

# knowledge snapshot



## Immersion: Relevance to addictive disorders and underlying brain mechanisms

### What this article is about

Sometimes when people gamble, they become completely immersed, and lose track of time and what is occurring around them. This state of immersion often occurs when people are playing fast, digitized forms of gambling, such as electronic gaming machines (EGMs), slot machines, and online gambling. Some people who gamble to cope with negative feelings or as an escape may seek the immersion that gambling can provide.

The aim of this article was to explore the research on immersion in addictive disorders by focusing on two topics. The first topic was the relevance of immersion in gambling to other addictions. The second topic was how research on brain systems involved in immersion can help develop hypotheses about dysregulation and intervention in addictions.

### What was done?

The authors reviewed research that is relevant to the two topics. For the first topic, they summarized the research available on how immersion is relevant to other behavioural addictions as well as substance-related addictions. For the second topic, they summarized studies investigating brain systems and neurochemical substrates involved in immersion.

### What you need to know

#### *Immersion in substance-related addictions*

Some substances with addiction potential, or drugs of abuse, can cause what is called “a state of altered identity”. Clinically, this state is known as dissociation. Dissociation refers to an experience in which the person feels disconnected from themselves, their thoughts, and their feelings. The “general theory of

### Why is this article important?

People with gambling disorder may experience immersion. Immersion describes a state where people are completely focused on what they are doing and lose track of time and their surroundings. The goal of this review article was to identify and summarize research on two related topics. First, the authors wanted to examine whether immersion is relevant to other addictive disorders. Research suggests that immersion is a common feature of addictive disorders and is often related to experiences of trauma. Second, the authors reviewed literature on brain systems involved in immersion. Research has linked several brain regions and networks to immersion. The neurotransmitters dopamine and norepinephrine may also be involved.

addictions” states that dissociation is a common feature across addictions. This theory also proposes that experiencing trauma, particularly in childhood, makes people more prone to dissociate while engaging in their addiction. Other research suggests that people with trauma and addiction issues may use substances because it aids them in reaching a state of dissociation. This is called the “chemical dissociation” hypothesis.

Another line of research focuses on the “flow” theory. Unlike the clinical perspective of dissociation, flow has its origins in positive psychology. Flow describes a mental state when a person is fully immersed in an activity, where their skills are balanced with the challenge of the activity. Being in a flow state can lead to enjoyment and optimal performance in the activity.

The term “dark flow” has been proposed in EGM gambling to emphasize excessive gambling and negative consequences from being in this state. The authors proposed that immersion may represent a common ground between dissociation and flow.

## *Immersion in behavioural addictions*

Playing video games and using the internet can be immersive experiences similar to playing on an EGM. Current research suggests a similar relationship between trauma, immersion, and behavioural addictions as described for substance use addictions.

## *Brain systems*

Neuroscience studies have focused more on the flow perspective rather than dissociation. Early research has suggested that flow is due to transient hypofrontality. Transient hypofrontality proposes that flow occurs when a practiced skill can be maintained automatically. The result is that the prefrontal cortex may be suppressed temporarily. In contrast, “synchronization theory” proposes that flow may occur because different areas of the brain “talk” to each other in a more automatic and efficient manner. The authors summarized several ways to induce flow in a laboratory setting, including pressing a button to a certain rhythm in sync with a metronome. Research has identified several brain networks involved in flow state, including the default mode network, the central executive network, and the salience/reward network. These networks involve brain regions such as the medial prefrontal cortex, anterior cingulate cortex, amygdala, and dorsal striatum.

## *Neurochemical substrates*

Research has found that certain neurotransmitters may be involved in immersion. Neurotransmitters are chemicals in the brain that carry signals between brain cells. Researchers have found that people prone to immersion have higher levels of dopamine in a region of the brain called the dorsal striatum. Researchers have also identified a gene associated with dopamine production that may be linked to immersion proneness. Another neurotransmitter, norepinephrine, may also be involved in immersion via its role in attentional processes.

## **Who is it intended for?**

This research is intended for researchers interested in immersion in addictive disorders. It may also inform prevention and treatment of addictive disorders.

## **About the researchers**

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## **Citation**

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## **About Greo**

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