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Therapeutic Potential of Psychedelic Drugs, Specifically Magic Mushrooms, Marijuana, and MDMA with Veterans Who Suffer from Post-Traumatic Stress Disorder (PTSD)

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Abstract

Post-Traumatic Stress Disorder (PTSD) is a stress-based condition that a person develops after being exposed to an overwhelmingly traumatic event. Military troops frequently experience stress and trauma, making them highly susceptible to psychopathology. This paper evaluates nine clinical trials that used either magic mushrooms, marijuana, or MDMA as an adjunct to traditional psychotherapy to treat veterans who suffer from anxiety, depression, PTSD, suicidality, and other psychopathologies. Multiple scholarly journals and articles were read and analyzed, which show support for the therapeutic potential of psychedelic drugs in treating veterans with PTSD. After receiving psychedelic-assisted psychotherapy, the research showed participants experienced a multitude of positive effects, including an improved ability to access and process traumatic memories, a renewed sense of motivation and enthusiasm to engage in life, as well as an increased sense of empathy for self and others. Additionally, psychedelic drugs have been shown to reduce physical pain as well as symptoms of anxiety, depression, PTSD, and suicidality. The studies support the use of psychedelic drugs as an adjunct to psychotherapy and show promise in treating other mental health and wellness issues.

Keywords: Post-Traumatic Stress Disorder (PTSD), Magic Mushrooms, Psilocybin, Psilocin, Psychedelic Drugs, Psychedelic-Assisted Psychotherapy, Marijuana, 3, 4-Methylenedioxymethamphetamine, MDMA, Ecstasy, Veterans

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Therapeutic potentials of psychedelic drugs, specifically magic mushrooms, marijuana, and 3, 4-methylenedioxymethamphetamine (MDMA) in the treatment of veterans who suffer from anxiety, depression, Post-Traumatic Stress Disorder (PTSD), and suicidality are no hallucination. Military training and service are very dangerous. Soldiers are called upon to manage natural disasters, control rioters, and fight wars. As a result, service members are repeatedly exposed to highly stressful situations where traumatic events are likely to occur. Veterans' negative experiences accumulate and their trauma compounds, manifesting as anxiety, depression, PTSD, and suicidality. Without proper treatment, veterans will continue to suffer in multiple life domains across their lifespan.

To better understand and treat mental illnesses, the Food and Drug Administration (FDA) and Drug Enforcement Agency (DEA) have allowed researchers to focus their attention on the therapeutic potentials of psychedelic drugs, including magic mushrooms, marijuana, and MDMA. Research on these medications have shown them to be highly effective in treating a wide range of psychopathologies (Doblin, 2002; Amoroso, 2015; Sessa et al., 2019; Krediet et al., 2020). As a result, the FDA designated magic mushrooms as a "breakthrough treatment" for treatment resistant depression (TRD), and MDMA as a "breakthrough treatment" for PTSD (Krediet et al., 2020). The goal of psychedelic-assisted psychotherapy is to help veterans process, integrate, and recover from their trauma using medications known to facilitate transformative experiences. Receiving psychedelic drugs during a therapy session typically causes a person to experience hallucinations as well as changes in sensation and perception, commonly referred to

as “tripping”. Although psychedelic trips change the treatment experience; “tripping” is not required to achieve profound and long-lasting psychological benefits.

By summarizing multiple studies, this paper serves to inform psychotherapists, physicians, and other mental health providers about the therapeutic potentials of psychedelic drugs and the positive effects experienced by those who consumed the medications. Scientific research indicates psychedelic drugs are effective in treating psychopathology and possess tremendous therapeutic potential for veterans who suffer from anxiety, depression, PTSD, and suicidality.

Literature Review

Post-traumatic stress is a normal human response to traumatic events, whereas Post-Traumatic Stress Disorder (PTSD) is a more serious condition that impacts the anatomy and physiology of the brain (Brenner et al., 2009; *How PTSD Affects The Brain*, 2017). The American Psychiatric Association’s Diagnostic and Statistical Manual of Mental Disorders (DSM-5) describes PTSD as a condition that develops after a person becomes exposed to a stressful or traumatic event such as the threat of death, serious injury, or sexual violence (DSM-5, 2013). “The onset of PTSD is influenced by a complex interaction of biological, cognitive, and psychosocial factors across multiple time points” (Forbes et al., 2019, p. 97). The severity of a person’s psychological distress following a traumatic event is often impacted by several factors, including their age, and gender, the type of trauma they experienced, previous traumatic experiences, their culture, and other protective factors (Jackson-Cherry et al., 2014).

The DSM-5 categorizes PTSD symptoms into four domains: intrusion, negative alterations, reactivity, and avoidance (DSM-5, 2013). Intrusive images, thoughts, and memories are common experiences among PTSD sufferers (DSM-5, 2013). Overwhelming sensory

intrusions that cause veterans to feel as though they are reliving their traumatic experience are known as flashbacks or dissociative episodes (Morgan, 2020). Negative alterations are associated with persistent and exaggerated pessimistic beliefs or expectations about oneself and the world, distorted cognitions about the cause or consequence of the trauma, and the inability to experience positive emotions (DSM-5, 2013). Arousal and reactivity are physiologically linked and typically manifest as hypervigilance, irritability, reckless or self-destructive behavior, outbursts, sleep disturbances, and issues with concentration (DSM-5, 2013). Finally, avoidance is a hallmark symptom of PTSD and serves as a protective factor, which helps veterans disconnect from their painful or traumatic experiences mentally, physically, and emotionally (Morgan, 2020).

