



Psilocybin-based mushrooms and usage

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Abstract

Nature created a mushroom-based compound known as psilocybin that can biochemically affect neural processing and alter perception. Although psilocybin usage dates to ancient times, its contemporary usefulness is expanding. Discovering the history and imagining the future of psilocybin is enlightening and fascinating. This review presents research and opinions on the potential benefits and hazards of psilocybin usage.

Introduction

Science-based medicine continues to research naturally occurring compounds for health and well-being. Magic mushrooms are fungi that contain the hallucinogenic compound psilocybin. Psilocybin acts like a neurotransmitter in the human body because it has structural similarity to serotonin. Psilocybin's half-life characteristics and receptor residence time can alter perceptions and thoughts. Negative emotions and feelings are intrinsic in our nervous system through experiences. If we can change the biochemistry of our nervous system with psilocybin, we may be able to change perceptions and thoughts. With professional medical supervision, psilocybin-assisted treatment may bring enlightenment and hope to the human condition.

Discussion

Evolution

How long have psilocybin-based mushrooms been in existence? Evolutionary analysis indicates two independent transitions of muscarine-free lineages to psilocybin-producing states. The transition to a hallucinogen, psilocybin-producing mushrooms, from their toxic muscarine-producing ancestors, occurred between 10-20 million years ago [1]. Psilocybin may have been an evolutionary adaptation in mushrooms during the late Cenozoic ice age to help prevent freezing. Psilocybin is a water-soluble zwitterion that lowers the freezing point of psychedelic mushrooms, allowing them to withstand colder temperatures and

resist stunted growth.

Nichols [2] explores the earliest recorded origins of psilocybin mushrooms. Psilocybin is an indole-based secondary metabolite produced by numerous species of mushrooms. South American Aztec Indians referred to them as teonanacatl, meaning "God's flesh," and used in religious and healing rituals. Spanish missionaries in the 1500s attempted to destroy all records and evidence of the use of these mushrooms. Nevertheless, a 16th-century Spanish Franciscan friar and historian mentioned teonanacatl in his extensive writings, intriguing 20th-century ethnopharmacologists and leading to a decades-long search for the identity of teonanacatl. In 1957, a photo essay in a popular magazine described these mushrooms for the Western world. Chemical synthesis of the active ingredient occurred. In the past 10-15 years, several FDA-approved clinical studies have indicated potential medical value for psilocybin-assisted psychotherapy in treating depression, anxiety, and certain addictions. If more extensive studies can validate the early clinical studies, psilocybin is poised to impact treatments available in psychiatric medicine significantly.

Paulson [3] writes that magic mushrooms go far back in human history. People have been eating, tripping on, and even worshiping magic mushrooms for millennia. Some people even believe eating psychedelic mushrooms led directly to the origins of human consciousness. Essentially, the mushroom made us human. The "Stoned Ape Theory" is improbable, but people cannot stop talking about it.

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Lamb [4] explores the connection between human consciousness and psilocybin ingestion. Did psychedelics stimulate human consciousness? First proposed by 20th-century ethnobotanist Terence McKenna (1946 - 2000) in his 1992 book *Food of the Gods*, the basic concept is that the consumption of psychedelic fungi may have played a crucial role in the development of the human mind and culture. The hypothesis suggests we owe the emergence of language and self-reflection to the ancient, sustained consumption of psilocybin mushrooms. In *Food of the Gods*, McKenna made his argument based on noted qualities of the psychedelic experience (such as augmented empathy and sensory perception), shamanistic traditions in ancient cultures, and the known and hypothetical range of psychedelic plants and fungi in ancient times. The criminalization of psychedelics alienated humans from an aspect of their ascendancy. The stoned ape hypothesis is not likely to leap to the level of scientific theory in the foreseeable future. However, the modern psychedelic reconnection that Terence McKenna and others advocated might occur — especially as more studies examine potential therapeutic uses.

Rodriguez Arce et al. [5] teach a strong connection between the evolution of human social consciousness and the use of psilocybin. The evolutionary scenario suggests that integrating psilocybin into the ancient diet, collaborative practice, and proto-religious activity may have enhanced hominin response to the socio-cognitive niche and aided in its creation. In particular, the interpersonal and prosocial effects of psilocybin may have mediated the expansion of social bonding mechanisms such as laughter, music, storytelling, and religion, imposing a systematic bias on the selective environment that favored selection for prosociality of our lineage.

There is no disputing that the history of human evolution and subsequent civilizations formed in Central America, Egypt, and Greece are mirrored in their ritual use of psilocybin.

Nutrition and health

Shortsleeve [6] teaches that mushrooms are a superfood because they have protein, virtually no fat, no cholesterol, are loaded with vitamins, are low in sodium, promote a healthy immune system, and boost bone health. Furthermore, a 0.125-ounce (~3.5 grams) serving of dried and cured psilocybin mushrooms comprises 2 grams of protein, 1 gram of carbohydrates, 0 grams of fat, 250 mg potassium, and provides 20% of the daily recommended allowance of iron [7].

War on drugs

Can psilocybin serve purely medical innovation, unfettered by political and legal restrictions? Littin [8] discusses that the war on drugs halted research into the potential benefits of psychedelics. The author proffers cautionary optimism after the dark decades following the 'War on Drugs.' Arthur King was one of the thousands of research subjects given LSD, psilocybin, and mescaline as therapeutic tools in the 1950s and 1960s, often with government support and promising results. However, the backlash against psychedelic testing had already begun. By the mid-1970s, the legal exploration of the therapeutic benefits of psychedelic drugs was over. This research is only gathering momentum again in a new wave of U.S. clinical trials into other drugs with psychedelic properties. In recent years, university administrators, government regulatory agencies, and private donors have begun giving the stamp of approval and the money needed for new and expanding research into the use of MDMA, also known as ecstasy and psilocybin, the active ingredient in

magic mushrooms. Advocates of the therapeutic and spiritual use of psychedelics are already celebrating the start of the "post-prohibition era." That party may be a bit premature, but the government crackdown in the 1970s and 1980s on scientific research and personal use of psychedelic drugs had declined.

Still [9] discusses the changing political landscape of psilocybin use in the service of medical progress. Former Texas Gov. Rick Perry spent 14 years in that chair before twice running for president and later becoming President Donald Trump's Department of Energy secretary. Never a fan of legalizing recreational drugs, Perry came out of semi-retirement this spring to back a Texas Democrat in her bid to require a state clinical study of using psilocybin — found in "magic mushrooms" — to help veterans with mental health problems. The bill passed the Texas Legislature, thanks partly to Perry, meaning Texas joined Oregon, Connecticut, New Jersey, Maine, and California to take a harder look at using psilocybin and other psychedelic drugs to treat depression, post-traumatic stress disorder and even conditions such as Parkinson's disease. "This is not a conservative or Republican issue. It is a right or wrong issue," said Perry, who finds himself in the company of congressional Democrats such as Rep. Alexandria Ocasio-Cortez is calling for more government-funded research. A bill calling on the National Institutes of Health to fund such studies may be moving through Congress.

