

# Reduced reactivity to fear conditioning and pain tests in persons involved in violent video gaming is influenced by adverse childhood experiences

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## Abstract

Videogaming, including violent video gaming, has become very common and lockdown measures of the COVID-19 pandemic even increased the prevalence rates. In this study we examined if violent videogaming is associated with more adverse childhood experiences and if it impairs pain processing and fear conditioning. We tested three groups of participants (violent video gamers, nonviolent video gamers, and non-gamers) and examined fear conditioning as well as pain perception during functional magnetic resonance imaging (fMRI). Violent video gamers displayed significantly higher pain thresholds as well as pain tolerance for electric stimulation, pressure pain stimulation, and cold pressor pain measurements compared to nonviolent video gamers and non-gamers. This relationship was moderated by adverse childhood experiences, especially physical neglect. Brain images acquired during the fear conditioning fMRI task showed that violent video gamers display significantly less differential brain activation to stimuli signaling pain versus no pain in the anterior cingulate cortex, the juxtapositional lobule cortex, and the paracingulate gyrus compared to non-gamers. There was also a significant negative correlation between adverse childhood experiences and activation in the precuneus and the intracalcarine cortex for signals of pain versus safety. The results of this study imply that violent video gaming is related to reduced processing of pain and signals of pain in a fear learning task, dependent of adverse childhood experiences. These mechanisms need to be examined in more detail and these data could be helpful in preventing the onset and adverse consequences of violent video gaming.

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