Title: Brain Functioning and Decision-Making

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4.1 BRIEF SUMMARY

Aggressive behaviors inflict massive costs on the public health. Psychopathy — the tendency to be callous, manipulative, and lack remorse — is one of the most central predictors of aggression and a core feature of psychopathology. Psychopathic individuals' antisocial acts have long been thought to be due to an inability to empathize with their victims. However, recent work suggests that psychopathic individuals have intact empathic abilities. Instead of employing their empathy to help others, psychopathic individuals appear to use empathy to exact greater harm on their victims. Such *antisocial empathy*, its neural bases, and its effects on the aggression of psychopathic individuals remains unexamined. We propose a functional neuroimaging study in which we will recruit 36 healthy adult male participants, who are at the low and high extremes of the psychopathy distribution (18 per group). While undergoing functional MRI, participants will complete a psychological task that evokes antisocially- and prosocially-motivated empathic responding. We predict that psychopathic individuals will exhibit greater recruitment of the brain's cognitive empathy network when empathy facilitates antisocial goals (i.e., harming a competitor) and that this neural recruitment will the predict greater aggression towards their targets. These findings will serve as an initial foray into this potential new frontier for research on psychopathy, empathy, and aggression. If supported, this novel approach would readily translate into new motivation-focused interventions and would inform biological and psychological models of the monumentally-costly phenomenon of psychopathic aggression.

4.2.a NARRATIVE STUDY DESCRIPTION

Aggressive behavior is a substantial public health concern in the United States, with approximately 1.2 million violent crimes occurring in 2015[1]. Such violent crimes (e.g., aggravated assault, murder, rape) resulted in over 1.5 million non-fatal injuries and over 17,000 deaths in 2015[2]. Psychopathy is a well-established risk factor for such violence. Understanding the psychological factors (such as antisocial empathy) that explain such psychopathic aggression), as well as the neural mechanisms that transmit these effects, is crucial to developing effective and targeted psychological and pharmacological interventions that seek to reduce such violent outcomes. This project will empirically investigate these phenomena.

4.2.b PRIMARY PURPOSE

Basic Science

4.2.c INTERVENTIONS

Behavioral

4.2.d STUDY PHASE

N/A

4.2.e INTERVENTION MODEL

Other: Within-participants, repeated-measures experimental manipulation (randomized order)

4.2.f MASKING

Participant - Yes
Care Provider - No
Investigator - Yes
Outcomes Assessor - No

4.2.g ALLOCATION

N/A

4.3 OUTCOME MEASURES

Primary - Change in accuracy of empathic pain judgments

Time frame: collected during intervention.

Brief description: Accuracy rates for pain ratings of faces during antisocial empathy trials (as compared to prosocial empathy trials).

NIH-Defined Phase III Clinical Trials: N/A

Primary - Change in brain activity assessed by fMRI

Time frame: collected during intervention.

Brief description: Blood-Oxygen-Level-Dependent signal change (as assessed by functional MRI) in the cognitive empathy brain network during antisocial empathy trials (as compared to prosocial empathy trials).

NIH-Defined Phase III Clinical Trials: N/A

4.4 STATISTICAL POWER AND DESIGN

The MRI Study will employ a 2 (psychopathy: high vs. low) x 2 (empathy-type: antisocial vs. prosocial) mixed-effects design. The outcome variables are pain ratings and brain activity during such pain ratings. G*Power statistical software (version 3.1) was used to conduct power analyses for this interactive effect, revealing that such a moderation model will have at least 80% power to detect a modest interactive effect size estimate of $f = .08$ with 36 participants, 18 per group.

4.5 SUBJECT PARTICIPATION DURATION

Participation in our study consists of a single, 3-hour laboratory session.

4.5 FDA-REGULATED INTERVENTION?

No

4.7 DISSEMINATION PLAN

The PI, Dr. David Chester, has submitted this study as a clinical trial on ClinicalTrials.gov immediately after notification of the award (ID: NCT03974282). It is currently under review. As per the NIH Policy on the Dissemination of NIH-Funded Clinical Trial Information, the PI will report summary results of this study to ClinicalTrials.gov within the timelines specified by this policy. The Clinical Research Compliance Program at Virginia Commonwealth University has and will assist Dr. Chester with these aforementioned steps and ensure that compliance is maintained with NIH dissemination policies and Virginia Commonwealth's own internal clinical trial dissemination policy.