Decriminalization

Magic mushrooms are legal in Brazil, Bulgaria, Jamaica, the Netherlands, and Samoa. Many other countries have decriminalized the possession and cultivation of mushrooms. While the recreational use of magic mushrooms is still illegal across the United States, activists in some states are pushing for more widespread decriminalization. On November 3rd, 2020, Oregon became the first state to legalize psychedelic mushrooms. As research uncovers medical and therapeutic benefits, the United States could gradually change magic mushroom legality [10].

Leins [11] teaches that many cities support de-prioritizing policing, arrests, and prosecution for magic mushroom possession. These cities include Arcata, California; Oakland, California; Santa Cruz, California; Denver, Colorado; District of Columbia, Washington; Cambridge, Massachusetts; East Hampton, Massachusetts; Somerville, Massachusetts; Ann Arbor, Michigan; Detroit, Michigan; Washtenaw, Michigan; the entire state of Oregon; City of Port Townsend, Washington; and Seattle, Washington.

Branson-Potts [12] describes how a trip on magic mushrooms helped decriminalize psychedelic plants in a California city. Carlos Plazola locked himself in a bedroom while his cousin stood guard. For five hours, he tripped on magic mushrooms, nibbling the fungi, and sipping them in tea. He ingested 5 grams — a heady amount that connoisseurs call the "heroic dose." It was Plazola's first-time using mushrooms, which contain the naturally occurring hallucinogen psilocybin. He started having epiphanies, one right after the other, like lightning bolts. "I was making connections that I had never made in terms of my understanding of what we are, what the cosmos are, why we're here, where we're going," Plazola said. That mushroom trip last October by Plazola, the well-connected onetime chief of staff of a former Oakland City Council president, helped make Oakland the first city in California and the second in the nation to effectively decriminalize magic mushrooms. Plazola co-founded a group called Decriminalize Nature Oakland,

which wrote the ordinance and successfully lobbied for its passage. Plazola's mission was helped by the fact that he was a longtime aide to former Oakland City Council President Ignacio De La Fuente and knew all the council members. Councilman Noel Gallo, who introduced the measure, said he had "known him for a long, long time. I had a lot of respect for what he'd accomplished. They came to my office with a surgeon, doctors, users, and I listened to him." Gallo says he is now routing queries from people interested in decriminalizing psychedelics to Decriminalize Nature Oakland, which says it has communicated with people in dozens of cities. Plazola said, "It's not about money. Making it all about money is how we got into a place of opiate addiction and a horrible healthcare system."

Business and Employment Law

An article published in *Pharmaceutical Investing News* (2021) titled "The Future of Mental Health and Addiction Therapy: Why Capital is Flowing into psychedelics" explores the nexus between psychedelic-assisted mental health and changing social stigma via marketplace awareness. Investors and regulatory bodies are slowly warming up to the idea that psychedelics can provide suitable treatment options for those suffering from mental health conditions. The larger capital markets have seen a snowballing effect as psychiatric and mental health therapy innovations are now materializing through psychedelic research and medicine. With shifting consumer awareness and the removal of societal stigma, it is no wonder why the psychedelic medicine market is estimated to grow to US\$100 billion in the coming years. This exciting trend is forecasted to bring unprecedented levels of investment, capital gain, and the potential for alleviating pain for the millions of North Americans suffering from mental health issues [13].

Are United States employees protected by employment law when using psilocybin? *Employment law* is a broad area encompassing all aspects of the employer/employee relationship, except for the negotiation process covered by labor law and collective bargaining. Thousands of federal and state statutes, administrative regulations, and judicial decisions encompass employment laws [14].

Sheppard [15] discusses psilocybin use discrepancies and tensions between state and federal policy. In 2020, Oregon voters legalized therapeutic psilocybin in response to many scientific studies showing symptom reduction for depression, anxiety, substance use disorders, opioid addictions, migraines, other mental illnesses, HIV/AIDS, and cancer. The legal rethinking regarding therapeutic psilocybin continues in state legislatures and city councils. However, despite state and local legalization, it remains illegal under the federal Controlled Substances Act. This tension between local and Federal law places therapeutic psilocybin users and their employers in a difficult position. Because all types of psilocybin use remain illegal under federal law, a zero-tolerance drug use workplace policy would discipline a state-sanctioned psilocybin user for off-site or off-hours therapeutic psilocybin use. Therefore, this article proposes that as states and cities legalize therapeutic psilocybin, jurisdictions should adopt employment protections for psilocybin users like states have adopted for medical cannabis users. The proposed statute in this article protects psilocybin users from adverse action based solely on off-site and off-hours drug use and balances employers' rights.

Can microdosing psychedelic mushrooms enhance workplace

performance? Case [16] discusses why some execs are using psychedelics to get through the workday. After his father died in 2018, Paul Marlow struggled with fear, anxiety, and depression. That is when he turned to microdosing psychedelics as a remedy — and he has not looked back. Microdosing, he said, helps him focus on work. "It also gives me energy, and I notice myself thinking with an outside-the-box mindset," said Marlow, who runs the mental health support network Never Alone in Vancouver. Microdosing therapy, he added, "helps remove the dark clouds in my head when days are bad, giving me the opportunity to be somewhat productive. Without it, I would be in my bed those days, staring at the ceiling curled up into a ball." After his father died in 2018, Paul Marlow struggled with fear, anxiety, and depression. That is when he turned to microdosing psychedelics as a remedy — and he has not looked back. Microdosing, he said, helps him focus on work. "It also gives me energy, and I notice myself thinking with an outside-the-box mindset," said Marlow, who runs the mental health support network Never Alone in Vancouver. Microdosing therapy, he added, "helps remove the dark clouds in my head when days are bad, giving me the opportunity to be somewhat productive. Without it, I would be in my bed those days, staring at the ceiling curled up into a ball." As the pandemic persists, many who are looking for a jolt of motivation, inspiration, or medication are turning to microdosing — that is, ingesting small amounts of psychedelic drugs to combat mental health issues and enhance creativity, productivity, and physical well-being. The faithful swear by it. Moreover, studies indicate a link between taking "magic mushrooms" and tangible health benefits — including decreased instances of heart disease and diabetes as well as anxiety and depression. However, the social stigma of taking drugs on the clock has made the issue a gray matter. Considering stories like that of a CEO who said he was fired this past spring for microdosing psychedelics — drugs that are, after all, illegal — it also warrants asking what impact the practice could have on the workplace. One study by the *Harm Reduction Journal* cited "illegality" as the greatest challenge to the practice of microdosing, followed by "physiological discomfort" and "impaired focus." The top benefits were "improved mood," "creativity," and "self-efficacy." Nicholas Levich, cofounder of Denver-based Psychedelic Passage, a network of guides and "trip sitters" who facilitate psychedelic experiences, said he has worked with several clients who use microdosing to maximize their work performance — many of whom hold ranking executive positions or ownership roles in their companies. In fact, one of his group's facilitators specializes in helping high-level execs use microdosing for "self-mastery," he said. "The vast majority of jobs in the U.S. are based on productivity and production, and microdosing provides an all-natural way to improve these measures of performance," Levich added. Marlow also thinks the benefits to the broader workforce speak for themselves, predicting that microdosing is poised to become as "common as your morning cup of coffee." Not everyone is convinced. Microdosing psychedelics during the workday will likely remain "a fringe undertaking," said Dr. Lewis Jassey, medical director at Leafwell in Los Angeles. This telehealth platform helps obtain medical marijuana cards for the public and medical cannabis certificates for physicians. "For many, the fear of potentially losing their jobs due to drug-free workplace laws will be a significant reason they will probably avoid psychedelic use at work," added Jassey. "While most drug tests do not test for psychedelics, that does not mean an employee cannot be fired if their employer finds them "under the influence," Jassey said —