Veterans who experience trauma often suffer in silence, making the statistical prevalence difficult to calculate. According to the Department of Veterans Affairs (DVA) during their lifetime, half of all U.S. adults will experience at least one traumatic event, 15 million Americans will suffer from PTSD annually, and six percent of the U.S. population will develop some form of PTSD *(How Common is PTSD in Adults?*, 2020a, para. 7). “PTSD is a growing health concern associated with increased occupational, relationship, and other psychological dysfunction, as well as a decreased quality of life, and enhanced risk of suicide” (Barone et al., 2019, p. 200). The aforementioned statistics are alarming and indicate the need for well-trained, highly skilled, trauma informed, psychotherapists who use empirically validated and cost-effective methods to help service members with anxiety, depression, PTSD, and suicidality; work through their negative experiences; manage their triggers and reduce symptoms; as well as heal and grow in response to treatment.

Post-Traumatic Stress Disorder (PTSD) in Veterans

In addition to protecting and serving their country, people join the military for a variety of reasons including adventure, family tradition, career opportunities, the GI Bill, and skills development (Applegate et al, 1990). Newly enlisted soldiers are often sent off to boot camp unprepared for the physical, mental, and emotional challenges that lie ahead (Lowe et al., 2012). The military system is designed to break down a soldier and push them to their limits, to rebuild them into a highly-skilled, physically-fit, fighting machine (Applegate et al., 1990). Military training and service is serious, as are the risks. Every soldier sacrifices something of themselves while in the service and some make the ultimate sacrifice: their lives. The Congressional Research Service (CRS) reported that between 2006 and 2021, 18,571 active-duty personnel lost their lives while serving in the military (Aftergood, 2021; Congressional Research Service, 2021). Military service is dangerous, as evidenced by the number of soldiers who died in the line of duty and the number of soldiers who survived and continue to suffer.

Military service comes with unique challenges. Life as a soldier is difficult due to family separation, frequent base changes, multiple deployments, and unpredictable hours (Burrell et al., 2006). Soldiers can experience trauma at home and abroad as well as during peacetime, training, and war. The tolls that the constant stress and danger have on a person are tremendous (Weitz, 2015). Active-duty military personnel, especially those who are deployed, are most effected by high levels of anxiety, stress, and extreme pressure (Lowe et al., 2012). War and other types of combat are physically and psychologically taxing, causing negative effects in multiple life domains (Burrell et al., 2006). Soldiers often experience physical injuries, psychological damage, and other forms of trauma that affect physiological functioning, mental cognition, and emotional well-being (Lowe et al., 2012). Although the military provides mental health services, access to

therapists and counselors is limited (Defense Health Board Task Force on Mental Health, 2007). Therefore, soldiers who need help working through trauma related to military life do not receive the support they need. Even fewer mental health providers are on the front lines in combat zones, trauma hospitals, or other dangerous locations, precisely where help is needed most (Defense Health Board Task Force on Mental Health, 2007). Without access to therapists, veterans' symptoms will likely increase, causing greater dysregulation across their life span.

The military idealizes physical toughness and mental fortitude (Applegate et al., 1990), which promotes a culture of masculinity (Weitz, 2015). Masculinist cultures pressure members to remain silent about traumatic events, thus exacerbating the accumulative effects on their overall health and well-being (Weitz, 2015). As a result, veterans' symptoms are downplayed, rationalized, or ignored, leading to an increase in dysfunction across multiple life domains (Jackson-Cherry et al., 2014). Untreated trauma has been shown to increase veterans' rates of anxiety, depression, PTSD, suicidality, and other psychopathologies (Burrell et al., 2006). Additionally, certain types of trauma, such as combat and rape, are known to produce higher rates of PTSD in veterans (Jackson-Cherry et al., 2014). Military service members face danger on and off the battlefield, which exponentially increases their chances of developing a mental health disorder.

Investigations into PTSD have helped researchers understand the severity of the condition and identify ways in which the disorder negatively impacts soldiers' lives. "PTSD is one of the most common and costly disorders in veterans" (Congressional Budget Office, 2012, p. 3; Forbes et al., 2019). According to the he Department of Veterans Affairs (DVA), approximately 12% of soldiers deployed in Desert Storm and between 11- 20% of soldiers deployed during operations Iraqi Freedom and Enduring Freedom were diagnosed with PTSD

(*How Common is PTSD in Veterans?*, 2020b). Of the veterans who served in the Vietnam War, 30% experienced PTSD during their lifetime (*How Common is PTSD in Veterans?*, 2020b). The impact of PTSD can be seen throughout history, further confirming the effects of war related trauma.

Military stress and trauma have profound effects on veterans' mental health and wellbeing, often causing chaos and dysfunction in multiple life domains. A study conducted in 2009 by Greenberg and associates provides evidence that mental health problems, especially PTSD, are risk factors for imprisonment among male veterans (Greenberg et al., 2009). Women and minorities are known to experience disproportionately high rates of PTSD (Jackson-Cherry et al., 2014). Service women are forced to function in a culture of misogyny and encounter both combat trauma and military sexual trauma (MST), which includes harassment, sexual assault, and rape (Weitz, 2015). Studies conducted by the DVA state 23% of women experienced a sexual assault while serving in the military (*How Common is PTSD in Veterans?*, 2020b). As women's roles in the military increase, so does their exposure to combat situations, war, and MST, which increase their probability of developing PTSD (Reisman, 2016). Minorities continue to face multiple challenges while serving in the military, including racial discrimination, culturism, and the like. One study found that two-thirds of minorities on active duty reported experiencing offensive racial behaviors in the last year, and one in 10 reported career-related racial discrimination (Antecol et al., 2009). The negative impacts that trauma has on veterans can be seen across gender and race.

