Gambling disorder (GD) is a complicated behavioral addiction that affects the frontostriatal neural circuitry and prefrontal control of reward-associated brain areas, a discrepancy between prefrontal cortex and the mesolimbic reward pathway has been proposed as the major mechanism behind the pathogenesis of GD. Repetitive transcranial magnetic stimulation (rTMS) is a noninvasive treatment that utilizes magnetic fields to stimulate nerve cells linked to mood and behavioral control; this stimulation is usually applied either on the left or right side of the dorsolateral prefrontal cortex of the brain. rTMS selectively modulates the activities of brain circuits and possess the ability to overturn the alterations in the neurocircuitry of the brain linked to the pathophysiology of GD. rTMS adjusts impulsivity, cognitive/attentional control, cognitive plasticity, and decision-making, which are crucial in decreasing gambling craving and relapse. However, innovative clinical investigations are needed to analyze and establish the impact of rTMS on gambling craving and cessation, using a larger sample size.

Keywords: gambling craving; gambling disorder; repetitive transcranial magnetic stimulation; neuroregulation; neurotherapy

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conducted by Gay et al. (2017), they found that patients with GD had decreased gambling craving following a single session of high frequency rTMS delivered to their left DLPFC after viewing a gambling video, using a MagPro X100 stimulation system.

A key advantage of rTMS is that it selectively modulates the activities of brain circuits and possesses the ability to overturn the alterations in the neurocircuitry of the brain linked to the pathophysiology of GD (Pettorraso et al., 2021). rTMS significantly modulates impulsivity, cognitive/attentional control, decision-making, and cognitive plasticity, which are crucial in decreasing gambling craving and relapse (Zucchella, Mantovani, Federico, Lugobani, & Tamburin, 2020).

rTMS has been shown to adjust dopaminergic and glutamatergic neurotransmission, and both transmissions are altered in GD patients (Pettorraso et al., 2019). rTMS causes a decrease in dopamine transporter availability in striatal regions, leading to modulation in dopaminergic pathways; this implies that rTMS has the potential to modulate brain functioning, and neural circuits associated with GD (Pettorraso et al., 2019).

Neuroimaging findings have shown similar activation defects in regions of the mesolimbic reward system in patients with GD and substance use disorders (Limbrick-Oldfield, Van Holst, & Clark, 2013). Some patients with GD often abuse cocaine (Cowlishaw, Merkouris, Chapman, & Radermacher, 2014). However, rTMS is effective in lowering cocaine use and sleep disruption (Gómez Pérez et al., 2020).

Providing 5-Hz rTMS therapy for 2 weeks significantly reduced craving and impulsivity, and improved functional connectivity between left DLPFC with ventromedial prefrontal cortex, and ventromedial prefrontal cortex with right angular gyrus in patients with cocaine use disorder (Garza-Villarreal et al., 2021). Moreover, clinical improvements were observed in patients with comorbid gambling and cocaine use disorder who had undergone a high-frequency left-DLPFC-rTMS stimulation, including diminished cocaine craving and intake and decrease in the craving to gamble. There was also improvement in sleep quality and decrease in anxiety and depression among the patients (Cardullo et al., 2019).

In conclusion, GD is an addictive behavioral disorder, in which dysfunctions in the prefrontal neural activity have been proposed as the underlying pathophysiological mechanism.

Therefore, targeting the PFC for the treatment of GD using rTMS is a promising therapeutic innovation. rTMS seems to decrease gambling craving, enhance mood control, and improve cognitive function in patients with GD. rTMS could emerge as a reliable adjunct therapy in support of cognitive-behavioral therapy for the treatment of GD. However, advanced clinical investigations are needed to scrutinize and establish the impact of rTMS on gambling craving and cessation, using a larger sample size.

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