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The impact of violent video gaming and adverse childhood experiences on fear conditioning, pain-related empathy, pain perception and pain tolerance

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Video gaming and adverse childhood experiences are very common in our nowadays society. Recent events like lockdown measures of the COVID-19 pandemic led to even more people discovering video gaming for themselves. One of the most common types of video gaming is violent video gaming. Previous research stated that violent video gaming and adverse childhood experiences affect various pain perception types like pain sensitivity or pain processing. In this dissertation we tried to evaluate how violent video gaming and adverse childhood experiences affect fear conditioning, pain perception and empathy for pain in others. In addition, we also wanted to see if violent video gaming and adverse childhood experiences show interactional effect patterns regarding behavioral data or MRI data on these topics. We examined three groups of participants (violent video gamers, nonviolent video gamers and non-gamers) and assessed adverse childhood experiences on 5 different subscales (emotional abuse, emotional neglect, physical abuse, physical neglect and sexual abuse) via the Child Trauma Questionnaire to observe a diverse spectrum of possible effects and interactions. Pain sensitivity and empathy for pain in others experiments were conducted via fMRI measurements in the scanner as well as in the laboratory. Fear conditioning and pain perception experiments were completely assessed via fMRI measurements in the scanner. We conducted one big assessment for these topics and divided the experiments into two studies. Study 1 included a pain sensitivity assessment as well as a fear conditioning task and Study 2 consisted of an empathy for pain in others task with facial expressions shown to the participants and a pain perception task with different frequencies of electrical pain stimulation that were presented to the participant. Results for Study 1 displayed significantly higher pain threshold and pain tolerance for violent video gamers compared to nonviolent video gamers and non-gamers, but no significant difference between nonviolent video gamers and non-gamers. Adverse childhood experiences in the form of physical neglect moderated this connection significantly. Violent video gamer also showed significantly lower activation in anterior cingulate cortex, juxtapositional lobule cortex and the paracingulate gyrus compared to non-gamers for painful stimuli in the acquisition phase of the fear conditioning task conducted in the fMRI scanner. Increasing levels of physical neglect were connected to lower activation of precuneus and intracalcarine cortex for the same contrast of the fear conditioning. Study 2 revealed no difference between video gaming groups for emotion recognition via facial expressions in the empathy for pain experiment, but higher values of adverse childhood experiences displayed higher superior frontal gyrus activations for fear-based facial expressions. We did not observe any significant differences for the pain emotion in the empathy for pain experiment. Regarding the pain perception experiment violent video gamers displayed significantly higher activation in sensory-motor brain activation than non-gamers for the highest used pain stimuli frequency and higher values of physical abuse and physical neglect were connected to increased activity of middle frontal gyrus, superior frontal gyrus and frontal lobe in the pain perception experiment for a pain stimuli frequency of 1 Hz.

Overall violent video gaming and adverse childhood experiences were connected to various kinds of pain perception like pain threshold, pain tolerance and temporal summation affecting the individual directly but violent video gaming did not seem to affect the perception of painful emotions in others. This dissertation reveals that violent video gaming and adverse childhood experiences can have a wide range of consequences for the individual and researching more on these factors may help to understand many other consequences as well and improve treatment.