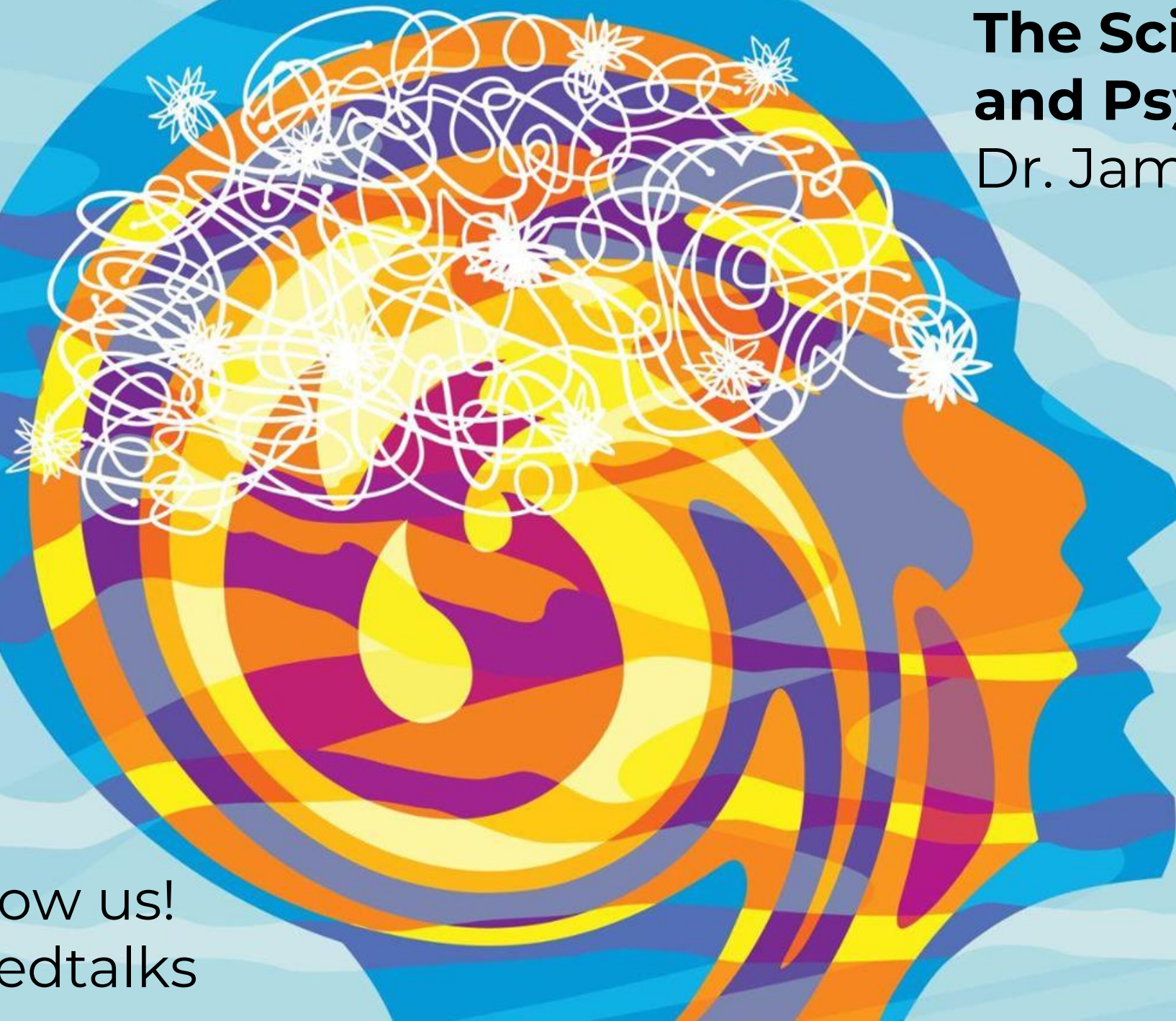


# The Science of ADHD and Psychedelics

Dr. James Brown



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# Plan

1. The Brain.
2. ADHD.
3. Psychedelics.

Break

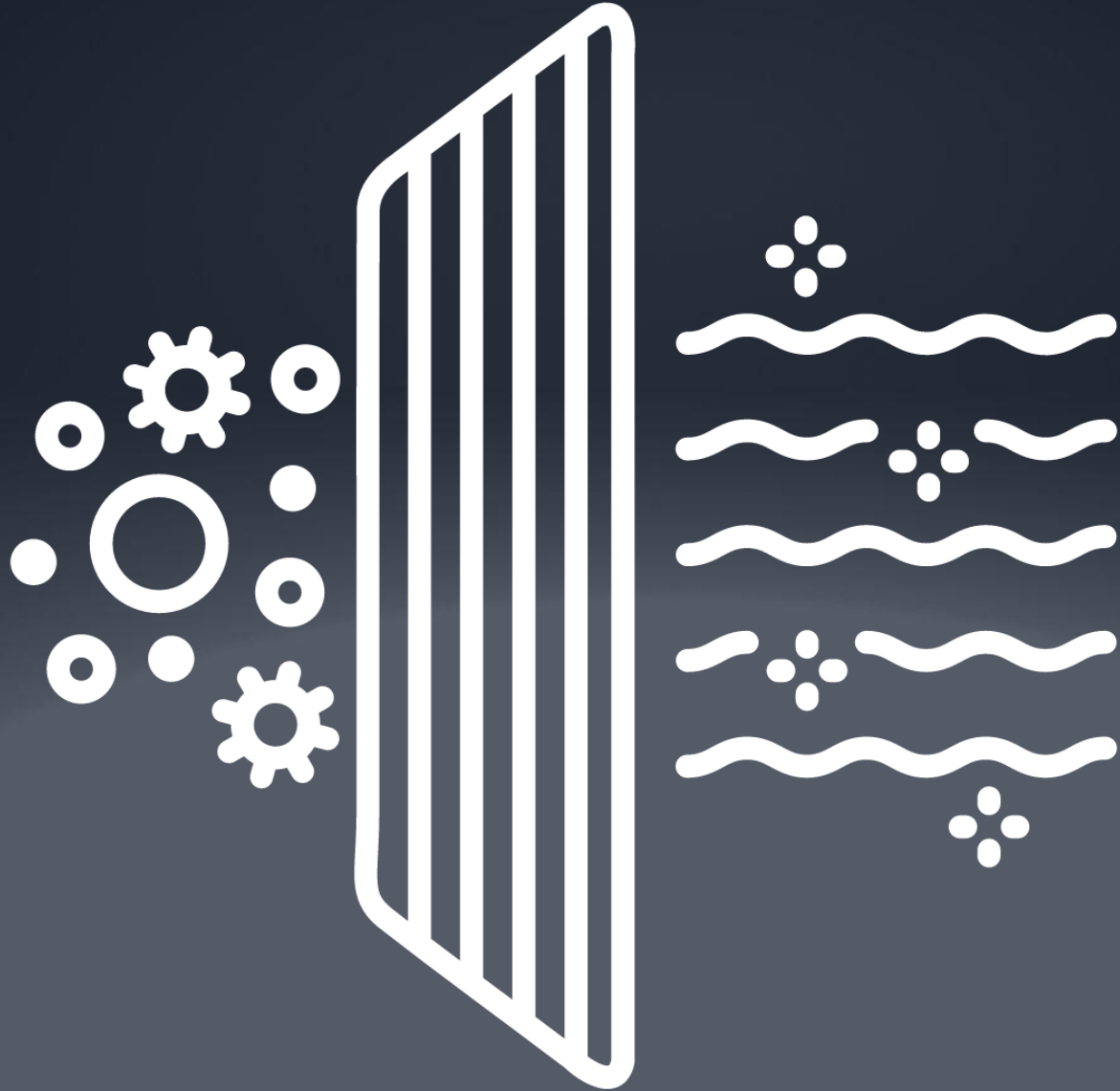
4. Microdosing and ADHD – theory and evidence

