consumption to a larger audience, garnering the media attention that has perpetuated the trend, and ultimately triggering an explosion of scientific research into microdosing since 2018.[254] This scientific research and increased public interest in microdosing has prompted discussion by legislators and regulators.[255]

In many cases, media coverage of microdosing has focused on Silicon Valley.[256] Since 2011, dozens of articles have discussed how technology professionals have been experimenting with microdosing to gain an edge in their competitive professional environment.[257] These articles have focused on the use

[250] Calderon, *supra* note 20; Plante, *supra* note 240.

[251] Fadiman & Korb, *supra* note 192, at 118-19.

[252] *See* FADIMAN, THE PSYCHEDELIC EXPLORER'S GUIDE, *supra* note 189, at 199-210 (publishing these case reports).

[253] *See generally* AYELET WALDMAN, A REALLY GOOD DAY: HOW MICRODOSING MADE A MEGA DIFFERENCE IN MY MOOD, MY MARRIAGE, AND MY LIFE (2017).

[254] *See* Rosenbaum et al., *supra* note 191, at 617 (discussing influence of Fadiman's 2011 book); *see also* Martin Andersson & Anette Kjellgren, *Twenty Percent Better with 20 Micrograms? A Qualitative Study of Psychedelic Microdosing Self-Rapports and Discussions on YouTube*, HARM REDUCTION J., Nov. 2019, at 1, 1 ("The origins of psychedelic microdosing are often attributed to James Fadiman and his 2011 book '*The psychedelics explorer guide*.'"); Kuypers et al., *supra* note 187, at 1040; *infra* notes 293-94 and accompanying text (identifying explosion in research since 2018).

[255] *See infra* Section III.B (citing discussions regarding microdosing by Oregon Board).

[256] *See, e.g.*, Emma Hogan, *Turn on, Tune in, Drop by the Office*, ECONOMIST (Aug. 1, 2017), https://www.economist.com/1843/2017/08/01/turn-on-tune-in-drop-by-the-office; Dominique Mosbergen, *Microdosing LSD Is a Growing Silicon Valley Trend. But Does It Actually Work?*, HUFFPOST (Sept. 3, 2018, 9:11 AM), https://www.huffpost.com/entry/microdosing-lsd-placebo-study_n_5b8d1e48e4b0511db3daaaff [https://perma.cc/Y9ZY-QEU6].

[257] *See, e.g.*, Andrew Leonard, *How LSD Microdosing Became the Hot New Business Trip*, ROLLING STONE (Nov. 20, 2015), https://www.rollingstone.com/culture/culture-news/how-lsd-microdosing-became-the-hot-new-business-trip-64961/; Olivia Solon, *Under Pressure, Silicon Valley Workers Turn to LSD Microdosing*, WIRED (Aug. 24, 2016, 8:28 AM),

of microdosing as a "productivity hack"[258] that helps tech workers improve their focus, energy, and creativity,[259] as well as boost mood,[260] and perhaps "stay young and relevant."[261]

Despite the media's focus on Silicon Valley,[262] however, the microdosing trend is not limited to the West Coast, the tech sector, or even the relatively educated or wealthy. At least one survey has found that tech professionals are not overrepresented in the populations that microdose, and on average, people who microdose tend to be less educated and less wealthy.[263] Media reports acknowledge this observation, at least implicitly, by often using "Silicon Valley" or "productivity hack" in headlines before describing how the practice of microdosing has spread to many other locales and contexts, including self-treatment for symptoms of depression, anxiety, pain, and addiction.[264]

With a large and growing market for microdosing products, several businesses have entered the field. Red Light Holland and Earth Resonance have leveraged the legality of psilocybin "truffles" in the Netherlands to sell microdosing kits containing consistent doses of truffles appropriate for microdosing.[265] In the Netherlands, Red Light Holland also offers expert

https://www.wired.co.uk/article/lsd-microdosing-drugs-silicon-valley [https://perma.cc/WD34-TVHX].

[258] *See, e.g.*, Chris Gayomali, *Forget Coffee, Silicon Valley's New Productivity Hack Is 'Microdoses' of LSD*, GQ (Nov. 23, 2015), https://www.gq.com/story/forget-coffee-silicon-valleys-new-productivity-hack-is-microdoses-of-lsd [https://perma.cc/248Z-QE73]; Hayden Vernon, *Silicon Valley's Extreme New Productivity Hack: LSD*, GQ (Nov. 16, 2019), https://www.gq-magazine.co.uk/lifestyle/article/microdosing-lsd [https://perma.cc/KS55-WTUC].

[259] *See* Vernon, *supra* note 258; *see also* Barbara Sahakian, Camilla D'Angelo & George Savulich, *Is Silicon Valley onto Something with Its LSD Microdosing?*, NEWSWEEK (Feb. 15, 2017, 7:55 AM), https://www.newsweek.com/lsd-creativity-silicon-valley-brain-activity-557055 [https://perma.cc/2ZL2-LXVN]; Solon, *supra* note 257.

[260] *See* Vernon, *supra* note 258.

[261] *See, e.g.*, Jack Kelly, *Silicon Valley Is Micro-Dosing 'Magic Mushrooms' To Boost Their Careers*, FORBES (Jan. 17, 2020, 11:11 AM), https://www.forbes.com/sites/jackkelly/2020/01/17/silicon-valley-is-micro-dosing-magic-mushrooms-to-boost-their-careers/?sh=30ba8895822a.

[262] *See* Webb et al., *supra* note 212, at 37 ("While there is no large-scale epidemiological study to show patterns of microdosing, media reports suggest that the practice is primarily found among White, middle- and upper-class professionals, especially in technology industries.").

[263] *See* Cameron et al., *supra* note 17, at 116 (finding individuals who reported microdosing tended to have less education and earn less than $50,000 per year).

[264] *See, e.g.*, Sahakian et al., *supra* note 259; Solon, *supra* note 257; Vernon, *supra* note 258.

[265] *See* Tim Smith, *The Startups That Microdose Magic Mushrooms*, SIFTED (Mar. 26, 2021), https://sifted.eu/articles/startups-microdosing/ [https://perma.cc/7M6K-7QCN]; *Products*, RED LIGHT HOLLAND, https://redlight.co/products/ [https://perma.cc/9Z68-BFTH] (last visited Feb. 10, 2023).

consultations in English or Dutch regarding microdosing.[266] In the United States, businesses have begun selling mock microdosing products in order to capitalize on the microdosing trend without violating local, state, and federal laws prohibiting psychedelic substances.[267] These companies include Psychedelic Water, which sells a beverage containing a mixture of herbal substances including damiana leaf, kava root, and green tea extract, which the company claims can produce feelings of calmness and euphoria.[268] Another example is Gwella, which sells gummy products intended to stimulate the effects of microdosing and optimize performance.[269] They contain mushrooms and botanicals that are legal to produce and sell, such as cordyceps, a species of fungus with medicinal uses in China and Tibet.[270]

In Canada, a company called Microdelics skirts the country's national prohibition by selling microdosing kits containing 1P-LSD, a derivative and functional analogue of LSD that occupies a legal gray area.[271] Medicinal Mushroom Dispensary, another Canadian company, sells microdoses of psilocybin online and plans to open a retail location in Vancouver, despite prohibition, on the expectation that Canadian law enforcement will use its resources elsewhere.[272] Other Canadian and American businesses are exploring the medical applications of microdosing in the hopes that they can legally offer those products in the future.[273]

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[266] *Products*, *supra* note 265.

[267] *See infra* notes 268-70 and accompanying text.

[268] Alisha Mughal, *Makers of the First Legal Psychedelic Beverage To Launch Microdosing Product in 2022*, SOME GOOD CLEAN FUN (Oct. 28, 2021), https://www.somegoodcleanfun.com/blog/makers-of-the-first-legal-psychedelic-beverage-to-launch-microdosing-product-in-2022nbsp [https://perma.cc/256V-BAU6].

[269] *Gwella Introduces Mojo: The World's First Legal Microdose Product*, GLOBENEWSWIRE (May 27, 2021, 8:00 AM), https://www.globenewswire.com/news-release/2021/05/27/2237360/0/en/Gwella-Introduces-Mojo-The-World-s-First-Legal-Microdose-Product.html [https://perma.cc/T7GB-L3RR].

[270] *Id.*

[271] Danielle Simone Brand, *You Can Now Buy a Microdosing Kit Online*, DOUBLEBLIND (May 20, 2021), https://doubleblindmag.com/lsd-microdosing-kit/ [https://perma.cc/LN5W-YXTS].

[272] Elianna Lev, *Could Magic Mushrooms Be the Next Drug Legalized in Canada?*, YAHOO! NEWS (July 26, 2019), https://finance.yahoo.com/news/could-magic-mushrooms-be-the-next-drug-canada-legalizes-171728039.html [https://perma.cc/C3SH-A5JY].

[273] Press Release, MindMed, MindMed Expands Psychedelic Microdosing Division, Adds Groundbreaking Study Evaluating LSD Microdosing Through Next-Gen Digital Clinical Markers (Jan. 12, 2021), https://mindmed.co/news/press-release/mindmed-expands-psychedelic-microdosing-division-adds-groundbreaking-study-evaluating-lsd-microdosing-through-next-gen-digital-clinical-markers/ [https://perma.cc/R4CJ-M2Y6]; Natan Ponieman, *This Canadian Company Is Launching a Psilocybin Microdosing Study*, BENZINGA (Aug. 18, 2021, 3:17 PM), https://www.benzinga.com/markets/cannabis/21/08/22563207/this-canadian-company-is-launching-a-psilocybin-microdosing-study [https://perma.cc/42WA-5K8D] ("Diamond Therapeutics Inc., a biotech company in the psychedelics sector has

C. *Why People Microdose*

Survey data indicate that people microdose for many reasons. The potential benefits of microdosing include improving cognitive function (e.g., focus, productivity, or problem-solving ability), promoting creativity, and enhancing mental and physical well-being.[274] Because many people microdose to improve focus, energy, or creativity,[275] the practice is often framed as a means of increasing occupational or academic performance.[276] Others report microdosing as a means of enhancing their mood.[277] In this context, the most frequently sought benefits are the alleviation of symptoms of depression or anxiety.[278] People also report microdosing to mitigate pain, especially symptoms related to cluster headaches, and migraines.[279] Finally, people have reported microdosing to address various substance use conditions.[280] Relatedly, Fadiman and Korb write that a substantial number of participants report substituting microdoses for the stimulants regularly prescribed for attention deficit and hyperactivity disorder ("ADHD") such as Ritalin or Adderall.[281] During the COVID-19

received authorization from Health Canada to launch a clinical trial to study the effects of low doses of psilocybin in healthy volunteers.").

[274] *See* Kuypers et al., *supra* note 187, at 1050; *see also* Webb et al., *supra* note 212, at 33 ("The purpose of microdosing is not to achieve unitive experience or ego dissolution from these substances; rather, people microdose classic psychedelics for a range of salubrious outcomes, including improving mood, heightening creativity, and reducing anxiety.").

[275] *See* Hutten et al., *Motives and Side-Effects*, *supra* note 191, at 427 ("The most frequently reported motives and effects of microdosing are stimulating productivity, for example, increasing focus, energy levels, and creativity and inducing positive mood."); Kuypers et al., *supra* note 187, at 1040 ("[M]icrodosing became prominent due to the belief it improved cognition . . . ."). *But see* Lea et al., *supra* note 218, at 6 ("The most common motivation for microdosing was an alternative treatment for mental health (40%), either as a replacement or adjunct to conventional treatments, followed by personal development and general wellbeing (31%), and enhancement of cognitive function (18%).").

[276] *See* sources cited *supra* notes 256-64 (discussing practice of microdosing while at work).