PTSD is an economic burden that plagues veterans, their families, society, and the health care system. Treating Afghanistan and Iraq veterans with PTSD costs the DVA more than two billion dollars annually, or approximately $8,300 per person (Congressional Budget Office,

2012; Reisman, 2016). The cost to treat veterans with PTSD is three and a half times higher than costs for those without the disorder (Congressional Budget Office, 2012; Reisman, 2016). Studies conducted by the Center for Military Health Policy Research report less than half of returning veterans who needed mental health services received treatment, and of those receiving treatment for PTSD and major depression, less than one-third received empirically-validated care (Tanielian et al., 2008). These statistics emphasize the need for well-trained, highly skilled, trauma-informed psychotherapists who use scientifically validated methods to help veterans process their traumatic experiences.

Non-PTSD Brains vs PTSD Brains

To understand PTSD, one must first understand the anatomy and physiology of the human brain. Understanding the human brain will provide insight into the complex differences between brains of individuals without PTSD and brains of individuals with PTSD. Three brain regions are largely responsible for the formation of a person's experiences and memories: the amygdala, prefrontal cortex (PFC), and the hippocampus.

The amygdala is a primitive, animalistic part of the brain wired to ensure survival (*How PTSD Affects The Brain*, 2017). The amygdala functions as an alarm system, and when triggered, sends signals to the brain and body, and produces a fear response (Roozendaal et al., 2009). When the amygdala is overactive, a person cannot think rationally because the fight or flight response is on high alert and focused on survival (Janak et al., 2015).

The PFC is the part of the brain where decisions and thoughts are worked through, which allows a person to regulate their emotional responses that are triggered by the amygdala (McEwen et al., 2013; *How PTSD Affects The Brain*, 2017). In service members with PTSD, the PFC cannot always complete its mission of calming down the amygdala and deescalating the

situation (*How PTSD Affects The Brain*, 2017). An overactive amygdala combined with an underactive PFC can create chaos. The co-dysfunction of the two systems causes individuals with PTSD to feel anxious around anything related to the original trauma, have strong physical reactions to situations that should not provoke a fear response, and avoid situations that might trigger intense emotions and reactions (Janak et al., 2015; *How PTSD Affects The Brain*, 2017).

The hippocampus is the brain's memory system and encodes experiences onto its hard drive. After a trauma occurs, the hippocampus works to remember the event accurately while also helping to make sense of the experience (Belleau et al, 2019; *How PTSD Affects The Brain*, 2017). Trauma is typically overwhelming and much of the information does not get processed, encoded, or integrated correctly (McEwen et al., 2013). Because veterans' brains and bodies are in a constant state of miscommunication, they have difficulty reconciling traumatic events as well as consolidating and integrating their experiences and memories.

No two PTSD sufferers experience the exact same trauma, symptoms, or brain changes; however, there are patterns that can be identified and evaluated (*How PTSD Affects The Brain*, 2017). Research shows that the brain of a person with PTSD looks and functions very differently than a non-PTSD brain. Critical brain structures including the amygdala, anterior circulate cortex (ACC), PFC, and the hippocampus are impacted by stress and trauma (Franz et al., 2020). Research into how PTSD effects the brain has discovered that changes occur in many regions: "Studies have shown that chronic stress is associated with structural brain changes, including spine density, dendritic length, and branching neurons in multiple brain regions" (Franz et al., 2020, p. 1210). Dahlgren and others further contend that "Neuroimaging studies have consistently shown a decrease in the activation of the medial prefrontal cortex (mPFC), including the anterior cingulate cortex (ACC), and the medial frontal gyrus (mFG) in individuals with

PTSD" (Dahlgren et al., 2018, p. 1133). PTSD brains are associated with smaller brain volume in multiple regions, smaller hippocampal volume (Franz et al., 2020), and show indications of PFC dysfunction (Arnsten, 2015). These brain changes impact everything from biochemistry to sensations and perceptions to thoughts and feelings, to physical and psychological responses (Janak et al, 2015). PTSD causes changes in veterans' brains, which manifest as anxiety, depression, and suicidality.

Over the past 50 years, innovative methods of neuroimaging have enabled scientists to identify "mechanisms in the brain that cause mental disorders as well as understand changes in functional brain circuitry that underline PTSD" (Bremner, 2007, p. 394; *How PTSD Affects The Brain*, 2017). These new scanning techniques include magnetic resonance imaging (MRI), functional magnetic resonance imaging (fMRI), positron emission tomography (PET), and single-photon emission computerized tomography (SPECT). Each of these scanning technologies have unique abilities and applications that are used to identify dysfunctional regions and systems within the brain. "An MRI uses a powerful magnet to throw the electrons that make up the brain tissue out of their normal patterns and measures the time it takes for them to return to their normal resting state" (Bremner, 2007, p. 400). fMRI is used to examine, measure, and map the brain's functional anatomy as well as track metabolism in the brain that demonstrates regional, time-varying changes (Glover, 2011). PET uses radiolabeled drugs to gauge brain functions including blood flow and oxygen consumption, measure responses to specific stimuli and track neurotransmitters such as dopamine in different parts of the brain (Berger, 2003). SPECT uses a gamma camera and radiolabeled tracers to gather information about blood flow and volume, metabolism, and functional brain changes as a result of PTSD, traumatic brain injuries, and other disease processes (Raji et al., 2014).

Brains of PTSD sufferers are damaged and when an event occurs that sparks anxiety, fear, or stress, it becomes difficult for their body's collective systems to differentiate real, perceived, and imagined threats (Reisman, 2016). The disconnection between perceptions, thoughts, feelings, experiences, and memories cause veterans to develop psychopathologies.