even if that employee is taking a low, non-psychoactive dose. Those working in roles that involve ensuring people's safety must be especially careful to avoid using psychedelics during working hours to avoid risking their own or others' well-being as well as legal culpability. "Employers retain their right to have a drug-free workplace," Jassey said. "Until compounds like psilocybin are legally available, they do not have to tolerate any psychedelic use — even in low doses — during working hours." Still, there are promising developments that could change how microdosing is treated in the workplace. As noted, a growing body of research points to the various benefits of psychedelics — including the use of psilocybin, a hallucinogenic chemical found in certain mushrooms, as an antidepressant. Should it become available as a prescription for depression, it could become as common as pharmaceuticals like Lexapro and Zoloft one day. "The key to microdosing in the workplace is legalization, but also medicalization," said Jassey. For his part, Levich of Psychedelic Passage believes that, in theory, it should not matter to an employer whether an employee is microdosing. "Employers do not monitor how many cups of coffee you have had or whether you have taken your pharmaceutical medication that day — microdosing is no different," he said. "If anything, employers should be open to this type of supplementation as it is natural, safe, and ultimately has the potential to increase employee productivity and well-being.

God experience

God is the perfect and all-powerful spirit, force, or energy that is worshipped, especially by monotheists—Christians, Jews, and Muslims, as the One who created and rules the universe [17].

As many philosophers and seers have parlayed over the ages, in as much as human beings are created in the image of God, we are primarily spiritual entities experiencing embodied existences. In our journey between birth and death, we seek meaning, purpose, and fulfillment via avenues that would connect us with our divine origins. In essence, God is the locus of completion, which obviates the clamor and confusion of an ego-driven life, largely devoid of Caritas, love, and compassion. Churches, temples, and mosques can only provide so much relief for the aching lacuna at the core of the human heart. Via a personal, inward journey, we seek pathways to the sacred with an urgency that can no longer be delayed. The planet and all sentient life seemingly sit helplessly at the crossroads of extinction. How can we elude further mental anguish, war, and self-destruction? For certain seekers, ancient practices attuned to divine enlightenment provide underdeveloped solutions through contemporary, traditional means. As a panacea for existential angst, psilocybin may provide relief to lives poised on the shoals of meaninglessness and destruction.

Griffiths et al. [18] research shows that after ingesting psychedelics, more than two-thirds of those identified as atheists before the experience no longer identified as atheists afterward. These experiences rated as among the most personally meaningful and spiritually significant lifetime experiences, with moderate to strong persisting positive changes in life satisfaction, purpose, and meaning attributed to these experiences.

Psilocybin catalyzes changes in brain patterning, mushroom tripping may provide permanent inroads to the peace and protection conferred to faithful believers. Scoles [19] discusses what may happen when psychedelics make you see God? Certain psychedelics stick to serotonin receptors called 5-HT_{2A}

in the central nervous system, producing classic trippy effects in ways neuroscientists do not totally understand yet. However, the substances seem to affect a framework in the brain called the default mode network, which typically lights up when you are pointing your attention inside yourself and not toward the outside world—like when you are daydreaming. When you pop or sip or chomp on a hallucinogen, this grid calms down, and its connections and oscillations change. Since in its sober state, it's all about self-contemplation, Griffiths and Barrett suspect that disrupting it results in the opposite: the "dissolution of the self," or the loss of your sense of being a lone individual. That could also explain the feeling of connectedness to everything outside who you are.

The potential of neurochemical effects on serotonin receptors may indeed provide radical transformative change to hapless communities in the throes of anguish. What may be born of desperation may end in a unified field of purpose whose breadth and depth may be unimaginable.

US Supreme Court and Religious Rights

The U.S. Supreme Court is the highest tribunal in the nation for all cases and controversies arising under the Constitution or the laws of the United States. As the final arbiter of the law, the Court is charged with ensuring the American people the promise of equal justice under law and thereby functions as guardian and interpreter of the Constitution. The Supreme Court consists of the United States Chief Justice and several Associate Justices as may be fixed by Congress. The number of Associate Justices is currently fixed at eight (28 U. S. C. §1). Power to nominate the Justices is vested in the President of the United States, and appointments are made with the advice and consent of the Senate [20].

Kleiman [21] reports the Supreme Court recently held that the use of hallucinogens in religious ceremonies is protected under the Religious Freedom Restoration Act and must be permitted unless there is a showing of harm. It is well-established that psilocybin is neither addictive nor physically toxic, though it is not without psychological and behavioral risks when used haphazardly.

An advocate of the healing powers of psilocybin, former Utah legislator and member of the LDS church, Steve Urquhart, has founded The Divine Assembly Church on the basis that the First Amendment protects the free exercise of religious expression. While Urquhart eschews all forms of sanctimonious notoriety, he proposes that each individual [congregant] can commune with the divine and receive direct guidance. Psilocybin is a holy sacrament in the service of heightened spiritual consciousness that connects directly with the Source. Gehrke [22] writes about the long, strange trip of Steve Urquhart, from GOP lawmaker to founder of a church of magic mushrooms. Urquhart states, "What I am attempting to do is set up this religion that believes in this very active sacrament that works, that people can have their own noetic experience, they can commune with the divine and receive direct guidance. I am just seeing wonderful things, really glorious things, and just almost coming out of my skin; it is so marvelous, and the only word I can think of in our language for that is rapture."