[277] *See* Hutten et al., *Motives and Side-Effects*, *supra* note 191, at 430 (finding following intended uses in survey of 1,116 respondents: "performance enhancement (37%), mood enhancement (29%), out of curiosity (15%), and for self-medication (14%)").

[278] *See id.* at 427 ("Another commonly reported motivation and subsequent outcome is the alleviation of psychological symptoms including depressive mood and anxiety and/or physiological symptoms such as pain."); Preller, *supra* note 199, at 736 ("Anecdotal reports describe the use of small doses of LSD to alleviate symptoms of anxiety and depression . . . .").

[279] Kuypers et al., *supra* note 187, at 1040.

[280] *See* Toby Lea, Nicole Amada, Henrik Jungaberle, Henrike Schecke, Norbert Scherbaum & Michael Klein, *Perceived Outcomes of Psychedelic Microdosing as Self-Managed Therapies for Mental and Substance Use Disorders*, 237 PSYCHOPHARMACOLOGY 1521, 1522 (2020).

[281] Fadiman & Korb, *supra* note 192, at 121.

pandemic, national rates of stimulant consumption increased significantly.[282] Though not empirically proven, replacing the use of stimulants such as Ritalin or Adderall with periodic microdoses could reduce the risk of addiction and other harms associated with these prescription medicines.[283] The following discussion evaluates the scientific evidence for the efficacy of microdosing as well as the evidence for its associated risks.

D. *Scientific Evidence on Microdosing Safety and Efficacy*

Self-reported data provide support for the benefits listed above, including improvements to cognition (e.g., focus, productivity, or problem-solving ability), creativity, and mental and physical wellness.[284] Based on surveys, many people who microdose report the practice can effectively treat the same mental and physical conditions often treated by standard psychedelic doses.[285] Some find microdosing to be *more* effective than conventional therapies for mental health conditions, such as generalized anxiety disorder and ADHD, and physical conditions associated with pain.[286] Furthermore, although some people who microdose report unwanted side effects such as anxiety, and physical discomfort such as headache or muscle pain, few report that these adverse effects occur frequently,[287] and when they do occur, they are typically mild.[288] Many side effects appear to result from the difficulty of obtaining accurate or consistent doses.[289] Some people who microdose report consuming a higher dose than intended and experiencing undesired effects such as perceptual changes,

[282] *See* Ashley Abramson, *Substance Use During the Pandemic*, MONITOR ON PSYCH., Mar. 2021, at 22, 23.

[283] Susan York Morris, *Adderall vs. Ritalin: What's the Difference?*, HEALTHLINE (Jan. 28, 2019), https://www.healthline.com/health/adhd/adderall-vs-ritalin [https://perma.cc/4DEE-5PGL] (discussing side effects of Ritalin and Adderall).

[284] *See* Anderson et al., *supra* note 194, at 4 (categorizing self-reported benefits and challenges of microdosing).

[285] *See* Nadia R.P.W. Hutten, Natasha L. Mason, Patrick C. Dolder & Kim P.C. Kuypers, *Self-Rated Effectiveness of Microdosing with Psychedelics for Mental and Physical Health Problems Among Microdosers,* FRONTIERS PSYCHIATRY, Sept. 2019, at 1, 7 (noting although microdoses were less effective than larger doses for treating anxiety and depression, researchers found no statistically significant difference in effectiveness with respect to other mental or physical disorders).

[286] *Id.* at 5.

[287] Lea et al., *supra* note 218, at 6.

[288] Kim P.C. Kuypers, *Microdosing Psychedelics as a Promising New Pharmacotherapeutic*, *in* MODERN CNS DRUG DISCOVERY 257, 271 (Rudy Schreiber ed., 2021); *see also* Hutten et al., *Motives and Side-Effects*, *supra* note 191, at 433 (finding occurrence of negative psychological or physical side effects did not predict microdosing cessation individually (although occurrence of both did predict cessation), that microdosing side effects were predominantly acute rather than long term, and that "main reason for users to have stopped microdosing was not due to negative side effects but rather because they deemed it to not be effective").

[289] Hutten et al., *Motives and Side-Effects*, *supra* note 191, at 433.

confusion, or anxiety, which are more frequently encountered with standard doses.[290] Insofar as the legal prohibition of psychedelics obstructs access to accurate and consistent microdoses, many challenges stem from the current legal status of psychedelics rather than from the substances themselves.[291]

Survey-based evidence for the safety and efficacy of microdosing is informative, and placebo-controlled trials are starting to catch up. One meta-analysis conducted in 2021 aimed to review "all scientific research to date on the effects of microdoses of psychedelics."[292] The author identified forty-four relevant peer-reviewed publications, eight of which were modern, placebo-controlled trials.[293] Of the forty-four total studies, thirty were published in 2018 or later, reflecting rapidly expanding scientific interest in microdosing.[294] On the whole, the placebo-controlled studies have yielded mixed results—providing evidence for some of the benefits reported by surveys, failing to find evidence for others, and leaving some benefits reported in survey data unexplored.[295] Overall, placebo-controlled studies have mostly been inconclusive with respect to confirming the results of survey-based studies.[296] Nevertheless, the available evidence for the safety and effectiveness of microdosing is encouraging and establishes the need for further research.[297] The existing evidence is analyzed below.

Notably, although psilocybin is often used for microdosing, consuming microdoses of LSD has been more extensively studied.[298] However, because the effects of LSD and psilocybin are similar, many studies combine subjects who microdose LSD and psilocybin. One such study, which in part investigated the differences between those who microdose psilocybin and LSD, found no significant differences with respect to the reported benefits and side effects of

[290] *See* Hutten et al., *Motives and Side-Effects*, *supra* note 191, at 427 (reporting respondents mentioned "unwanted 'trips' . . . when using higher doses than intended"); Johnstad, *supra* note 196, at 46 ("While there were no reports of accidentally taking a full dose when attempting to microdose, several respondents had unintentionally verged into the terrain of a mini-dose that led to uncomfortable situations . . . ."); Rosenbaum et al., *supra* note 191, at 618 (finding in anonymous online survey of 909 respondents recruited primarily from Reddit many respondents cited "guesswork" associated with dosing to be significant drawback).

[291] Anderson et al., *supra* note 194, at 5.

[292] Vince Polito & Paul Liknaitzky, *The Emerging Science of Microdosing: A Systematic Review of Research on Low Dose Psychedelics (1955-2021) and Recommendations for the Field*, NEUROSCIENCE & BIOBEHAVIORAL REVS., Aug. 2022, at 1, 2.

[293] *Id.* at 4-6.

[294] *Id.*

[295] *See id.* at 10, 12.

[296] *See* Kuypers, *supra* note 288, at 270.

[297] *Id.* at 272.

[298] *See* Balázs Szigeti, Laura Kartner, Allan Blemings, Fernando Rosas, Amanda Feilding, David J. Nutt, Robin L. Carhart-Harris & David Erritzoe, *Self-Blinding Citizen Science To Explore Psychedelic Microdosing*, ELIFE, Mar. 2021, at 1, 2 (noting that, as of publication, all recent double-blind, placebo-controlled microdosing studies had been conducted using LSD).

microdosing.[299] However, those who reported microdosing psilocybin rated the importance of the benefits higher than those who microdosed LSD.[300] Given the dearth of microdosing research on psilocybin specifically, and the overall similarity of reported effects, studies on LSD and studies in which participants used both LSD and psilocybin are included in this analysis. However, due to its rising popularity, special attention is paid to psilocybin.

1. Potential Benefits

Anecdotal reports have long claimed that microdosing has positive effects as both a cognitive enhancer and a natural remedy for mental health conditions.[301] Observational and survey-based research has largely supported these claims.[302] Moreover, placebo-controlled research has supported anecdotal claims regarding additional effects and benefits, including decreases in pain perception, increases in certain dimensions of creativity, and changes to time perception.[303] On the other hand, placebo-controlled research has largely failed to find support for other claimed benefits, including benefits to other aspects of cognition like working memory and attention, improved mental wellbeing, and enhanced sociability.[304] Some benefits reported in survey-based studies have not yet been investigated by placebo-controlled research, including, most significantly, benefits to populations with confirmed medical diagnoses.[305] Below, the benefits observed in survey-based research are examined first, followed by a discussion of the extent to which these self-reported benefits have been confirmed in placebo-controlled research.

Recent observational research has lent some credibility to anecdotal reports that "microdosing may improve well-being, creativity, and cognition."[306] One such study was a large cross-sectional survey that compared people who currently and formerly microdosed to individuals who had never microdosed and found that "experience with microdosing is associated with lower dysfunctional attitudes and negative emotionality and higher wisdom, open-mindedness, and creativity" compared to people who lack microdosing experience.[307] Another study, which was longitudinal (i.e., tracked participants

[299] Anderson et al., *supra* note 194, at 5.

[300] *Id.* at 4. Anderson explains, "Microdosing respondents reported up to three benefits and three drawbacks of microdosing psychedelics. They also gave each outcome a rating of subjective importance on a sliding scale from 0 to 100." *Id.*

[301] Lea et al., *supra* note 218, at 2.

[302] *See infra* notes 306-12 and accompanying text.

[303] *See infra* notes 313-20 and accompanying text.

[304] *See infra* notes 326-30 and accompanying text.

[305] Polito & Liknaitzky, *supra* note 292, at 7, 10, 12-13.

[306] Szigeti et al., *supra* note 298, at 1.

[307] Thomas Anderson, Rotem Petranker, Daniel Rosenbaum, Cory R. Weissman, Le-Anh Dinh-Williams, Katrina Hui, Emma Hapke & Norman A.S. Farb, *Microdosing Psychedelics: Personality, Mental Health, and Creativity Differences in Microdosers*, 236 PSYCHOPHARMACOLOGY 731, 737 (2019).

for some time before and after they microdosed) rather than cross-sectional (i.e., collected data at one point in time without before and after measurements), investigated a group of people who microdosed over the course of six weeks, collecting both daily and longer-term measures.[308] The study found "an increase across all psychological functions measured on dosing days" as compared to nondosing days, as well as a decrease in depression and stress ratings over the course of the study.[309] However, the study did not "identify any [long-term] changes on measures of mindfulness, mystical experience, positive personality traits, creativity, sense of agency or overall quality of life."[310] Broadly speaking, different survey-based studies report effects that are generally positive, but not always consistent, with respect to indicators of participants' cognitive processing, creativity, mood, mental health (e.g., depression and anxiety symptoms), self-efficacy (i.e., belief in one's ability to execute behaviors to achieve specific results),[311] and sociability, as well as reduced physical pain and reduced use of other substances.[312]

The remainder of this Section addresses placebo-controlled trials. Overall, these studies have yielded mixed results. They can confirm certain limited findings of less rigorous studies, including the conclusion that psychedelic microdoses alter cognitive processing, for instance, with respect to the perception of time[313] and pain.[314] Although altered time perception is neither strictly beneficial nor harmful, this result suggests that further inquiry into time perception may be warranted, especially given the potential of psychedelics to increase one's sense of being "in the present."[315] Focusing one's attention on the present is a common goal of meditation that has been shown to promote physical

[308] *See* Polito & Stevenson, *supra* note 246, at 1 (describing longer-term measures as "battery of psychometric measures tapping mood, attention, wellbeing, mystical experiences, personality, creativity, and sense of agency, at baseline and at completion of the study").

[309] *Id.* at 13.

[310] *Id.* at 15.

[311] *See* Michael P. Carey & Andrew D. Forsyth, *Teaching Tip Sheet: Self-Efficacy*, AM. PSYCH. ASS'N (2009), https://www.apa.org/pi/aids/resources/education/self-efficacy [https://perma.cc/VE92-5Y24].

