

Hallucinogen use in Pennsylvania: legal status, therapeutic applications, and use among youth

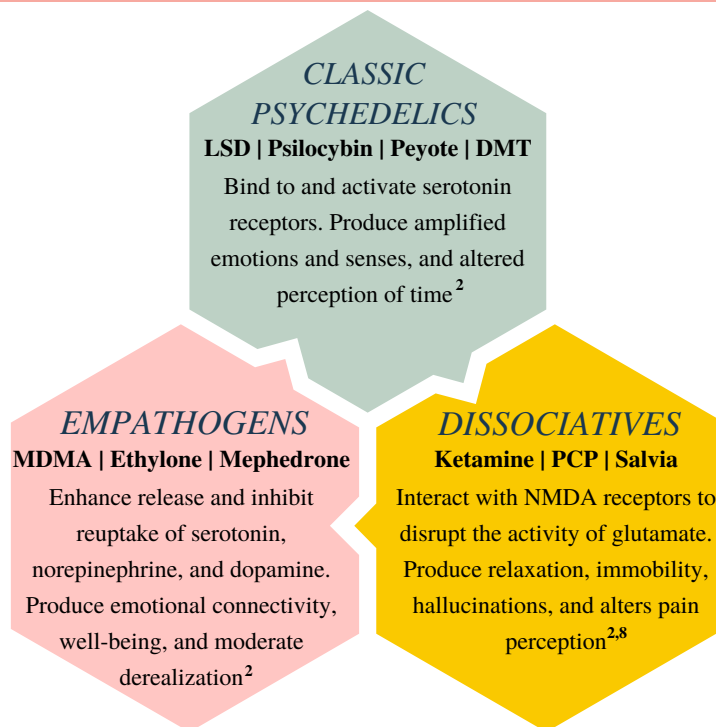
State Epidemiological Outcomes Workgroup, 2023

BACKGROUND

Hallucinogens are a diverse group of drugs—including classic psychedelics, empathogens, and dissociatives--that alter thoughts, perceptions, and mood.^a Over the past ten years, there has been a renewed interest in hallucinogen research and therapeutic application for the treatment of mental health conditions, especially with psilocybin.^{1,2} Recent research has found hallucinogens to be an alternative to first-line psychiatric medications. Though psychotherapy with conventional medications is effective for some people, patient retention, long-term use of medications, adverse effects, and treatment resistance can decrease its efficacy.³ Hallucinogen-assisted therapy offers a novel approach to addressing mental health conditions and substance use disorders. This brief examines the clinical and recreational use of hallucinogens in Pennsylvania, primarily, the four compounds most commonly used in clinical settings: LSD, psilocybin, MDMA, and ketamine.

Mental health is a major public health concern in the US and Pennsylvania. From 2019-2020, 21.0% of U.S. adults aged 18 or older and 19.7% of Pennsylvania adults had a mental illness in the past year.⁴ Of those Pennsylvania adults with any mental illness, 51.9% did not receive any mental health treatment in the past year.⁵ Additionally, 15.4% of U.S. adults 18 years or older and 15.9% of PA adults had a substance use disorder in the past year.⁴

99
ongoing and
planned Phase I-III
clinical trials with
psilocybin in the
U.S. as of May 2022⁶



~\$34
million in
psychedelic
research
studies are
being funded by the
NIH as of 2022⁷

LEGAL STATUS IN THE UNITED STATES & PENNSYLVANIA

- ▶ Classic psychedelics and MDMA are Schedule I controlled substances classified in 1970 and 1988, respectively. Ketamine is a Schedule 3 substance classified in 1999.^{9, b}
- ▶ Between 2020-2022, Colorado, Oregon, New Jersey, Washington, and D.C. decriminalized or reduced the penalty for personal possession of psychedelic substances within that time period.^{10,11}
- ▶ The possession of controlled substances in Pennsylvania can carry up to 1 year in jail and/or a fine of up to \$5,000 for a first offense.¹²
- ▶ Ketamine is legal in Pennsylvania for medical use only. It is available as a prescription in nasal spray form and intravenously in clinical settings.¹³

a. This report uses a broad definition of hallucinogens similar to the definition used by National Survey on Drug Use and Health (please see the note for Figure 5 on page 7).

b. Schedule I: high abuse potential and no medical value; Schedule III: moderate abuse potential with medical value.⁹

Pharmaceutical properties and therapeutic potential of hallucinogens

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LSD (ACID)



Source: Microgen (retrieved from Canva)

- LSD (lysergic acid diethylamide) can alleviate depression, psychiatric distress, and illness-related anxiety in patients with life-threatening diseases.¹
- In the 1950s-early 1970s, LSD was extensively researched in the US and Europe as a treatment of anxiety, depression, alcohol use disorder, and end of life-related distress.¹

- LSD research led to the development of selective serotonin reuptake inhibitors (SSRIs), the first-line medicine for depression.¹
- In 2014, a double-blind, active placebo-controlled pilot study was published for the first time since the 1970s, studying LSD-assisted psychotherapy to treat anxiety associated with life-threatening diseases.¹⁴
- As of now, there are no ongoing LSD trials in the U.S.²

PSILOCYBIN (SHROOMS, MAGIC MUSHROOMS)



Source: Yarygin (retrieved from Canva)

- Shows promise in treating major depressive disorder, treatment-resistant depression, anxiety and anxiety-related disorders, and substance use disorders.¹⁵
- **In 2018, psilocybin was granted Breakthrough Therapy Designation status by the FDA for treatment-resistant depression.**²
- In 2021, Johns Hopkins Medicine was awarded the first NIH grant for psychedelic therapy research in 50 years; the grant will explore the potential of psilocybin for tobacco addiction.¹⁶

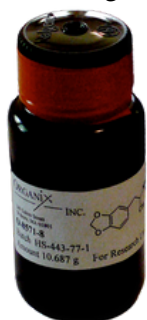
THERAPEUTIC POTENTIAL OF HALLUCINOGENS

- ▶ Promising medications for treating PTSD, depression, anxiety, substance use disorders, end-of-life psychiatric distress.²
- ▶ Produce sustained decreases in psychiatric symptoms after one or two drug administrations.¹⁵
- ▶ Effects are thought to occur through “rewiring” of the brain by disrupting unhealthy thought patterns and allowing for more flexible cognition.¹