Bombard [23] writes about why some ex-Mormons are using psychedelics. Steve Urquhart, a former Utah state legislator, announced that he was forming his church. Urquhart was once a highly conservative lawmaker, which was in line with his background as a member of the Church of Jesus Christ of

Latter-day Saints from Washington County. His new church, The Divine Assembly, bears little in common with Mormonism because its sacrament is psychedelics rather than bread and water. They make up a loosely knit but growing sub-culture of thousands of seekers who find in psychedelics access to healing, personal discovery, and even mystical, spiritual states of consciousness that harken back to their Mormon tradition. One of the most valuable insights David gained during his first magic mushroom trip was that he had everything he needed within himself – he could captain his ship.

Spirituality

Spirituality is a broad concept with room for many perspectives. It includes a sense of connection to something bigger than us; it typically involves a search for meaning in life. As such, it is a universal human experience that touches us all. A spiritual experience may be sacred, transcendent, or a deep sense of aliveness and interconnectedness. Some may find that their spiritual life is associated with a church, temple, mosque, or synagogue. Others may pray or find comfort in a personal relationship with God or a higher power. Still, others seek meaning through their connections to nature or art. Like your sense of purpose, your definition of spirituality may change throughout your life, adapting to your own experiences and relationships [24].

Griffiths et al. [25] reported that psilocybin-occasioned mystical-type experience in combination with meditation and other spiritual practices produces enduring positive changes in psychological functioning and trait measures of prosocial attitudes and behaviors.

Metaphysical belief

Metaphysical belief is a type of philosophy or study that uses broad concepts to help define reality and our understanding of it, metaphysical studies generally seek to explain inherent or universal elements of reality that are not easily discernable or experienced in our everyday life. As such, it is concerned with explaining the features of reality that exist beyond the physical world and our immediate senses [26].

For many, the use of hallucinogenic mushrooms provides a window into the recesses of metaphysical experience, which provides insight into the otherwise ineffable reaches beyond the material plane. Shamanic cultures across the ages have accessed this metaphysical realm through expertise that parallels the most prescient and sacred of priestly functions. Much can be gleaned from ancient wisdom and praxis in Western cultures that clamor for meaning beyond the material confines of late capitalism. Indeed, archaeological evidence in the form of petroglyphs and ritual artifacts places psilocybin use as central to sacred healing rites. One wonders why the West has both vilified and eschewed psilocybin usage in the face of millennia of ancient wisdom. On cursory reflection, within the context of spiritual bankruptcy, Western subjectivity faces a pandemic of toxic drug dependence, mental illness, environmental peril, and a full spectrum of mounting social injustices. The time for global readjustment is past due.

Timmermann et al. [27] report that psychedelic-use may causally influence metaphysical beliefs—shifting them away from ‘hard materialism.

Everyone has a genetic predisposition to understand their existence and wonders if there is a never-ending metaphysical realm. The psychedelic hallucinogen psilocybin induces expanded neural networking in the brain, triggering a paradigm

shift of images and thoughts during focused reasoning. In simplification, psilocybin allows everyone to conceptually explore the existence of the metaphysical through their genetic individuality and psilocybin-assisted cognition.

Religion

Religion is a set of organized beliefs, practices, and systems that usually relate to belief and worship of a controlling force such as a personal god or another supernatural being, religion exerts a powerful influence on normative codes and behavior. While different understandings of religion exist, not all religions are immersed in a belief in a god, gods, or even supernatural forces. Religion often involves cultural beliefs, worldviews, texts, prophecies, revelations, and morals that have spiritual meaning to members of the faith. The religious practice encompasses a range of ritual signifiers, including sermons, Doxa, prayer, meditation, trances, sacred sites, symbols, and feasts. Throughout his prolific life, famed psychoanalyst Sigmund Freud describes religion alternately as an unconscious form of wish fulfillment, neurosis, delusion, and control over the outside world. However, modern psychology recognizes that religion can play a germinal role in an individual's life and experiences and even improve health and well-being. The psycho-somatic forces at play in the healing arts are undeniable. Studies have shown that religion can help people develop healthy habits, regulate their behaviors, and understand their emotions—all factors that affect one's health [28].

Devlin [29] teaches that the use of psychedelics in the service of mystical revelation has an ancient, trans-global history. Due to fungi's adaptability and species versatility throughout a wide range of climates, psilocybin has probably been used for at least 10,000 years. Some even suggest that magic mushrooms have been ingested since 10,000 B.C.E. In fact, ethnobotanists and historians alike have posited that the evolution of Homo sapiens mirrors that of psilocybin consumption in that, or so the Stoned Ape Theory goes, “the heightened consciousness achieved from encounters with mushrooms containing psychedelic compounds enabled Homo erectus to evolve into Homo sapiens, some 1.8 billion years ago.” Forming relationships to bond with others of the species in the service of higher, mystical powers may have been the hallmark of human development.

The pre-modern use of psychedelics was appropriated by shamanism to manage therapeutic, divination, and consciousness-raising within communities. Kirti [30] describes illustrations of Magic Mushrooms in Early Christian Iconography. Does Christianity have a psychedelic history? Dating back to 200 CE, various mushroom motifs and a mushroom stone resembling the shape of *Psilocybe Mexicana* have been found in Mexico that might have been used by the indigenous people of Mesoamerica for religious ceremonies, divination, and healing. The Plaincourault Chapel in Mérégnay, France, was built around the 12th century had a fresco of Adam and Eve, surrounding an *Amanita* mushroom and themselves covered with mushroom caps and not fig leaves. The church of Saint Martin de Vicq in central France had a fresco portraying Christ's entry to Jerusalem. And how could we miss the five psilocybin mushrooms over the heads of the youth welcoming Christ? Canterbury Cathedral in England is one of the most famous churches for Christians, and when the Browns visited this church, they uncovered another psychedelic painting. Christ encircled with plants at the bottom. And these are not ordinary plants but psilocybin mushrooms, including *Amanita muscaria*, blue psilocybin, and two other varieties of *Psilocybe*.

St. Michael's Church, Germany, has a painting of the Jesse Tree in which a tree grows from Jesse, founder of the lineage of the major kings of Israel, from whose tribe it was predicted that the Messiah would be born. This painting shows the Temptation scene from the Garden of Eden with a backdrop of a psilocybin red-and-gold mushroom cap. Just like the consumption of psychedelics in other cultures historically, the visual evidence of these magic mushrooms reveals alternative understandings of early Christianity.

Addictions

Addiction is a compulsive need for and use of a habit-forming substance. It is accepted as a mental illness in the diagnostic nomenclature and results in substantial health, social and economic problems. In diagnostic terminology, addiction includes personality disorders and other behaviors considered deviant. However, it is now considered a clinical syndrome. Addiction is multifactorial, with substantial genetic influence. Environmental factors also influence the development of addictions [31].