[312] *See* Polito & Liknaitzky, *supra* note 292, at 7, 10, 12-14.

[313] Jiří Wackermann, Marc Wittmann, Felix Hasler & Franz X. Vollenweider, *Effects of Varied Doses of Psilocybin on Time Interval Reproduction in Human Subjects*, 435 NEUROSCIENCE LETTERS 51, 51 (2008); *see also* Steliana Yanakieva, Naya Polychroni, Neiloufar Family, Luke T.J. Williams, David P. Luke & Devin B. Terhune, *The Effects of Microdose LSD on Time Perception: A Randomised, Double-Blind, Placebo-Controlled Trial*, 236 PSYCHOPHARMACOLOGY 1159, 1159 (2019) (finding similar effects of LSD microdoses).

[314] *See* Johannes G. Ramaekers, Nadia Hutten, Natasha L. Mason, Patrick Dolder, Eef L. Theunissen, Friederike Holze, Matthias E. Liechti, Amanda Feilding & Kim P.C. Kuypers, *A Low Dose of Lysergic Acid Diethylamide Decreases Pain Perception in Healthy Volunteers*, 35 J. PSYCHOPHARMACOLOGY 398, 398 (2021).

[315] Kuypers, *supra* note 288, at 269.

and mental wellbeing.[316] Though somewhat speculative, it is possible that changes in time perception help mediate some of the reported benefits of microdosing. People with symptoms of depression and anxiety often become stuck worrying about the future or the past, and microdosing may help them refocus their attention.

The reduced perception of pain associated with microdosing warrants further study. Some pain medicine experts hypothesize that psychedelics help disrupt pathways that convey pain sensations throughout the body.[317] Like shaking a snow globe, psychedelic experiences might help disrupt these well-worn paths to reduce the perception of painful stimuli, or at the very least, help people form a less distressing relationship with pain.

A recent set of psilocybin-specific controlled studies reports limited positive effects on creativity, finding that subjects who microdosed produced higher quality original answers than subjects who did not, although no effect was found on other measures of creative thinking.[318] Similarly, a different study found that microdosing psilocybin increased feelings of awe in response to aesthetic stimuli.[319] Finally, placebo-controlled studies have consistently found that people who microdose report subjective alterations to their conscious state.[320] A qualitative examination of anecdotal reports characterized these subjective alterations as an overall "heightened sense of presence and perceptual clarity,"[321] and several studies have attempted to quantitatively explore this altered consciousness using a five-dimensional altered states of consciousness scale.[322]

One study measured the effects of different microdoses of LSD and found that the largest dose (twenty micrograms) produced significant changes in four of the five dimensions of altered consciousness compared to placebo.[323] The affected variables included oceanic boundlessness, anxious ego dissolution, visionary

[316] *See* Yi-Yuan Tang, Britta K. Hölzel & Michael I. Posner, *The Neuroscience of Mindfulness Meditation*, 16 NATURE REVS. NEUROSCIENCE 213, 215 (2015).

[317] *See* Ramaekers et al., *supra* note 314, at 403.

[318] *See* Luisa Prochazkova, Michiel van Elk, Josephine Marschall, Ben D. Rifkin, Neil R. Schon, Donatella Fiacchino, George Fejer, Martin Kuchar & Bernhard Hommel, Microdosing Psychedelics and Its Effect on Creativity: Lessons Learned from Three Double-Blind Placebo Controlled Longitudinal Trials 2 (June 17, 2021) (unpublished manuscript), https://psyarxiv.com/emcxw/ [https://perma.cc/2AXJ-66YG].

[319] *See* Michiel van Elk, George Fejer, Pascal Lempe, Luisa Prochazckova, Martin Kuchar, Katerina Hajkova & Josephine Marschall, *Effects of Psilocybin Microdosing on Awe and Aesthetic Experiences: A Preregistered Field and Lab-Based Study*, 239 PSYCHOPHARMACOLOGY 1705, 1705 (2022).

[320] *See* Polito & Liknaitzky, *supra* note 292, at 2.

[321] Andersson & Kjellgren, *supra* note 254, at 4.

[322] *See* Polito & Liknaitzky, *supra* note 292, at 12-13.

[323] *See* Nadia R.P.W. Hutten, Natasha L. Mason, Patrick C. Dolder, Eef L. Theunissen, Friederike Holze, Matthias E. Liechti, Amanda Feilding, Johannes G. Ramaekers & Kim P.C. Kuypers, *Mood and Cognition After Administration of Low LSD Doses in Healthy Volunteers: A Placebo Controlled Dose-Effect Finding Study*, 41 EUR. NEUROPSYCHOPHARMACOLOGY 81, 84, 87, 89 (2020) [hereinafter Hutten et al., *Mood and Cognition*].

restructuralization, and reduction of vigilance (with no significant change to the auditory alterations dimension).[324] The smallest dose (five micrograms) did not produce any significant changes, but a moderate dose (ten micrograms) only produced significant changes in the anxious ego dissolution dimension.[325] Alterations to consciousness are neither clearly a benefit nor an adverse event.

At least so far, controlled studies have not confirmed many benefits of microdosing that are reported in surveys and observational studies, including enhanced cognition,[326] increased sociability,[327] elevated mood,[328] and improvements in various measures of anxiety and depression.[329] Notably, several controlled studies have suggested that the purported positive effects of microdosing may largely be attributable to expectancy bias (i.e., the placebo effect).[330] Nevertheless, it is important to note that conclusive evidence for the benefits of microdosing should not be required to legalize or decriminalize the practice. Proving or disproving the reported benefits of microdosing is essential for advancing scientific understanding of the practice and developing FDA approved therapies that utilize it. However, proof is not required for reducing

[324] *See id.* at 84. The study explains oceanic boundlessness is "the experience of unity, spiritual experience, blissful state, and insightfulness." *Id.* Anxious ego dissolution is "disembodiment, impaired control and cognition, and anxiety." *Id.* Visionary restructuralization is "complex imagery, elemental imagery, audio-visual synesthesia, and changed meaning of percepts." *Id.* The source does not further define auditory alterations or reduction of vigilance. *Id.*

[325] *See id.* at 87 tbl.3.

[326] Federico Cavanna, Stephanie Muller, Laura Alethia de la Fuente, Federico Zamberlan, Matías Palmucci, Lucie Janeckova, Martin Kuchar, Carla Pallavicini & Enzo Tagliazucchi, Microevidence for Microdosing with Psilocybin Mushrooms: A Double-Blind Placebo-Controlled Study of Subjective Effects, Behavior, Creativity, Perception, Cognition, and Brain Activity 24 (Dec. 7, 2021) (unpublished manuscript), https://www.biorxiv.org/content/10.1101/2021.11.30.470657v1.full.pdf [https://perma.cc/8PDW-FXXU].

[327] *See* Bershad et al., *supra* note 234, at 797-99 (finding no significant difference between people who microdose and placebo group in measuring feelings of social rejection or friendliness).

[328] *See id.* at 792. *But see* Anya K. Bershad, Katrin H. Preller, Royce Lee, Sarah Keedy, Jamie Wren-Jarvis, Michael P. Bremmer & Harriet de Wit, *Preliminary Report on the Effects of a Low Dose of LSD on Resting-State Amygdala Functional Connectivity*, 5 BIOLOGICAL PSYCHIATRY: COGNITIVE NEUROSCIENCE & NEUROIMAGING 461, 461 (2020) (finding "weak and variable" effect of microdosing on mood based on twelve-microgram dose of LSD); Hutten et al., *Mood and Cognition*, *supra* note 323, at 89 (finding no group-level differences in mood but positive mood increase at individual level).

[329] *See* Josephine Marschall, George Fejer, Pascal Lempe, Luisa Prochazkova, Martin Kuchar, Katerina Hajkova & Michiel van Elk, *Psilocybin Microdosing Does Not Affect Emotion-Related Symptoms and Processing: A Preregistered Field and Lab-Based Study*, 36 J. PSYCHOPHARMACOLOGY 97, 97 (2022).

[330] *See, e.g.*, Cavanna et al., *supra* note 326, at 1 (finding microdosing psilocybin had either null effects or trend toward cognitive impairment on all measures except for acute subjective effects); Szigeti et al., *supra* note 298, at 1 (finding in large self-blinded study that anecdotal benefits of microdosing could be explained by placebo effect).

criminal penalties or creating regulatory frameworks. In the context of supported adult-use frameworks, for example, consumers should be free to draw their own conclusions and to make their own decisions regarding whether to microdose. The adult-use context differs significantly from the healthcare context, where efficacy should be established before a treatment is approved and can be prescribed by physicians. In the medical context, introducing ineffective therapies into clinical practice is a poor allocation of resources that can negatively affect outcomes. By comparison, in adult-use markets, if people are fully informed of the risks and benefits of microdosing, they can decide for themselves whether to spend time and money on the practice. Moreover, if the risks of microdosing are low, it may be worthwhile regardless of whether it is proven more effective than placebo.

One notable limitation of existing research is the lack of controlled studies on *longer-term* microdosing. However, one study concluded earlier this year.[331] It is possible that changes to mood or mental health, for example, require more than a few weeks of microdosing, as is typically the case with commonly used antidepressants.[332] The lack of trials involving longer-term microdosing could help explain some of the differences between the survey-based and placebo-controlled studies. Additionally, most placebo-controlled studies have been conducted on subjects without existing mental health diagnoses, so it remains to be seen whether effects are different for subjects with documented mental health diagnoses such as depression or PTSD.[333] Given these and other limitations of existing controlled studies, it is likely premature to conclude that the anecdotal evidence supporting the benefits of microdosing are due only to expectancy bias.[334]

2. Potential Risks

In some respects, the adverse effects of microdosing have not been fully evaluated. However, what evidence does exist has led Dutch psychologist and neuroscientist Kim P.C. Kuypers to suggest that "[a]ll in all, the negative effects linked with low doses of psychedelics seem rather mild."[335] Furthermore, the only placebo-controlled study specifically designed to evaluate the safety of microdosing found that "administration of low dose LSD carried no safety risk

[331] Robin J. Murphy, Rachael L. Sumner, William Evans, David Menkes, Ingo Lambrecht, Rhys Ponton, Frederick Sundram, Nicholas Hoeh, Sanya Ram, Lisa Reynolds & Suresh Muthukumaraswamy, *MDLSD: Study Protocol for a Randomised, Double-Masked, Placebo-Controlled Trial of Repeated Microdoses of LSD in Healthy Volunteers*, TRIALS, Apr. 2021, at 1, 13.

[332] Polito & Liknaitzky, *supra* note 292, at 14.

[333] *See, e.g.*, Szigeti et al., *supra* note 298, at 14 (noting use of nonclinical population as study limitation).

[334] Polito & Liknaitzky, *supra* note 292, at 15-16.

[335] Kuypers, *supra* note 288, at 271.

and was well tolerated during the limited 21-day period studied."[336] The existing evidence thus suggests a favorable safety profile for short-term microdosing, but further research is needed to evaluate microdosing that occurs over longer periods.[337]

One notable survey-based study attempted to create a taxonomy of self-reported benefits and side effects.[338] The most commonly reported categories of challenges and side effects were related to the illegal status of microdosing, which requires people to obtain illicit products of unknown identity and purity, causing possible physiological discomfort (e.g., visual distortion, insomnia, and headaches), increased anxiety, and impaired focus, energy, and mood.[339] Less commonly reported challenges included social and cognitive disturbances.[340] Survey-based studies have not always agreed regarding the prevalence of side effects, with estimates ranging from twenty percent of people experiencing side effects[341] to more than fifty percent.[342] However, side effects appear to be largely limited to the day the microdose was taken, rather than long-term,[343] and they appear to occur infrequently, even among people who report them.[344]

Overall, placebo-controlled clinical studies have found microdosing to be well tolerated.[345] Nevertheless, the side effects observed include mildly increased anxiety and mild dissociation (a feeling of disconnection from oneself and the external world),[346] minor unpleasant physical symptoms such as headaches,[347] and decreases in self-rated concentration with minidoses.[348] These minor undesired effects comport well with the most common self-reported side effects from surveys discussed above.[349]

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[336] Neiloufar Family, Emeline L. Maillet, Luke T.J. Williams, Erwin Krediet, Robin L. Carhart-Harris, Tim M. Williams, Charles D. Nichols, Daniel J. Goble & Shlomi Raz, *Safety, Tolerability, Pharmacokinetics, and Pharmacodynamics of Low Dose Lysergic Acid Diethylamide (LSD) in Healthy Older Volunteers*, 237 PSYCHOPHARMACOLOGY 841, 848 (2020).