Drug Classification

Psychedelics, also known as serotoninergic hallucinogens, is a broad drug category with mechanistically dissimilar psychoactive agents (Siegel et al., 2021). Psychedelics effect brain changes in a multitude of ways: "Psychedelics dramatically alter the user's perceptions of their surroundings and thoughts to create a world in which reason takes a back seat to the intensified sensations generated by illusions, delusions, and hallucinations" (Inaba et al., 2014, p. 6.1). Magic mushrooms, marijuana, and MDMA, also known as ecstasy, are all classified as psychedelic drugs due to their profound effects, resulting in a mystical-spiritual experience (Begola et al., 2018).

The Controlled Substances Act of 1970 regulates substances under federal law and places them into one of five categories known as Schedules. Drugs are scheduled based on a substance's medical use, potential for abuse, and safety profile (Controlled Substance Schedules, 2021; *Drug Scheduling*, n.d.). Magic mushrooms, marijuana, and MDMA are all considered psychedelics, classified as Schedule I drugs, and are, therefore, illegal at the federal level. Efforts are currently underway to reschedule these drugs based on the overwhelming empirical evidence that supports their overall use (Iserson, 2019). Additionally, several states have already or are in the process of decriminalizing and/or legalizing the medical and recreational use of magic mushrooms, marijuana, and MDMA. Decriminalization indicates a person will not be arrested or

imprisoned if they are in possession of a small amount of a drug, whereas legalization indicates the removal of all legal prohibitions and consequences *(Drug Scheduling*, n.d.).

Magic Mushrooms

Psychedelic plants and fungi grow in many regions of the world including Asia, Europe, Mexico, and the United States (Warf, 2014). Botanical records show entheogenic plants and fungi, such as magic mushrooms, have existed for over 250 million years (Inaba et al., 2014). Archaeological records show early hunter gatherers consumed mushrooms as a source of food as far back as 10,000 years (O'Regan et al., 2016). Several hundred species of mushrooms contain psilocybin and psilocin, psychoactive substances that, when consumed, alter a person's perceptions. Each mushroom species has properties, potencies, and effects that make them unique.

As humans evolved and transitioned from small tribes of hunter gatherers to living in larger communities, they shared vital skills and knowledge such as farming, flint mapping, smelting, firing pottery, and the use of natural medicines (Tuttle, 2014). As cultures and religions developed, mushrooms took on more complex roles in society, serving critical ceremonial, recreational, religious, spiritual, and medicinal functions (Guzmán, 2008). Mushroom cults began to appear in Mesoamerica around 3000 B.C. and left artifacts such as mushroom shaped rocks as evidence of their worship (Carod-Artal, 2015). Mushrooms containing psilocybin and psilocin are experienced by humans as "magical" because they produce effects that are reported as enlightening, transcending, and transformative: "Psychedelic effects include visceral sensations, changes in sight, hearing, taste, and touch" (Inaba et al., 2014, p. 6.11), which produce altered states of consciousness.

Indigenous people knew which species of mushrooms produced magical experiences centuries before modern science discovered psilocybin and psilocin. The intoxicating mind-altering effects were the reasons native peoples including the Nahuatls, Puebla, and Matlazincs, used mushrooms in their ceremonies and rituals (Guzmán, 2008). Similarly, the Aztecs referred to magic mushrooms as "Teonanacatl" or "Flesh of the Gods" because their consumption was required before an individual could enter the spirit world (Carod-Artal, 2015). Psychoactive inebriants are still being used by traditional healers and shaman around the world to tell the future, treat illnesses, dispel curses, cast out spirits, and communicate with the gods (Guzmán, 2008).

In 1956, the primary psychedelic agents that produce the "mystical-magical" effects in mushrooms were identified as psilocybin and psilocin. "The psychedelic effects are caused by disrupting the neurotransmitters serotonin and dopamine as well as generating a sudden release of norepinephrine, a stimulatory neurotransmitter that intensifies sensory perceptions (Inaba et al., 2014, p. 6.11). In 1957, *Life* Magazine published an article by Gordon Wasson titled "Seeking the Magic Mushroom," which catalyzed people's interest in consuming the fungi to experience its mystical- spiritual effects (Inaba et al., 2014). Recreational use of magic mushrooms quickly became popular and, in the 1960s, became associated with hippie culture. It must be noted that doctors, psychotherapists, counselors, and others experimented with what became commonly known as "shrooms" and believed the fungi had tremendous therapeutic potential for a wide range of mental health conditions (Iserson, 2019).

In 1970, the U.S. government declared mushrooms containing psilocybin and psilocin would be classified as a Schedule I drug (Comprehensive Drug Abuse Prevention and Control Act, 1970). The federal government enacted laws that made it illegal to possess and consume

"shrooms" and imposed harsh penalties on those who broke the law (Iserson, 2019). As a result, mushroom use was pushed underground, which added fuel to the fire of people's desire to consume this magical drug for its mystical effects. Scientific inquiry and research with "shrooms" became tightly controlled and only possible with special permission from the Drug Enforcement Agency (DEA) (Iserson, 2019). Due to governmental restrictions, research on psychedelic mushrooms and their effects were slow (Iserson, 2019). As knowledge accumulated, researchers began to focus their efforts on the drug's therapeutic potential in the treatment of anxiety, depression, tobacco use, alcohol addiction, obsessive compulsive disorder (OCD), and PTSD (Krediet et al., 2020).

