Exploring Neural Correlates of Empathy and Emotion Regulation in Juveniles who Sexually Offend: An fMRI Study

Sara Jones, Ph.D, APRN, PMHNP-BC

To effectively address the needs of youth who perpetrate sexual violence and reduce rates of recidivism, a better understanding of the mechanisms of juvenile sexual offending is needed. Current literature identifies various factors that are believed to put youth at risk for sexual offending, two of which are empathy deficits and difficulties in emotion regulation. However, the presence and extent of how these factors contribute to sexual offending are often debated. This study used functional magnetic resonance imaging (fMRI) to compare engagement of brain regions recruited in empathy and emotion regulation among juveniles who had sexually offended (JSOs), and the possible role of childhood sexual abuse (CSA) in this mechanism.

This study enrolled 53 males (ages 12-20), including 17 healthy control subjects and 36 JSOs, including 15 with history of CSA (JSO+). Participants underwent interviews to assess trauma histories and psychological functioning, then fMRI was used to probe brain functioning related to empathy and emotion regulation. Task activation analysis was used, which consisted of traditional generalized linear model (GLM) analyses of fMRI BOLD data; activation contrasts were then pooled across subjects and analyzed into a second-level between-subjects GLM.

Preliminary findings of the empathy data were presented at last year’s conference, though significant head motion had excluded multiple data in that analysis. After undergoing a novel method of motion correction that salvaged more data and increased statistical power, final analysis demonstrated new results. Data from 38 subjects were analyzed: 11 controls and 27 JSOs, including 11 JSO+. Using a whole-brain approach, results of the fMRI data showed no statistical differences in engagement of brain regions associated with general empathy between controls and all JSOs (p<.05 corrected), nor between JSO+ and JSO-. We also used a focused region-of-interest (ROI) approach, in which regions canonically implicated in empathy were compared; no significant group differences in engagement within these regions were observed.

Final analysis of the emotion regulation included 39 subjects: 10 controls and 29 JSOs, including 12 JSO+. Using a whole-brain approach, analysis of the fMRI data showed significant differences between groups. While attempting to regulate emotions associated with negative stimuli, compared to controls, JSOs demonstrated less engagement in the ventral visual stream (p<.05 corrected), with JSO- demonstrating lesser engagement than JSO+ in this region. JSOs also demonstrated greater engagement in the temporal parietal junction compared to controls, indicating that JSOs actively attempted to recruit attention and orient to the task, though they used less visual identification while trying to do so. Further comparing JSO+ to JSO-, JSO+ demonstrated: less engagement in the dorsolateral
prefrontal cortex, anterior insular cortex, and superior temporal sulcus; and, greater engagement in the superior frontal gyrus (p<.05 corrected). Differences in these regions indicate altered cognitive control and salience processing among JSO+ when attempting to regulate emotions in the presence of negative stimuli.

These findings pose intriguing implications for the assessment and treatment of JSOs. While the relationship between abilities to empathize and regulate emotions and juvenile sexual offending are continually debated, development of these skills is currently implemented in the majority of treatment programs for JSOs. If general empathy deficits are not indicated to contribute to sexual offending, as these findings support, this misdirected focus may contribute to ineffective treatment and poor outcomes. However, by identifying alterations in brain regions associated with cognitive and affective processes that contribute to offending behaviors, such as emotion regulation, fMRI may demonstrate to be a useful tool to identify individualized risk factors and aid in tailoring interventions for JSOs.

Goals of the Workshop:
1. Discuss current research related to empathy, emotion regulation, and childhood sexual abuse among juveniles who sexually offend.
2. Summarize the findings of a research study that uses functional neuroimaging (fMRI) to neural correlates of empathy and emotion regulation in juveniles who sexually offend.
3. Discuss the implications for practice and future research related to the use of neuroimaging in the assessment and treatment of juveniles who sexually offend.