# Disclaimer

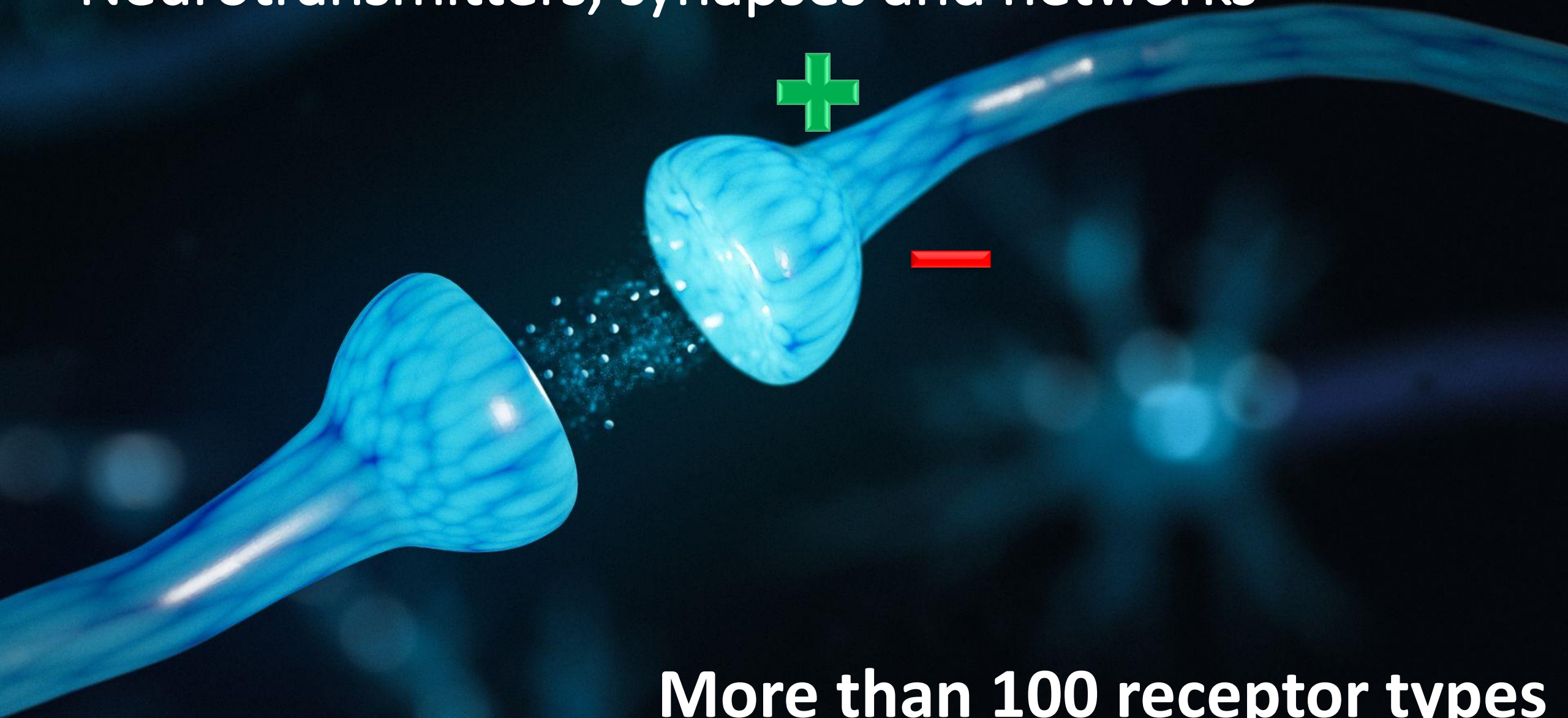
**This talk is intended to provide evidence-based information about the effects of psychedelic compounds and their relevance to psychiatric and neurodevelopmental conditions. It is not intended to promote the use of psychedelic compounds or to provide medical advice.**