According to research, subjects who participated in psilocybin-assisted psychotherapy experienced a multiplicity of positive effects including intensified feelings of existential and spiritual wellbeing (Ross et al., 2016). A study conducted by Mason and colleagues found that psilocybin successfully reduced participants' symptoms of anxiety and depression (Mason et al., 2019). The study went on to discover that psilocybin improved creative thinking, increased empathy levels, and enhanced participants' well-being (Mason et al., 2019). Results from a third study show higher doses of psilocybin resulted in improved clinical outcomes compared to lower doses, and at a six-month follow-up, approximately 80% of participants continued to experience significant decreases in depressed mood and anxiety (Griffiths et al., 2016). Additionally, the study indicates that subjects developed a deeper understanding of the meaning of life, experienced an increase in optimism, and their quality of life improved (Griffiths et al., 2016). According to Hendricks and associates (2015), individuals who have consumed magic mushrooms at least once in their lifetimes show significantly lower levels of psychological distress and suicidal thinking. Research has shown that psilocybin effected a larger reduction in

suicidal ideation than other psychedelic drugs, suggesting its therapeutic potential as a "suicide prophylaxis" (Hendricks et al, 2015). While the true explanation for why or how it happens may still be unresolved, there is enough evidence to suggest these medicines should be studied further and applied to other medical and psychological conditions.

Research results strongly indicate that magic mushrooms provide substantial therapeutic relief for individuals who suffer from mental health conditions. In fact, the amount of scientific evidence was so strong and compelling that, in 2018, the FDA designated psilocybin a breakthrough therapy for treatment-resistant depression (TRD). "The FDA grants this designation for treatments that (1) are intended alone or in combination with one or more other drugs to treat a serious or life-threatening disease or condition; and (2) preliminary clinical evidence demonstrate substantial improvement over existing therapies" (*Phase 3 Trial Program: MDMA-Assisted Therapy for PTSD*, n.d.). Research into the therapeutic potential of magic mushrooms as a method of treating PTSD and other psychological conditions in veterans is ongoing.

Marijuana

Cannabis sativa, also known as marijuana, grows in many parts of the world, including the U.S. and Mexico (Warf, 2014). Marijuana's country of origin is unknown; some experts believe it is indigenous to temperate areas in western and central Asia, while others suggest China or Siberia (Warf, 2014). Botanical science claims, "Cannabis has been transported widely, providing extensive opportunities for establishment outside of its original range" (Schultes, 1981, p. 770; Small, 2015). The genus cannabis includes several species and subspecies, each with properties, potencies, and effects that make them unique. The two most recognizable cannabis subspecies are Cannabis sativa L. and Cannabis sativa.

Cannabis sativa L., also known as industrial hemp, produces a fibrous material that can be processed to make clothes, canvas, shoes, paper, and oil. Hemp's strength and versatility made it so valuable that its worth cannot be calculated. Hemp made it possible for sailors to navigate the open sea by allowing them to harness the wind in their sails, clothed them on their journeys, and provided paper for sea and star charts as well as treasure maps (Skoglund et al., 2013; Small, 2015). Cannabis sativa L. contains 0.3% or less of Δ9-tetrahydrocannabinol (THC) and has almost no psychoactive properties and therefore is not used as an intoxicant (Hurgobin et al., 2021).

Conversely, Cannabis sativa, also known as marijuana, does have psychoactive properties and is considered both a medicine and an inebriant. According to Warf, the female plant produces a sticky resin-like substance that is rich in cannabinoids, specifically THC and cannabidiol (CBD) (Warf, 2014). Cannabis sativa plants and products that contain 0.3% or more of THC and used for their medicinal or intoxicating effects, are considered drug-type (Hurgobin et al., 2021). Archaeological and written records demonstrate that for centuries, humans around the world have exploited cannabis for cultural, medicinal, recreational, religious, and spiritual reasons (Carod-Artal, 2015). "Due to its versality, a relationship between Cannabis and Homo Sapiens have existed for at least 10,000 years" (Inaba et al., 2014, p. 6.26). Industrial hemp and marijuana are woven into the world's sociocultural fabric, uniting humanity through the drugs' domestication, trade, and use.

As adventurers explored the world, they brought seeds of culture, religion, and cannabis in their backpacks, sowing them along the way. Cannabis, an old-world drug, arrived in the New World and Latin America in the early sixteenth century (Warf, 2014). Smoking cannabis for its psychedelic effects was influenced by multiple sources and developed over time. Historical

records show Pygmies from Uganda in East Africa smoked marijuana out of gourds going back hundreds of years, with its use spreading amongst tribes (Inaba et al., 2014). Asian immigrants, African slaves, and Middle Eastern peoples likely introduced the tradition of consuming or smoking marijuana for its medicinal and psychedelic effects to the European and Western worlds (Chasteen, 2016). Contact with the New World's indigenous tribes introduced the practice of smoking tobacco out of pipes (Inaba et al., 2014). Once immigrants, slaves, and other ethnic peoples began to use indigenous pipes to smoke marijuana for its psychoactive effects, its use spread like wildfire, even amongst Europeans (Warf, 2014).

In 1937, the U.S. passed the Marihuana Tax Act, which set up strict regulations on cannabis and outlawed it on a national level (Pacula et al., 2017). If one was caught in possession of cannabis, harsh punitive measures were imposed, including large fines, arrest, and incarceration (Iserson, 2019). In 1964, two Israeli biochemists discovered marijuana's main psychoactive ingredient known as THC (Inaba et al., 2014). In 1970, Attorney General John Mitchell lobbied for marijuana to be scheduled, and shortly thereafter, it became a Schedule I drug alongside heroin, LSD, magic mushrooms, and MDMA, also known as ecstasy (Iserson, 2019). This classification hindered scientific inquiry and research into the therapeutic potential of cannabis. Over time, however, the DEA granted scientists permission to study the effects of cannabis on individuals who suffered from anxiety, depression, PTSD, and physical pain (Pacula et al., 2017).

