Dr. Olivia Choi and colleagues are 2017 recipient of the
Student Paper Award for their article
"Stimulation of the Prefrontal Cortex Reduces Violent Criminal Intent: A Randomized Clinical Trial."

Stimulation of the Prefrontal Cortex Reduces Violent Criminal Intent: A Randomized Clinical Trial

Despite evidence that criminology is increasingly aware of the contributions of biological sciences, several gaps remain. Investigations of biological risk factors for antisocial behavior have largely supported correlational conclusions, rather than causal interpretations (Loeber, Byrd, and Farrington, 2015). Furthermore, although recent studies have begun to examine the mechanisms underlying the link between biological risk factors and antisocial behavior, such mediating processes remain to be well-elucidated (Portnoy et al., 2014; Sijtsema et al., 2010). One of the best-replicated risk factors for aggressive and violent behavior is prefrontal brain impairment (e.g., Yang and Raine, 2009). An experimental design was adopted to examine the neural foundations of violence in order to help bridge these research gaps.

Through a double-blind, stratified, placebo-controlled, randomized trial, this study tested whether upregulation of the prefrontal cortex reduces the likelihood of engaging in violent acts, and the mechanism underlying this relationship. 81 healthy adults (36 males, 45 females) were randomly assigned to receive bilateral stimulation of the dorsolateral prefrontal cortex using transcranial direct current stimulation (tDCS), a non-invasive technique that influences neural excitability by delivering a direct, continuous, low-intensity electrical current to cortical areas between anodal and cathodal electrodes (Brunoni et al., 2012), or to a placebo condition. Intentions to commit violent acts and perceptions of the moral wrongfulness of these acts were assessed using hypothetical vignettes. One day after the experiment session, participants who received prefrontal stimulation reported being less likely to commit physical and sexual assault ($p < .01$) and judged violent acts as more morally wrongful ($p < .05$) compared to the sham controls. To add to our mechanistic understanding of the etiology of antisocial behavior, 31% of the total effect of tDCS on intentions to commit violence was found to be accounted for by perceptions of greater moral wrongfulness regarding the violent acts.

These findings help to strengthen conclusions from neurological, neuroimaging, and neuropsychological research (e.g., Damasio, 2000; Rogers and De Brito, 2016; Yang and Raine, 2009) by documenting experimentally the role of the prefrontal cortex on the likelihood of engaging in physical and sexual assault, and the perception of such acts as morally wrong. Our initial findings that are limited to intentions to commit violence and moral judgment require extensive replication. Nevertheless, among other etiological mechanisms, the role of biological factors on the development of antisocial behavior has been

acknowledged and there has been increasing discussion of biological interventions on antisocial and aggressive behavior in both children and adults (e.g., Hübner and White, 2016; Raine, 2015). This first known application of prefrontal tDCS to intentions to commit violence takes a modest step towards translating prior brain imaging research on offenders into practice by testing a novel, evidence-based method of reducing violence perpetration and suggests that the brain may be therapeutically amenable to change using a non-invasive tool with transient and relatively minor adverse effects (Fertonani, Ferrari, and Miniussi, 2015).

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