# The Brain





# Neurotransmitters, synapses and networks



More than 100 receptor types

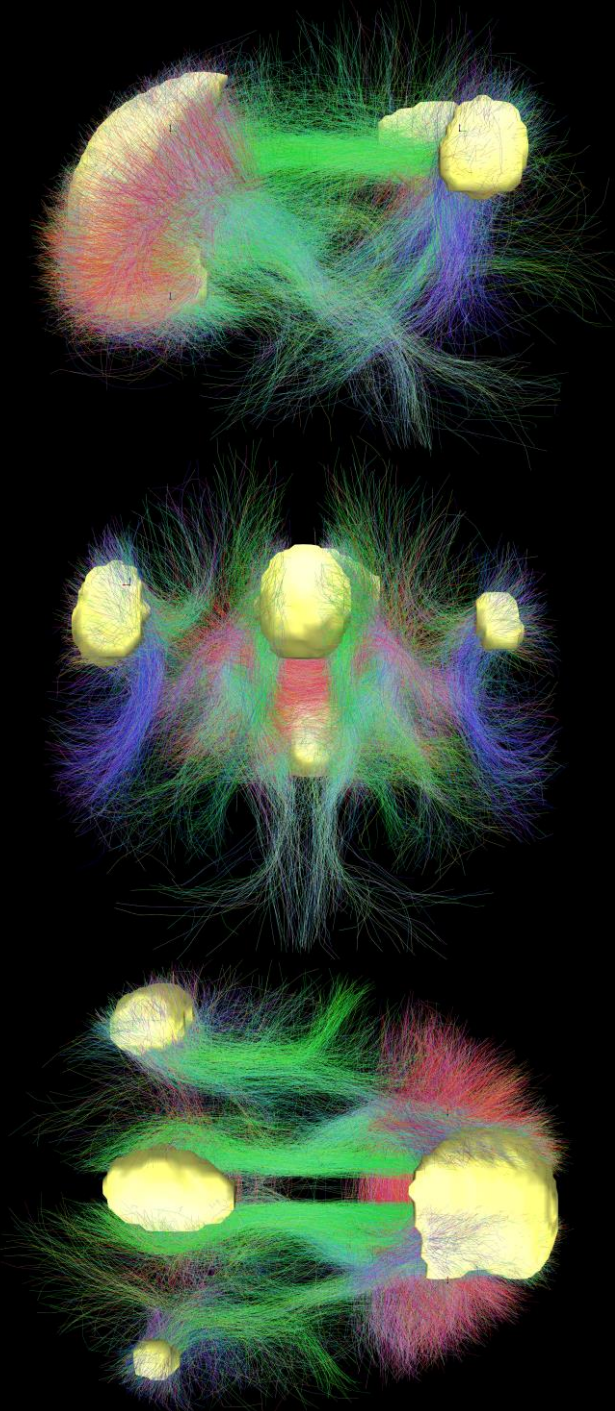


Brain Networks



# The Default Mode Network (DMN)

- **Network of neurons responsible for:**
  - Daydreaming
  - mind-wandering
  - thinking about ourselves/others/past/future
- **Made up of several connected brain areas:**
  - Dorsal medial prefrontal cortex
  - Posterior cingulate cortex
  - Angular gyrus



ADHD

# What is ADHD

- 'Attention-deficit hyperactivity disorder'... which is a terrible name
- Lifelong neurodevelopmental disorder.
- Attention, inhibition and emotional issues.
- 2.5-5% of adult population.
- Almost never comes alone...

# The 'ADHD Brain'

- **No such thing!**
- **But.... generally ...**
  - Slightly altered structure.
  - Altered function.
  - Altered communication between areas (networks).
  - Reduced neurotransmitter activity (especially dopamine and noradrenaline).
  - Neural 'pruning' doesn't occur...
- **Pharmacological treatment increases levels of these neurotransmitters and may even 'rewire' some networks.**

# Symptoms of ADHD (inattention)

1. **Making careless mistakes/lacking attention to detail**
2. Difficulty sustaining attention
3. Inability sometimes to listen when spoken to directly
4. Failure to follow through on tasks and instructions
5. Exhibiting poor organisation
6. Avoiding/disliking tasks requiring sustained mental effort
7. Losing things necessary for tasks/activities
8. Being easily distracted (including unrelated thoughts)
9. Being forgetful in daily activities

# THSH

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Row: A Seat: 15

People around you may stand

Order ID: 18-CB-0X7V

Standard

**PLEASE CHECK YOUR TICKETS CAREFULLY**

# Symptoms of ADHD (hyperactivity/impulsivity)

1. Fidgeting with or tapping hands or feet, squirming in seat
2. Leaving seat in situations when remaining seated is expected
3. Experiencing feelings of restlessness
4. Having difficulty engaging in quiet, leisurely activities
5. Being “on-the-go” or acting as if “driven by a motor”
6. Talking excessively
7. Blurting out answers
8. Having difficulty waiting for your turn
9. Interrupting or intruding on others