Medical research has identified two types of cannabinoid receptors, CB1 and CB2, that are located throughout the human body. CB1 receptors are found primarily in the brain and spinal cord, while CB2 receptors are found in the peripheral tissues, such as the stomach and legs. Both types of CB receptors are involved in the regulation of pain, mood, appetite, sleep,

memory, and emotional state (Iversen, 2003). Smoking or consuming marijuana products allows THC and CBD molecules to bind with matching endocannabinoid receptors in the body and brain to reduce anxiety, alleviate pain, and alter a person's sensations and perceptions (Iversen, 2003).

Multiple studies have investigated the therapeutic effectiveness of Cannabis sativa for treating PTSD. Results from one study indicated medical cannabis was an effective treatment option for military and other service veterans with PTSD, particularly those for whom conventional psychotherapy and psychopharmacology was ineffective (Smith et al., 2017). The study went on to discover cannabis use results in improvements across all PTSD measures including social, family, and pain management (Smith et al., 2017). Finally, client improvements were associated with a 50% reduction in the use of other PTSD related medications (Smith et al., 2017). Results from a second study found that patients reported significant symptom improvement and increased quality of life after four months of cannabis use (Chan et al., 2017). A third study's results showed all PTSD symptoms including intrusions, flashbacks, irritability, and anxiety were reduced by 50% immediately after using cannabis (LaFrance et al., 2020). Finally, the study found the longer the research participants used cannabis, the greater their symptoms were reduced and that higher doses of cannabis predicted larger reductions in intrusions and anxiety than lower doses (LaFrance et al., 2020).

Additional findings indicated that "cannabinoids reduce responses to conditioned fear cues, impair retrieval of emotionally adverse memories, and promote the extinction of fear memories" (LaFrance et al., 2020). These research findings are significant and support the use of cannabis as an effective treatment for veterans who suffer from symptoms of anxiety, depression, PTSD, pain, and suicidality.

3, 4-Methylenedioxymethamphetamine (MDMA)

In 1914, Merk, a German pharmaceutical company, discovered 3,4-methylenedioxymethamphetamine (MDMA), a short acting psychostimulant with effects that last approximately four to six hours. "MDMA's primary mechanism of action is on the 5-HT transporter, which results in excessive serotonin in the synaptic cleft and also interacts with other neurotransmitters' systems including dopamine and norepinephrine" (Amoroso, 2015, p. 339). Research has shown that "MDMA significantly increases blood plasma levels of oxytocin, and the subjective pro-social feelings are positively correlated to the oxytocin levels in the blood" (Amoroso, 2015, p. 9; Dumont et al., 2009, p. 360). Commonly known as ecstasy, MDMA alters a person's sensory perceptions by elevating and intensifying one's physical, mental, and emotional senses, which promotes feelings of happiness and well-being (Inaba et al., 2014). MDMA "operates on emotions more so than cognitive processing" (Doblin, 2002, p. 190), which allows an individual to connect with and explore their inner thoughts and emotions. Veterans who can process their traumatic experiences can therefore heal and achieve post-traumatic growth in response to treatment.

During the 1950s, the U.S. became interested in psychological warfare. To study these techniques, the military gave soldiers ecstasy to brainwash them and to understand the drug's overall effects (Inaba et al., 2014). The military's experimentation was halted because of the drug's inability to achieve the desired results. In 1988, the DEA decided that MDMA had no therapeutic use and classified it as a Schedule I drug, alongside heroin, LSD, magic mushrooms, and marijuana (Controlled Substance Schedules, 2021; *Drug Scheduling,* n.d.; Comprehensive Drug Abuse Prevention and Control Act, 1970). Professionals who utilized MDMA as an adjunct to traditional psychotherapy were forced to discontinue its use or face harsh consequences

including loss of license and imprisonment (Iserson, 2019). When the DEA eventually granted researchers permission to study MDMA, research focused almost exclusively on negative aspects of consumption, rather than its therapeutic potential (Begola et al., 2018). Once researchers were allowed to experiment with and investigate MDMA, the therapeutic potential became clear.

The first randomized clinical trial that used MDMA-assisted psychotherapy to address treatment resistant PTSD was published in 2010. Participants' PTSD symptoms were assessed using the Clinician Administered PTSD Symptoms Scale (CAPS-IV). Clients received traditional psychotherapy and two sessions where either a placebo or 125 mg of MDMA were administered (Mithoefer et al., 2011). The results showed that 83% of the patients who received MDMA-assisted psychotherapy and were reassessed using the CAPS-IV no longer met the criteria for PTSD (Mithoefer et al., 2011). Additionally, results showed that MDMA-assisted psychotherapy clients continued to produce positive results, including decreased levels of anxiety and depression three and a half years after their initial course of treatment (Mithoefer et al., 2018).

In a second study, veterans with treatment resistant PTSD described qualitative improvements in self-awareness, relationships, social skills, openness to therapy, and a reduction in problematic substance use after being treated with MDMA (Barone et al., 2019). Participants expressed an improved ability to process traumatic memories, experienced an increased sense of empathy for self and others, and felt a renewed sense of motivation and enthusiasm to engage in life (Barone et al., 2019). Barone further contends, "All research participants reported experiencing lasting personal benefits and enhanced quality of life that extended beyond quantifiable symptom reduction" (Barone et al., 2019, p. 199). Factors identified as being critical to the success of MDMA-assisted psychotherapy include a strong therapeutic alliance,

preparatory sessions, which helps prepare veterans for the experience, and integrative sessions, which helps veterans process their experiences (Barone et al., 2019). “MDMA’s psychopharmacological characteristics are what make it well suited as an adjunct to trauma-focused psychotherapy” (Siegel et al., 2021, p. 78).

