Cue-reactivity in continued, frequent cannabis use: a 3-year follow-up study


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Background
- Cannabis is the most frequently used illicit drug worldwide
- Worldwide, 7-8% of all frequent cannabis users meets diagnostic criteria for substance dependence [1]

Introduction
- Cue-reactivity refers to the physical, psychological, behavioural and neural reactions triggered by exposure to substance related cues [2]
- Previous research found that cue-reactivity is associated with continued substance use and relapse [3]
- This suggests that cue-reactivity may be involved in addiction pathology.

Objective
- To investigate if cannabis cue-induced brain activity could predict the amount of cannabis use three years later.
- To investigate if cannabis cue-induced brain activity could predict problem severity three years later (measured with the CUDIT).

Methods
- Prospective neuroimaging 3 year-follow-up study
- Participants were 23 male and female frequent cannabis users (more than 10 days per month for at least 2 years at baseline)
- Cue-induced brain activity was measured with an event-related cue-reactivity fMRI task performed at baseline.
- The mean percentage signal change between neutral and cannabis stimuli was calculated in FSL using the featquery toolbox
- ROIs were the anterior cingulated cortex (ACC), orbitofrontal cortex (OFC), ventral tegmental area (VTA), striatum and the amygdala.

Results
- Baseline cue-induced brain activity in the right striatum significantly predicted problem severity at 3-year follow-up (p = .003, Table 1).
- None of the cue-induced ROI activations predicted the amount of cannabis use at follow-up.

| Table 1. Hierarchical multiple regression analysis for variables associated with cannabis problem severity (CUDIT-scores) at 3 year follow up (N=22) |
|-----------------|-----|-----|-----|
| B               | SE  | β   |
| Step 1: R²=0.62*** |     |     |
| Cudit Baseline  | 0.98| 0.17| 0.79*** |
| Step 2: ΔR²=0.08*  |     |     |
| Cudit Baseline  | 0.89| 0.16| 0.72*** |
| Daily cigarettes baseline | 0.31| 0.14| 0.29* |
| Step 3: ΔR²=0.12** |     |     |
| Cudit Baseline  | 0.73| 0.14| 0.58*** |
| Daily cigarettes baseline | 0.23| 0.11| 0.22 |
| PSC right striatum | 27.87| 8.23| 0.38** |

*p < .05, **p < .01, ***p < .001. Model step 1: R²= 0.62, adjusted R²: 0.62***, step 2: R²= 0.70***, adjusted R²= 0.67; step 3: R²= 0.82, adjusted R²: 0.79***. SE: standard error. CUDIT: Cannabis Use Disorder Identification Test. PSC striatum, R: Percentage signal change right striatum.

Conclusion
- Cannabis cue-induced activation in the right striatum predicted problem severity in frequent cannabis users at 3-year follow-up.
- Therefore cue-reactivity can be of added value to the identification of subjects at risk for developing problematic cannabis use and possibly dependence.

References

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