[337] *See* Polito & Liknaitzky, *supra* note 292, at 16.

[338] *See* Anderson et al., *supra* note 194, at 1-2.

[339] *Id.* at 5.

[340] *Id.*

[341] Hutten et al., *Motives and Side-Effects*, *supra* note 191, at 433.

[342] *See* Lea et al., *supra* note 218, at 6 tbls.3, 7.

[343] *See* Hutten et al., *Motives and Side-Effects*, *supra* note 191, at 433 ("[O]nly a small proportion of the microdosers (1-3%) in the present study indicated that the negative effects lasted for days after dosing.").

[344] Lea et al., *supra* note 218, at 7.

[345] Kuypers, *supra* note 288, at 271.

[346] Ramaekers et al., *supra* note 314, at 403.

[347] *See, e.g.*, Family et al., *supra* note 336, at 848 (finding low doses of LSD to have favorable overall safety profile, but people who microdose still reported more headaches than members of placebo group).

[348] Hutten et al., *Mood and Cognition*, *supra* note 323, at 89.

[349] *See supra* notes 338-44 and accompanying text.

One interesting trend among existing trials is the observation of bidirectional effects.[350] In other words, microdosing may sometimes produce benefits reflected by a particular measure, and at other times produce side effects reflected by the same measure—for example, microdosing has been reported to both increase or decrease anxiety and improve or impair focus.[351] Why microdosing has such bidirectional effects is a question that requires further study. Expectancy bias may account for some of these bidirectional effects in individual users.[352] However, some bidirectional effects may be related to dosage, the environments in which people microdose, or differences in individual psychology or physiology.[353]

Crucially, among the most commonly reported difficulties of microdosing are those associated with its illegality. These challenges are primarily related to accurate and consistent dosing, the availability of products, and the cost of microdosing.[354] If people lack a legal means of obtaining products for microdosing, then they might obtain illicit products of unknown identity and purity from friends or strangers, which can be dangerous. One meta-analysis, which in part analyzed the side effects reported in survey-based studies, expressed concern about the relative frequency of some side effects.[355] However, the authors noted that the prevalence of these effects may be partially explained by incorrect dosing.[356] If side effects are caused by ingestion of a larger dose than intended, as has been suggested by some controlled research,[357] then the availability of accurate and precise doses could largely mitigate this risk, and legal access to microdoses may serve as a form of harm reduction.

In the context of microdosing, consuming more than the intended dose of a psychedelic is unlikely to cause direct physical or psychological harm; the risk is primarily related to the impact of the dose on one's ability to work and perform other activities of daily life while microdosing. Accordingly, one must use caution and ensure that one's physical and cognitive abilities are not affected before driving or engaging in other potentially dangerous activities. It may be more prudent to avoid dangerous activities entirely while microdosing.

Though their concerns have not been substantiated, some researchers hypothesize that long-term microdosing could cause valvular dysfunction due to psilocybin's repeated activation of serotonin receptors in the heart.[358] Though it

[350] *See* Polito & Liknaitzky, *supra* note 292, at 14-15.

[351] Anderson et al., *supra* note 194, at 6.

[352] *Id.*

[353] *See* Polito & Liknaitzky, *supra* note 292, at 14-15.

[354] Anderson et al., *supra* note 194, at 5.

[355] Genís Ona & José Carlos Bouso, *Potential Safety, Benefits, and Influence of the Placebo Effect in Microdosing Psychedelic Drugs: A Systematic Review*, 119 NEUROSCIENCE & BIOBEHAVIORAL REVS. 194, 200 (2020).

[356] *Id.*

[357] *See* Hutten et al., *Mood and Cognition*, *supra* note 323, at 89 (noting reduced concentration was only found in participants who took largest of three LSD doses).

[358] *Id.*

did not involve psilocybin, one meta-analysis conducted on drug-associated heart valve disease found a significant relationship between this condition and the consumption of certain drugs that stimulate the serotonin 5-HT_{2B} receptor.[359] Although psilocin (a psychoactive produced when the body breaks down psilocybin) has been shown to bind to 5-HT_{2B} receptors,[360] "psilocybin testing in preclinical studies has not revealed any signals of [heart valve diseases]."[361] However, human studies designed to test the valve injury hypothesis have not yet been conducted.[362]

In a response to theoretical concerns regarding valvular dysfunction and microdosing, Fadiman and Korb argue that these concerns are excessive given the established safety profile of psychedelics and the lack of reported heart valve problems among those who microdose.[363] Further, they noted that the FDA-approved drug that led to these concerns, a weight loss drug called Fen-Phen, was administered in doses that "far exceed the doses used in microdosing, seemingly resulting in several orders of magnitude more *activity* at the receptors."[364] Moreover, while Fen-Phen was administered daily for extended periods, people usually microdose intermittently, with several days between doses, and for limited periods ranging from weeks to months.[365] Fadiman and Korb argue that researchers must "be careful not to create such fears [regarding microdosing and valve dysfunction] before we have evidence."[366] In the meantime, reasonable precautions can be taken such as limiting the frequency of dosing and the duration of microdosing cycles.

Although more research on the risks and benefits of psychedelic microdosing is necessary, existing scientific evidence suggests many potential benefits and that adverse effects are largely transient and mild.[367] Especially in supportive and controlled settings, where effects can be monitored over time, microdosing may be a valuable addition to both therapeutic and supported adult-use frameworks.

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[359] Jacqueline H. Fortier, Beatrice Pizzarotti, Richard E. Shaw, Robert J. Levy, Giovanni Ferrari & Juan Grau, *Drug-Associated Valvular Heart Diseases and Serotonin-Related Pathways: A Meta-Analysis*, 105 HEART 1140, 1140-48 (2019).

[360] Kuypers et al., *supra* note 187, at 1045.

[361] *Id.* at 1043.

[362] *See id.* ("It remains to be seen whether repeated low-dose psilocybin administration in preclinical studies might produce valvular hyperplasia, and whether or not this would translate to the human user population.").

[363] James Fadiman & Sophia Korb, *Commentary*, 33 J. PSYCHOPHARMACOLOGY 1054, 1054 (2019).

[364] *Id.*

[365] *Id.*

[366] *Id.*

[367] *See supra* notes 345-48 and accompanying text.

III. DESIGNING LEGAL FRAMEWORKS TO PROMOTE EQUITY AND PUBLIC HEALTH

As local, state, and federal governments legalize or decriminalize psilocybin and other psychedelics, they should consider how proposed legislation and administrative rules may impact microdosing, with a particular eye toward concerns regarding equity and public health. Although most of the reported benefits of the practice have yet to be confirmed by randomized controlled trials, there is little reason to believe that microdosing carries significant risks if used sparingly or for limited periods.[368] Indeed, for many people who microdose, the greatest challenges may be posed not by adverse health effects per se, but by access to safe and affordable products, reliable education and support, and accurate and consistent dosing.[369] Thoughtful legalization and regulation can help address these concerns.

The following discussion addresses equity and public health concerns associated with legal prohibitions on microdosing. Prohibition raises equity concerns because many people may be unable to afford standard dosing offered through supported adult-use frameworks like Oregon's and the medical frameworks of other states. Many believe that the complex rules created to implement Measure 109 could drive prices beyond the reach of some historically marginalized communities, including racial minorities and people with disabilities.[370] Microdosing can help bring prices down because smaller doses of psilocybin are required, and the length of administration sessions can be shortened. However, the practice can only produce these benefits if regulators adopt rules that allow microdosing. If the practice is prohibited, then some marginalized communities, which often lack equal access to mental healthcare resources, may also lack a legal means of benefitting from psychedelics.

Finally, though decriminalization and legalization can minimize the risks associated with microdosing, overly permissive rules could create additional risks unless they are accompanied by education for stakeholders such as healthcare providers, first responders, psychedelic facilitators, and the public. Without adequate education, people may microdose incorrectly or too frequently, which could have unknown risks. In jurisdictions that have only partially decriminalized psychedelics, police could arrest, institutionalize, or otherwise harm people for possessing or consuming low doses, and the most marginalized communities could be disproportionately impacted. The following discussion analyzes these concerns.

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[368] *See supra* Section II.D.

[369] *See supra* notes 339, 354-57 and accompanying text.

[370] *See Oregon Psilocybin Services—Public Listening Sessions*, OR. HEALTH AUTH., https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/Pages/Psilocybin-Public-Listening-Sessions.aspx [https://perma.cc/37PL-S7JT] (last visited Feb. 10, 2023).

A. *Microdosing Safety*

1. Microdosing as a Gentle Introduction to Standard Dosing

Standard dosing of psychedelics can cause temporary challenging experiences characterized by a variety of mild side effects such as anxiety, headache, and nausea.[371] In rare instances, people may experience more severe or prolonged adverse effects, including depressed mood or protracted perceptual disturbances.[372] Though severe adverse effects appear to be rare, the possibility of their occurrence, and the high likelihood of experiencing at least some degree of mental or physical discomfort, may cause people to experience anxiety before consuming a standard dose.[373] Accordingly, microdosing could serve as a gentle introduction to psychedelics for people who have little experience with these substances.

In this respect, microdosing serves an important safety function by allowing people to build confidence before progressing to higher doses. Some individuals may be more sensitive to psychedelics. Moreover, some are allergic to substances found in mushrooms and may not be aware of it.[374] For these reasons, in some cases, it may be preferable for first time users to consume microdoses instead of standard doses. If they respond well to a microdose, then the dose can be increased hours later or on subsequent days.

Microdosing may also be an appealing alternative to standard dosing for people who wish to experience some of the benefits of psychedelics without experiencing the emotional and perceptual changes that are associated with consuming standard doses. If jurisdictions prohibit microdosing or make it too expensive or burdensome, those individuals must either seek illicit sources of

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[371] *See* Robin Carhart-Harris, Bruna Giribaldi, Rosalind Watts, Michelle Baker-Jones, Ashleigh Murphy-Beiner, Roberta Murphy, Jonny Martell, Allan Blemings, David Erritzoe & David J. Nutt, *Trial of Psilocybin Versus Escitalopram for Depression*, 384 NEW ENG. J. MED. 1402, 1410 (2021).

[372] *See* Press Release, *supra* note 48 (finding in Phase 2 trial of psilocybin therapy for treatment-resistant depression that some participants reported treatment-emergent suicidal behavior, intentional self-injury, and suicidal ideation); *see also* John H. Halpern, Arturo G. Lerner & Torsten Passie, *A Review of Hallucinogen Persisting Perception Disorder (HPPD) and an Exploratory Study of Subjects Claiming Symptoms of HPPD*, *in* 36 BEHAVIORAL NEUROBIOLOGY OF PSYCHEDELIC DRUGS, *supra* note 195, at 333 (discussing hallucinogen persisting perception disorder—a rare condition that occurs less frequently with psilocybin than with LSD and less frequently with supported use than unsupported use—that involves reexperiencing of some perceptual distortions after intoxication, as well as attendant functional impairment or anxiety).