# *Non-diagnostic symptoms of ADHD*

- **Emotional dysregulation.**
- **Rejection-sensitive dysphoria (RSD).**

# Executive functions in ADHD



REWARD



# The Default Mode Network in ADHD

- **DOES NOT** get switched off when we start tasks!
- **Mind wandering ensues...**
  
- **Mind-wandering test (MEWS) might be as good (or better) than current tests for ADHD**

# Psychedelics

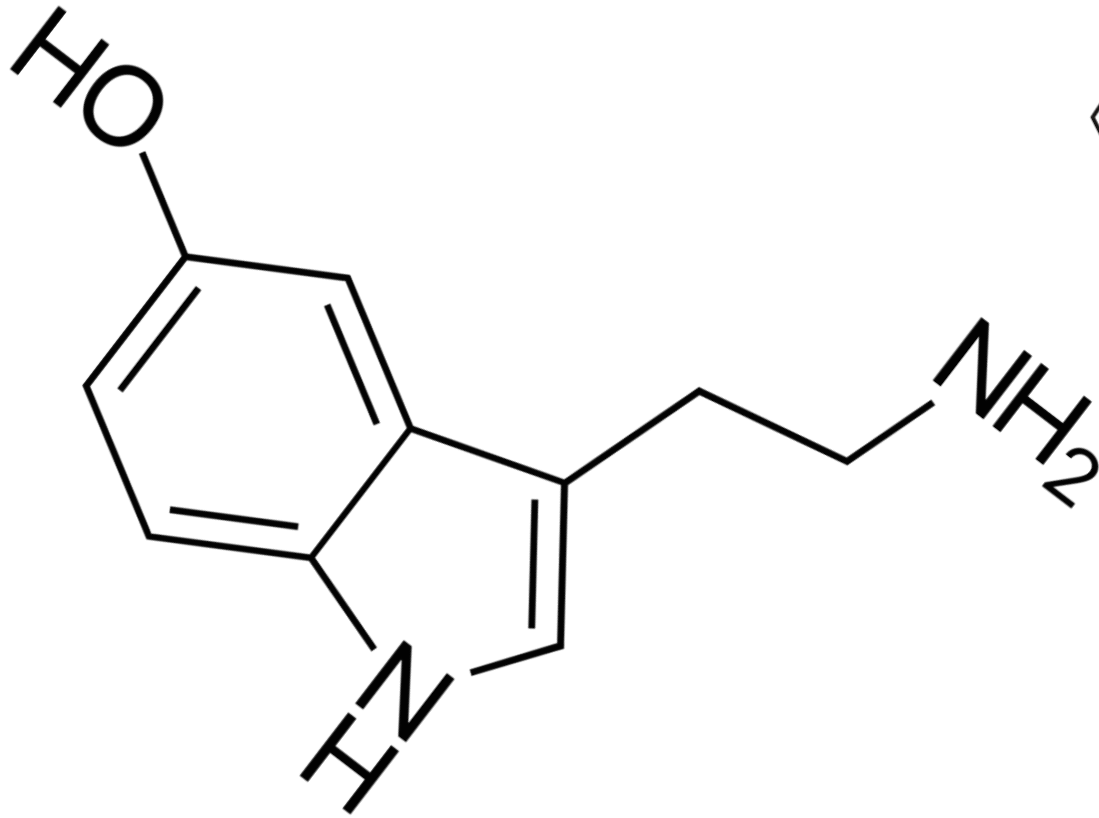
# What are psychedelics?

- Psychedelic = Greek for 'soul/mind' and 'manifest'.
- Classical psychedelics are 'Serotonergic hallucinogens' that alter perception and mood and affect numerous thought processes.
- The *traditional* term includes all substances that at least partially activate multiple serotonin receptors in the brain.
  - Lysergic acid diethylamide (LSD-25)
  - Mescaline
  - Psilocybin
- Other classes include dissociatives and entactogens

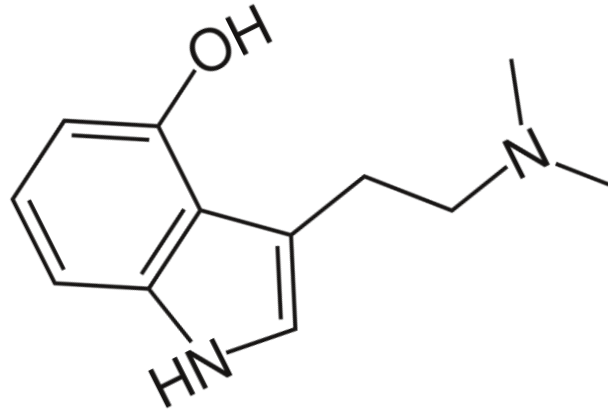
# How do they work?

- Classical psychedelics mostly bind 5-HT<sub>2A/B</sub> serotonin\* receptors mainly in the pre-frontal cortex (PFC) the control centre for attention and 'higher level' thinking processes.
- They increase processing of sensory information, potentially as a result of decreased 'filtering' of information, and activity of sensory systems.

