

## ALTERED STATES OF CONSCIOUSNESS IN GAMBLING AND INTERNET GAMING DISORDERS AS A RISK FACTOR FOR ADDICTION

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### Abstract

In GD and IGD, both at the preclinical level of problem game and at the clinical level of pathological game, altered states of consciousness are observed during the game and shortly before. In the scientific literature, they are called flow-state, dark flow, game trance, game intoxication, and so on. During these states, the person loses touch with reality, the real life situation completely detached from life's problems and concerns, and associated emotional experiences and is transformed into the space of the game. Self-identification is disrupted, as a result of which the player identifies with the game character, the avatar-hero of the game, or with the network character. In addition, the perception of time and memory of events during the game is disrupted. These states themselves become very desirable and attractive to players and contribute to the emergence of a pathological desire to constantly participate in the game in order to repeat an unusual experience. In this review of research, based on the materials of numerous researches and own clinical practice, it is demonstrated that such altered states of consciousness can contribute to the formation of addiction, lead to negative psychosocial consequences and comorbid psychopathology. It also shows how the game industry induces such states with certain psychotechnical methods. Materials from clinical and neurobiological studies were used for the analysis. Electronic literature search was conducted using PubMed, PsychINFO, ScienceDirect, Web of Science and Google Scholar.

**Keywords:** *Behavioural addictions, altered states of consciousness, gambling disorder, internet gaming disorder.*

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### 1. Introduction

Gambling disorder and Internet gaming disorder are behavioural addictions in the center of which is dependence from a certain type of the game behaviour over which the control is lost, both in frequency of involvement in the game, as well as in time. A pathological craving for play appears and eventually increases to a compulsive urge, which is constantly embodied almost without a struggle of motives. The dependent person continues to play despite the negative consequences for his mental and physical health, personality, relationships in the family, with friends and in the team, in the professional sphere or in school. The pathological need for the game becomes dominant and replaces all other interests, hobbies, forms of activity, relationships end even the basic needs: food, sleep, intimacy, child care, etc. (Chung et al., 2019). There are some cases when players ignored the deterioration of physical health and even severe pain, they did not hear loud sounds such as screaming and crying children or pets. Gamers and gamblers isolate themselves from the environment. Their relationships with family, friends, and work colleagues become conflicted, shallow, and consumering (Calado & Griffiths, 2016).

### 2. Objectives

The objective of the study was to determine the effect of altered states of consciousness (dark flow), which are observed in the clinical picture of patients with both GD and IGD, on the occurrence of addiction and comorbid psychopathology.

### 3. Methods

We selected and analysed 13 studies for our review. Seven studies have investigated changes in self-perception, self-identity, and perception of the surrounding reality in IGD. Six were neurocognitive

and based on fMRI neuroimaging techniques, and one was a systematic review of 18 differently designed studies of changes in self-perception and self-identity in IGD. Six other studies based on test questionnaires were designed to determine the relationship between the severity of altered states of consciousness (ASC) and the severity of addiction and comorbid psychopathology in GD. In addition, we took into account clinical observational data based on self-reports from patients with GD and IGD.

#### 4. Main results

From clinical observation, thanks to players' self-reports, we have learned that during the game, as the addiction develops, the person enters an altered state of consciousness, similar to a trance or hypnosis. Previous research also reveals this phenomenon. In the scientific literature, the term flows state, flow experience, or dark flow, but the definitions of game trance or hypnosis better characterize these states. During game trance, we can observe several clinically relevant effects, as they increase the addiction itself or increase the risk of addiction and the risk of adverse consequences of games (Dixon et al., 2019; Murch et al., 2020; Burleigh et al., 2018).

We observe detachment from problems, the disappearance of the entire surrounding world, and total immersion in the game process in persons with GD or in the world of a computer game with IGD, which becomes the only reality for the person. In addicted players, self-identity is altered by merging with the slot machine or game avatar, and the sharpness of perception of sounds and color effects in the game is increased (Lemenager et al., 2014; Kruger et al., 2022). Players cease to perceive flaws and imperfections in computer graphics when they are fully immersed in the game, and their imagination unconsciously draws out the missing details. Tachyornia develops - a change in the perception of time, and a person feels that he has spent much less time in the game than in reality. In casinos or gaming halls, daylight and clocks are excluded explicitly for the effect of losing time. The computer game introduces its daily cycle, and total immersion in the game world with such a density of events eliminates the realistic perception of time.

The memory of certain events and circumstances of the game becomes selective. For example, only winnings or near-winnings are remembered, which has been proven to motivate one to continue playing, while losses are forgotten or reduced to a minimum. As a result, one forgets how much one has lost or won and where, when, and how much one has borrowed (Green et al., 2020; Dixon et al., 2019).