[373] *See* JEFFREY GUSS, ROBERT KRAUSE & JORDAN SLOSHOWER, YALE MANUAL FOR PSILOCYBIN-ASSISTED THERAPY OF DEPRESSION, at II.9 (2020), https://psyarxiv.com/u6v9y/ [https://perma.cc/N9F4-9GQQ] (listing "[e]mpathizing with . . . anxiety about being in the study" as part of preparation session).

[374] *Test ID: MUSH*, MAYO CLINIC LAB'YS, https://www.mayocliniclabs.com/test-catalog/overview/82626#Clinical-and-Interpretive [https://perma.cc/4LXF-DZ72] (last visited Feb. 10, 2023) (discussing mushroom allergies).

psychedelics for microdosing and expose themselves to the associated legal and safety risks, or they must forgo the potential benefits altogether.

2. Safer and More Consistent Products and Services

One of the greatest potential benefits of legalizing and regulating psychedelics, as Oregon has elected to do, is the availability of accurate and consistent doses that are correctly labeled, unadulterated with other substances, and uncontaminated by pesticides and other toxins.[375] Accurate and consistent dosing reduces the risk of consuming higher doses than intended when microdosing, as well as when consuming minidoses, standard doses, or high doses. Proper labeling conveys accurate information to consumers regarding common allergens, such as peanuts, and other additives that may be present in psychedelic products. In Oregon, the OHA's final rules required psilocybin product labels to list potential food allergens, but the rules did not require labels to include information about pesticides, substrates, or other chemicals.[376] Testing products for contaminants and adulterants can reduce the risk of physical and psychological harm.[377]

Accurate and consistent dosing is particularly important in the context of microdosing, where people risk consuming higher doses than intended before returning to work or engaging in potentially dangerous activities such as driving or operating heavy machinery.[378] The legalization and permissive regulation of microdosing reduces this risk by increasing the likelihood of consuming consistent microdoses that do not exceed the intended dose and cause unintended psychedelic effects.[379] Psychedelic substances obtained from illicit sources may have variable and unpredictable potency.[380] However, the psilocybin content of

[375] *See* Jean-Gabriel Fernandez, *Why Legal Marijuana Is Safer*, SHEPHERD EXPRESS (Dec. 10, 2019, 3:16 PM), https://shepherdexpress.com/cannabis/cannabis/why-legal-marijuana-is-safer/ [https://perma.cc/7MQS-JESR]; *Oregon Psilocybin Services*, OR. HEALTH AUTH., https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/Pages/Oregon-Psilocybin-Services.aspx [https://perma.cc/V54Q-EQUP] (last visited Feb. 10, 2023) (explaining Oregon Psilocybin Services Section will "license and regulate the manufacturing, transportation, delivery, sale, and purchase of psilocybin products").

[376] *See* OR. ADMIN. R. 333-333-2400, -2410 (2022); *Oregon Psilocybin Services—Oregon Psilocybin Advisory Board*, *supra* note 87.

[377] *See generally* FRED FISHEL & PAUL ANDRE, MU EXTENSION, UNIV. OF MO.-COLUMBIA, PESTICIDE POISONING SYMPTOMS AND FIRST AID (2002), https://extension.missouri.edu/media/wysiwyg/Extensiondata/Pub/pdf/agguides/agengin/g01915.pdf [https://perma.cc/23ZS-MSMM] (discussing pesticide poisoning); Dusty Rose Miller, *Potentiating Psilocybin: MAOIs and the Entourage Effect*, PSYCHEDELIC TIMES (Mar. 13, 2020), https://psychedelictimes.com/potentiating-psilocybin-entourage-effect/ [https://perma.cc/2RY7-9DZR] (discussing monoamine oxidase inhibitors and other substances that can potentiate psilocybin).

[378] *See supra* Section II.D.2.

[379] *See* Fernandez, *supra* note 375.

[380] *See, e.g.*, *How Can We Reduce the Harms Associated with Using Psilocybin Mushrooms?*, DRUG POL'Y ALL., https://drugpolicy.org/drug-facts/reduce-harms-psilocybin-

mushrooms produced and sold through adult-use frameworks will also vary considerably because psilocybin content varies significantly from species to species, batch to batch, and even mushroom to mushroom.[381]

Under many emerging legal frameworks, such as Oregon's supported adult-use model, extracts of psilocybin, for which the concentration of the substance can be more consistently controlled, can be administered as alternatives to whole mushrooms. Other alternatives, such as dried and homogenized mushrooms, or truffles, may also result in more consistent doses. These options have been discussed by the Oregon Board and are permitted in the final rules published by the OHA.[382]

Creating burdensome rules that make microdosing too expensive or burdensome, or banning the practice entirely, may push people to microdose without guidance, using illicit substances of unknown purity and origin.[383] Some may consume substances that are contaminated or adulterated, which can cause physical or psychological injury.[384] Dosage may be unpredictable and highly variable, and those who microdose could accidentally consume higher doses than intended, putting people at risk for unanticipated mental or physical impairment and subsequent injury to themselves or others.[385] Some might seek the guidance of underground suppliers and microdosing coaches who could exploit them physically, emotionally, or financially.[386] The following Section discusses this risk and how legalization can reduce it. By reducing or eliminating the risk of adulteration and inaccurate dosing, legalization will help those who microdose ensure that they do not exceed their intended dose, which could result in unanticipated perceptual, emotional, or physical effects while at work or in other dangerous or inappropriate settings.

3. Decreased Risk of Abuse and Exploitation

In the context of standard dosing, serious allegations have recently been made regarding emotional, physical, and sexual abuse by psychedelic facilitators.[387] Though the risk of abuse could be lessened when microdoses are administered,

mushrooms [https://perma.cc/33CP-7LL4] (last visited Feb. 10, 2023) (discussing variability in potency of psilocybin mushrooms); *Mushrooms*, DANCESAFE, https://dancesafe.org/magic-mushrooms/ [https://perma.cc/3B65-PGNH] (last visited Feb. 10, 2023).

[381] *See* sources cited *supra* note 380.

[382] *See* OR. ADMIN. R. 333-333-1010 (2022).

[383] *See infra* Section III.B.

[384] *See* Sarah Saleemi, Steven J. Pennybaker, Missi Wooldridge & Matthew W. Johnson, *Who Is 'Molly'? MDMA Adulterants by Product Name and the Impact of Harm-Reduction Services at Raves*, 31 J. PSYCHOPHARMACOLOGY 1056, 1056 (2017).

[385] *See* sources cited *supra* note 380.

[386] *See infra* Section III.A.3.

[387] *See, e.g.*, Katie MacBride, *"Aharon Said It Was Healing."* INVERSE (Nov. 16, 2021), https://www.inverse.com/mind-body/grossbard-bourzat-psychedelic-assisted-therapy-abuse [https://perma.cc/CAF5-3UCG] (reporting on allegations of abuse made against underground facilitator Aharon Grossbard and his wife Françoise Bourzat).

significant asymmetries of power exist between underground psychedelic facilitators and their clients, and these power dynamics could be exploited even in the context of microdosing.[388] Decriminalizing or legalizing microdosing brings it out of the shadows and promotes safer practices. Because people may be less fearful of being stigmatized, arrested, or prosecuted, they may be more likely to report instances of abuse, which could act as a deterrent.[389] Under prohibition, people may be hesitant to report cases of abuse or the sale of adulterated or contaminated psychedelic products.[390] If microdosing is decriminalized or regulated, and people are harmed by consuming contaminated or adulterated products, they may be more likely to report those products and prevent future harm. Because psychedelic substances obtained from underground sources can be contaminated or adulterated, legalizing or decriminalizing psychedelic microdosing should be framed as an important harm-reduction measure that promotes public health.[391] After attending a meeting of the Oregon Board's Research Subcommittee, Dr. Fadiman told a journalist, "There is going to be microdosing throughout Oregon regardless of what this committee does. . . . The question is, can it also help people use it more safely and more effectively?"[392]

B. *Microdosing Economics and Psychedelic Equity*

As psychedelics are increasingly commercialized, and more states legalize these substances and related services, many are concerned that psychedelic products and services will become too expensive.[393] When states legalized cannabis, the cost of obtaining licenses and opening businesses skyrocketed in many states.[394] Punitive tax regulations also increased the costs, and the same will be true of businesses that provide psychedelics and related services.[395] Under Section 280E of the Internal Revenue Code, companies that handle illicit

[388] *See id.*

[389] *See id.*

[390] *See* Fernandez, *supra* note 375.

[391] *See* Saleemi et al., *supra* note 384, at 1056, 1058 (discussing frequent adulteration of MDMA obtained from underground sources).

[392] Tess Riski, *Oregon Voters Legalized Psilocybin Use. But What About Microdosing?*, WILLAMETTE WEEK (Jan. 26, 2022, 9:20 AM), https://www.wweek.com/news/2022/01/26/oregon-voters-legalized-psilocybin-use-but-what-about-microdosing/ [https://perma.cc/EM3U-9UW6].

[393] Alexander Lekhtman, *How Will Oregon Implement Legal Psilocybin Therapy?*, FILTER (Mar. 17, 2021), https://filtermag.org/oregon-legal-psilocybin-therapy/ [https://perma.cc/62RT-XRWP].

[394] Angela Dills, Sietse Goffard, Jeffrey Miron & Erin Partin, *The Effect of State Marijuana Legalizations: 2021 Update*, CATO INST. (Feb. 2, 2021), https://www.cato.org/policy-analysis/effect-state-marijuana-legalizations-2021-update [https://perma.cc/9FUM-VZZT].

[395] *Id.*

substances like cannabis or psilocybin cannot deduct their business expenses.[396] Consequently, these costs are passed on to consumers.[397]

Decriminalizing psychedelics could be an effective means of reducing the cost of microdosing and standard dosing because people can access psychedelics by producing them at home or obtaining them from other noncommercial cultivators, avoiding Section 280E and burdensome state regulation. In contrast, psychedelics sold under state legalization frameworks can significantly increase the cost of both microdosing and standard dosing because products and related services are subject to Section 280E and complex administrative rules.[398] In these circumstances, deliberate steps should be taken to reduce the cost of psychedelics and related services. Otherwise, people will be denied access or encouraged to receive them from underground sources.

In Oregon-based market research, people who expressed interest in legal microdosing under Measure 109 demonstrated that they are price conscious.[399] People who reported interest in attending six-hour microdosing workshops indicated that they would be "happy to pay" about $60 overall and would be willing to pay a maximum of about $100.[400] These prices are likely unrealistic because they would have to include the cost of products, overhead associated with operating a psilocybin service center, and compensation for six hours of a facilitator's time. This research illustrates the importance of reducing the costs of microdosing products and services.

Although economies of scale could reduce the cost of legal psilocybin services, legislators and regulators also play an important role by setting tax rates and licensing fees, which influence the prices of controlled substances such as cannabis and psychedelics.[401] Legal cannabis markets—which can serve as useful comparators—have been most successful at replacing underground cannabis markets in states with lower taxes on cannabis sales.[402] Psychedelic microdoses need not be overly expensive even in legally sanctioned markets. For instance, in the Netherlands, Red Light Holland sells a kit containing fifteen

[396] Katherine P. Franck, *Cannabis Reform: High on the Banking Agenda*, 24 N.C. BANKING INST. 163, 184 (2020).

[397] *Id.* at 167-72.

[398] *See id.* at 170, 184.

[399] *See* RED LIGHT OR., RED LIGHT OREGON: MARKET RESEARCH AND MICRODOSING SAFETY REPORT FOR MEASURE 109, at 12, 14 (2021), https://redlightoregon.com/wp-content/uploads/2021/10/Survey-Report-1-1.pdf [https://perma.cc/MB7M-NMJ2].