Alcohol addiction

Alcoholism is alcohol dependence, the body's inability to stop drinking due to alcohol cravings. Individuals with an alcohol addiction may go to extreme measures such as stealing, lying, hiding alcohol, and even drinking household cleaners that contain alcohol and other unhealthy behaviors to satiate cravings and preempt withdrawal. In the absence of alcohol, these individuals can experience alcohol withdrawals characterized by agitation, tremors, hot flashes, increased heart rate and blood pressure, nausea and vomiting, and seizures. Withdrawing from alcohol can be lethal, and individuals should seek professional help to quit their drinking habit [32].

When alcohol dependence becomes long-term and chronic, the delicate balance in cerebral neurotransmitters occurs, and inhibitory and excitatory chemical changes result in poor brain circulation, which, in turn, may lead to stroke, heart disease, and lasting damage to the liver. Because alcohol moves quickly through the blood-brain barrier, neurons are damaged and even die. There are no cures for alcohol-related brain damage. As a result of ongoing clinical studies, psilocybin-assisted therapy may give patients insight into the source of their addiction. Researchers are hopeful that psychedelic use may significantly reduce alcohol consumption or cause complete abstinence.

Taub [33] teaches that psychedelic drugs can help alcoholics stop drinking. Picking up where this previous generation of scientists had left off, a team of researchers from Johns Hopkins University conducted an online survey of people with a history of alcohol use disorder (AUD) who had reported a reduction in drinking after using psychedelics at home. Three hundred forty-three people replied to the survey. Thirty-eight percent said they had managed to reduce their drinking after using LSD. In contrast, 36 percent claimed to have decreased their alcohol consumption after taking psilocybin – the active compound in magic mushrooms. Appearing in the *Journal of Psychopharmacology*, the study describes how respondents struggled with alcoholism for an average of seven years before their psychedelic experience, with 72 percent qualifying for a severe AUD diagnosis. After their psychedelic trip, however, an incredible 83 percent no longer met the criteria for AUD of any kind. More than 80 percent of participants overcome their alcoholism after taking a psychedelic drug like LSD or magic mushrooms, suggesting that these mind-altering substances

have a crucial role in addiction treatments. Thirty-six percent claimed to have decreased their alcohol consumption after taking psilocybin – the active compound in magic mushrooms.

Psilocybin-assisted alcohol sobriety may affect the part of the brain responsible for alcohol cravings. In continuation, animal studies indicate that psilocybin exposure reduces the expression of mGluR2 receptors essential for alcohol cravings. MacBride [34] describes a study that suggests psilocybin may reverse alcohol-induced brain damage. Researchers show that one psychedelic, psilocybin, essentially repairs the part of the brain responsible for alcohol cravings, hinting at a potential new treatment for the disorder. Meinhardt and his colleagues exposed mice to alcohol vapor to intoxicate them to similar levels as people with chronic alcohol use disorder experience for seven weeks. Over that period, the researchers monitored the mice's behavior and molecular changes in their brains. They then separated the alcohol-dependent mice into three groups and gave two groups of psilocybin: Lower dose psilocybin; Higher dose psilocybin; and Control group. As hypothesized, mGluR2 expression was reduced in the brains of alcohol-dependent mice. That reduction was consistent with lower executive function and increased alcohol cravings. In other words, becoming dependent on alcohol resulted in changes in the brains of mice — specifically in mGluR2 expression — and made the mice want more alcohol and less able to resist alcohol (in addition to a reduction in other executive functions). In both groups of mice that received psilocybin, the treatment restored mGluR2. This change was also evident in the mice's behavior: The psilocybin group relapsed roughly 45 percent less than the control mice.

Tobacco addiction

Nicotine dependence (also called tobacco addiction) involves physical and psychological factors that make it difficult to stop using tobacco, even if the person wants to quit. Nicotine releases dopamine in the same brain regions as other addictive drugs. When the person stops using tobacco, nicotine levels in the brain drop, and this change triggers processes that contribute to the cycle of cravings and urges that maintain addiction. Long-term changes in the brain caused by continued nicotine exposure result in nicotine dependence and attempts to stop cause withdrawal symptoms relieved with renewed tobacco use [35].

Garcia-Romeu et al. [36] evaluated psilocybin-occasioned mystical experiences during tobacco addiction treatment. The research shows that smoking cessation outcomes significantly correlated with measures of mystical experience on session days and retrospective ratings of personal meaning and spiritual significance of psilocybin sessions. These results suggest a mediating role of mystical experience in psychedelic-facilitated addiction treatment.

Shapiro [37] reports that Johns Hopkins University received a grant for psilocybin research in smoking cessation. The nearly \$4 million award is the first federally funded grant for psychedelic treatment in more than 50 years. Psilocybin produces visual and auditory illusions and profound changes in consciousness. Combined with preparation and structured support, psilocybin has shown promise for treating a range of addictions and mental health disorders. The current double-blind, randomized trial involves psilocybin sessions, and cognitive behavioral therapy — a type of talk therapy (psychotherapy) focused on pinpointing negative patterns of thought that can lead to behavioral and mental health problems.

The NIH grant will also allow Johns Hopkins and other institutions to compensate study participants — a decision that allows researchers to diversify and expand the pool of patients. Johnson says that this improvement will increase scientific confidence in the study's results.

Abuse

Murray [38] discusses if psilocybin (magic mushrooms) is addictive. Like any substance, individuals can become dependent for different reasons. The more a person uses, the more they may crave the substance. Furthermore, individuals may prefer to combine psilocybin mushrooms with another substance (such as LSD) for a different, more intensive effect. For this reason, people are more likely to develop a psychological dependence on psilocybin mushrooms rather than a physical dependence. The severity of dependence often depends on the frequency of use and number of mushrooms a person consumes. People abusing mushrooms can become dependent by believing they need the drug to maintain a sense of enlightenment or happiness. A “good trip,” in which the user feels euphoric, may influence them to continue using the drug.

However, “good trips” are not guaranteed. Researchers from Johns Hopkins reported that 10% of study participants who used psilocybin mushrooms felt that they put themselves or those around them in danger; moreover, their “bad trips” were distressing enough to comprise “one of the top 10 biggest challenges of their lives. Not only can someone abusing Magic Mushrooms become accustomed to the altered state of mind that they bring, but the user can also begin to have trouble living in the real world.” They may experience memory loss and continue using psilocybin mushrooms to maintain their altered state. Some hallucinogenic drug users suffer from flashbacks, fatigue, and irritability. Treatment is needed if users cling to the drug so much that they become out of touch with reality or begin taking psilocybin alongside other drugs. Altering one's senses can lead to dangerous situations, not to mention legal repercussions. States have enacted laws that define the consequences of getting caught with psilocybin, but in some states, like Texas, possessing or distributing the drug is considered a felony. The offender may face thousands of dollars in fines and jail time.

