Altered gray matter volume in the brain of pathological gamblers with and without substance use disorder

What this research is about

Research has shown that there are many similarities between substance use disorder (SUD) and pathological gambling (PG). These similarities include clinical characteristics, impaired mental processes, and altered brain activity. Recent findings have shown that the co-occurrence of PG and SUD leads to more severe gambling. People with PG and SUD have altered brain activity in regions of the brain that are involved in decision making. No research has looked at changes in gray matter volume in PG independent from SUD. The gray matter includes regions of the brain that are involved in muscle control, memory, emotion and decision making. The aim of this study was to extend past research by comparing gray matter volume in pathological gamblers with and without SUD, as well as individuals without gambling problems (healthy controls).

What the researcher did

The researchers recruited 107 male pathological gamblers from an inpatient treatment center in Germany. Of the 107 gamblers, 31 were diagnosed with alcohol use disorder, 16 were diagnosed with multiple substance misuse, and 60 did not have SUD. The researchers also recruited 98 males without PG as healthy controls.

For each participant, the researchers assessed gambling behaviour, urges to gamble, anxiety, and depression. Gambling behaviour included gambling severity, number of years spent gambling, and age of onset of gambling disorder. The researchers used magnetic resonance imaging (MRI) to assess gray matter volume in different regions of the brain of PG and healthy controls.

What the researcher found

PG without SUD and PG with multiple substance misuse had more severe gambling compared to those with alcohol use disorder. PG with alcohol use disorder also had a later age of onset and a lower urge to gamble compared to PG with multiple substance misuse.

Gray matter volume decreased for areas of the prefrontal cortex in the brain of PG compared to healthy controls. Specifically, there was lower gray matter volume in the medial frontal gyrus of PG without SUD. The medial frontal gyrus is part of the prefrontal cortex and plays a role in social awareness and behaviour. In PG without SUD, the amount of time spent gambling was associated with gray matter

What you need to know

This study examined changes in gray matter volume in pathological gamblers (PG) with or without substance use disorder (SUD). It also compared PG to individuals without gambling problems (healthy controls). Regardless of whether they had SUD or not, PG had decreased gray matter volume in areas of the prefrontal cortex of the brain. The prefrontal cortex is involved in decision making. In PG without SUD, the amount of time spent gambling was associated with gray matter deficit in the superior medial frontal gyrus. Those who spent more hours gambling had less gray matter volume in that region of the brain. The medial frontal gyrus is part of the prefrontal cortex and plays a role in social awareness and behaviour. Gambling treatment providers should consider the implications of altered brain structures when designing treatment programs.
deficit in the superior medial frontal gyrus. Those who spent more hours gambling had less gray matter volume in that region.

PG with multiple substance misuse and those with alcohol use disorder not only had less gray matter volume in the medial frontal gyrus, but also in the anterior cingulate. The anterior cingulate plays a role in regulating emotion. However, an increase in gray matter volume was also seen in the amygdala for PG with alcohol use disorder. The amygdala has a role in emotion, particularly fear and danger. It thus plays an important role in survival and decision making. PG with multiple substance use also had a decrease in gray matter volume in the precuneus compared to PG without SUD. The precuneus is involved in risk avoidance behaviour.

How you can use this research

This study shows that PG has altered grey matter volume regardless of the co-occurrence of SUD. These results may have implications for personalized therapy in the treatment of PG and addiction in general. Researchers can further explore changes in gray matter volume in other groups of gamblers (e.g., female gamblers).

About the Researcher

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Citation


Keywords

Behavioural addiction, gray matter, magnetic resonance imaging, pathological gambling, substance use comorbidity

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Gambling Research Exchange Ontario (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 responsible 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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