The role of neuromodulation, cognitive processing and behavioral inhibition in problem gambling

INTRODUCTION

- Previous research identified deficits in risky decision-making in problem gamblers (PGs) (Lawrence et. al., 2009).
- Irrational thinking plays an important role in the development of problem gambling (Benhsain, Taillefer & Ladouceur, 2004).
- Research found a link between gambling-related cognitive distortions and gambling problem severity (Xian et. al., 2008).
- Pathological gambling has been associated with elevated impulsivity (Michalczuk et. al., 2011).

METHODS

- Transcranial direct current stimulation (tDCS): is a non-invasive brain stimulation technique that applies a very weak electrical current (1.5 mA) to the scalp to modulate neuronal activity.
- Electroencephalography (EEG): Measures the changes in brain electrical activity.

OBJECTIVES

- To investigate the role of prefrontal cortex (PFC) in problem gambling decision-making.
- To study whether neuromodulation can help to moderate cognitive distortions, impulsivity and risk taking behaviour.
- To offer improved treatment interventions for problem gamblers.

EXPERIMENTAL DESIGN

Phase 1: neuromodulation of DLPFC and vmPFC to decide the brain area to target in phase 2.

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Controls</th>
<th>PGs in stimulation</th>
<th>PGs in sham</th>
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<tbody>
<tr>
<td>Experiment 1</td>
<td>Stimulation</td>
<td>tasks</td>
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<tr>
<td>Sham</td>
<td>tasks</td>
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Phase 2: Longitudinal neuromodulation of PGs not treated with CBT and PGs treated with CBT.

<table>
<thead>
<tr>
<th>Experiment</th>
<th>PGs in stimulation</th>
<th>PGs in sham</th>
<th>PGs + CBT in stimulation</th>
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<tbody>
<tr>
<td>Experiment 3</td>
<td>Stimulation</td>
<td>tasks</td>
<td>tasks</td>
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<tr>
<td>Sham</td>
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PREDICTIONS

- PGs will show higher scores in tasks that measure impulsivity, risk taking behaviour, biases and cognitive distortions than healthy controls. EEG resting activity will differ for both groups.
- The tasks performance will change after neuromodulation treatment to a larger extent in stimulation than in sham. In particular, a decrease of the above mentioned measures will be linked to improved executive function and control inhibition performance.
- Combined neuromodulation with CBT will show enhanced cognitive performance than neuromodulation treatment.

REFERENCES


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