McClintock et al. [39] discuss unrecognized magic mushroom abuse in a 28-year-old man. A definitive diagnosis eluded multiple emergency medicine, critical care, and consulting physicians. His [the patient's] symptoms included altered mental status, vomiting, diaphoresis, and mydriasis. The patient later admitted using mushrooms to a nurse. In the absence of confirmatory testing, but supported by exclusionary and anecdotal data, we believe that our patient's symptoms are consistent with Psilocybe mushroom toxicity. We feel that had this been considered initially, the correct diagnosis would have led to better utilization of resources. We want to remind emergency physicians of the possibility of mushroom abuse in any similar clinical setting.

The overconsumption of psilocybin may be dangerous and, in some instances, lethal. Psilocybin is a volatile compound; processed and aged Psilocybe mushrooms have variable potency based on substandard processing and distribution. Therefore, the unregulated production, distribution, and consumption of Psilocybe mushrooms may present a public health concern. In the spirit of consumer health and safety, entheogenic mushrooms consumed in medicinal and recreational applications are preferably certified for potency and supplied with FDA-approved recommendations (i.e., guidelines) for safe usage.

Driving under the influence

Manson [40] asks, "What does it feel like to drive on psychedelics?" The author writes that the psilocybin mushroom has hallucinogenic effects that significantly affect a person's ability to drive. In addition, a wide range of sensory distortions often occurs, resulting in compromised depth perception and slowing down the brain's response to stimuli. Psilocybin can be detected through urine analysis for up to a week, post-ingestion. When found in the vehicle, illegal drug possession charges may be incurred.

Driving under the influence of magic mushrooms is a terrible idea. While we favor the use of psilocybin-containing mushrooms - they should never be used when taking part in traffic. So how long would it take before you can drive again? First, let us look at a bit of magic mushroom timeline: About 20 minutes after eating mushrooms, your liver will convert most of the psilocybin to psilocin. This chemical will produce psychedelic effects by acting on serotonin receptors in your brain. Most magic mushroom trips last for 4 to 6 hours. The psilocin is then gradually filtered out of your body, and by the end of the 6-hours, most of the active ingredients have been passed out of your body through urine. But even though most of the effects will be gone after 6-hours, we advise waiting even a couple of hours longer before driving any vehicle [41].

A reason to think of psychedelic mushrooms as a dangerous drug relates to impaired judgment and distorted perception while driving a motor vehicle. The risk/benefit analysis of psilocybin based on motor vehicle impairment reinforces its restricted use as a recreational drug. Furthermore, strict guidelines are required to limit driving injuries or death while under the influence of psilocybin during its medical use. Although psilocybin use may be detrimental while driving a motor vehicle, a study indicates that psilocybin use is not associated with increased criminal activity.

Jones et al. [42] report that psilocybin use is associated with lowered odds of crime arrests in US adults. The authors write that future research should explore whether causal factors and third variable factors (e.g., personality, political orientation) underlie the relationship between classic psychedelic use and reduced criminal behavior.

Flashbacks

Some people who regularly use magic mushrooms may experience flashbacks that harken back to a previous magic mushroom experience. Flashbacks usually consist of visual distortions that involve perceptual or emotional changes. As such, mushroom flashbacks can occur weeks, months, or even years after the drug was last taken. Such recurrences, which usually last a minute or two, may be disturbing, especially if a frightening experience or hallucination reemerges. Flashbacks can be brought on by a variety of factors, including the onset of stress, combining mushrooms with other drugs, fatigue, and even physical exercise [43].

Hartney [44] discusses flashbacks and what causes them. Having a flashback can be distressing; however, calming, or self-soothing activities like deep breathing, grounding techniques, and mindfulness can ease psychological discomfort and help the individual to stay in the moment. It's also important to understand one's triggers to avoid or deflect them---and to better manage them when they do occur. Whether you turn to a loved one or a mental health professional, know that you don't have to deal with hallucinogen persisting perception disorder (HPPD) and drug-related flashbacks alone. Getting help and

seeking support is a great first step toward overcoming the disturbing and frequent visual disturbances of HPPD.

Near death experience

A thought-processing experience resulting from a hefty dose of psilocybin might be a near-death hallucination. A near-death experience offers individuals a better understanding that they will die someday but that the experience is not one to be feared.

Sleuties et al. [45] teach that a psychedelic near-death experience is an entheogenic episode caused by substituted tryptamines (e.g., psilocin). Near-death-like symptoms can provide a profound experience. When positive, such experiences may encompass a variety of sensations including detachment from the body, feelings of levitation, total serenity, security, warmth, the experience of absolute dissolution, and the presence of lights. When negative, however, such experiences may include sensations of anguish and distress.

Sandoiu [46] teaches that near-death experiences occur because of significant changes in the way the brain is working, not because of something beyond the brain.

Dose

A magic mushroom dosage differs with 180 different species and can have a 12x variability in potency. One way to determine the correct magic mushroom dose would be to base it on body weight. For example, an average dose would be 0.25 mg of magic mushroom per 1 kg (2.2 lbs.) of body weight. A high dose would be 0.5 mg magic mushroom per 1 kg (2.2 lbs.) of body weight. An extreme dose would be 1 mg of magic mushroom per 1 kg (2.2 lbs.) of body weight. Oliver Carlin (AKA 'The Mushroom Man') teaches that if you were to take dried *Psilocybe Cubensis*: a microdose would be 0.1 grams; a lift-off dose would be 1 gram; a Hero's journey would be 5 grams [47].

Nicholas et al. [48] report that high dose psilocybin is associated with positive subjective effects in healthy volunteers. The authors write that a high dose of psilocybin elicited subjective effects at least as strong as the lower doses and resulted in positive persisting subjective effects 30 days after, indicating that a complete mystical experience was not a prerequisite for positive outcomes.

Rootman et al. [49] disclose that adults who microdose psychedelics report health-related motivations and lower levels of anxiety and depression compared to non-microdosers. The authors write that this examination of a large international sample of adults highlights the prominence of therapeutic and wellness motivations for microdosing psychedelic drugs and identified lower levels of anxiety and depression among microdosers relative to controls. We also identified a diversity of microdosing practices with substantial variations in dose, frequency, and use of combinations of psychedelic and non-psychedelic substances (i.e., stacking). Future research is warranted to better determine the impact of these distinct practices—and of microdosing more broadly—on the aspects of cognition, mood, and well-being that microdosing is intended to enhance.

Kelly [50] discloses that Silicon Valley is microdosing 'magic mushrooms' to boost their careers. The author relays wide-ranging psilocybin testimonials across the business spectrum: Scott Adams, the creator of the Dilbert cartoon strip, pundit on YouTube and Periscope, and resident of Northern California, claims that he took mushrooms once, and it was the best day of his life, and he no longer felt any limits to his life and career success. Joe Rogan, the host of one of the most listened-to

podcasts and another California resident, is a big proponent of microdosing mushrooms and has had numerous guests on his shows, ranging from scientists to MMA fighters, who have shared their positive experiences from microdosing.

