

Effects of Psilocybin: Alterations to the Brain

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Abstract

Classified as hallucinogens, psilocybin is a psychedelic drug that affects our psychological processing. Recent studies highlight the benefits of controlled doses utilized as a medication for depression and other mental health illnesses to exert the positives of synthetic medicines without the side effects that often occur. By regulating mood and through various brain mechanisms the drug modifies, the personalities of individuals can improve. Of the Big Five personalities, patients displayed an increase in extraversion and openness levels- possibly through serotonin uptake. Based on varying dosages and environments upon experiment, individuals present a diversified set of results to analyze. Despite evidence presenting support for the usage of psilocybin, research on this subject is limited as studies are heavily regulated and not often approved for further investigation. Additional analysis should be organized before deciding on the legality of this hallucinogen; in the future, when additional evidence becomes available, public opinion on psychedelic drugs may change depending on scientific authentication of advantages and disadvantages regarding the effects of psilocybin. It's vital to foster an environment where research can be further conducted to fully understand the therapeutic potential and risk associated with use.

Keywords: Hallucinogens, Mental health, Brain alterations

1. Introduction

Heated debates regarding psilocybin and its legality have circulated throughout the decades. My interest in this topic surfaced weeks after a friend mentioned the subject. Before this conversation, I was indifferent about this drug, commonly known as “shrooms,” as it had no purpose or impact on my life. He expressed his view and elaborated on the effects and potential benefits of psilocybin in self-reflection. I often think back on the exact conversation because his passion for this subject was evident through the simple paragraph he sent me, along with video and website links from his research. This occurrence has influenced me to research the topic he was so fascinated with in hopes of sharing the same appeal to the effects and history of this psychedelic drug.

Only a handful of treatments are available for patients suffering from mood disorders and post-traumatic stress disorder (PTSD). Following several decades of restricted research on psychedelics due to legislative barriers, recent years have witnessed a resurgence of thoughtful investigations exploring the utility of compounds like 3, 4-methylenedioxymethamphetamine (MDMA) and psilocybin. Improvement of participants appears to correlate with the perspective changes, seemingly unaligned with the currently available paradigms. Psychedelic psychotherapy has emerged as a blend of biological therapy and psychotherapy, being explored in hopes of transforming the field of mental health care.

1.1 Problem Statement

Once perceived as a dangerous substance that medical practitioners publicized as deleterious, psilocybin research

has suggested it as a potential cure for long-term clinically diagnosed depression. Children as young as eight take synthetic medication to produce more serotonin, but these antidepressants often cause suicide; the irony is evident. The urgency to address this issue due to its possible benefits to patients suffering from various mental illnesses should be reevaluated, ultimately assessing whether shrooms should be legalized and entrusted to the public. It is only a matter of time before psychologists discover a safe and effective solution as a form of treatment through psilocybin; the only factor left to consider is the funding necessary to carry out further research.

2. Objectives

The long-term goal of this literature review is to determine if psilocybin should be legalized. Psilocybin is a hallucinogenic drug that alters our serotonin levels- controlled dosages have displayed benefits to certain individuals.

1. What are the side effects of shrooms?
2. How can it be used for medical purposes, and what are the benefits of it?
3. Should shrooms be legalized or exposed to the general public? How could this affect society?
4. Are there consequences for taking regulated doses?
5. Does the drug physically damage the body, or is hallucination the dangerous part of taking it?

The result of this literature review will provide the audience with further details regarding the effects of taking psilocybin, whether it's used for medical practices or to experience a feeling of euphoria.

