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People with gambling disorder have distinct neural responses to gambling cues during decision-making tasks

What this research is about

Addictive disorders can affect the way people respond to certain cues. For example, someone with gambling disorder (GD) may experience a strong craving to gamble when they see a slot machine. Meanwhile, someone without GD may not experience this craving. When a person with GD sees a gambling-related cue, they may have a strong neural response to that cue. This, in turn, can affect their behaviour. This is similar to how people with a substance use disorder react to cues that are related to their addiction.

When something becomes a cue to someone's addiction, it can affect their decision-making behaviour. The way a cue can change behaviour is called Pavlovian-to-instrumental transfer (PIT). PIT is linked to specific neural responses in brain areas such as the amygdala, orbitofrontal cortex (OFC), and nucleus accumbens (NAcc). These neural responses are called PIT signatures. People with substance use addictions have different PIT signatures than healthy people. Thus, addictions could cause changes to PIT signatures. It is possible that people with gambling addiction could have unique PIT signatures as well. This study tested for differences in PIT signatures between people with and without gambling disorder.

What the researchers did

The researchers recruited participants with potential GD and participants with little or no gambling experience ("healthy controls" or HC). The gamblers filled out the German short questionnaire for gambling behaviour (KFG) to test if they had GD. In total, 30 GD and 30 HC participants completed the study. The two groups of participants were matched on age, personal income, and alcohol use.

What you need to know

Addictions can change the way people respond to cues that are related to their addiction. For example, someone with gambling disorder (GD) may experience gambling craving when they see a slot machine. The slot machine is a cue to their addiction and could elicit a specific neural response. This study tested whether people with GD have different neural responses during a gambling task compared to people without GD.

Participants completed a gambling decision-making task while viewing either gambling-related, positive, negative, or neutral images. Participants with GD were more likely to gamble when the images were gambling-related, positive, and negative cues. During the task, the neural responses of people with GD were different than those of people without GD. Thus, GD is linked to distinct neural responses during gambling decision-making.

Each participant completed a gambling task in an fMRI machine which scanned their brain activity. The participants viewed a screen that showed them a cue. This image could be gambling-related (e.g., showing a slot machine) or neutral. It could also show a negative consequence of gambling, or a positive effect from not gambling. Then, a gambling scenario appeared over the cue. Each gambling scenario had two numbers, one negative and one positive. The negative number showed the possible loss if they chose to gamble on this trial. The positive number showed the possible gain. Based on this information, they had to choose whether they would gamble in each scenario.

In total, participants completed 202 trials, each showing a cue and a gambling scenario. After completing the task, participants rated whether the cues elicited gambling cravings.

The researchers tested whether participants were more likely to gamble when the cues were gambling-related. Finally, they compared the PIT responses between participants in the GD and HC groups.

What the researchers found

The gambling-related cues elicited more gambling cravings than the neutral cues. This was especially true for GD participants. GD participants were much more likely to gamble after seeing the gambling-related cues than neutral cues. Meanwhile, the gambling-related cues did not seem to affect the HC participants as strongly. The same results were found for positive and negative cues.

The neural PIT responses differed between the GD and HC groups in a few ways. First, compared to HC participants, GD participants had stronger neural activity between the NAcc and the amygdala when choosing to gamble or not during the gambling-related cues. They also had stronger neural activity between the amygdala and lateral OFC when choosing to gamble during the positive cues. However, they had weaker activity between the amygdala and anterior OFC when choosing to gamble during the negative cues. Thus, GD and HC participants had distinct neural PIT signatures.

How you can use this research

Clinicians could use neural PIT signatures to help identify people with gambling disorder.

About the researchers

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Citation

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Gambling Research Exchange (GREO) has partnered with the Knowledge Mobilization Unit at York University to produce Research Snapshots. GREO is an independent knowledge translation and exchange organization that aims to eliminate harm from gambling. Our goal is to support evidence-informed decision making in safer gambling policies, standards, and practices. The work we do is intended for researchers, policy makers, gambling regulators and operators, and treatment and prevention service providers.

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