- Ongoing U.S. clinical trials are evaluating the potential of psilocybin-assisted psychotherapy to treat obsessive-compulsive disorder, type II bipolar disorder, anorexia nervosa, and depression in people with early Alzheimer’s.²

MDMA (ECSTASY, MOLLY)

- MDMA (3,4-methylenedioxy-methamphetamine) shows promise in treating chronic, severe post-traumatic syndrome disorder (PTSD).¹⁷
- Compared to SSRIs, MDMA-assisted psychotherapy was shown to have greater tolerability and safety, more durable clinical effects, and lower dropout rates.¹⁸
- From the late 1970s to the late 1980s, MDMA was successfully used in treating thousands of patients in individual, group, and couples therapy.¹⁹



Source: Multidisciplinary Association for Psychedelic Studies (MAPS)

- In 2017, **the FDA approved Phase 3 trials with MDMA and granted Breakthrough Therapy Designation to MDMA for PTSD treatment.**²
- If Phase 3 trials are successful, the FDA may approve MDMA-assisted psychotherapy as a legal₁ prescription treatment for PTSD.

KETAMINE (SPECIAL K, K)

- Was found to be an effective and fast acting treatment for patients with moderate to severe major depressive disorder and treatment-resistant depression.²⁰
- May help prompt neuron connection regeneration in the brain, which allows for more cognitive flexibility and the opportunity to develop more positive thought patterns -- an effect not seen in typical antidepressants.²⁰
- **The FDA approved esketamine, a form of ketamine, for the treatment of major depressive disorder.**²⁰

- Allows for lower dosages and can be taken as a nasal spray rather than an IV, which is the current requirement for ketamine delivery.
- It is the only hallucinogen therapy available outside of clinical trials in the U.S.²¹



Source: SoundMind Center

Psychedelic and MDMA therapy; development of novel hallucinogens; mental health medications

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PSYCHEDELIC- AND MDMA-ASSISTED THERAPIES

Psychedelic- and MDMA-assisted psychotherapy refers to the supervised administration of the substances in a therapeutic setting combined with conventional psychotherapy. It takes place over the course of several weeks or months and involves three stages: preparation, medication, and integration.²²



Figure 1:
MDMA-assisted psychotherapy session.
Source: Multidisciplinary Association for Psychedelic Studies (MAPS)

Preparation

Patient is screened and meets with the therapist to discuss the patient's symptoms, history, life events, and intentions for therapy.^{2,23}

Medication

1 to 3 drug administrations, lasting for 6-8 hours; primarily a time for self-introspection and spontaneous experiences with the supervision of a therapist.^{2,23}

Integration

Happens between medication sessions with a therapist; reviews and interprets the psychedelic experience and translates takeaways into long-term desirable change.^{2,23}

MENTAL HEALTH MEDICATIONS

Several classes of medications are commonly prescribed for treating mental health disorders. Medications are often combined with other treatments, such as psychotherapy.

Antidepressants:

- SSRIs (Selective Serotonin Reuptake Inhibitors),
- SNRIs (Serotonin-Norepinephrine Reuptake Inhibitors),
- TCAs (Tricyclic Antidepressants),
- MAOIs (Monoamine Oxidase Inhibitors),
- NDRI (Norepinephrine-Dopamine Reuptake Inhibitors).

Anxiolytics: used for anxiety disorders or symptoms.

Antipsychotics: used to treat psychosis and psychotic episodes.

Mood stabilizers: used to treat mood disorders, such as depression and bipolar disorder.

Stimulants: mainly used to treat ADHD (Attention Deficit Hyperactivity Disorder).²⁴

DEVELOPMENT OF NOVEL HALLUCINOGENS

Researchers are exploring the development of new hallucinogen drugs without hallucinogenic/dissociative effects. Novel compounds could allow for more effective psychiatric care by potentially offering:

- Sustained therapeutic effects with improved safety profile, including lower cardiotoxicity, reduced potential for misuse, and lack of hallucinations.
- Improved access for patients with personal/family history of psychotic disorders.
- Reduced therapy sessions due to shorter duration of drug action.^{25,26}

In Philadelphia, the Discovery Center at Saint Joseph's University focuses on the discovery and development of new and innovative psychedelics and similar compounds that will have breakthrough potential as **“life-changing therapeutics for neuropsychiatric indications.”**²⁷

Therapeutic use of hallucinogens versus opioids; potential for misuse and dependence

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THERAPEUTIC USE OF OPIOIDS AND HALLUCINOGENS

Opioid-assisted therapy

- For the treatment of pain or opioid use disorder.
- Pain treatment:
 - Opioids (e.g., oxycodone) can be purchased at pharmacies and self-administered.
- Treatment for opioid use disorder:
 - Opioids are prescribed in combination with psychotherapy.
 - Administered over the course of months, years, or lifetime.
 - Suboxone is available at pharmacies by prescription.
 - Methadone is typically administered daily under medical supervision.²⁸

Hallucinogen-assisted therapy

- For the treatment of mental health disorders.
 - Also found to help reduce daily opioid use.²⁹
- Involves the presence of trained facilitators and use of a curated therapeutic environment.²
- Drugs are taken in combination with psychotherapy and administered by a trained professional.²
 - Psychedelic therapy involves 1-3 drug sessions, spaced a few weeks to a month apart.²
 - Ketamine is administered in 6-12 sessions over two to four weeks. Initially given twice a week, then once a week.²¹

POTENTIAL FOR MISUSE AND DEPENDENCE

- LSD and psilocybin have not been shown to induce compulsive use, physical dependence, or withdrawal, unlike other drugs of misuse, such as opioids. This may be due to the long-lasting, intense experience and rapid tolerance of psychedelics, possibly leading users to limit their frequency of use.^{30,31}
- Some clinical trials on MDMA have reported no misuse potential, while recreational users have reported physical and psychological withdrawal and cravings. MDMA use has been associated with risk-taking behaviors and impulsivity.³²
- Ketamine has the potential for misuse, due to its reward and reinforcing effects which may induce physical and psychological dependence in some users.⁸
- LSD and ecstasy are ranked lower than opioids or cannabis for dependence, both in terms of psychological and physical dependence; ratings for ketamine are lower than those for opioids and comparable with those of cannabis, **Figure 2**.³³