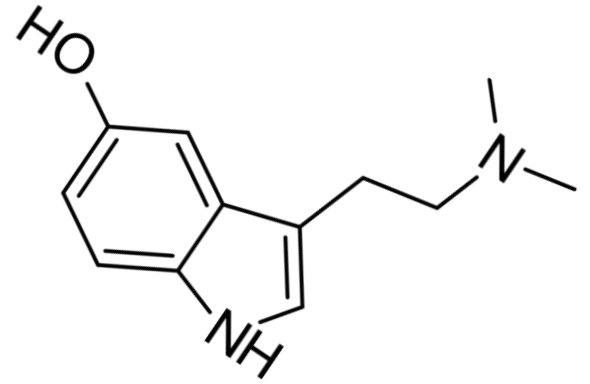
\* LSD has a different mechanism of action.



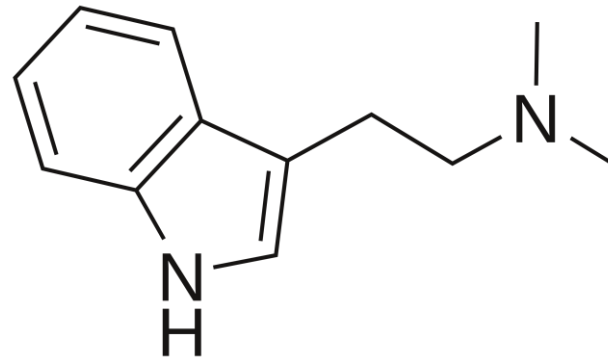
Serotonin  
(5-hydroxytryptamine (5-HT))



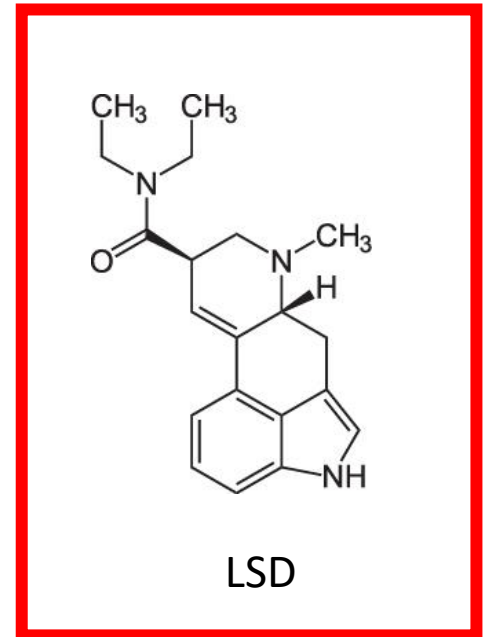
Psilocin  
(4-HO-DMT)



Bufotenin  
(5-HO-DMT)

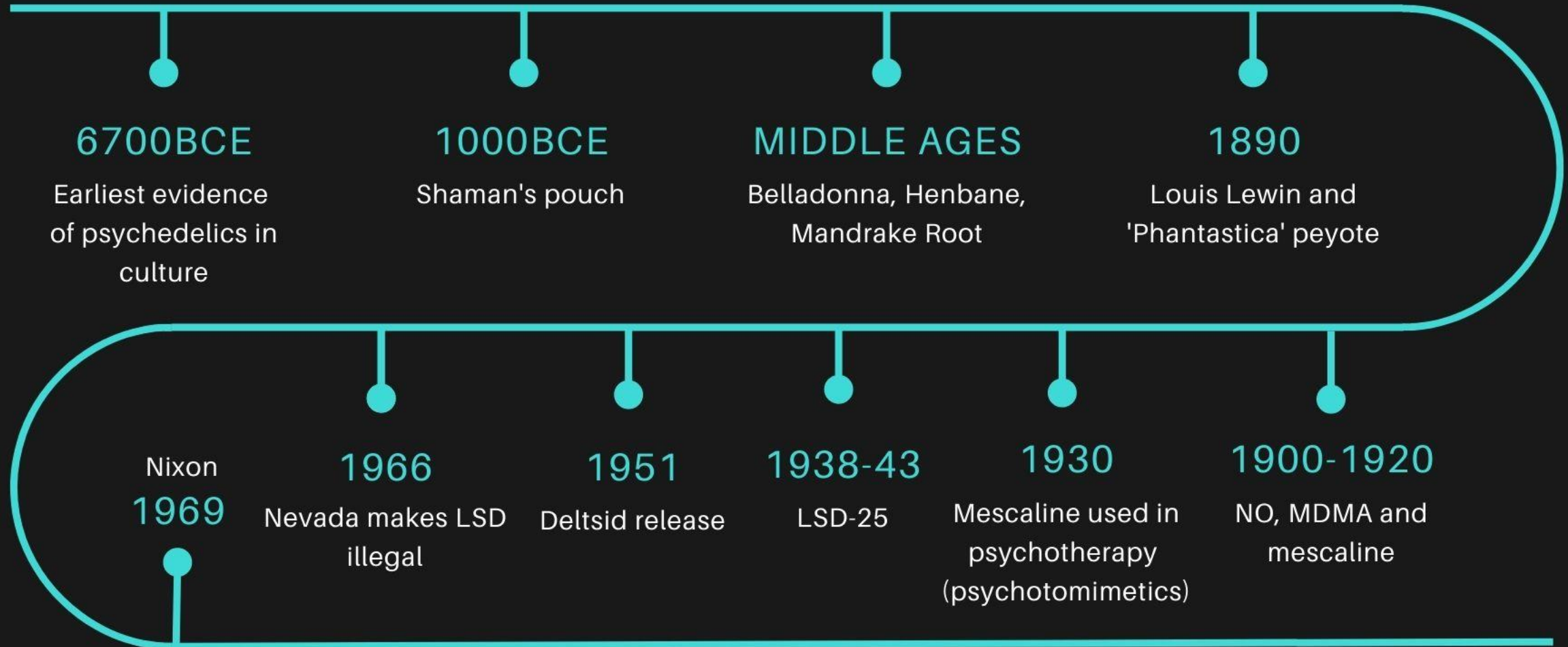


Dimethyltryptamine (DMT)



LSD

# Timeline of psychedelics





# What we know about psychedelics in psychiatry (1).

- Psychedelic substances are a useful 'adjunct' to psychotherapy.
- What usually takes years can take a few sessions (Ketamine 1-12, MDMA 3, LSD 2, psilocybin 2-4).
- 'Emotional release'
- Safety....? Generally low toxicity/addiction.