3. Content

3.1 Human brain reaction to psilocybin

During the recruitment period from January to July 2013, a total of 5850 participants were involved in the survey conducted by Carbonaro et al. (2016), but only 1993 presented usable data. Of these participants, Carbonaro (2016) revealed that 68% endorsed taking a high dose of psilocybin; 36% displayed attempts to take larger than usual doses for the session. Under these conditions, patients were either alone, with another person, with a few people, in a small group, or a larger gathering. Their mental state, comfort, safety of surroundings, social support, and overall trust for others were all considered. This study documented those experiences associated with acute adverse effects that benefitted some but inflicted potential negative effects on others. Additional factors to consider include the use of other drugs before or during the session, correlating with the experience but not displaying a direct effect to put anyone in physical harm. This allows for the conclusion that psilocybin assists in minor psychological distress, audacious behavior, and endurance of psychological problems.

Like Carbonaro's study (2016), Carhart-Harris (2018) emphasized that the degree of difficulty during the experience correlates to the dosage and environment to which the participant is exposed. When carefully screened, the risk of dangerous behavior is low in lab studies, but further caution should be taken. By distinguishing different drug classes according to differing mechanisms of action, Carhart-Harris supports his claim that psychedelics are more efficacious than Selective serotonin reuptake inhibitors (SSRI); SSRIs can often represent a biomedical approach to treatment based on a theory linking low serotonin levels to the pathophysiology of depression. This information suggests that depression can be treated by altering serotonin signaling in the brain. However, psychiatric labels don't correspond to known biological pathologies that treatments can target and cure; it is only socially constructed labels. In the study by Carhart-Harris (2018), brain scans of patients on Lysergic acid diethylamide (LSD) and a placebo were compared. LSD reduces the amount of brain energy necessary to transition from a current brain state to another. In other studies, participants can describe their sense of moral obligation to support the historical significance of legitimizing psychedelics. Misrepresentation of data can lead to differing mental health outcomes in official reporting, ultimately skewing results, and providing an unstable foundation for future research studies.

3.2 Effects on behavior

The National Institute of Health Research and the Clinical Research Network (2018) conducted a study to examine

the effects of psilocybin in regulated doses during separate sessions. Bloomfield and Carhart-Harris (2016) led a group of 20 patients suffering from moderate or severe unipolar treatment-resistant depression (TRD) who were given small doses of oral psilocybin in a healthy setting. These doses would then be considered, and the Big 5 Personalities were evaluated based on whether each domain (Neuroticism, Extraversion, Openness, Conscientiousness, and Agreeableness) was affected. After three months, the 20 participants were invited back for a follow-up study. This determined that overall, Neuroticism scores decreased, whereas both Extraversion and Openness increased. This study also covered topics such as the relationship between peak experience and personality changes as well as baseline personality scores as predictors of peak experience and treatment response. The experiment was conducted as a target towards therapy for major clinically depressed patients who were found to display significant changes in personality measures; these results further supported the Big Five analysis the researchers established after the 3- follow-up.

When researchers established that their test subjects had changes in personality measures after taking doses of psilocybin, these results were like patients on synthetic medication, although psilocybin proved to manage their openness and extraversion. The responses of taking psilocybin were similar to those who underwent pharmacotherapy, allowing for selective serotonin uptake. Through these studies, the researchers provide evidence as to why psilocybin's benefits should not be overlooked. Based on Erritzoe, D. et al. (2018) research conclusions, legalizing this drug may be unlikely, but medical professionals should further study how it can be beneficial for patients in regulated doses (2018). It has already been proven that this hallucinogenic drug benefits numerous disorders, but additional support is necessary to apply this long-term; clinical improvement and personality change were other factors found in this study. Further reinforced in De Veen et al.'s study (2017), researchers elaborate on treating substance use disorders involving psychological and pharmacological interventions. When psilocybin was first introduced, researchers found the substance to substantially affect attitude, mood, and social behavior. It was further discovered that persistent positive effects lasted up to 25 years after a single dose of psilocybin. A double-blind study was performed by Bogenschutz (2015) where ten participants were given minimal amounts of psilocybin in 2-3 sessions. These patients who suffered from alcohol dependency displayed a significant decline in the percentage of drinking days and heavy drinking days. These studies combined would further prove the potential benefits of psilocybin, although more research is necessary to concrete these ideas.