Accidental deaths

Psilocybin has very low toxicity levels. The potency of magic mushrooms depends largely upon their species and whether it is consumed in dried or fresh form. *Psilocybe cubensis* is the most ingested hallucinogenic mushroom, and it is potent. Because shrooms are not sold in measurable capsules or tablets, the amount a user should take can be confounding. Typically, one dose of *psilocybe cubensis* consists of about 3.5 grams or 1/8 ounce. Doubling this amount puts a user at risk of overdosing. Other substances, including alcohol, also put the user at risk for ID'ing. Occasionally, shrooms may be laced with other drugs or misidentified as psychedelic. Consumption of toxic or tampered mushrooms may, indeed, cause fatality.

Ketha & Garg [51] report that ingesting amounts beyond a tolerable limit is a dangerous gambit. The authors write that although toxicity involving ingestion of "magic mushroom" is not uncommon, fatalities due to psilocybin toxicity are rare. A 6-year-old child who accidentally ingested *Psilocybe* mushrooms developed hyperthermia, seizures and eventually died. Another case involved a "mushroom party" in France. A 22-year-old man harvested and prepared psilocybin mushrooms for his friends. He had already ingested some mushrooms while picking them. When he met his friends in the bar, he was already intoxicated by the mushrooms. He brought some of the mushrooms with him, ate some in front of his friends, and then invited them to join in. Later, the group consumed tea which was prepared from 20 to 40 of the mushrooms. All subjects had various euphoric and symptomatic experiences. After about an hour and a half, the lead subject went into convulsions and fell into a coma. The patient was taken to an emergency room where he could not be resuscitated and was pronounced dead. Postmortem toxicological results drawn 36 hours after death revealed a blood concentration of 4 µg/mL of psilocin. All other toxicology tests were negative. The Psilocin level, in this case, seems to be the highest reported.

It should be iterated that, while it is possible to overdose on magic mushrooms, fatality is a rare event. However, doses that far exceed 3.5 grams (or 1/8 of an ounce) of *psilocybe cubensis* put the user at risk of overdosing. Furthermore, mixing mushrooms with alcohol and other substances can increase the likelihood of a bad trip. While large doses of psilocybin may result in bad trips, including intense anxiety (panic attacks), paranoia, and/or psychosis, users who already suffer from mental illness are at higher risk for a frightening experience. Losing consciousness, a waning grip on reality, or becoming seized with severe panic are obvious signs that immediate medical attention is required.

Conclusion

Psilocybin usage may provide enlightenment and hope to the human condition when administered by trained medical professionals. Foremost, when mental adversity severely diminishes one's quality of life and the lives of those within proximity, one may consider psilocybin-assisted therapy.

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Conflicts of interest

The authors declare no conflict of interest..

References

- Kosentka P, Sprague SL, Ryberg M, et al. Evolution of the toxins muscarine and psilocybin in a family of mushroom-forming fungi. *PloS one*. 2013;8(5):e64646.
- Nichols DE. Psilocybin: from ancient magic to modern medicine. *The Journal of antibiotics*. 2020;73(10): 679–686.
- Paulson S. Did Magic Mushrooms Shape Human Consciousness? To the Best of Our Knowledge, [Internet] 2020. available from: <https://www.ttbook.org/interview/did-magic-mushrooms-shape-human-consciousness>
- Lamb R. The Stoned Ape Hypothesis: Did Magic Mushrooms Influence Human Evolution? Howstuffworks, [Internet] 2021. available from: <https://science.howstuffworks.com/life/evolution/stoned-ape-hypothesis.htm>
- Rodríguez Arce JM, Winkelman MJ. Psychedelics, Sociality, and Human Evolution. *Front Psychol*. 2021;12:729425.
- Shortsleeve C. Are Mushrooms Healthy? Here's What Experts Say. *Time.com*, [Internet] 2019. available from: <https://time.com/5500684/are-mushrooms-healthy/>
- Psilocybin Mushrooms - Dried, Cured. *MyFitnessPal, Inc.*, [Internet] 2022. available from: <https://www.myfitnesspal.com/food/calories/dried-cured-405215571>
- Lattin D. The War on Drugs Halted Research into the Potential Benefits of Psychedelics. *Slate.com*, [Internet] 2017. available from: <https://slate.com/technology/2017/01/the-war-on-drugs-halted-research-into-the-potential-benefits-of-psychedelics.html>
- Still T. Tom Still: Psilocybin research makes for strange political bedfellows – but promise is there. *Madison.com*, [Internet] 2021. available from: https://madison.com/business/tom-still-psilocybin-research-makes-for-strange-political-bedfellows-but-promise-is-there/article_2981ceb9d-79c9-5288-bf38-52d9a6de818b.html
- Mushroom Laws by State. *Worldpopulationreview.com*, [Internet] 2022. Available from: <https://worldpopulationreview.com/state-rankings/mushroom-laws-by-state>
- Leins C. States Consider Decriminalizing Magic Mushrooms. *US News*, [Internet] 2019. available from: <https://www.usnews.com/news/best-states/articles/2019-06-14/states-consider-decriminalizing-magic-mushrooms>
- Branson-Potts H. How a trip on magic mushrooms helped decriminalize psychedelic plants in a California city. *Los Angeles Times*, [Internet] 2019. available from: <https://www.latimes.com/local/lanow/la-me-ln-oakland-decriminalize-mushrooms-psychedelic-plants-20190622-story.html>
- The Future of Mental Health and Addiction Therapy: Why Capital is Flowing into Psychedelics. *Pharmaceutical Investing News*, [Internet] 2021. available from: <https://investingnews.com/innspired/mental-health-addiction-psychedelics/>
- Employment Law and Legal Definition. *uslegal.com*, [Internet] available from: <https://definitions.uslegal.com/e/employment-law/>
- Sheppard B. A Trip Through Employment Law: Protecting Therapeutic Psilocybin Users in the Workplace. *J Law Health*. 2021;35(1):146-180.
- Case T. Mushroom boardroom: Why some execs are using psychedelics to get through the workday. *worklife.news*, [Internet] 2021. available from: <https://worklife.news/leadership/mushroom-boardroom-why-some-execs-are-using-psychedelics-to-get-through-the-workday/>
- God definition. *Meridian-Webster*, [Internet] available from: <https://www.merriam-webster.com/dictionary/god>
- Griffiths RR, Hurwitz ES, Davis AK, Johnson MW, Jesse R. Survey of subjective "God encounter experiences": Comparisons among naturally occurring experiences and those occasioned by the classic psychedelics psilocybin, LSD, ayahuasca, or DMT. *PLoS One*. 2019;14(4):e0214377.
- Scoles S. What happens when psychedelics make you see God? *Popular Science*, [Internet] 2020. available from: <https://www.popsci.com/story/health/psilocybin-hallucinogens-spiritual-science/>
- About the Court. *Supreme Court of the United States.*, [Internet] available from: <https://www.supremecourt.gov/about/about.aspx>
- Kleiman M. Religious Freedom and Psilocybin. *The Atlantic*, [Internet] 2007. available from: <https://www.theatlantic.com/daily-dish/archive/2007/01/religious-freedom-and-psilocybin/231171/>
- Gehrke R. The Salt Lake Tribune, [Internet] 2020. available from: <https://www.sltrib.com/news/2020/09/07/robert-gehrke-long/#>
- Bombard B. Why Are A Growing Number of Ex-Mormons Using Psychedelics? *RadioWest*, [Internet] 2021. available from: <https://radiowest.kuer.org/curiosities/2021-02-25/why-are-a-growing-number-of-ex-mormons-using-psychedelics>
- Delagran L. What Is Spirituality? *University of Minnesota*, [Internet] 2016. available from: <https://www.takingcharge.csh.umn.edu/what-spirituality>
- Griffiths RR, Johnson MW, Richards WA, et al. Psilocybin-occasioned mystical-type experience in combination with meditation and other spiritual practices produces enduring positive changes in psychological functioning and in trait measures of prosocial attitudes and behaviors. *J Psychopharmacol*. 2018;32(1):49-69.
- Metaphysical definition. *PBS*, [Internet] available from: <https://www.pbs.org/faithandreason/genloss/metaph-body.html>
- Timmermann C, Kettner H, Letheby C, et al. Psychedelics alter metaphysical beliefs. *Sci Rep*. 2021;11:22166.
- Stibich M. What is Religion? *Verywellmind*, [Internet] 2021. available from: <https://www.verywellmind.com/religion-improves-health-2224007>
- Devlin H. Religious leaders get high on magic mushrooms ingredient – for science. *The Guardian*, [Internet] 2017. available from: <https://www.theguardian.com/science/2017/jul/08/religious-leaders-get-high-on-magic-mushrooms-ingredient-for-science>
- Kirti K. Illustrations of Magic Mushrooms in Early Christian Iconography. *Media.com*, [Internet] 2021. available from: <https://medium.com/the-collector/illustrations-of-magic-mushrooms-in-early-christian-iconography-c92b5afa13b0>
- Hesse M. What does addiction mean to me? *Mens sana monographs*. 2006;4(1):104–126.
- What is the definition of alcoholism? *Pinelands*, [Internet] available from: <https://www.pinelandsrecovery.com/definition-of-alcoholism/>
- Taub B. Psychedelic Drugs Can Help Alcoholics Stop Drinking, According to New Study. *IFLS*, [Internet] 2019. available from: <https://www.iflscience.com/health-and-medicine/psychedelic-drugs-can-help-alcoholics-stop-drinking-according-new-study/>
- Macbride K. Magic mushroom study suggests psilocybin may reduce alcohol-induced brain damage. *Inverse.com*, [Internet] 2021. available from: <https://www.inverse.com/mind-body/psilocybin-repairs-alcohol-brain-damage>
- Nicotine dependence. *Camh*, [Internet] 2022. available from: <https://www.camh.ca/en/health-info/mental-illness-and-addiction-index/nicotine-dependence>
- Garcia-Romeu A, Griffiths RR, Johnson MW. Psilocybin-occasioned mystical experiences in the treatment of tobacco addiction. *Curr Drug Abuse Rev*. 2014;7(3):157-164.
- Shapiro M. Johns Hopkins receives grant for psilocybin research in smoking cessation. *Johns Hopkins Medicine*, [Internet] 2021. available from: <https://www.hopkinsmedicine.org/news/articles/johns-hopkins-receives-grant-for-psilocybin-research-in>