# Psychedelics and the brain

- Psychedelic substances increase 'neurogenesis' in cortical regions (plus others involved in emotion).
- Microdoses 'hypothesised' to do the same.

# What we know about psychedelics in psychiatry (2)

- **Benefits reported in**
  - **ASD**
  - **Alcoholism/drug addiction**
  - **Depressive disorders**
  - **End of life care/anxiety**
  - **Obsessive compulsive disorder (OCD)**
  - **Post-traumatic stress disorder (PTSD)**

# Microdosing

# Microdosing

- Not new!
- These substances were used at lower doses as an aphrodisiac, to reduce hunger, inspire courage, nullify pain, and to treat ailments such as gout and syphilis
- The ingestion of 'sub threshold' of psychedelic substances.
- Dosage varies (depends on the specific substance; 1/10 – 1/20)
- For example:
  - Psilocybin = 0.1-0.3g
  - LSD it = 10 - 20  $\mu\text{g}$
  - DMT = mg

# Microdosing Plan

- The current popularity of microdosing can be traced back to a book, **The Psychedelic Explorers Guide** by James Fadiman
- Example: James Fadiman's plan (every 3 days)



# Benefits of microdosing?

## Study 1:

- Self-reported increases in positive moods, increased energy, improved work effectiveness, and improved health habits were observed in clinical and non-clinical populations.

## Study 2:

- Self-reported benefits included cognitive and creative enhancement, reduced depression and anxiety, enhanced self-insight and mindfulness, improved mood and attitude toward life, improved habits and health behaviors, and improved social interactions and interpersonal connections.

# Benefits of microdosing?

## Study 3:

- A general increase in reported psychological functioning across all measures on dosing days, post study measures revealed reductions in reported levels of depression and stress; lower levels of distractibility. Notably, the effects believed most likely to change were *unrelated* to the observed pattern of reported outcomes.
- Study 4:
- We found that both convergent and divergent thinking performance was improved after a non-blinded microdose, whereas fluid intelligence was unaffected

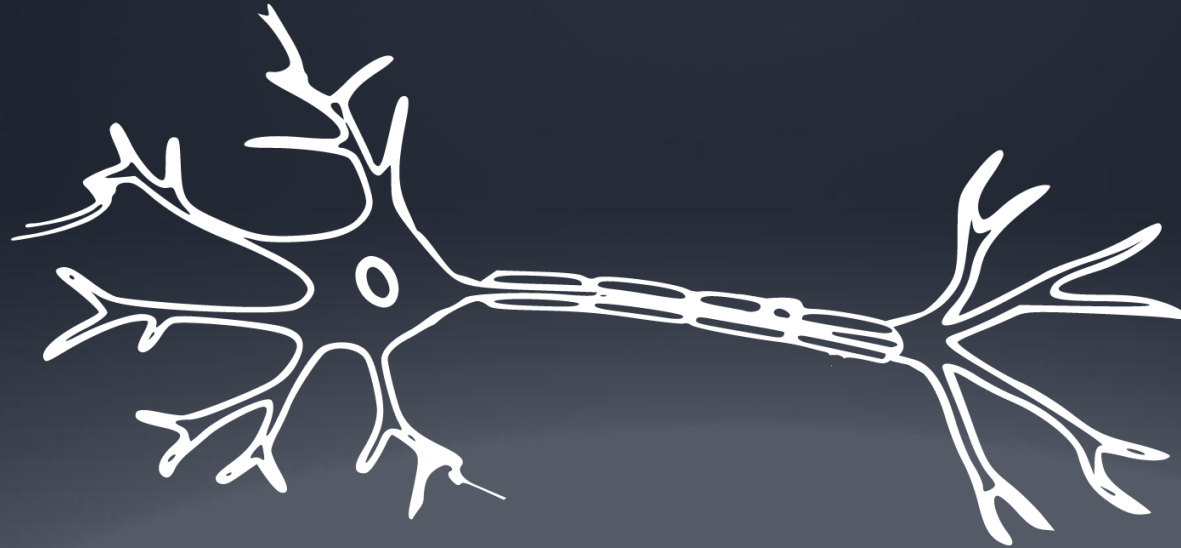


# But...

- **Lack of objectivity.**
- **Small trials (apart from one).**
- **This *could* be the placebo effect...**
- **Largest placebo-controlled trial (191 people) on psychedelic microdosing found that psychological outcomes that improved for the microdose group also improved and for the placebo group.**
- **Is it positive bias?**