[400] *Id.*

[401] *See* Dills et al., *supra* note 394.

[402] *See* Natalie Fertig, *'Talk About Clusterf—': Why Legal Weed Didn't Kill Oregon's Black Market*, POLITICO (Jan. 21, 2022, 4:45 PM), https://www.politico.com/news/magazine/2022/01/14/oregon-marijuana-legalization-black-market-enforcement-527012 [https://perma.cc/WJ8V-E2MM] (noting Oregon's low taxes have made legal market account for eighty to eighty-five percent of state's demand, but underground marijuana operations are still flourishing by exporting marijuana to high-tax jurisdictions like Los Angeles).

microdoses of psilocybin truffles for twenty-fives euros,[403] which is less expensive than current prices in underground U.S. markets.[404] Nevertheless, in the United States, tax reform will be necessary to significantly reduce the prices of psychedelic substances once they are legalized.[405] Still, there are limits to how much these prices can be reduced in supported adult-use frameworks. In such systems, which require facilitators to sit with clients for up to six hours after administering standard doses, paying for a facilitator's time accounts for much of the associated cost.[406] Frequently, psychedelic services require the presence of more than one facilitator or staff member,[407] raising prices further.

However, because microdoses do not produce the physical and perceptual disturbances that are characteristic of standard doses, the duration of administration sessions can be shortened, significantly reducing the cost of services.

If a facilitator charges $100 per hour for facilitation services, a five-hour administration session would cost $500, before accounting for the cost of psilocybin and other business expenses. Reducing the duration of an administration session to one hour, would significantly reduce costs associated with the facilitator's services from $500 to $100. The OHA's rules allow for administration sessions lasting as few as thirty minutes if clients consume 2.5 milligrams or less of psilocybin.[408]

Critics of allowing microdosing under supported adult-use frameworks might claim that people who microdose typically follow schedules of alternating "on days" interspersed with periods of several "off days" over the course of weeks or months.[409] Consequently, whereas clients consuming standard doses might attend administration sessions spaced several (often three) weeks apart, microdosing clients would complete multiple microdosing sessions during the same period. Due to the necessity of paying for a facilitator's time, the cost of microdosing could approach the cost of a single five-hour standard dosing

[403] *Have You Tried Microdosing?*, iMICRODOSE, imicrodose.nl [https://perma.cc/A62J-9H3B] (last visited Feb. 10, 2023).

[404] Amelia Williams, *How Much Do Shrooms Cost?*, LEAFLY (Jan. 31, 2023), https://www.leafly.com/news/lifestyle/how-much-do-shrooms-cost [https://perma.cc/RRH3-XN3J].

[405] *See* Franck, *supra* note 396, at 170 (outlining dynamic in which high banking costs for cannabis firms are passed on to cannabis consumers).

[406] *See* Santos-Longhurst, *supra* note 83.

[407] *See* Press Release, Multidisciplinary Ass'n for Psychedelic Stud., MAPS Wins Appeal and Authorization To Study MDMA in Healthy Volunteer Therapists (May 12, 2021), https://maps.org/news/media/maps-wins-appeal-and-authorization-to-study-mdma-in-healthy-volunteer-therapists/ [https://perma.cc/LE2H-SK98] (indicating MAPS uses two-facilitator team to support MDMA therapy).

[408] *See* OR. ADMIN. R. 333-333-5250(1)(a), (2) (2022) (providing that "[f]or clients consuming less than 2.5 mg of psilocybin analyte . . . . the minimum duration shall be 30 minutes," unless administration session is client's first or client is consuming whole dried fungi, in which case minimum administration time is one hour).

[409] *See* Kuypers et al., *supra* note 187, at 1041.

session.[410] However, many people report microdosing for only a few weeks before experiencing benefits, and the limited duration may therefore yield cost savings compared to standard dosing.[411] Moreover, if products with consistent psilocybin content are used, then the duration of administration sessions could be further reduced after a client completes an initial session to determine tolerability.[412] If an initial microdose is well tolerated, then subsequent administration sessions could be reduced to fifteen minutes because the client's response to the selected dose would have been established, and there would be little or no reason to prolong the administration session. We now move from a discussion of general principles to an analysis of a specific dilemma faced by the Oregon Board and the OHA.

C. *Making Oregon's System Safer and More Equitable*

The OHA published final rules for Oregon's psilocybin services program on December 27, 2022. These rules allow for limited approaches to microdosing. However, this outcome was far from certain. Though the text of Oregon's Measure 109 does not mention microdosing, it also lacks any mention of standard dosing, or any other type of dosing for that matter.[413] The Measure only requires the OHA to specify the "maximum concentration of psilocybin that is permitted in a single serving of a psilocybin product" and the "number of servings that are permitted in a psilocybin product package."[414] It requires no minimum dose nor minimum duration for administration sessions. Regarding the length of administration sessions, Measure 109 provides little guidance. It merely requires the Oregon Board to make recommendations regarding the "public health and safety standards and industry best practices for holding and completing an administration session, including . . . [t]he circumstances under which an administration session is considered complete."[415] The Oregon Board must also recommend "requirements, specifications and guidelines for holding and verifying the completion of . . . an administration session."[416] These mandates provide significant latitude for the Oregon Board to make recommendations regarding the conduct and completion of psilocybin administration sessions.

Tom Eckert, a chief petitioner and codrafter of Measure 109, who formerly served as chair of the Oregon Board and its training subcommittee before resigning, has stated that he does not support microdosing under Measure 109

410 *See* sources cited *supra* note 199.

411 *See* Fadiman & Korb, *supra* note 192, at 120.

412 *Id.*

413 OR. REV. STAT. § 475A.210-722 (2022).

414 *Id.* § 475A.642(1).

415 *Id.* § 475A.230(8).

416 *Id.* § 475A.230(3)(a).

because it is not within the spirit of the measure.[417] However, according to Dave Kopilak, an attorney and codrafter of the measure, the text of Measure 109 clearly allows for microdosing, and the OHA has statutory authority to adopt rules that allow it.[418] Moreover, when the drafters were contemplating whether to implement dosing limits, they intentionally left the text open-ended to allow for flexibility.[419] According to Kopilak, it is therefore up to the OHA to draft rules that either make microdosing accessible or impede access.[420] A textualist might doubt whether the intent of Measure 109's drafters is of any consequence, particularly when the text is clear and the statute was enacted by ballot initiative instead of through an act of the legislature.

Throughout the Oregon Board's first year of operation, Board members and the public raised the topic of microdosing at various meetings and public listening sessions.[421] The first in-depth discussion of microdosing occurred at a meeting of the Oregon Board's Licensing Subcommittee on December 2, 2021.[422] At this meeting, the subcommittee passed a recommendation that would allow facilitators to adjust the duration of psilocybin administration sessions to suit the needs and goals of each client.[423] The subcommittee recommended that there be no minimum or maximum duration for administration sessions and that facilitators be allowed to decide when an administration session ends based on a variety of factors, including the dose and type of psilocybin products administered, the client's goals, whether the client has trustworthy transportation home, and the degree to which the administered psilocybin products are affecting the client's physical and cognitive function.[424] The subcommittee made this recommendation to allow for shorter administration sessions that are better suited to microdosing.[425] Members who approved the recommendation believed that shorter sessions and lower doses could reduce the cost of

[417] *See WATCH | Webinar | Oregon Psilocybin Update & What's To Come*, GREEN LIGHT L. GRP. (Jan. 25, 2022), https://greenlightlawgroup.com/blog/watch-webinar-oregon-psilocybin-update-whats-to-come [https://perma.cc/GEY8-CQM8].

[418] Emerge L. Grp., *Deep Dive into Oregon Psilocybin Services Act—Microdosing*, YOUTUBE, at 25:40 (Apr. 9, 2022), https://www.youtube.com/watch?v=wSMrwfXbCjE&ab_channel=EmergeLawGroup.

[419] *Id.*

[420] *Id.*

[421] *See Oregon Psilocybin Services—Public Listening Sessions*, *supra* note 370.

[422] *OPAB Licensing Subcommittee Meeting Recording*, OR. HEALTH AUTH., https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/Documents/Complete%20PAB-LS%20Meetig%2012.2.21.m4a [https://perma.cc/Q35E-BMDF] (last visited Feb. 10, 2023) (providing access to recording of Oregon Board's December 2, 2021, Licensing Subcommittee meeting).

[423] *Id.*

[424] *Id.*; *see also OPAB Meeting Recording*, OR. HEALTH AUTH., https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/Documents/OPAB%20Meeting%20Recording%20-%202022-01-26.m4a [https://perma.cc/55C9-J6DR] (last visited Feb. 10, 2023) (providing access to recording of Oregon Board's January 26, 2022, meeting).

[425] *See OPAB Licensing Subcommittee Meeting Recording*, *supra* note 422.

psilocybin services and increase access, helping to achieve Measure 109's stated goal of improving "the physical, mental, and social well-being of all people" in Oregon, as well as helping to fulfill the Oregon Board's mandate to "develop a long-term strategic plan to ensure that psilocybin services will become and remain safe, accessible, and affordable" for everyone in the state who is twenty-one years of age or older.[426]

Before the licensing subcommittee's recommendations could be formally submitted to the OHA, they had to be voted on and approved by the full Board.[427] Then the OHA must adopt them if they are to become part of the state's administrative rules.[428] The Oregon Board approved the subcommittee's recommendation regarding variable length administration sessions, which were subsequently submitted to the OHA for consideration and potential adoption.[429] However, in its final rules, the OHA instead adopted a tiered approach to administration session duration.[430] Under these rules, the minimum duration of each session increased in a stepwise manner depending on the dose of psilocybin administered.[431] For instance, the final rules require clients consuming between five and ten milligrams of psilocybin to remain at a service center for a minimum of two hours, and clients consuming between ten and twenty-five milligrams would be required to remain under supervision for a minimum of four hours.[432] The highest tier requires clients who consume between thirty-five and fifty milligrams to remain at service centers for a minimum of six hours.[433]

There are numerous ways the OHA could have prohibited microdosing or made it overly burdensome. For instance, the OHA could have required clients to complete a preparation session before every administration session. However, the finalized rules allowed a single preparation session to remain valid for all administration sessions completed at the same service center within twelve months of the preparation session.[434]

By imposing a minimum dose of psilocybin above the microdosing range, the OHA could have effectively banned the practice.[435] The Products Subcommittee

[426] *Id.*; OR. REV. STAT. § 475A.205(1)(b) (2022).

[427] *See Oregon Psilocybin Services—Administrative Rules*, OR. HEALTH AUTH., https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/Pages/Psilocybin-Administrative-Rules.aspx [https://perma.cc/5ZXH-6W3D] (last visited Feb. 10, 2023).

[428] *See id.*

[429] *See* OR. HEALTH AUTH., LICENSING SUBCOMMITTEE ROLL CALL AND VOTE COUNT 5 (2021), https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/Documents/Licensing%20Roll%20Call%20and%20Vote%20Count%2012.2.2021.pdf [https://perma.cc/KMG4-7EX8].

[430] *See* OR. ADMIN. R. 333-333-5250 (2022).