- smoking-cessation
38. Murray K. What Are Psilocybin Mushrooms? Addiction Center, [Internet] 2022. available from: <https://www.addictioncenter.com/drugs/hallucinogens/psilocybin-mushrooms/>
 39. McClintock RL, Watts DJ, Melanson S. Unrecognized magic mushroom abuse in a 28-year-old man. *Am J Emerg Med.* 2008;26(8):972.e3-972.e972004.
 40. Manson J. What does it feel like to drive on psychedelics? Quora.com, [Internet] 2005. available from: <https://www.quora.com/What-does-it-feel-like-to-drive-while-on-psychedelics>
 41. Avalon Magic Plants. This is what happens when you drive under the influence of magic mushrooms. [Internet] 2019. Available from: <https://www.avalonmagicplants.com/blog/this-is-what-happens-drive-magic-mushrooms>
 42. Jones GM, Nock MK. Psilocybin use is associated with lowered odds of crime arrests in US adults: A replication and extension. *J Psychopharmacol.* 2022;36(1):66-73.
 43. Psilocybin (magic mushrooms). ADF.org, [Internet] available from: <https://adf.org.au/drug-facts/psilocybin/#:~:text=Long%2Dterm%20effects,the%20drug%20was%20last%20taken>
 44. Hartney E. What are flashbacks and what causes them? Verywellmind.com, [Internet] 2022. available from: <https://www.verywellmind.com/what-are-flashbacks-and-what-causes-them-22087>
 45. Sleutjes A, Moreira-Almeida A, Greyson B. Almost 40 years investigating near-death experiences: an overview of mainstream scientific journals. *J Nerv Ment Dis.* 2014;202(11):833-836.
 46. Sandoiu A. Psychedelic compound triggers near-death experiences. *Medical News Today*, [Internet] 2018. available from: <https://www.medicalnewstoday.com/articles/322794>
 47. Carlin O. Magic Mushroom Dosage, Heroic Dose & Microdosing Correctly. *Curative Mushrooms*, [Internet] 2020. available at <https://curativemushrooms.com/magic-mushroom-dosage-heroic-dose-microdosing>
 48. Nicholas CR, Henriquez KM, Gassman MC, et al. High dose psilocybin is associated with positive subjective effects in healthy volunteers. *Journal of psychopharmacology (Oxford, England).* 2018;32(7): 770-778.
 49. Rootman JM, Kryskow P, Harvey K, et al. Adults who microdose psychedelics report health related motivations and lower levels of anxiety and depression compared to non-microdosers. *Scientific reports.* 2021;11(1):22479.
 50. Kelly J. Silicon Valley Is Microdosing 'Magic Mushrooms' to Boost Their Careers. *Forbes*, [Internet] 2020. available from: <https://www.forbes.com/sites/jackkelly/2020/01/17/silicon-valley-is-microdosing-magic-mushrooms-to-boost-their-careers/?sh=4b26901a5822>
 51. Ketha H, Uttam Garg U. Toxicology cases for the clinical and forensic laboratory. *Science Direct*, [Internet] 2020. available from: <https://www.sciencedirect.com/book/9780128158463/toxicology-cases-for-the-clinical-and-forensic-laboratory>