# Video Games as Treatment Options for PTSD

*A Brief Review of the Neurobiology*

Eugene Lipov, M.D.
Thomas Lawley, Midwestern CCOM OMS-4

## Abstract (40 pt)

Post-Traumatic Stress Disorder (PTSD) affects millions globally, leading to symptoms like anxiety, hypervigilance, and emotional dysregulation. While psychotherapy and medications are standard treatments, their effectiveness varies. Recent studies suggest that video games (VGs) may offer a promising adjunctive therapy. This mini-review explores how VGs might positively impact PTSD-related brain dysfunction by enhancing neuroplasticity and regulating activity in key brain regions: the amygdala, hippocampus, and prefrontal cortex. Games such as *Super Mario* and *Tetris* have demonstrated increases in hippocampal and prefrontal cortex volume and activity, correlating with reduced PTSD symptoms. These findings highlight the potential of VGs in PTSD treatment.

## Introduction

PTSD involves dysregulation in the amygdala, hippocampus, and prefrontal cortex—brain regions responsible for fear processing, memory, and decision-making. Traditional treatments are only partially effective, necessitating alternative options. Video games have emerged as a novel modality that may improve cognitive and emotional functioning through their effects on brain plasticity.

## Research Question

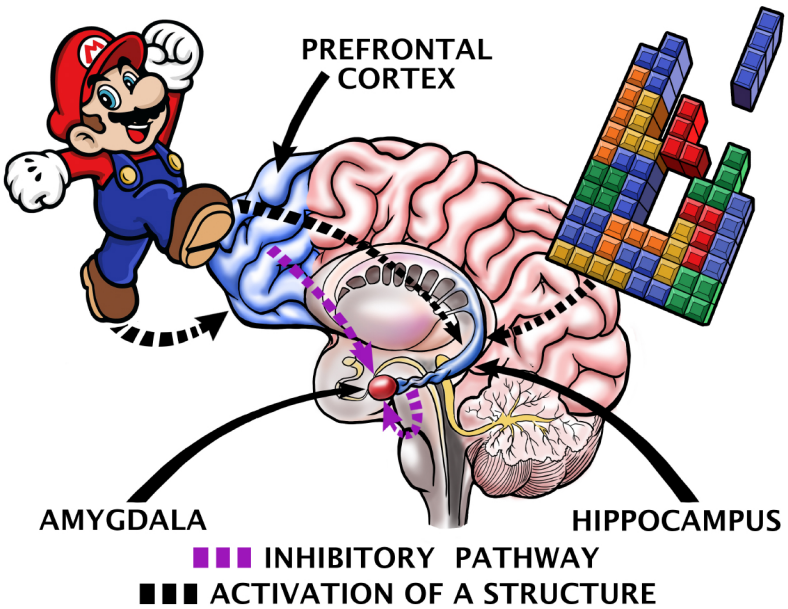
Can video games improve PTSD symptoms by promoting neuroplastic changes in key brain regions such as the amygdala, hippocampus, and prefrontal cortex?

## Methods

This is a mini-review summarizing findings from neuroimaging and clinical studies evaluating the impact of video games on PTSD-related brain regions. Sources include fMRI studies, volume analysis, and theoretical neurobiological models.

## Results

- *Super Mario* increased hippocampal and prefrontal cortex volume and activity
- *Tetris* correlated with reduced PTSD symptoms and increased hippocampal volume
- Neuroplastic changes suggest improved regulation of the amygdala




## Discussion

PTSD is characterized by a hyperactive amygdala, which is associated with heightened emotional arousal and fear responses. Neuroimaging studies have shown that the hippocampus and prefrontal cortex (PFC) are often underactive or reduced in volume in individuals with PTSD. These two regions normally exert an inhibitory effect on the amygdala—helping to regulate fear responses, emotional reactivity, and memory integration. When the PFC and hippocampus are impaired, this regulatory balance is disrupted, leading to unchecked amygdala activity.

Research indicates that certain video games, such as *Super Mario* and *Tetris*, can increase activity and volume in the hippocampus and PFC. This suggests that games may enhance these brain regions' ability to inhibit the amygdala, thereby improving emotional regulation and cognitive control in individuals with PTSD. These neuroplastic changes offer a potential explanation for the observed reductions in PTSD symptoms in studies using therapeutic video game interventions.

## Conclusions

Video games represent a promising adjunctive therapy for PTSD. By enhancing neuroplasticity and modulating brain activity in key regions, they could support traditional treatments and improve patient outcomes.

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