[431] *See id.*

[432] *Id.*

[433] *Id.*

[434] *Id.*

[435] Emerge L. Grp., *supra* note 418, at 26:37.

had raised the possibility of instituting a minimum dose.[436] However, the Oregon Board declined to approve such a rule, and the OHA has yet declined to adopt one, likely because starting clients at lower doses could promote safety as described above, and therefore, implementing a minimum dose could be dangerous.[437] It would also be difficult to enforce. The OHA also could have prohibited microdosing by imposing a minimum waiting period between administration sessions.[438] If a waiting period was longer than the off-day period of most microdosing protocols, then microdosing would be rendered impossible.[439]

Though mandatory waiting periods would impede microdosing, they could be less dangerous and controversial than rules requiring a minimum dose because clients could still be started on low doses of psilocybin.[440] However, a waiting period would require people starting at lower doses to wait longer before returning for a standard dose.[441] In other words, clients started on low test doses of psilocybin might be prohibited from subsequently taking a standard dose unless special exceptions were made for test doses. Regardless, in addition to prohibiting microdosing, waiting periods would make supported adult-use programs like Oregon's overly complex and cumbersome to oversee.

Minimum waiting periods could have other harmful effects. For instance, by prohibiting microdosing or making it overly burdensome, waiting periods would encourage people to microdose using illicitly obtained substances without guidance or support from facilitators.[442] In Oregon, the OHA's finalized rules imposed no waiting periods between administration sessions.[443] However, they imposed a waiting period of twenty-four hours between a preparation session and the first administration session that follows it.[444]

Rules that inhibit microdosing may be undesirable because the evidence presented above suggests that microdosing may have a variety of benefits and few associated risks if implemented with sensible rules and accompanied by

[436] *See Oregon Psilocybin—Products Subcommittee Meetings Archive*, OR. HEALTH AUTH., https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/Pages/Psilocybin-Products-Subcommittee-Meetings-Archive.aspx (last visited Feb. 10, 2023) (providing access to recording of Oregon Board's December 9, 2021, Products Subcommittee meeting).

[437] *See* Emerge L. Grp., *supra* note 418, at 27:25.

[438] *Id.*

[439] *Id.*

[440] *See id.*

[441] *See supra* Section III.A.1.

[442] *See supra* Section III.A.1.

[443] *See* OR. ADMIN. R. 333-333-5200 (2022) (outlining requirements for administration sessions, none of which mandate waiting period).

[444] *See* OR. ADMIN. R. 333-333-5000(1) ("A facilitator must complete a preparation session with every client who will participate in an administration session at least twenty-four hours . . . prior to the commencement of the client's first administration session with the facilitator.").

adequate consumer education.[445] Moreover, banning or restricting microdosing could be unpopular because the public has expressed strong support for the practice.

During a series of three public listening sessions held on December 13, 14, and 15, 2021, members of the public shared their thoughts on microdosing under Measure 109.[446] At the December 13th session, five speakers stated their views.[447] One urged the OHA to consider shorter administration sessions for microdosing while emphasizing that it could be a great way to introduce the public to psilocybin.[448] Presumably, some people may be hesitant to start with a large dose, and others may wish to avoid having psychedelic experiences altogether. For these individuals, microdosing may be a viable alternative. Another speaker framed microdosing as a means of advancing equity and diversity in the emerging Oregon psilocybin industry.[449] This commentator argued that microdosing is clearly allowed under Measure 109 because, regardless of whether clients are consuming a standard dose or a microdose at a service center, they are "consuming psilocybin" as required by the Measure.[450] To conclude, the speaker urged Board members to allow a range of doses from the lowest dose possible to a reasonable maximum dose.[451] This speaker, who expressed plans to become a licensed psilocybin facilitator and service center operator, argued that the lowest possible dose should be available for sensitive clients who could benefit from smaller doses.[452]

A third speaker expressed disbelief that anyone would suggest that microdosing was not allowed under Measure 109.[453] "As far as Measure 109 is concerned . . . it is very clear from the wording that microdosing is within the scope of the measure, and I see no reason why it should be under debate anymore," said this speaker.[454] A fourth speaker stated that microdosing sessions should only last from thirty to sixty minutes.[455] The speaker added, "I want to make sure the Oregon Board keeps that in mind as minimum time requirements are created."[456] A final commentator said, "it is essential and absolutely necessary for this to be allowed . . . in terms of equity, accessibility, and safety."[457]

[445] *See supra* Section II.D.
[446] *Oregon Psilocybin Services—Public Listening Sessions*, *supra* note 370.
[447] *Id.*
[448] *Id.*
[449] *See id.*
[450] *Id.*
[451] *Id.*
[452] *Id.*
[453] *Id.*
[454] *Id.*
[455] *Id.*
[456] *Id.*
[457] *Id.*

There may be other ways to reduce the cost of microdosing within supported adult-use frameworks. For both standard dosing and microdosing, the Oregon Board has discussed recommending group administration sessions in which multiple people consume psilocybin together with the support of facilitators.[458] In the context of standard dosing, groups of clients could pay significantly less for a single administration session by sharing the cost of the facilitators' services. The Licensing Subcommittee has recommended a maximum client-to-facilitator ratio for group sessions of eight-to-one for standard dosing.[459] Similarly, clients could reduce the cost of microdosing by visiting a center where multiple clients are observed and supported by facilitators simultaneously. In this context, the licensing subcommittee has recommended a maximum client to facilitator ratio of ten to one.[460] When combined with shortened administration sessions, group microdosing could significantly reduce the cost of services.

It is also possible to create subscription plans or memberships that further reduce the cost of microdosing in supported adult-use frameworks. By purchasing a month-long microdosing subscription, or paying week by week, clients could avoid paying a larger lump sum. Creating cooperative business structures where groups of individuals share ownership of service centers may further reduce prices. There has also been discussion of licensing religious organizations as service centers in Oregon.[461] As nonprofit organizations, religious groups could offer microdosing to their members at reduced rates.

Decriminalization of psychedelics is an alternative to supported adult use that has advantages for microdosing. However, under some decriminalization frameworks, such as the one created by Oregon's Measure 110, people who wish to microdose cannot do so without incurring fines or being stigmatized as people with substances use conditions by being required to attend substance use counseling sessions.[462] Furthermore, people living in jurisdictions with only partial decriminalization frameworks have no legal means of obtaining psychedelic substances for microdosing.[463] Measure 110, and other proposed laws that partially decriminalize psychedelics, do not decriminalize purchasing, cultivating, or sharing of psychedelics, which requires people who wish to microdose to break state drug laws to obtain psychedelic substances for microdosing. Because many activities associated with microdosing remain illegal in these jurisdictions, people are discouraged from openly discussing microdosing and from reporting bad actors who sell counterfeit or adulterated substances or otherwise exploit people who microdose.

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[458] *See id.*

[459] *See* OR. HEALTH AUTH., LICENSING SUBCOMMITTEE ROLL CALL AND VOTE COUNT 3 (2022), https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/Documents/Licensing%20Subcommittee%20Roll%20Call%20and%20Vote%20Count%201.6.2022.pdf [https://perma.cc/VQP6-4P73].

[460] *See id.*

[461] *See Oregon Psilocybin Services—Public Listening Sessions*, *supra* note 370.

[462] *See supra* Section I.B.2.

[463] *See supra* Section I.B.2.

Some of these concerns can be addressed by decriminalizing the noncommercial cultivation and sharing of psychedelics. The personal use section of Colorado's Proposition 122 takes this approach. Seattle's psychedelic decriminalization resolution takes a similar approach by decriminalizing the cultivation and sharing of several psychedelics for "religious, spiritual, healing, or personal growth practices . . . without financial or other consideration."[464] Oakland, California's decriminalization resolution took a similar approach.

As an additional safeguard, cities and states that decriminalize can pass provisions that provide education to various stakeholders on best practices for discussing and practicing microdosing. These provisions could create community outreach programs that educate the public on how to minimize the associated risks. Programs should also teach healthcare providers about microdosing, and how to discuss it with their patients, and educate emergency responders about state and local psychedelic laws and how to respond safely and ethically to calls involving these substances. To prevent people from microdosing with adulterated or contaminated products, cities and states can also authorize or decriminalize drug-checking centers where people can take samples for testing without fear of being arrested and prosecuted.

Another alternative to supported adult use is retail sales, which is the approach that many states have taken to adult-use cannabis.[465] However, there are currently no jurisdictions outside the Netherlands that use such a retail model for psychedelics.[466] Retail dispensaries can sell psychedelics directly to consumers who can then consume standard doses or microdoses at home.[467] In the Netherlands, several companies sell premeasured microdoses over the counter through retail stores called smart shops.[468] Particularly when it comes to microdosing, the retail sales model has significant advantages over supported adult use. For instance, the model eliminates the need for facilitators and service centers that are part of Oregon's supported adult-use model. Psychedelics could potentially be sold at existing cannabis dispensaries eliminating the need to establish new retail stores. The staff of Dutch smart shops typically advise consumers on proper dosing of psychedelics and may provide pamphlets with additional information.[469] In a U.S. retail model, the budtenders of cannabis dispensaries could assume this role. The United States may not be ready for retail

[464] Seattle City Council, Res. No. 32021, at 3-4 (Oct. 4, 2021), http://seattle.legistar.com/ViewReport.ashx?M=R&N=Text&GID=393&ID=4515134&GUID=8CD61F8D-9B90-4957-8008-495858A86A3A&Title=Legislation+Text [https://perma.cc/FXV5-R2VW].

[465] *See* Dills et al., *supra* note 394.

[466] *See Pharmadrug's Supersmart Launches Psilocybin Online Retail Platform in the Netherlands*, PSYCHEDELIC INV. (June 7, 2022) [hereinafter *Psilocybin Online Retail Platform*], https://psychedelicinvest.com/pharmadrug-launches-online-retail-platform-in-the-netherlands/ [https://perma.cc/LBY6-5HME].

[467] *See id.*

[468] *See id.*

[469] *Id.*

sales of psilocybin or other psychedelics. Yet, it remains a potential model that could reduce overly burdensome regulations and barriers to access.

IV. LEGAL AND REGULATORY RECOMMENDATIONS

The following discussion makes legal recommendations to promote safe and equitable access to microdosing. Recommendations are made for legal frameworks that involve decriminalization, supported adult use, retail, and therapeutic models for psychedelics regulation.

A. *Decriminalization Frameworks*

Decriminalization frameworks reduce or eliminate the criminal penalties associated with psychedelics, which may allow people to microdose without concern for being arrested.[470] However, many decriminalization frameworks do not create legal paths for people to obtain safe supplies of psychedelics for microdosing.[471] To create these pathways, jurisdictions could implement resolutions, ordinances, or legislation to decriminalize the cultivation and noncommercial sharing and gifting of psychedelics in addition to their possession and consumption, which will provide people with a means of obtaining microdoses without having to risk arrest or prosecution.

These legal reforms bring microdosing out of the shadows, making people more likely to report instances of abuse and harmful or misrepresented products. They also respect the traditional mode of consuming psychedelics, which is more communal than commercial.[472] However, because people will consume products that are not tested systematically, there is some risk of product adulteration and contamination. To help reduce the risk, jurisdictions that decriminalize should draft legislation that creates drug-checking centers that test samples submitted by the public to ensure they have not been contaminated or adulterated. Legislators should fund education and training on microdosing safety for a variety of stakeholders including healthcare providers, first responders, and the public.

Finally, when drafting legislation, jurisdictions that decriminalize should include provisions that protect employees from employer retaliation for microdosing if they are not noticeably impaired at work. These kinds of protections have been built into the proposed Washington State Psilocybin Services Wellness and Opportunity Act, which prohibits employers from retaliating against employees for participating in psilocybin services as long as they are not noticeably impaired in the workplace.[473] Recommendations for supported adult-use frameworks are considered next.

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[470] *See* Ponté, *supra* note 164, at 21.

[471] *See supra* Section I.B.2.

[472] *See* George et al., *supra* note 2, at 11.

[473] S. 5660, 67th Leg., Reg. Sess (Wash. 2022) ("An employer in the state of Washington may not discriminate against an employee for receiving psilocybin services as sanctioned under this chapter absent the employee's visible impairment at work . . . .").