3.3 Surfacing conflicts

Prouzeau, D. et al. (2022) reviewed recent literature on the efficacy of psilocybin in depression; researchers found limitations in the small number of published studies that lacked placebo control variables. To truly understand the neurobiological mechanisms of psychedelics and their association with humans, their acute hallucinogenic effects on mood and other psychological factors should be reconsidered. Patients who are on other medication or treatment are asked to taper them off, so the antidepressants don't induce a blunted response to the psychedelics and mediate a down-regulation of 5-HT_{2A} receptors and the coadministration of an antidepressant which carries a potential risk of serotonergic syndrome given the shared agonism on 5-HT_{2A} receptors. Following these results, a survey by Prouzeau (2022) and his team was done after the administration of high doses of psilocybin, demonstrating that 62% of subjects consider this experience to be one of the most meaningful moments in their lives. Several studies show a correlation between therapeutic response and the intensity of initial mystical-type experiences. Factors such as results combined with political tides could lead to the reclassification of psilocybin in the future- allowing more studies to be done. The published minimal research focuses primarily on severe depression or other treatment-resistant illnesses. Fourteen clinical trials are recruiting participants to explore further the efficiency of psilocybin in depressive disorders, bipolar disorders, and other depression-related disorders. Psilocybin represents a promising alternative to treatment as it proves to have a large, rapid, and persistent effect on patients; additional research would reinforce the potential benefits of psilocybin; therefore, this will be effective in my research to be compared with other articles in my literature review. In a 1984 review performed, Prouzeau, D. et al. (2022) reconsidered the lack of evidence supporting the harm of psychedelic drugs in controlled settings. An analysis performed by Prouzeau (2022) further proved the range of psychotropic substances ranked LSD and psilocybin to be one of the safest drugs studied. A population study done by Prouzeau (2022) followed the review where 130 participants reported that psychedelic drug use was associated with

lower mental distress, a need for mental health treatments, and prescribed medication for psychological treatment. It is difficult to carry out extensive clinical studies because of numerous obstacles, such as cost and supply, and the lack of federally approved institutions to conduct psychedelic research. Although much has been discovered regarding the benefits of psilocybin, even the slightest concern can halt research. These restrictions account for reasons why not many studies have been conducted; legal prohibition opens arguments and creates circular discussion among the United Nations and other councils. These discoveries were determined by numerous psilocybin studies done throughout the nation, as working with a potentially harmful substance could substantially affect the people and environment where the drug is tested and studied.

4. Discussion

4.1 Previous Findings

Although limited, studies regarding psilocybin and its effects have been widely debated among researchers. Within these disagreements, many fail to realize that monitored doses of this psychedelic drug have more positives than previously credited. The recreational use of psilocybin has attached a negative connotation to its name resulting in individuals overlooking the clinical aspect of taking controlled doses. Researchers documented participants' behaviors and evaluated whether the good truly outweighs the bad and the extent to which it may impact people suffering from differing mental illnesses. The assessment of brain alterations and personality changes proffered a foundational understanding contributing to one of many surfacing substitutions for synthetic medication.

4.2 Acknowledging Limitations

During the recruitment period from January-July 2013, a total of 5850 participants were involved in the survey conducted by Carbonaro et al. (2016), but only 1993 presented usable data. Of these participants, Carbonaro et al. (2016) concluded that 68% endorsed taking a high dose of psilocybin while 36% outlined their attempts to take larger doses for said session. In this controlled environment, patients were alone, with one person, with a few people, in a small group, or in a larger gathering. Their mental state, comfort, environmental safety, social support, and overall trust for others were all taken into account. This study documented those experiences associated with acute adverse effects that opened benefits for some but inflicted negative effects on others. Other factors to consider include the use of other drugs before or during the session correlating with the experience although it had no direct impact on the physical harm of anyone. In conclusion, Carbonaro et al. (2016) established that psilocybin assists in acute psychological distress, dangerous behavior, and enduring psychological problems. As presented in the study, external factors can heavily influence an individual's reaction to this hallucinogenic drug. Researchers must take into account experiences personal to said participants and analyze all aspects contributing to their results; it is difficult to moderate every variable that may come into play completely.