Expert panel rankings of drugs by psychological and physical dependence

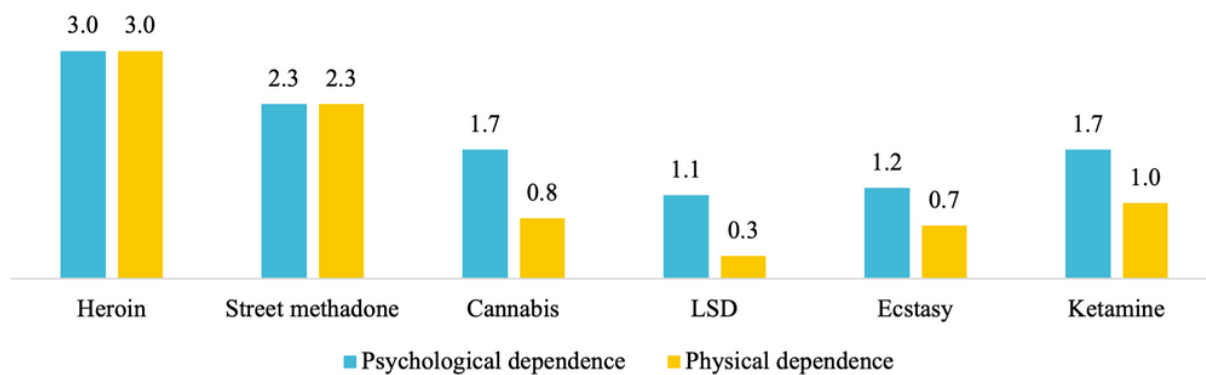


Figure 2. Dependence rankings of heroin, street methadone, cannabis, LSD, ecstasy, and ketamine

Source: Based on Nutt et al. (2007) four point risk scale of 0-3, zero being no risk and 3 being extreme risk³³

Therapeutic services and user experiences in Pennsylvania; ketamine therapy

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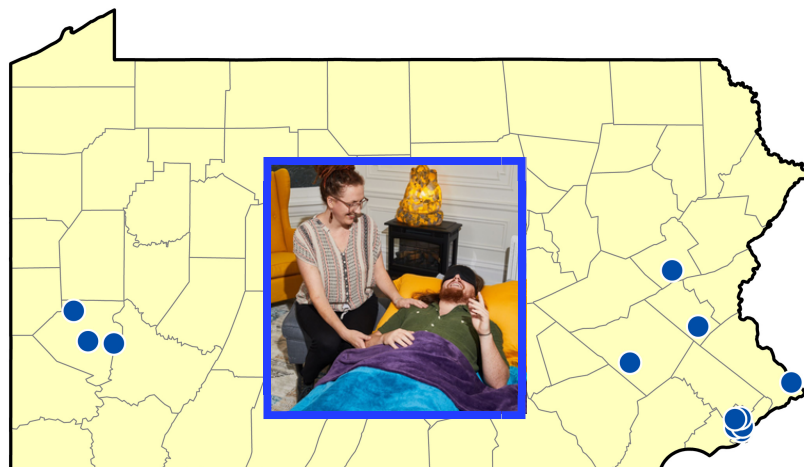
SERVICES

Ketamine clinics

- As of September 2022, there are 13 ketamine clinics in Pennsylvania, **Figure 3**. Of those, 4 clinics are located in Philadelphia. The rest are located in Allentown, Bala Cynwyd (2 clinics), Emmaus, Lehighton, Monroeville, Pittsburgh, West Lawn, and Wexford.

Other services

- Trip sitting, guiding, and integration services
 - Unlike clinical psychedelic therapists, trip sitters and guiders cannot provide psychoactive substances; instead, they help facilitate the psychedelic experience.³⁴
 - A U.S.-based harm reduction company provides trip sitting, guiding, and integration services in all major cities in Pennsylvania.³⁴
- Psychedelic Society (Pittsburgh, Lehigh Valley, Philadelphia)
 - Advocating for decriminalization, therapeutic use, and mainstream acceptance of psychedelics.³⁵
- Clinical trials
 - Allentown was used as a research/recruitment location for a 2019 study on ketamine in patients with treatment-resistant depression (ClinicalTrials.gov identifier NCT01627782).³⁶



● Ketamine Clinic

Figure 3. Map of PA ketamine clinics; ketamine-assisted psychotherapy at SoundMind Center in Philadelphia, PA

Sources: Geographic locations of ketamine clinics were acquired from Google Maps, data were retrieved in June-July 2022; image for ketamine-assisted psychotherapy is provided by SoundMind Center.

KETAMINE THERAPY

The two main forms of ketamine therapy are ketamine infusions (IV drip; typically with minimal therapeutic support) and ketamine-assisted psychotherapy (via nasal spray or oral lozenge; accompanied by a trained facilitator).³⁷ One ketamine clinic in Philadelphia is awaiting FDA approval to provide MDMA- and psilocybin treatment.³⁷

KETAMINE EXPERIENCES OF PENNSYLVANIA USERS

- Data were gathered from June 2022-February 2023 using Reddit, a social platform for content-sharing and discussion threads.
- Six forums, 8 posts, 124 comments were initially identified; 2 forums, 3 posts and 6 comments were selected based on testimonies from users who were discussing ketamine treatment in the r/Pittsburgh and r/Philadelphia groups.
- Four themes emerged: 1) ketamine treatment is a life-changing experience that enhances quality of life; 2) ketamine treatment has greater efficacy compared to conventional treatment; 3) high cost of ketamine treatment can be prohibitive; and 4) apprehension to treatment due to previous recreational adverse effects.

“Without regular access to ketamine I have passive suicidal ideation, which gradually ramps up to planning and lots of intrusive pictures and videos. And eventually every moment is just trying to distract myself from the distressing images and intrusive thoughts.”

“I’ve been on countless antidepressant and ADHD meds, and Spravato [brand name for Esketamine] seems to actually be working.”