B. *Supported Adult-Use Frameworks*

Supported adult-use frameworks have the benefit of ensuring that people can microdose with more consistent products that have been tested by state-sanctioned laboratories under the supervision of trained and licensed facilities. However, Oregon is currently the only state with a supported adult-use framework that allows for microdosing. The text of Measure 109 neither specifies a minimum psilocybin dose nor minimum duration for administration sessions.[474] However, the OHA's rules set a minimum session duration of thirty minutes for clients consuming a psilocybin dose less than 2.5 milligrams.[475] The following recommendations are intended to guide the OHA, the Oregon legislature, and other jurisdictions and agencies that craft legislation and rules for the supported adult use of psychedelics.

To encourage people to choose microdosing products that have been tested for safety, supported adult-use jurisdictions should create legislation and rules that allow the production of microdosing products with accurate and consistent doses. Accordingly, when drafting legislation and rules, they should avoid setting minimum doses for psychedelics or lower limits on the duration of administration sessions. These limitations may pose a safety risk and would be challenging and expensive to enforce. Instead, they should create legislation and rules that train psychedelic facilitators to determine the appropriate dose and duration for each administration session.

When drafting legislation and rules, supported adult-use jurisdictions should avoid implementing waiting periods between psychedelic administration sessions. Requiring waiting periods will make microdosing challenging or impossible and encourage people to microdose using illicit products of unknown origin and purity. It may also prevent people from starting with low doses of psychedelics to determine how sensitive they are, or whether they have allergies to ingredients in psychedelic products, which poses safety risks. This concern could be partially addressed through rules that allow for booster doses following the successful administration of a microdose or minidose.[476] Then people could consume a small test dose followed by a larger standard dose hours or days later if they react positively to the test dose.[477] However, in addition to making microdosing more burdensome, and potentially more dangerous, rules that create waiting periods between administration sessions could be challenging and expensive to enforce. It is likely safer and more practical to adequately train facilitators and empower them to determine the optimal dosing schedules for clients.

To create flexible systems that can efficiently accommodate a spectrum of doses, supported adult-use jurisdictions should craft legislation and rules that allow for variable length administration sessions, as recommended by the

[474] Emerge L. Grp., *supra* note 418, at 26:37, 29:30.

[475] OR. ADMIN. R. 333-333-5250(1)(a) (2022).

[476] *See supra* Section III.C.

[477] *See supra* Section III.A.1.

Oregon Board. Variable length administration sessions can be adjusted to accommodate the full range of psychedelic doses from microdoses and minidoses to standard doses and large doses. This approach is preferable to the tiered approach required by the OHA's finalized rules,[478] which are too rigid and oversimplify the relationship between dose and client response. Legislators and regulators should fully integrate microdosing into psychedelic facilitator training programs. Facilitators should be trained to understand and implement different microdosing protocols. They should also be familiar with the state of microdosing science and how to explain it clearly to clients lacking medical or scientific backgrounds.

To reduce the cost of microdosing, supported adult-use jurisdictions should draft rules that allow group microdosing sessions where facilitators simultaneously support and advise multiple clients. Group microdosing may take the form of microdosing cafes or shared workspaces where people consume microdoses and read, work, or socialize with support from trained facilitators who act as coaches or guides. To further reduce costs, jurisdictions should draft rules that allow nonprofits, religious organizations, and cooperatives to provide microdosing services at reduced rates.

People with certain disabilities and health conditions may have mobility impairments that affect their ability to travel to psychedelic service centers.[479] Accordingly, to ensure that a safe and legal means of microdosing is available to all, supported adult-use jurisdictions should draft legislation and rules that allow for at-home administration sessions when people cannot travel to a service center due to disability or illness. The proposed Washington Psilocybin Services Wellness and Opportunity Act currently contains this type of provision.[480] For similar reasons related to accessibility, jurisdictions should allow for a variety of product types to ensure that people with disabilities have equal access to microdosing. Otherwise, people with certain health conditions, such as dysphagia—a condition that makes swallowing difficult—may be unable to consume psychedelics.[481] Allowing a variety of products that can be consumed in different ways helps ensure that these individuals have access. Though the Oregon Board recommended a variety of product types, including transdermal patches and sublingual strips that deliver psilocybin,[482] the OHA's current rules allow only for psilocybin products that are consumed orally or enterally (through

[478] *See* OR. ADMIN. R. 333-333-5250.

[479] *See* S. 5660, 67th Leg., Reg. Sess (Wash. 2022).

[480] *See id.*

[481] *See Dysphagia (Difficulty Swallowing)*, CLEVELAND CLINIC, https://my.clevelandclinic.org/health/symptoms/21195-dysphagia-difficulty-swallowing [https://perma.cc/6DZW-ZE8A] (last updated Mar. 24, 2020).

[482] *See Equity SC Products Recommendations Summary (11/17/2021)*, OR. HEALTH AUTH., https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/Documents/Equity%20Product%20Rec%20Summary%2011.17.xlsx [https://perma.cc/6QZD-B5KT] (last visited Feb. 10, 2023).

the digestive tract).[483] This limitation could leave some potential clients with no options for participating in the state's psilocybin services program.

During the implementation of Oregon's Measure 109, there has been some debate regarding whether microdosing is permitted under the statute. To avoid unnecessary confusion in the future, the drafters of future legislation could implement language stating that microdosing cannot be prohibited and must be regulated by administrative rules when drafting psychedelics legislation. Moreover, when legislation creates advisory boards, task forces, or working groups to evaluate potential legislation or administrative rules, it should put the safe and equitable implementation of microdosing within the scope of the body's mandate.

Finally, to promote public safety, supported adult-use jurisdictions should fund education and training on microdosing safety for a variety of stakeholders including healthcare providers, first responders, and the public. They should include a legislative provision protecting employees from employer retaliation, as well as whistleblower protections and affirmative duties that encourage facilitators and employees of psychedelic manufacturers and service centers to report misconduct. As stated previously, the proposed Washington State Psilocybin Wellness and Social Opportunity Act contains provisions to protect employees.[484] Regarding whistleblower protections and affirmative duties to report, the licensing subcommittee of the Oregon Board recommended such measures in a facilitator code of ethics that it approved in early 2022.[485] The OHA largely incorporated those recommendations into its final rules.[486]

C. *Retail Models*

In the Netherlands, people can microdose at home because the Dutch smart shop model effectively functions like the U.S. cannabis dispensary model.[487] In smart shops, customers can purchase products that are designed for microdosing and consume them without supervision.[488] This approach differs from supported adult-use models created by Measure 109 in Oregon, and proposed legislation in other states, which requires licensed facilitators to administer psychedelics to clients.[489] However, like supported adult-use frameworks, retail models have the benefit of creating a safe and legal supply of microdoses that can be tested for

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[483] *See* OR. ADMIN. R. 333-333-2120; *Oregon Psilocybin Services—Public Listening Sessions*, *supra* note 370.

[484] Wash. S. 5660.

[485] *See* ETHICAL PRINCIPLES/CODE OF CONDUCT FOR PSILOCYBIN FACILITATORS (2022), https://www.oregon.gov/oha/PH/PREVENTIONWELLNESS/Documents/Ethical%20Principles-Code%20of%20Conduct%20for%20Jan%206%20Meeting%201-2-2022.pdf [https://perma.cc/9MFG-DGMD].

[486] *See* OR. ADMIN. R. 333-333-4700, -4810, -5120.

[487] *Psilocybin Online Retail Platform*, *supra* note 466.

[488] *See id.*

[489] *See supra* Section I.B.

adulterants and contaminants.[490] They would also bring microdosing out of the shadows, making people more likely to report misconduct or harmful psychedelic products.[491]

Under retail models, consumer education is key to promoting safe and enjoyable microdosing experiences. Legislation and rules might require sales staff to educate consumers on microdosing safety and common protocols. They could provide consumers with pamphlets containing additional information, which is common practice in Dutch smart shops. However, these materials are often written and created by the companies that produce the products.[492] In a state retail model, an agency or working group could produce educational materials that are provided to consumers at the point of sale.

D. *Medical Frameworks*

When the FDA approves psychedelics like psilocybin for treating certain medical conditions, such as treatment-resistant depression, the agency will undoubtedly implement REMS that mandate how the substances can be administered, who can administer them, and where they can be administered. These restrictions could significantly impede the off-label use of microdosing as a treatment option. In addition to encouraging people to shift to illicitly sourced microdosing products, which has associated risks, overly restrictive REMS could impede the accumulation of research data that could be gained through off-label prescribing. Low dose off-label prescribing is common with other medications, and it should be allowed for psychedelics. Accordingly, the FDA should only adopt evidence-based REMS that are sensitive to the needs of affected communities and drafted in consultation with them. In 2021, in response to widespread criticism, the FDA relaxed REMS implemented for mifepristone, a drug that has been used safely to end pregnancies and treat early miscarriages.[493] Because poorly crafted REMS can be burdensome and negatively impact the quality and availability of medical care, it is important to get them right the first time.[494]

In addition to crafting only evidence-based REMS with input from regulated communities, jurisdictions that create medical frameworks for psychedelics should fund research on microdosing to advance our scientific understanding of the practice.

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[490] *See supra* Section IV.B.

[491] *See supra* Section IV.A.

[492] *Psilocybin Online Retail Platform*, *supra* note 466.

[493] *See* Steve Inskeep & Sarah McCammon, *The FDA Relaxes Controversial Restrictions on Access to Abortion Pill by Mail*, NPR (Dec. 17, 2021, 5:07 AM), https://www.npr.org/2021/12/17/1065083161/the-fda-relaxes-controversial-restrictions-on-access-to-abortion-pill-by-mail [https://perma.cc/W4KV-DCSB]; *see also* Julia Kaye, Rachel Reeves & Lorie Chaiten, *The Mifepristone REMS: A Needless and Unlawful Barrier to Care*, 104 CONTRACEPTION 12, 12 (2021).

[494] *See* Kaye et al., *supra* note 493, at 13-14.

CONCLUSION

Microdosing is a growing trend in which people consume low doses of psychedelic substances once or twice per week to boost cognitive performance, enhance mood, or decrease symptoms of depression, anxiety, or pain. However, as more cities and states decriminalize or legalize psychedelics, their statutes, ordinances, and resolutions do not address microdosing, which may incentivize people to microdose using illicit products of unknown origin and purity. To promote safety and equitable access to microdosing, jurisdictions should address the practice in their legal reforms.

Cities and states that pursue a decriminalization approach to psychedelics regulation should ensure that people have a legal means of obtaining safe supplies of the substances for microdosing. This goal can be achieved by educating the public, decriminalizing microdose production and sharing, and implementing drug-checking sites to test substances for identity and purity. Jurisdictions that create supported adult-use frameworks should draft legislation and rules that allow for safe and equitable microdosing. They should avoid setting minimum doses, requiring waiting periods between administration sessions, and mandating minimum durations for those sessions. Moreover, supported adult-use jurisdictions should integrate microdosing into facilitator training programs and allow for products and services that make microdosing accessible for people with disabilities. To reduce costs, they should support models that reduce the costs of microdosing such as nonprofit and cooperative business structures and group microdosing services. Successful implementation of these measures should be within the statutory mandate of state agencies, advisory boards, and working groups. Jurisdictions that create retail models could require sales staff to be trained on microdosing protocols and to provide additional sources of information to consumers. Finally, jurisdictions that create medical frameworks should invest in microdosing research, implement only evidence-based REMS, and consult regulated communities when drafting REMS. In all cases, microdosing education is paramount. Moreover, to promote public safety, all jurisdictions should create safeguards for employees and facilitators who report misconduct or dangerous products and services.