

with high levels of distress early post-trauma. This is important as these individuals are at increased risk for subsequent PTSD.

References

- [1] Howlett, J.R., Stein, M.B., 2016. Prevention of trauma and stressor-related disorders: a review. *Neuropsychopharmacology*, 41(1), 357–369.
- [2] Kirsch, P., Esslinger, C., Chen, Q., Mier, D., Lis, S., Siddhanti, S., ... Meyer-Lindenberg, A., 2005. Oxytocin modulates neural circuitry for social cognition and fear in humans. *The Journal of neuroscience*, 25(49), 11489–11493.
- [3] Preckel, K., Scheele, D., Kendrick, K.M., Maier, W., Hurlmann, R., 2014. Oxytocin facilitates social approach behavior in women. *Frontiers in behavioral neuroscience*, 8, 191.
- [4] Frijling, J.L., van Zuiden, M., Koch, S.B., Nawijn, L., Goslins, J.C., Luitse, J.S., ... Olff, M., 2014. Efficacy of oxytocin administration early after psychotrauma in preventing the development of PTSD: study protocol of a randomized controlled trial. *BMC psychiatry*, 14(1), 92. risk for subsequent PTSD.

S.12.07 Effects of LSD and music on brain activity

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Lysergic acid diethylamide (LSD) is a classic psychedelic drug that produces a profound altered state of consciousness, likely via serotonin 2A receptor activation. Recent clinical trials support the safety and efficacy of psychedelics in the treatment of mood- and addiction disorders [1,2]. Within this therapeutic model, music listening is considered to be an essential component [3,4] to facilitate therapeutic experiences [5]. This talk will present results from a study that investigated the effects of LSD and music on subjective experience and brain activity, using functional magnetic resonance imaging (fMRI).

For the study, twenty healthy participants were scanned on two separate occasions. Participants received placebo (intravenous saline) on one occasion, and 75 micrograms of intravenous LSD on the other. On each occasion, two 7-minute scans without music were performed, with one 7-minute music listening scan in between, all under eyes-closed resting state conditions. Two music tracks were played in the two conditions in a counter-balanced fashion. Data-analyses consisted of studying the effects of LSD on brain activity associated with different acoustic features in the music (tonality, rhythm, timbre). This was followed by connectivity analyses to assess brain-mechanisms underlying the effects of LSD on (1) music-evoked emotion, (2) music-induced mood, and (3) music-induced imagery. LSD showed marked changes on BOLD activations to music in sensory and high-level brain regions. Connectivity-changes of the medial prefrontal cortex were associated with acute and enduring changes in affect. Connectivity-changes of the parahippocampus to visual cortex pathway correlated with changes in eyes-closed imagery.

References

- [1] Johnson, M.W., Garcia-Romeu, A., Cosimano, M.P., Griffiths, R.R., 2014. Pilot study of the 5-HT_{2A}R agonist psilocybin in the treatment of tobacco addiction. *J Psychopharmacol* 28:983–92.
- [2] Grob, C.S., Danforth, A.L., Chopra, G.S., 2011. Pilot study of psilocybin treatment for anxiety in patients with 478 advanced-stage cancer. *Arch. Gen. Psychiatry* 68, 71–78.
- [3] Kaelen, M., Barrett, F.S., Roseman, L., Lorenz, R., Family, N., Bolstridge, M., Curran, H.V., Feilding, A., Nutt, D.J., Carhart-Harris, R.L.,

2015. LSD enhances the emotional response to music. *Psychopharmacology (Berl.)*.

- [4] Johnson, M.W., Richards, W., Griffiths, R.R., 2008. Human hallucinogen research: guidelines for safety. *J Psychopharmacol* 22:603–20.
- [5] MacLean, K.A., Johnson, M.W., Griffiths, R.R., 2011. Mystical experiences occasioned by the hallucinogen psilocybin lead to increases in the personality domain of openness. *J Psychopharmacol* 25:1453–61.

S.12.08 Cannabinoids in attention-deficit/hyperactivity disorder: a randomised-controlled trial

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Substance use disorder is a common comorbidity in Attention Deficit Hyperactivity Disorder (ADHD) [1] with one of the most common drugs of abuse appearing to be cannabis [2]. Adults with ADHD sometimes describe self-medicating with cannabis, with some reporting a preference for cannabis over prescribed stimulant or other ADHD medications. Given this, we conducted a pilot randomised placebo-controlled trial of cannabinoids to provide an initial evaluation of the effects of cannabinoids on cognitive performance, as well as on levels of inattention and hyperactivity-impulsivity. 30 adults with ADHD were randomised to placebo or Sativex Oromucosal Spray, a cannabinoid medication containing a 1:1 ratio of delta-9-tetrahydrocannabinol (Δ^9 -THC) to cannabidiol (CBD). In the intention to treat analysis, Sativex treatment was associated with a nominally significant improvement in hyperactivity/impulsivity ($d=0.90$, $p=0.03$) and a trend for improvement in inattention ($d=0.7$, $p=0.10$). There were further indications for improvement in activity and cognitive performance ($d=0.59$, $p=0.16$), and emotional lability ($d=0.65$, $p=0.11$). Per protocol effects were slightly higher. Although individual findings did not reach conventional significance levels, effects across multiple measures showed consistent improvements in cognition and behaviour. ADHD may represent a subgroup of individuals that gain cognitive enhancement and reduction of ADHD symptoms from the use of cannabinoids. These findings provide preliminary evidence using an experimental design for the self-medication hypothesis of cannabis use in ADHD; and support the need for further research into the effects of cannabinoids on ADHD symptoms and impairments.

References

- [1] Arias, A.J., Gelernter, J., Chan, G., Weiss, R.D., Brady, K.T., Farrer, L., Kranzler, H.R., 2008. Correlates of co-occurring ADHD in drug-dependent subjects: Prevalence and features of substance dependence and psychiatric disorders. *Addict. Behav.* 33, 9, 1199–1207.
- [2] Huntley, Z., Maltezos, S., Williams, C., Morinan, A., Hammon, A., Ball, D., Marshall, E.J., Keaney, F., Young, S., Bolton, P., Glaser, K., Howe-Forbes, R., Kuntsi, J., Xenitidis, K., Murphy, D., Asherson, P.J., 2012. Rates of undiagnosed attention deficit hyperactivity disorder in London drug and alcohol detoxification units. *BMC Psychiatry*, 12(1), 223.

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