“There are apparently a few places doing ketamine treatments locally and online... but I used to party and I never want to dig a K-hole [adverse effects] again.”

“I did eight rounds of IV infusions for PTSD and it's been life-changing.”

“Medical assistance doesn't pay for ketamine treatment afaik [as far as I know] and it's very expensive out of pocket. Nasal is the only kind insurance would cover, anyway. IV is more effective but very very expensive.”

“My kid has/had treatment resistant depression. We found a Dr. and therapist in White Oak doing Ketamine treatments. Not covered by insurance and costs like \$500 treatment. Done through IV. It was a godsend and worth every penny. Had a few treatments over the last few years but depression is for the most part gone.”

Interest and engagement among PA community groups; expansion of hallucinogen research in the U.S.

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INTEREST AND ENGAGEMENT AMONG COMMUNITY GROUPS

- Data were gathered from 3 Pennsylvania-based news outlets and UPenn Nursing website.
- Community groups with interest/engagement in the therapeutic use of psychedelics were identified by locating testimonies from journalists and interviewees discussing psychedelic-related research, education, and use in PA.
- Findings reveal community interest in using psychedelics to address mental health concerns, including PTSD in veterans, racial/ethnic trauma in communities of color, and daily stress among mothers. In 2022, University of Pennsylvania has organized academic events focused on psychedelic medicine and research.

PA veterans with PTSD seeking new methods of treatment, especially for suicidal thoughts, have turned to **psilocybin**.

Veterans have traveled to psychedelic retreats in different cities and states where psilocybin has been decriminalized, such as Oakland, California. **Those who have tried it have credited psilocybin to them still being here.**³⁸

Advocates and social workers see psychedelics as a potential treatment for **Black and Latino people** and the **trauma** associated with being in that population. Some have experienced increased compassion and empathy for the self and others.³⁹

In January 2022, Penn Nursing hosted a **virtual learning series on the Psychedelic Revival**, discussing psychedelic medicine and research.⁴⁰

Philadelphia moms have taken to **microdosing** to handle their daily life stressors, providing them with more patience with their family. Other Philadelphia residents have used **psilocybin as an alternative medicine for dealing with trauma**. One nursing student found it helpful for dealing with his trauma and anxiety after his brother's suicide.⁴¹

EXPANSION OF HALLUCINOGEN RESEARCH AND THERAPEUTIC USE IN THE U.S.

- **The US Department of Veterans Affairs has renewed their interest in hallucinogen-assisted therapy.** Current and future clinical trials include: MDMA-assisted group and couples therapy for veterans, psilocybin therapy for veterans with methamphetamine use disorder, and MDMA therapy for veterans with combat-related treatment-resistant PTSD.⁴²
- FDA authorized the establishment of **an expanded access program for MDMA-assisted psychotherapy**; the program will open access to investigational MDMA treatment for a limited number of patients with serious or life-threatening condition who are unable to participate in ongoing clinical trials.⁴³
- As of 2022, six states, including Oregon, Connecticut, Hawaii, Maryland, Utah, and Texas, have legalized the study of psychedelic-assisted therapy. **Oregon became the first U.S. state to develop a regulatory framework for psilocybin-assisted therapy.**¹⁰
- The Drug Enforcement Administration proposed increases in production of several psychedelic substances, including LSD, psilocyn, and mescaline, for clinical trials in 2023.⁴⁴
- In 2021, the Public Health Benefits of Psilocybin Act (H.B. 1959) was introduced in PA to allow the research of psilocybin-assisted psychotherapy for various mental health conditions, including PTSD. The legislation would have prioritized research of veterans and first responders.⁴⁵ It was reintroduced in March 2022 as the Psilocybin Data Act (H.B. 2421) but died in committee.⁴⁶

Hallucinogen use among PA & U.S. youth

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LIFETIME HALLUCINOGEN USE AMONG YOUTH IN PENNSYLVANIA AND U.S.

According to Pennsylvania Youth Survey (PAYS) - a biennial survey of school students in 6th, 8th, 10th, and 12th grades in the Commonwealth - from 2015-2021, the lifetime use of hallucinogens (acid, LSD, shrooms) decreased from 2.7% to 2% and ecstasy use dropped from 1.9% to 0.6% (**Figure 4**). Overall, the lifetime use of hallucinogens was lower than lifetime use of alcohol (33.9%) or marijuana (12.2%) among PA youth in 2021 (**Figure 6**).

The U.S. data from the National Survey on Drug Use and Health indicate varied trends in lifetime use of hallucinogens among youths aged 12-17 (**Figure 5**). The lifetime use of all hallucinogens decreased from 3.1% to 2.3% between 2015-2020, along with the use of ecstasy (1.4% to 0.7%) and psilocybin (1.1% to 0.8%). At the same time, the use of LSD (1.3%) or ketamine (0.2%) remained steady, between 2015-2020. In 2021, 2.3% of US youths were estimated to use hallucinogens in their lifetime, 1.6% used LSD, 1.1% used psilocybin, 0.6% used ecstasy, and 0.2% used ketamine.*

Overall, among PA and U.S. youths, the lifetime prevalence across any hallucinogen category has not exceeded 4% in each year during the examined period. In contrast, among the nation's young adults (aged 18-25), the lifetime rates of hallucinogen use have been markedly higher, decreasing from 18.6% in 2015 to 15.7% in 2020, and estimated at 15.4% in 2021, according to NSDUH.⁴⁷

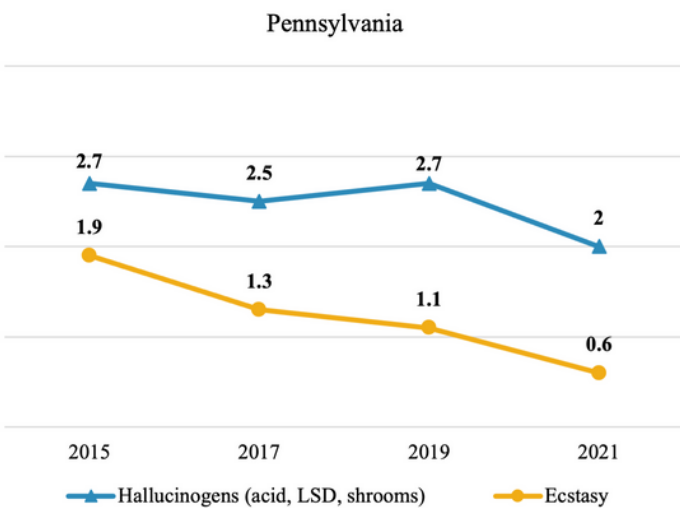


Figure 4. Lifetime hallucinogen and ecstasy use among PA youth (%), 2015-2021

Source: Pennsylvania Youth Survey, full dataset (all valid responses, grades 6, 8, 10, and 12)
 Note: PAYS refers to hallucinogens and ecstasy as separate categories; "acid, LSD, shrooms" are examples given of hallucinogens.