Similar to Carbonaro's study (2016), Carhat-Harris et al. (2018) emphasized how the degree of difficulty during the experience correlates to the dosage and environment to which the participant is exposed. When carefully screened, the risk of dangerous behavior is low in lab studies, but further caution should be taken. By distinguishing different drug classes according to differing mechanisms of action, Carhat-Harris et al. (2018) supports his claim that psychedelics are more efficacious than Selective Serotonin Reuptake Inhibitors (SSRIs); SSRIs can often represent a biomedical approach to treatment based on a theory linking low levels of serotonin to the pathophysiology of depression. This information suggests that depression can be treated by altering serotonin signaling in the brain; serotonin is a neurotransmitter linked with depression. However, psychiatric labels don't correspond to known biological pathologies that treatments can target and cure; it is only socially constructed labels. Brain scans of patients on LSD and a placebo were compared. Psilocybin reduces the brain energy required to switch from one brain state to another, allowing for spacious mental capacity. Misrepresentation of data can lead to differing mental health outcomes in official reporting, ultimately skewing results and providing an unstable foundation for future research studies. These findings emphasize the direct correlation between both internal and external factors that may trigger varying levels of

psychological processing. Depending on the original state a participant was in before their involvement in the study, their desire for more or less psilocybin per trip can foreshadow how the drug impacts that specific person.

4.3 Suggesting Improvements

The National Institute of Health Research and the Clinical Research Network (2018) conducted a study to examine the effects of psilocybin in regulated doses during separate sessions. Bloomfield and Carhart-Harris et al. (2016) led a group of 20 patients suffering from moderate or severe unipolar treatment-resistant depression (TRD) who were given small doses of oral psilocybin in a healthy setting. These doses would then be considered and the Big 5 Personalities were evaluated based on whether each domain (Neuroticism, extraversion, openness, conscientiousness, and agreeableness) was affected. After three months, the 20 participants were invited back for a follow-up study. This determined that overall, neuroticism scores decreased, whereas extraversion and openness increased. This study also covered topics such as the relationship between peak experience and personality changes as well as baseline personality scores as predictors of peak experience and treatment response. The experiment was conducted as a target towards therapy for major clinically depressed patients who were found to display significant changes in personality measures; these results further supported the Big Five analysis the researchers established after the 3- follow-up. When researchers confirmed that their test subjects had personality changes, they discovered that these results were similar to patients on synthetic medication, although psilocybin proved to manage their openness and extraversion. The responses of taking psilocybin were similar to those who underwent pharmacotherapy, allowing for selective serotonin uptake. Through these studies, the researchers provide evidence as to why psilocybin's benefits should not be overlooked. Furthermore, this outcome led psychologists to believe that with proper data supporting the substitution of psilocybin for antidepressants, shrooms could confidently be confirmed to provide the benefits of regular medication without the concomitants.

4.4 Implications in Other Study Areas

An article published in 2022 demonstrated opposing views stating that despite the success psychedelic therapy can have, several participants still relapse or become less responsive to treatment. The introduction analyzed Carhart-Harris's (2018) results stating that it still lacks a concrete model to identify the specific factors to focus on when maximizing the effectiveness of partner-assisted therapy (PAT). To elaborate on these points, a search through the Pubmed Medline and Scopus databases was done to familiarize their understanding of patients suffering from a psychiatric condition and utilize psychedelics as a form of psychological intervention concluding that the relationship between patient to psychologist is critical and many of the studies analyzed lacked some form of stability one way or the other. Still, medical professionals should further study how it can be beneficial for patients in regulated doses (2018). It has already been proven that this hallucinogenic drug benefits numerous disorders, but additional support is necessary to apply this long-term; clinical improvement and personality change were other factors found in this study. Reinforced in De Veen et al.'s study (2017), researchers elaborate on treating substance use disorders involving psychological and pharmacological interventions. When psilocybin was first introduced, researchers found the substance to substantially affect attitude, mood, and social behavior. It was further discovered that persistent positive effects lasted up to 25 years after a single dose of psilocybin. These biological factors supply an individual's overall behavior; abnormal changes in brain processing can lead to disorders that have lasting consequences.