MDMA-assisted psychotherapy is delivered over a short period, is cost effective, and has been empirically validated as effective in treating PTSD (Doblin, 2002). “Multiple studies have shown as few as two MDMA-assisted psychotherapy sessions can successfully reduce symptoms in patients with treatment resistant PTSD with retained remission for up to six years post treatment” (Sessa et al., 2019, p. 138). Clinical studies investigating MDMA indicate the medication is safe and effective in treating psychopathology (Dos Santos et al., 2018). According to Doblin (2002), “MDMA is superior to all other psychedelics because the primary effects are short acting which allows one to return to baseline quickly, rarely interferes with cognitive functioning, and reduces fear and defensiveness” (p. 186). Sessa further contends, “The unique and powerful role of psychedelic drugs is tailor-made for disorders based around anxiety and fear, especially OCD and PTSD” (Sessa, 2014, p. 59).

In 2017, the Food and Drug Administration (FDA) designated MDMA as a breakthrough therapy for the treatment of PTSD**.** Currently, phase three clinical trials are underway, which means MDMA could be FDA approved for the treatment of veterans with PTSD as soon as 2023. Research into the therapeutic potential of MDMA as a method of treating other psychopathologies in veterans is ongoing.

Treatment Barriers

Military veterans with anxiety, depression, PTSD, and suicidality face multiple obstacles in accessing mental health services. In 2014, the Veterans Administration conducted an audit and

found the greatest barrier veterans have to obtaining treatment for mental health issues was provider availability (DVA, 2014). The lack of providers exacerbates the severity and duration of veterans' symptoms. Prolonged psychological pain and suffering are known to increase suicide rates and other psychopathologies, especially among veterans (Reisman, 2016). According to the DVA, between 18 and 22 veterans die from suicide every day (DVA, 2014), and in 2016, veterans accounted for 20% of all suicides in the U.S. (Reisman, 2016).

Another significant barrier hindering veterans are the sociocultural stigmas associated with mental illness and treatment. The military's masculinist culture idealizes obedience, physical toughness, and mental fortitude, and deviation from this norm is met with resistance (Weitz, 2015). Research has indicated that veterans perceive mental illness as a weakness and therefore often feel ashamed or embarrassed to seek help (Institute of Medicine (US) Committee on the Initial Assessment of Readjustment Needs of Military Personnel, Veterans, and Their Families, 2010; Rae Olmsted et al., 2011). As a result of the military culture and social stigmas, veterans with anxiety, depression, PTSD, and suicidality often ignore, marginalize, or rationalize their symptoms (Weitz, 2015). Symptom suppression increases pain and suffering, making veterans' mental health conditions worse, which further increases stigmas (Rae Olmsted et al., 2011). This process demonstrates the harmful cycle stigmas, PTSD, and other psychopathologies have on a veteran.

Stigmas extend to medication use. Rather than being inconvenienced or embarrassed by taking FDA-approved medications such as Zoloft or Paxil, veterans often self-medicate with alcohol and drugs (McFarling et al., 2011). Self-medicating has been shown to exacerbate presenting symptoms, which makes treating underlying anxiety, stress, and trauma more challenging (Jackson-Cherry et al., 2014). Medications have the potential to help many veterans

recover; however, drugs such as Zoloft require time to reach their therapeutic potential and are known to produce negative side effects, including cardiovascular issues, sleeping problems, diarrhea, muscle pain, and sexual dysfunction (American Psychological Association, 2017). The stigma surrounding the medical application of psychedelic substances to treat anxiety, depression, PTSD, suicidality, and other psychopathology is even more pronounced than those associated with traditional medications such as Zoloft and Paxil (McFarling et al., 2011). Biases, stigmas, and misconceptions about mental illness, psychotherapy, medications, and psychedelic drugs are harmful because they prevent veterans from receiving the help they need.

Clinical Mental Health Program Applications

The therapeutic potential of magic mushrooms, marijuana, and MDMA is supported by empirical evidence that indicates psychedelics are highly effective in treating psychopathology and reducing symptoms of anxiety, depression, PTSD, and suicidality. Psychedelic drugs are relatively safe to consume and function as a catalyst in treating mental illness in veterans as well as disorders resistant to traditional psychotherapeutic interventions.

A major therapeutic benefit of psychedelic drugs includes helping veterans process their pain and trauma and allowing them to perceive the world in new ways. Psychedelics facilitate the healing process by enhancing emotional sensitivity and promoting emotional release, which facilitates higher levels of self-awareness. After the psychedelic effects wear off, veterans are better able to reintegrate negative experiences and develop new ways of understanding themselves and the world around them. Studies have found that hallucinogenic experiences were rated among the most meaningful and spiritually significant events in a person's life and can improve one's well-being and life satisfaction for up to a year after the experience (Majić et al., 2015; Begola et al., 2018). The synergistic effects of psychedelic-assisted psychotherapy can

help veterans heal, grow, and express a more integrated sense of themselves in response to their traumatic experiences.

Magic mushrooms, marijuana, and MDMA will soon become FDA-approved medications intended to be used as adjuncts to traditional psychotherapy with individuals who suffer from anxiety, depression, PTSD, and suicidality. Psychedelic drugs and evidence-based, trauma-informed psychotherapy are powerful tools that can help veterans reduce their psychological pain and suffering as well as promote mental, physical, and emotional health and wellness through transformative experiences. Regardless of a person's intentions to utilize magic mushrooms, marijuana, or MDMA in therapy, industry best practices require therapists to familiarize themselves with the use of psychedelic drugs to treat psychopathologies as a method of enriching the therapeutic alliance, supporting and facilitating clients' healing processes, and stimulating post-traumatic growth.