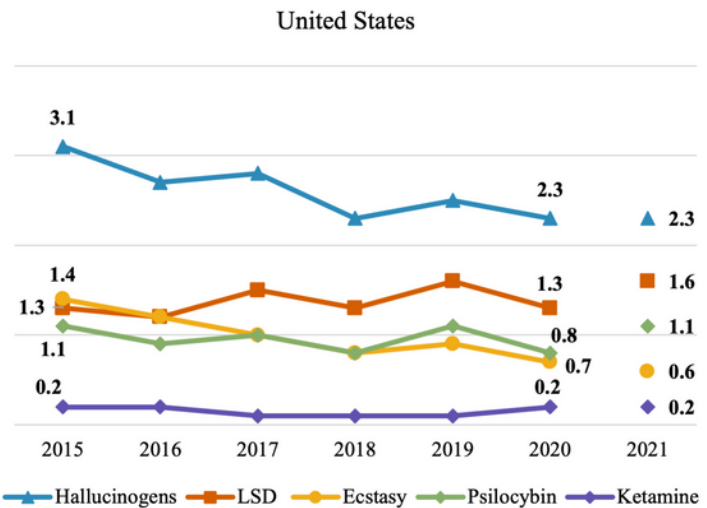


Figure 5. Lifetime use of LSD, psilocybin, ecstasy, and ketamine among 12-17 year olds in the US (%), 2015-2021

Source: National Survey on Drug Use and Health
 Note: NSDUH refers to hallucinogens as a main category and ecstasy (or "Molly", MDMA) as a subcategory. The other subcategories of hallucinogens listed in NSDUH include: LSD ("acid"), PCP, peyote, mescaline, psilocybin, ketamine, DMT, AMT, Salvia divinorum, and any other hallucinogen.
 *Due to methodological changes in 2021, NSDUH does not recommend direct comparison with data from previous years.

LIFETIME SUBSTANCE USE AMONG PENNSYLVANIA YOUTH, 2021

2%

Hallucinogens

12%

Marijuana

34%

Alcohol

Figure 6. Lifetime hallucinogen, marijuana, and alcohol use among PA youth, 2021

Source: Pennsylvania Youth Survey, full dataset (all valid responses, grades 6, 8, 10, and 12)

Hallucinogen and ecstasy use among PA youth

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HALLUCINOGEN AND ECSTASY USE BY MARIJUANA AND ALCOHOL USE

During 2015-2021, PA students with lifetime experience of using marijuana or alcohol were also more likely to report using hallucinogens and ecstasy in their lifetime (**Figures 7-8**). Particularly, in 2021 when lifetime hallucinogen use was at 2% among PA youth overall, the rate was substantially higher among youth with lifetime marijuana use (15.5%) and alcohol use (5.6%). Similarly, in 2021, lifetime ecstasy use was at 0.6% among PA youth overall, however the rate was elevated among students with lifetime use of marijuana (4.4%) and alcohol (1.7%).

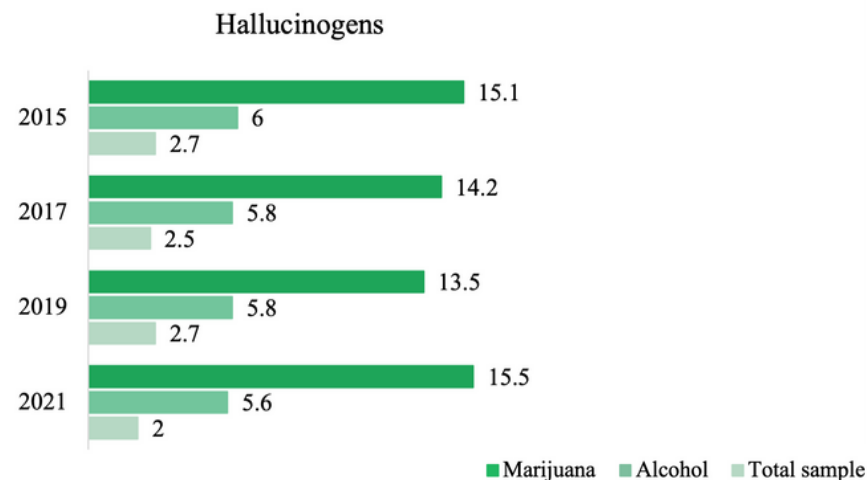


Figure 7. Lifetime hallucinogen use by lifetime marijuana and alcohol use (%), 2015-2021

Source: Pennsylvania Youth Survey, full dataset (all valid responses, grades 6, 8, 10, and 12)

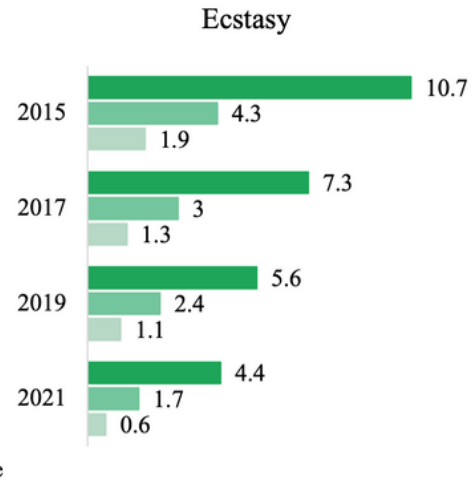


Figure 8. Lifetime ecstasy use by lifetime marijuana and alcohol use (%), 2015-2021

Source: Pennsylvania Youth Survey, full dataset (all valid responses, grades 6, 8, 10, and 12)

HALLUCINOGEN AND ECSTASY USE BY RISK OF DEPRESSION

In 2015-2021, PA students with high risk of depression had consistently higher rates of lifetime hallucinogen and ecstasy use than those with low risk of depression (**Figures 9-10**). In 2021 alone, the proportion of students with high risk of depression who used hallucinogens and ecstasy in their lifetime was 3.5% and 1.1% accordingly. By comparison, among students with low risk of depression, the 2021 lifetime rates were only 0.8% for hallucinogens and 0.2% for ecstasy.