Minor influences can spiral into major problems if early exposure to these issues is not resolved. Mental health conditions such as obsessive-compulsive disorder (OCD), anxiety disorders, and PTSD all originate from disturbances in mood and promote abnormalities. A double-blind study was performed by Bogenschutz et al. (2015) where ten participants were given minimal amounts of psilocybin in 2-3 sessions. These patients who suffered from alcohol dependency displayed a significant decline in the percentage of drinking days and heavy drinking days. Alcohol overdose can lead to permanent brain damage and, if exposed at an early age, can halt brain development in upcoming years. Cardiovascular disease is a widely known result of alcohol abuse; addiction is strenuous to interfere with, but

psilocybin has decreased percentages contributing to said components- it is only a matter of time before succeeding research attests to concrete these ideas.

4.5 Relations with Other Illnesses

An article published by New York University (NYU) examines a new study that found that psychedelic mushrooms reduce heavy drinking by 83%. It elaborates on Bogenschutz's (2015) report that traditional ways to break the alcohol dependency cycle often dampen cravings. Because psilocybin had been a previous treatment for alleviating anxiety and depression in patients suffering from severe forms of cancer, Bogenschutz et al. (2015) suggested it be tested in other addiction disorders as well. With a total of 93 participants (48 received 1-3 doses of psilocybin, 45 received antihistamine placebo), these individuals provided accounts from their personal experiences during weeks 5-36 of the study. Because psilocybin is a compound derived from naturally occurring fungi, it has mind-altering abilities leading to profound alterations in perception, emotions, sense of self, and personal and spiritual significance as emphasized by Bogenschutz et al. (2015). It's been finalized that a larger research trial must be conducted before declaring the drug ready for national clinical use. Subsequently, Prouzeau, D. et al. (2022) reviewed recent literature on the efficacy of psilocybin in depression; researchers found limitations in the small number of published studies that lacked placebo control variables. Placebos allow psychologists to attribute any difference in outcome to the participant simply believing that they are receiving the real treatment. Without a necessary control group, the validity of independent variables may be unstable and can be easily influenced by the patient. To truly understand the neurobiological mechanisms of psychedelics and their association with humans, their acute hallucinogenic effects on mood and other psychological factors should be reconsidered. Patients who are on other medication or treatment are asked to taper them off so the antidepressants don't induce a blunted response to the psychedelics and mediate a down-regulation of 5-HT_{2A} receptors as well as the coadministration of an antidepressant which carries a potential risk of serotonergic syndrome given the shared agonism on 5-HT_{2A} receptors. These receptors are involved in constitutive activity of signaling pathways corresponding with the role of serotonin in learning and psychological functioning. Areas of the prefrontal cortex are vital components to 5-HT_{2A} receptors- managing our thoughts, actions, and emotions. A survey coordinated by Prouzeau et al. (2022) and his team after the administration of high doses of psilocybin, demonstrated that 62% of subjects considered this experience to be one of the most meaningful moments in their lives. Several studies show a correlation between therapeutic response and the intensity of initial mystical-type experiences. This initiates an individual's ability for self-reflexivity and affirmation during the trip. While minimal published research focuses primarily on severe depression or other treatment-resistant illnesses, fourteen clinical trials are recruiting participants to explore further the efficiency of psilocybin in depressive disorders, bipolar disorders, and other depression-related disorders. In a 1984 review performed, Prouzeau, D. et al. (2022) reconsidered the lack of evidence supporting the harm of psychedelic drugs in controlled settings. An analysis performed by Prouzeau et al. (2022) further proved the range of psychotropic substances ranked LSD and psilocybin as one of the safest drugs studied. A population study done by Prouzeau et al. (2022) following the review illustrated that 130 participants reported that psychedelic drug use was associated with lower mental distress, a need for mental health treatments, and prescribed medication for psychological treatment. It is difficult to carry out large clinical studies due to numerous obstacles, such as cost and supply, and the lack of federally approved institutions to carry out psychedelic research.