Therapists who treat veterans have common goals for their clients including improved functionality, healing, safety, sustained recovery, wellness, and an enhanced quality of life. Utilizing psychedelic psychotherapy has the potential to help veterans connect with traumatic experiences, assist in the expression of thoughts and feelings, and allow them to process and integrate memories. Research has shown that psychedelic drugs are therapeutically valid, relatively safe to consume, cost effective, have a low potential for abuse, and reduces traditional medication consumption by half. Most importantly, psychedelic drugs facilitate profound life-enhancing experiences that can help veterans heal from their trauma and, therefore, can live happier, healthier, and more functional lives.

Discussion

Military life is marked by chaos and uncertainty. Military service is a very dangerous occupation, with no room for error. One misstep can cost a soldier their life or the lives of fellow troops. Anxiety, pressure, stress, and trauma build up over time and have profound effects on the human brain, changing it in a multitude of ways. Brains of PTSD sufferers are damaged, and when an event occurs that sparks anxiety, fear, or stress, it becomes difficult for the body's collective systems to differentiate real, perceived, and imagined threats (Reisman, 2016). The disconnection between perceptions and reality, thoughts and feelings, and current experiences and memories produce psychopathology and cause dysregulation to manifest in multiple life domains across a soldier's lifespan.

Troops who survive the traumas of combat and war are highly susceptible to developing psychopathology including anxiety, depression, PTSD, and suicidality (Reisman, 2016). Soldiers should not return home from war to suffer in silence or die by suicide, yet many do. Veterans who suffer from PTSD face multiple treatment barriers including the inability to access mental health providers who use evidence-based techniques; the military's masculinist culture; stigmas related to mental health issues, psychotherapy, traditional medications, and non-traditional drugs such as magic mushrooms, marijuana, and MDMA. Biases, stigmas, and misconceptions surrounding the use of psychedelic drugs persist, stifling scientific inquiry into their therapeutic potentials and use with veterans who suffer from mental illness. Psychotherapists who treat veterans will soon have access to powerful tools that can be used to help fight anxiety, depression, PTSD, and suicidality.

Research into the therapeutic potential of psychedelic drugs as a method of treating veterans with PTSD shows exceptionally promising results. Individuals who participated in

psilocybin-assisted psychotherapy experienced a multiplicity of positive effects, including intensified feelings of existential and spiritual well-being (Ross et al., 2016), reduced symptoms of anxiety and depression, improved creative thinking, increased empathy levels, and enhanced feelings of well-being (Mason et al., 2019). Additionally, subjects developed a deeper understanding of the meaning of life and experienced both an increase in optimism and an improvement in their quality of life (Griffiths et al., 2016).

Research participants who used medical cannabis experienced a reduction in symptoms related to physical and psychological pain, anxiety, depression, PTSD, and suicidality (Iversen, 2003). Marijuana was also found to be effective in veterans with PTSD, particularly those for whom conventional psychotherapy and psychopharmacology was ineffective (Smith et al., 2017). Cannabis use resulted in improvements across all PTSD measures including social, family, pain, and quality of life (Smith et al., 2017). These improvements were associated with a reduction in PTSD symptoms, including intrusions, flashbacks, irritability, and anxiety (LaFrance et al., 2020). Finally, THC and CBD have been shown to reduce responses to conditioned fear cues, impair retrieval of emotionally adverse memories, and promote the extinction of fear memories (LaFrance et al., 2020).

Individuals who participated in MDMA-assisted psychotherapy experienced positive results, including decreased levels of anxiety, depression, and PTSD symptoms three and a half years after their initial course of treatment (Mithoefer et al., 2018). Participants also described improvements in their self-awareness, relationships, social skills; an openness to therapy; and a reduction in problematic substance use (Barone et al., 2019). Additionally, the group of participants who received MDMA-assisted psychotherapy expressed an improved ability to process traumatic memories, an increased sense of empathy for themselves, and a renewed sense

of motivation and enthusiasm to engage in life (Barone et al., 2019). Mental health providers must recognize the therapeutic potential that exists with psychedelic-assisted psychotherapy and be prepared to facilitate veterans' healing and post-traumatic growth through the application of psychedelic drugs.

Psychedelic psychotherapy may be useful for individuals who suffer from conditions such as body dysmorphic disorder (BDD) or personality disorders (PD). Psychedelic medications have the potential to help people with these conditions better understand themselves, their actions, and the world from an alternative perspective. The ability for a person to suspend or displace their perception of reality may help those who suffer from BDD or PD gain insight into their thought processes and behavior patterns, allowing them to function more effectively in the world.

Typically, people who suffer from mental health conditions such as anxiety, depression, PTSD, and suicidality are prescribed medications to help manage their symptoms. In the U.S. drugs used to treat mental illness are intended for long term use, often have side effects, and can be expensive even with insurance. Magic mushrooms, marijuana, and MDMA are safe to consume, effective in as few as two doses, and produce positive long-term effects. Psychedelic-assisted psychotherapy can lessen the economic burden on veterans, society, and the healthcare system by decreasing the number of medications and sessions needed to address their concerns. The money saved utilizing psychedelic psychotherapy can be recycled back into the veteran healthcare system to train and hire additional psychedelic psychotherapists to treat service members with PTSD and other psychopathologies.

Despite the wealth of scientific data showing support for psychedelic-assisted psychotherapy, limitations exist, including government restrictions, inaccurate Schedule

placement, and legal issues. Government restrictions make it difficult for scientists to investigate the therapeutic potentials of psychedelic drug and, therefore, limit the number of studies being conducted. Results from approved studies found that magic mushrooms, marijuana, and MDMA are highly effective at treating a wide range of conditions. Steps towards rescheduling these medications have been made; however, progress is slow. Factors such as misconceptions about psychedelic drugs, limited access to education and training, and legal consequences reduce mental health providers' willingness to become certified psychedelic psychotherapists.

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