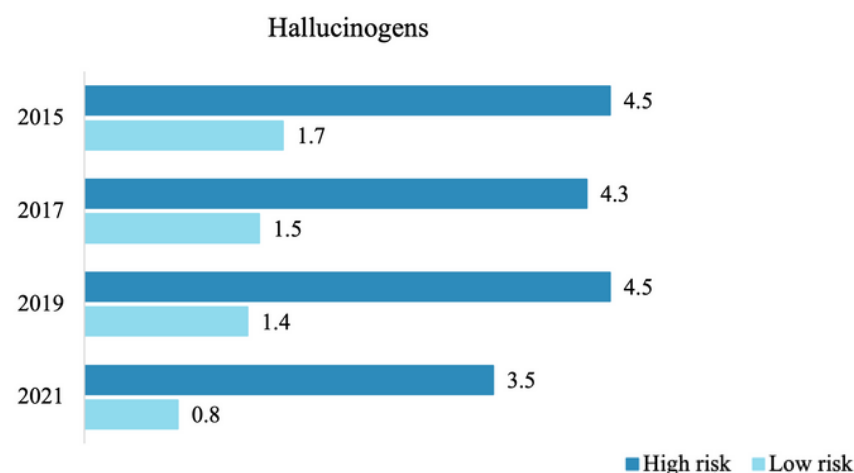


Figure 9. Lifetime hallucinogen use by low- and high risk of depression (%), 2015-2021

Source: Pennsylvania Youth Survey, full dataset (all valid responses, grades 6, 8, 10, and 12)

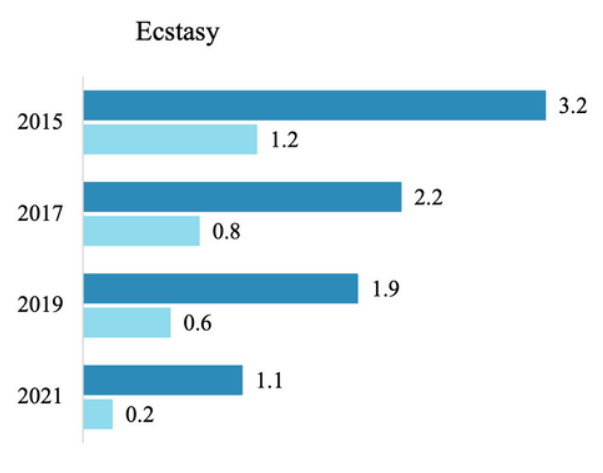


Figure 10. Lifetime ecstasy use by low- and high risk of depression (%), 2015-2021

Source: Pennsylvania Youth Survey, full dataset (all valid responses, grades 6, 8, 10, and 12)

Hallucinogen and ecstasy use among PA youth

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HALLUCINOGEN AND ECSTASY USE BY SENSATION-SEEKING, REBELLIOUSNESS, AND ACCUMULATIVE RISK

Figures 11-12 portray the prevalence of lifetime hallucinogen and ecstasy use among PA youth across several risk factors: sensation-seeking, rebelliousness, and accumulative risk across four domains: family, school, community, and peer-individual risk. Compared to PA students on average (i.e., in the total sample), those at high risk of sensation-seeking, rebelliousness, and high accumulative risk had elevated rates of lifetime hallucinogen use during 2015-2021.

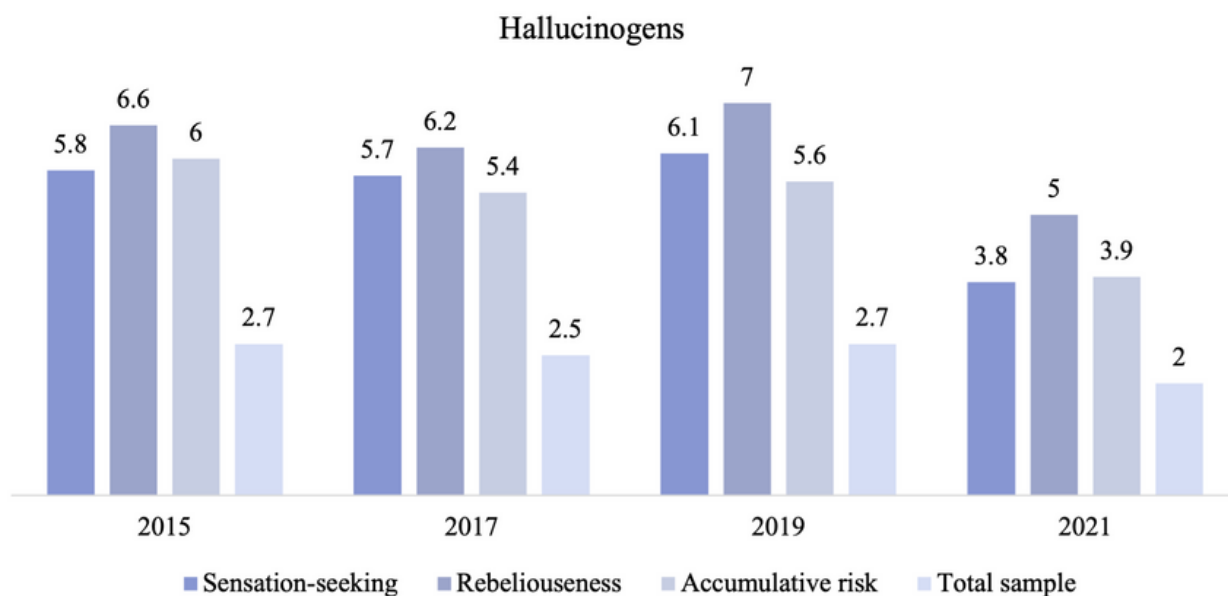


Figure 11. Lifetime hallucinogen use by the high risk of sensation-seeking and rebelliousness and high accumulative risk (%), 2015-2021

