

research snapshot

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Abnormal brain activity may explain lower loss aversion in individuals addicted to gambling and alcohol

What this research is about

Pathological gambling is a disorder where an individual is unable to control their urge to gamble. Alcohol dependence is when an individual cannot control their desire to drink. These two addictions have similar characteristics. For example, people with these addictions have problems making appropriate decisions. They tend to be less sensitive to probable negative consequences of their addiction than healthy individuals are. This might be due to alterations in a phenomenon called loss aversion.

Research suggests that a part of the brain called the dorso-lateral-prefrontal cortex (DLPFC) is involved in loss aversion. Specifically, this part of the brain may be involved in keeping individuals from making risky choices. It is less active when individuals think their losses are bigger than their gains. Research also suggests that activity in other regions of the brain may explain individual differences in loss aversion. Loss aversion has not been studied and compared in pathological gambling and alcohol dependence.

This study investigated the differences in loss aversion between pathological gamblers, individuals with alcohol dependence, and healthy individuals. Functional magnetic resonance imaging was used to assess brain activity during the loss aversion task.

What the researchers did

The researchers recruited 19 pathological gamblers by posting notices on the Internet and in casinos. A psychologist assessed them for pathological gambling. The researchers recruited 15 individuals with alcohol dependence from a treatment facility. They also recruited 17 healthy individuals who did not have any

What you need to know

This study investigated loss aversion in individuals addicted to gambling and alcohol. The participants were 19 pathological gamblers, 15 individuals addicted to alcohol, and 17 healthy individuals. They completed a loss aversion task while their brain activity was being measured with functional magnetic resonance imaging. Compared to healthy individuals, both pathological gamblers and those addicted to alcohol showed lower loss aversion. Specifically, these two groups were less sensitive to losses. Compared to healthy individuals, those addicted to alcohol had altered brain activity in the lateral prefrontal regions when dealing with losses. Pathological gamblers had altered brain connectivity between the amygdala and the posterior orbito-frontal cortex when dealing with gains. This altered connectivity may have caused lower loss aversion as losses become less salient when gamblers gain more money.

addictions. Participants were all male, right-handed, and did not suffer from other mental disorders.

To determine how severe their gambling behaviour was, pathological gamblers completed the Yale Brown Obsessive Compulsive Scale and the Gambling Symptom Assessment Scale. To assess how severe their alcohol addiction was, individuals with alcohol dependence completed the Alcohol Dependence Scale. They also completed the Obsessive-Compulsive Drinking Scale to assess their craving levels. All participants completed the Gamblers' Beliefs Questionnaire, which assessed their beliefs about gambling.

All participants completed a loss aversion task which presented them with a series of gambles. In each gamble, participants had a 50% chance of winning some amount of money and a 50% chance of losing another amount of money. They had to decide whether they wanted to accept the gamble or not. The amount of money won or lost changed for each gamble. The participants completed the task while their brain activity was being measured using functional magnetic resonance imaging.

What the researchers found

Pathological gamblers and individuals with alcohol dependence showed lower loss aversion than healthy individuals. Both groups showed lower loss aversion as a result of being less sensitive to losses. Their sensitivity to gains was not different from healthy individuals. Among pathological gamblers, those with lower loss aversion had more distorted beliefs about gambling. For example, they were more likely to believe that they could control the outcome of a gamble.

With respect to brain activity, individuals addicted to alcohol had reduced activity in the DLPFC compared to healthy individuals as they lost more money. They also had increased activity in the ventro-lateral prefrontal cortex (VLPFC) compared to healthy individuals. These results suggest that when those addicted to alcohol are faced with rising losses, they exert more mental efforts and resources. Pathological gamblers' brain activity in these areas did not change dramatically as they faced losing more money.

Pathological gamblers showed altered connectivity patterns between loss aversion relevant parts of the brain when compared to healthy individuals. Specifically, they had stronger connectivity between the amygdala and the posterior orbito-frontal cortex as a result of gains. This altered connectivity may have caused lower loss aversion because losses become less salient with rising gains.

How you can use this research

This study shows that treatment providers should consider loss aversion when diagnosing and treating pathological gambling. The loss aversion task may be

adapted to be a training tool in therapy. More research is needed to understand the brain activity of pathological gamblers and individuals addicted to alcohol when dealing with significant losses.

About the researchers

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Citation

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Keywords

Pathological gambling, alcohol dependence, loss aversion, neurobehavioural patterns, neural sensitivity

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