Sometimes a player experiences a whole spectrum of emotions in a single game, from a peak positive to a peak negative. For example, excitement, the height of the emotional state of excitement, is set by the degree of risk. That is, the higher the stake, the higher degree of excitement. The dynamics of emotional fluctuations in internet video games are set by the game's events, the wins and losses, and what happens to the avatar due to partial or complete self-identification with the avatar (Burleigh et al., 2018; Dixon et al., 2018).

Neurobiological studies confirm that dependent internet gamers exhibit increased activation in brain regions such as the angular gyrus, inferior frontal gyrus, precuneus, and in the medial prefrontal cortex, during avatar reflection compared to self-reflection (Table 1). For reference, these brain regions are associated with the processing of identification, empathy, and the process of self-determination in healthy subjects. In research there was a decrease in bilateral brain activation in the AG and the middle occipital gyrus during self-perception and hyperactivity of the left angular gyrus during perception of avatar movement in the game and correlation with the severity of symptoms. Based on this, it was concluded that the stronger the player's identification with the avatar, the heavier the dependence.

Table 1. Neurobiological studies of avatar self-identification at IGD.

Study	Task/Method	Sample	Main results
Kim, Y.R et al. (2012)	A ball-throwing animation task in fMRI	N = 17 IGDp N = 17 HCs	- Activation in the thalamus, bilateral precentral area, bilateral middle frontal area, and the right temporal-parietal junction. - Higher activation in the left temporal-parietal-occipital junction, right para-hippocampal area. - The duration of internet use correlated with the activity of posterior area of left middle temporal gyrus.
Dong, G. et al. (2012 a,b,c,d)	The Stroop task and an event-related fMRI	N = 17 IGDp N = 17 HCs	- Higher activations in the left AG during avatar-perception. - A positive correlation between gender identity and brain activation in the left AG during self-perception.

Leménager, T. et al. (2014)	Images of Massively Multiplayer Online Role-Playing Games (MMORPGs) during fMRI.	N = 16 IGDp N = 17 HCs	- Decreased bilateral brain activations in the AG and the Middle Occipital gyrus during self-perception
Liu, J. et al. (2016)	Task-state in fMRI	N = 19 IGDp N = 19 HCs	- IGD participants had increased activation in regions that are associated with visuo-spatial orientation, space, attention, mental imagery and executive function (right superior parietal lobule, insular lobe, pre-cuneus, cingulate gyrus, superior temporal gyrus, and left brainstem)
Dieter, J. et al. (2015)	FMRI while completing a Giessen -Test (GT) - derived paradigm assessing self-, ideal-, and avatar-related self-concept domains.	N = 15 IGDp N = 17 HCs	- In all avatar-related contrasts, within-group comparisons showed addicted players to exhibit significantly higher brain activations in the left AG. - The between-groups comparisons revealed avatar-related left AG hyperactivations in addicts.
Choi, E.J. et al. (2018)	The teenagers described themselves, a famous historical person or their own game character, undergoing a functional magnetic resonance imaging (FMRI).	N = 12 IGDp N = 15 HCs	- When addicted adolescents were thinking about their own game characters, more global and significant medial prefrontal (MPFC) and anterior cingulate (ACC) activations were observed, than even when compared to thinking about themselves. - The ACC activation was correlated with the symptom severity. - The activation patterns demonstrated that addicted adolescents were most attached to their game characters and equated their game characters to human.
Green, R. et al. (2020)	This systematic review examined 18 quantitative studies of avatar- and self-related concepts and problematic gaming, including 13 survey-based and 5 neuroimaging studies.	N = 18 quantitative studies	Survey-based studies have consistently reported that negative self-concept, avatar identification, and large self-avatar discrepancies are significantly associated with problematic gaming. Poor self-concept appears to be a risk factor for GD, particularly for games that facilitate role-playing and identity formation.

The following shows the dark flow studies at GD (Table 2). The results of all these studies demonstrate a strong correlation between the severity of gambling addiction, depth of immersion in an altered state of consciousness, and comorbid psychopathology such as depression, anxiety, and stress.

Table 2. Studies of altered states of consciousness: immersion into the "dark flow" of the game in gamblers with GD.