4.6 Reassessing Clinical Potential

Although much has been discovered regarding the benefits of psilocybin, even the slightest concern can suggest a hesitation to begin studies related to psilocybin. These restrictions account for reasons why not many studies have been conducted; legal prohibition opens arguments and creates circular discussion among the United Nations and other councils. These discoveries were determined by numerous psilocybin studies done throughout the nation, as working with a potentially harmful substance could substantially affect the people and environment where the drug is tested and studied. Additionally emphasizing these points, recent findings done through the Johns Hopkins University

Institution Marisol Martinez et al. (2022) provided evidence that psychedelic drugs as a form of therapy are effective under carefully controlled conditions although results in research require insane amounts of preparation and further support. To carry out this research, Gukasyan et al. (2017) recruited 27 participants who showed long-term depression history and had previously been exposed to standard antidepressants. Under varying circumstances, participants of both groups displayed a significant decrease in depression- measured using the RID-Hamilton Depression Rating Scale. After the first period of testing, these clients continued to be exposed to treatment producing immediate and long-term effects after one or two treatments. Psilocybin represents a promising treatment alternative as it has a large, rapid, and persistent effect on patients, but supplemental research would reinforce a plausible defense for skeptics.

When psychedelic research becomes better established, clinicians will provide further evidence to address the misconceptions that surfaced as hallucinogenic drugs rose to popularity for recreational purposes. Drug and alcohol abuse solely for feelings of euphoria builds stigmatization making it arduous for futuristic studies to be initiated. With the limited resources available, psychologists can provide support countering only a small portion of dissent regarding whether psilocybin is verily safe, even under scrutiny and in controlled environments.

5. Conclusion

Include a detailed conclusion that briefly summarizes the main findings, explores their implications, and underscores the overall importance of the research.

The extensive review conducted on the effects and potential of psilocybin yields as a contentious yet promising subject in regard to mental health treatment. Through analyzing various perspectives and studies, several key findings and implication emerge, shaping the discourse around the legalization of this psychedelic compound.

First, the research presented underscores the potential benefits of psilocybin in greeting various mental health disorders including depression, PTSD, and substance use disorders. Studies have shown significant improvements in mood, personality traits, and even long-term outcomes following controlled doses of psilocybin. These findings challenge traditional paradigms of mental health care and suggest a promising avenue for further exploration in psychedelic-assisted therapy. Furthermore, the review highlights the importance of carefully controlled environments and dosages in maximizing the therapeutic potential of psilocybin while minimizing risks. Factors such as set, and setting play a crucial role in shaping the subjective experiences of individuals undergoing psychedelic therapy. Understanding these nuances is essential for ensuring the safety and efficacy of such treatments.

Nonetheless, the research also acknowledges the limitations and challenge associated with studying psychedelics, including regulatory barriers, stigma, and logistical constraints. Despite the promising findings, further research is needed to fully elucidate the mechanisms of actions, optimize treatment protocols, and address other concerns. The literature review provides compelling evidence supporting the therapeutic potential of psilocybin while also highlighting the complexities involved in its clinical application. By addressing these challenges a continuing to pursue rigorous research, researchers can unlock the full potential of psychedelics and revolutionize mental health care for the better.

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