Source: Pennsylvania Youth Survey, full dataset (all valid responses, grades 6, 8, 10, and 12)

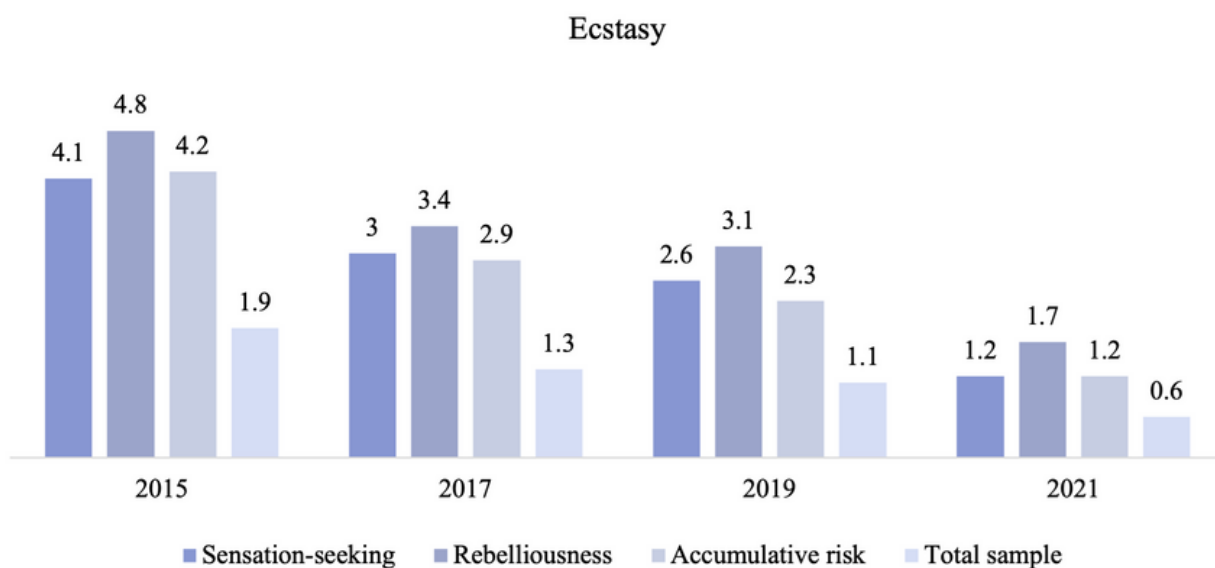


Figure 12. Lifetime ecstasy use by the high risk of sensation-seeking and rebelliousness and high accumulative risk (%), 2015-2021

Source: Pennsylvania Youth Survey, full dataset (all valid responses, grades 6, 8, 10, and 12)

Hallucinogen adverse effects and overdose

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ADVERSE EFFECTS AND ADULTERATION

PSYCHEDELICS & MDMA

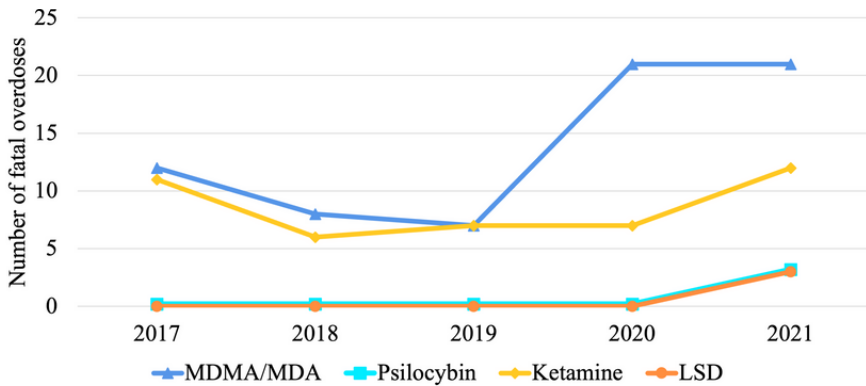
- The unpleasant effects of psychedelics include anxiety, nausea, fear, increased heart rate and blood pressure, sweating, muscle aches, and transient headaches.^{48,49}
- In controlled settings, psychedelics and MDMA were found to have low physiological toxicity and lack of serious adverse effects.⁵⁰
- MDMA purchased on the street was found to be adulterated with methamphetamine, ketamine, cocaine, "bath salts," and over-the-counter cough medicines.⁴⁹

KETAMINE & OTHER DISSOCIATIVES

- Ketamine misuse is associated with adverse effects, including bladder toxicity, confusional states, cardiovascular issues.⁵¹
- Street ketamine can be adulterated with cocaine, MDMA, methamphetamine, amphetamine, and muscle relaxants.⁸
- In Philadelphia, phencyclidine (PCP), an illicitly manufactured dissociative anesthetic, was found to be adulterated with fentanyl, a potent synthetic opioid. From 2019 to 2020, the presence of fentanyl in PCP-involved fatal overdoses increased from 63% to 75% in Philadelphia.⁵²