# Psychedelics and ADHD (Theory)

# Psychedelics and ADHD Brains (structure)



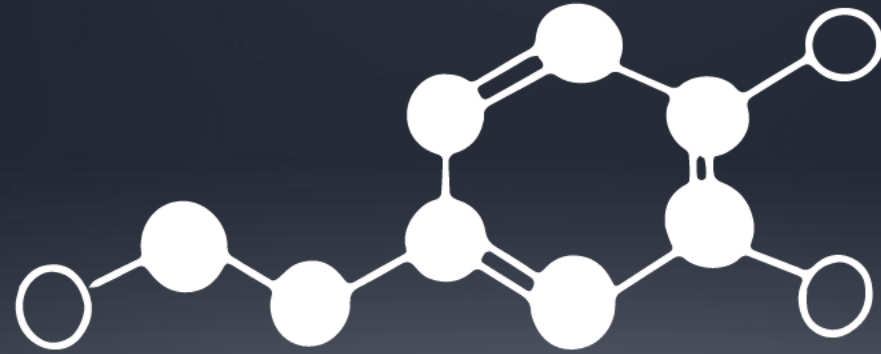
**2021 study reported that a single dose of psilocybin sustainably increases the number and size of neuronal connections by 10% through growth of new neurones.**

# Psychedelics activate 'brain loop' network

**CSTC loop - Involved in learning, memory and the gating of sensory information, cognitive and emotional regulation which are impaired in ADHD**

# Psychedelics deactivate DMN





DOPAMINE

# Psychedelics and ADHD (Evidence)

# Psychedelics in ADHD: the '*subjective*' evidence

## Study 1:

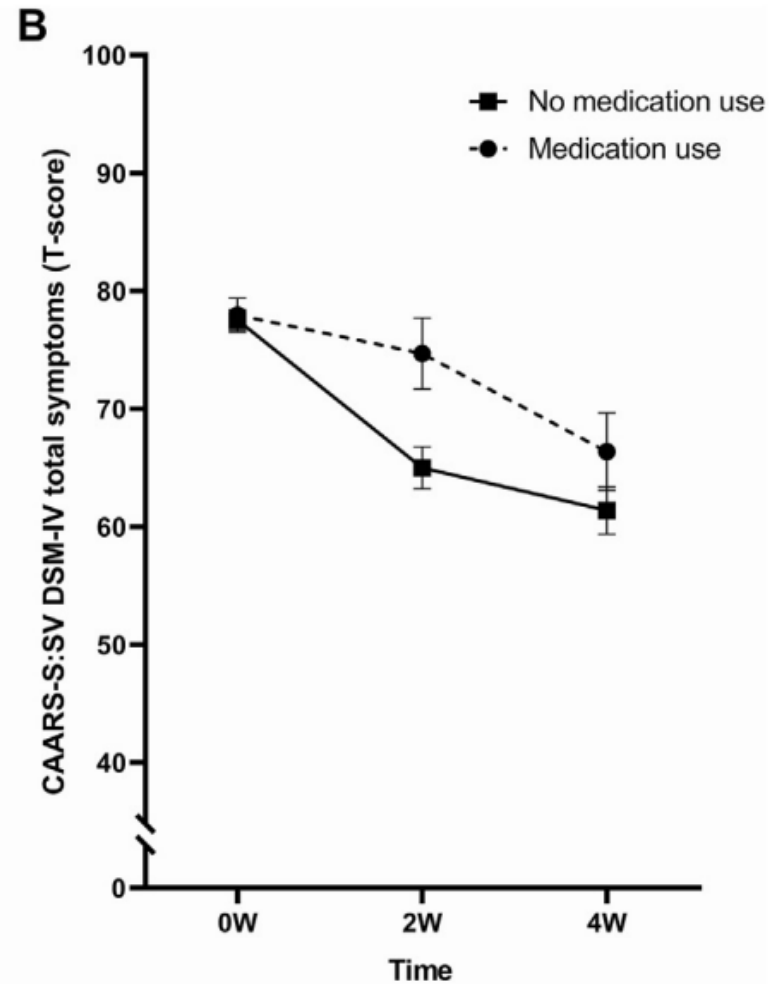
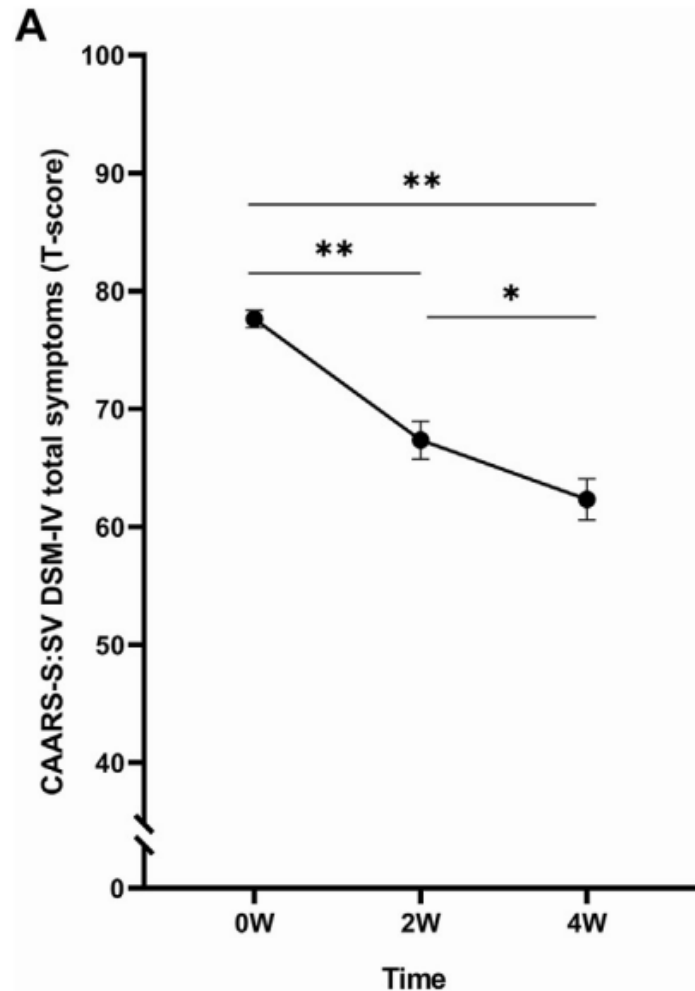
- Self-reported effectiveness of microdosed psilocybin was *significantly higher* compared to that of conventional treatments for ADHD and anxiety disorders