Study	Task/Method	Sample	Main results
Tricker, C. et al. (2016)	A community sample was assessed for the urge to gamble an altered state of consciousness (assessed by the Altered State of Awareness dimension of the Phenomenology of Consciousness Inventory) at baseline, after a neutral cue, and after a gambling cue.	N = 37 GDp M age = 32 M PGSI = 5; PGSI = Problem Gambling Severity Index	It was found that (a) problem-gambling severity (PGSI score) predicted an increase in urge and an increase in an altered state of consciousness, and (b) increase in an altered state of consciousness mediated the relationship between problem-gambling severity and increase in urge.
Trivedi, R.H. & Teichert, T. (2017)	Empirical data were collected by applying a structured questionnaire with established scales.	N = 500 online gamblers	The findings indicate that online gambling addiction is reinforced by time transformation and autotelic experience.
Murch, W.S. et al. (2020)	Researchers presented data from three separate experiments conducted between 2015 and 2018 in which self-reported gambling flow and cardiac pre-ejection period (PEP; a measure of sympathetic nervous system arousal) were examined	N1 = 121, age M = 21.25, SD = 2.91; N2 = 80, age M = 20.55, SD = 2.37; N3 = 106, age M = 20.80, SD = 2.39	It was found that self-reported flow states were associated with significant decreases in PEP during the first five minutes of EGM use. Thus, participants who experienced flow showed a greater sympathetic nervous system response to the onset of gambling.

Dixon, M.J. et al. (2018)	In this study, a realistic slot machine simulator equipped with a force sensor was used to measure how hard players pressed the spin button after different outcomes. The severity of gambling addiction, stress, anxiety and depression were measured using test questionnaires	N = 150 gamblers M = 91 F = 62	This measure of arousal showed that LDWs (loss disguised as a win) were treated similarly to small wins. Additionally, depression symptomatology and dark flow were strongly correlated in the multiline game, with significant relationships between depression and gambling expectancy, and gambling expectancy and dark flow ratings also emerging
Dixon, M.J. et al. (2019)	Gamblers were assessed for mindfulness problems (using the Mindful Attention Awareness Scale), gambling problems (using the Problem Gambling Severity Index), and depressive symptoms (using the Depression Anxiety and Stress Scale).	N = 129 gamblers	Our key results were that mindfulness problems outside of the gambling context were positively correlated with depression, problem gambling status, and most importantly, dark flow within the gambling context. Dark flow was positively correlated with positive affect during play and the combination of dark flow and depression predicted gambling problems.
Kruger, T.B. et al. (2022)	Gamblers were assessed for mindfulness (using the Mindful Attention Awareness Scale), gambling problems (using the Problem Gambling Severity Index), depressive symptoms (using the Depression, Anxiety, and Stress Scale), and boredom proneness (using the Boredom Proneness Scale).	N = 110 gamblers F = 56 M = 53 1 non-binary	Using hierarchical multiple regression, we found that dark flow accounted for unique variance when predicting problem gambling severity (over and above depression, mindfulness, and boredom proneness).

## 5. Discussion

In GD and IGD, both at the preclinical level of the problematic game and the clinical level of the pathological game, altered states of consciousness are observed during play and shortly before it, called flow-state, dark flow, game trance, and so on (Kruger et al., 2022; Leménager et al., 2016). During these states, the person loses touch with reality. The real-life situation completely removes himself from life problems and worries and related emotional experiences and moves into the virtual world of games. Self-identification is disturbed because the player identifies with the game character, the avatar-hero of the game, or the online image (Choi et al., 2018; Dieter et al., 2015; Tricker et al., 2016). In addition, the perception of time and memory of events during the game is impaired. These conditions become highly desirable and appealing to players and contribute to a pathological desire to continually engage in the game to repeat the unusual experience. The state of dark flow with the effect of detachment from life's problems and negative emotional feelings about them, followed by a stimulating and euphoric effect (or immersive pleasure), becomes very desirable for the addict and stimulates the urge to play, and thus the development of addiction (Trivedi & Teichert, 2017; Kruger, 2022; Dong et al., 2012). After returning from this illusionary free state, problems return, new debts and difficulties are added, and depression, anxiety, aggression, etc. (Dixon et al., 2018, 2019; Choi et al., 2018).

A limitation of this study is the small number of studies selected and their heterogeneity in design. The phenomenon of altered states of consciousness in GD and IGD is still very poorly understood, as is its clinical significance in the pathogenesis of addiction and comorbid psychopathology. Extensive research in this area is necessary for the future.

## 6. Conclusions

As a result of our clinical observations and a review of scientific research have concluded that altered states of consciousness during gambling and internet video games contribute to addiction, negative psychosocial consequences, and comorbid psychopathology. The game industry induces such states by using specific of various psycho-technical methods. For example, the methods of close wins or losses disguised as winnings while gambling on a slot machine. For this purpose, the design of games is constantly being improved, various sound and visual effects invented, etc.

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