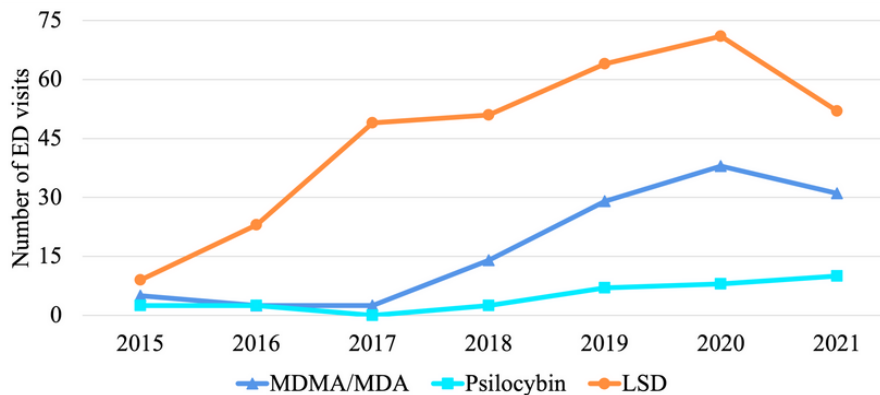
FATAL AND NONFATAL OVERDOSE

Between 2017 and 2021, a maximum of 122 unintentional fatal overdoses involving MDMA/MDA^a, ketamine, LSD, or psilocybin were reported in Pennsylvania (**Figure 13**).^b Within the same time period, overdose deaths from all drugs, excluding alcohol-only deaths, in PA amounted to 24,871.⁵³ Additionally, from 2015-2021, more than 460 emergency department visits for nonfatal overdoses involving either MDMA/MDA, LSD, or psilocybin were reported across the state (**Figure 14**).^{c,d}



	2017	2018	2019	2020	2021
MDMA/MDA	12	8	7	21	21
Psilocybin	0	0	0	0	<6
Ketamine	11	6	7	7	12
LSD	0	0	0	0	<6

Figure 13. Hallucinogen-involved unintentional fatal overdoses in PA, 2017-2021.



	2015	2016	2017	2018	2019	2020	2021
MDMA/MDA	5	<5	<5	14	29	38	31
Psilocybin	<5	<5	0	<5	7	8	10
LSD	9	23	49	51	64	71	52

Figure 14. Hallucinogen-involved emergency department (ED) visits in PA, 2015-2021.

Notes: a. MDA is an empathogen chemically similar to MDMA and an MDMA metabolite.

b. Please note that most drug overdose deaths involve more than one substance and counts may not be mutually exclusive.

c. Counts may be underestimated as comprehensive toxicology testing is not routinely performed in ED settings and some facilities do not provide diagnostic codes for contributing cause of overdose.

d. Counts for ketamine-involved ED visits are not included due to insufficient data.

Source: Data in Figures 10-11 were supplied by the Office of Drug Surveillance and Misuse Prevention, Pennsylvania Department of Health, Harrisburg, Pennsylvania. The Pennsylvania Department of Health specifically disclaims responsibility for any analyses, interpretations, or conclusions.

State Epidemiological Outcomes Workgroup, 2023

CONCLUSION

This brief examined the current state and potential for the therapeutic use of hallucinogens in Pennsylvania, along with trends in recreational use among Pennsylvania youth. The development of this analysis was encouraged by growing scientific evidence documenting the preliminary efficacy of hallucinogen applications in controlled clinical settings, particularly among people who either do not benefit from first-line mental health or addiction treatment, or experience major distress.

Our analysis highlighted the therapeutic potential and risks associated with the use of four prominent hallucinogens: LSD, psilocybin, MDMA, and ketamine. Despite these being Schedule 1 substances (except ketamine), recent U.S. pilot trials and clinical applications abroad support the therapeutic efficacy of hallucinogens.^{2,17,48,54} In our social media analysis, we found that Pennsylvania users regarded therapy with ketamine, the only legally available hallucinogen, as “life-changing” and efficacious in alleviating depression and PTSD, particularly compared to conventional treatment. Importantly, our report documented a range of adverse health effects associated with hallucinogen use, yet the potential of hallucinogens for dependence is estimated to be lower than that of opioids, and lower or comparable to that of marijuana.³³ The available data indicate that a maximum of 122 fatal overdoses associated with the use of either MDMA, ketamine, LSD, or psilocybin occurred in Pennsylvania between 2017-2021, representing less than 5% of all drug overdose fatalities (except alcohol-related deaths) reported by the state during this timeframe.

This review identified a limited availability of treatment and support services relative to the therapeutic use of hallucinogens in Pennsylvania. There are only thirteen ketamine clinics in Pennsylvania, mainly clustered around the metropolitan areas of Southeastern and Southwestern Pennsylvania. Yet, the analysis of Pennsylvania news outlets identified groups of Pennsylvania residents - veterans, mothers, nurses, and social workers - interested in the therapeutic use of hallucinogens, particularly psilocybin, for addressing mental health issues ranging from suicide and trauma to daily stress.

One concern that may arise is whether the potential legalization of therapeutic hallucinogens may potentiate their recreational use among youth. Less than 3% of PA youth reported lifetime hallucinogen or ecstasy (MDMA) use in each year from 2015-2021, and those rates have declined by 2021. Notably, hallucinogen and ecstasy use was greater in subgroups of students with lifetime marijuana and alcohol use, high risk of depression, and higher levels of sensation-seeking, rebelliousness, and accumulative risk. At the same time, such a profile of risky behaviors or poorer mental health is typical for youth who report the misuse of other drugs.⁵⁵⁻⁵⁷

Several limitations of this report need to be noted. Though ketamine treatment is legal in Pennsylvania, no published data is available on the demographics of patients or treatment outcomes, so this review relied on the experiences of patients reflected in social media. Use-related data was limited, including the lack of data on ketamine misuse or disaggregated data on the use of LSD and psilocybin among youth. To better assess usage trends among PA youth, future studies need to disentangle the trajectories of use for specific hallucinogens and examine youth's motives for use. Additionally, data on hallucinogen-involved overdoses needs to be interpreted with caution - given that emergency visits related to hallucinogen use are likely to be underestimated and hallucinogen-involved overdose deaths may also involve other substances, including toxic adulterants increasingly present in U.S. street drug supply.⁵⁸

While risks and adverse side-effects of hallucinogen use exist, novel treatment approaches offered with the use of hallucinogens are important to explore given the extent of mental health and overdose crises in Pennsylvania, further exacerbated by the COVID-19 pandemic.⁵⁹

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State Epidemiological Outcomes Workgroup, 2023

Pennsylvania SEOW

The State Epidemiological Outcomes Workgroup (SEOW) is supported by the Pennsylvania Department of Drug and Alcohol Programs. SEOW members represent both governmental and non-governmental agencies from across Pennsylvania. The goal of the SEOW is to inform and enhance state and community decisions regarding substance misuse prevention and mental health promotion programs, practices, and policies.

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