## Study 2:

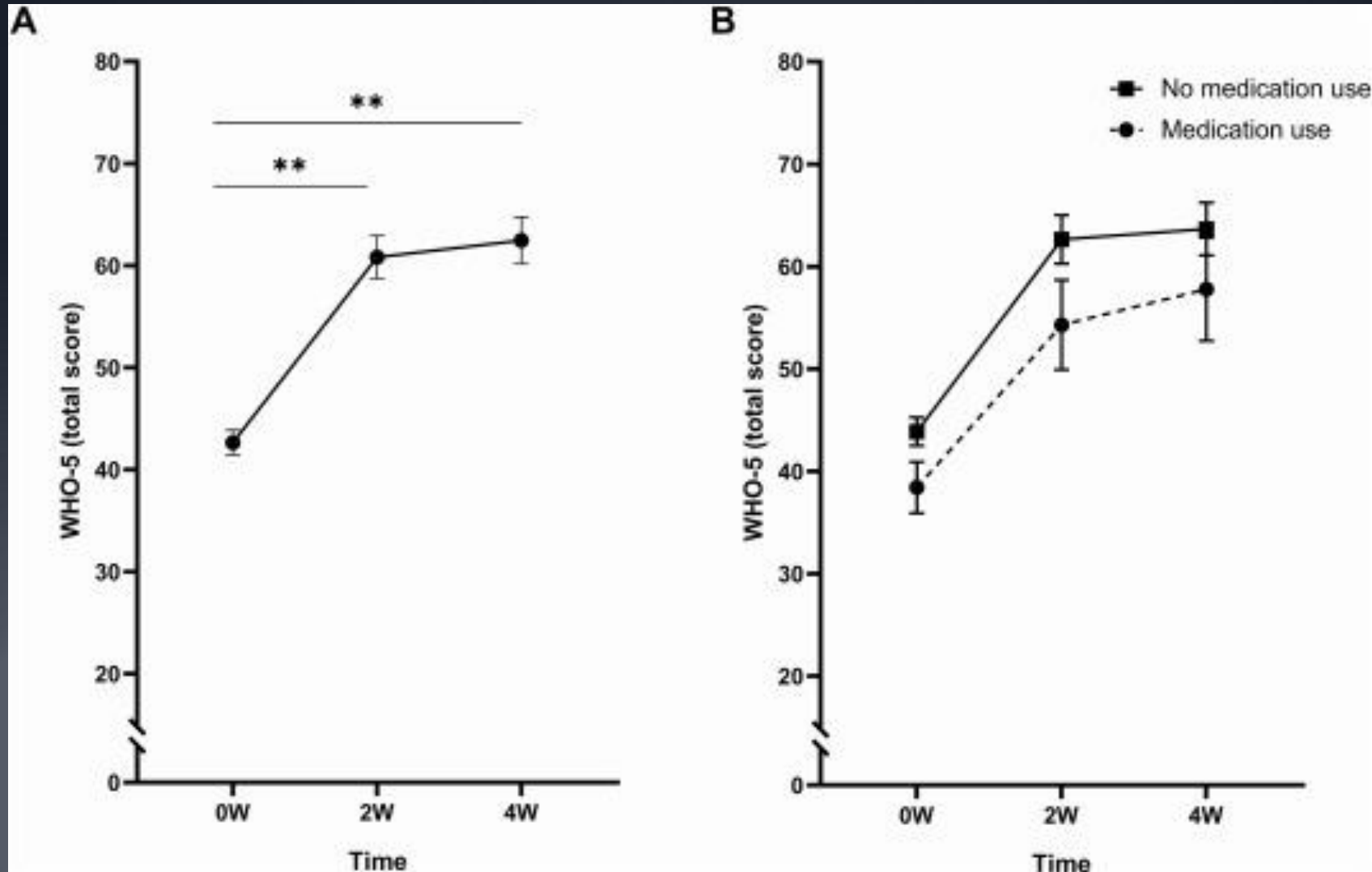
- Microdosing to self-medicate ADHD symptoms could improve not only in these symptoms, but also various comorbid issues or downstream issues caused by their disorder, whether or not it was their intention to treat these issues.



# Psychedelics in ADHD: the *objective* evidence



# Psychedelics in ADHD: the '*objective*' evidence



# Summary

- Psychedelics have a rich history in culture and medicine.
- There is a strong evidence-base for the use of psychedelics in psychiatry.
- Someone once left MDMA on a shelf for 50 years 🤖
- Microdosing appears to be safe (or as safe as anything can be) and *possibly* effective in treating inattention and emotions in ADHD but more research is needed!

# Resources

- [www.ADHDadult.uk](http://www.ADHDadult.uk)
- Discord - theadhdadults
- Online magazine - Focusmag.uk



@theadhdadults (and @adhdadult\_james)

# The ADHD Adults Podcast

James Brown and Alex Conner

"with" Mrs ADHD

