Early Trauma Exposure, Polygenic risk for AUD, and Neural Response Inhibition in Adolescence and Young Adults: Trajectories of Frontal Oscillations during a Go/NoGo Task

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Background: Trauma, particularly when experienced early in life, may alter brain and concurrent cognitive, affective and behavioral development, thereby increasing risk for substance use disorders and related psychopathology. While research indicates that genetic factors may exacerbate these vulnerabilities, few studies have empirically examined these effects using relatively large longitudinal and genetically informative developmental samples with dense phenotyping in multiple domains. **Methods**: The association of early assaultive, non-assaultive, and sexual-assaultive experiences prior to age 10 with developmental trajectories of neurophysiological functioning during response inhibition (frontal theta and posterior delta activity during an equal probability Go/NoGo task) were examined, using data from the Collaborative Study of the Genetics of Alcoholism (COGA) prospective cohort, comprising offspring from high-risk and comparison families who were aged 12-22 at enrollment and who have been sought for interview every 2 years (only those with 3+ interviews were included in the present analyses, N: 3,030). Interactions with early trauma exposures and polygenic risk for alcohol and cannabis use disorders (AUD, CUD) based on recently published GWAS data, were examined. Additionally, associations of neurophysiological functioning with AUD, CUD, externalizing (EXT) and internalizing (INT) psychopathology measured at each individual's last assessment were examined. Models were adjusted for age, gender, self-reported race/ethnicity, parental alcohol use disorders, and participants' own alcohol and cannabis use. **Results**: Individuals exposed to sexual assaultive trauma prior to age 10 had altered developmental trajectories of NoGo frontal theta; the typical developmental change in frontal theta activity observed throughout adolescence and young adulthood occurred at a slower rate among those who had been exposed to early sexual assault, but not other types of trauma, compared to those who were not exposed (controlling for other types of assaultive and non-assaultive trauma exposure). Importantly, effects remained significant after accounting for parental history of AUD and participants' own alcohol and cannabis use. Associations were more robust for participants with greater polygenic risk for AUD, but not CUD. Further, changes in NoGo frontal theta development was associated with increased risk for AUD and INT (mood disorders and suicidal ideation), but not CUD or EXT (conduct disorder, oppositional defiant disorder). Post-hoc analyses showed that early sexual assault was associated with higher rates of impulsivity (Barrett Impulsivity Scale) and sensation seeking (Zuckerman's Sensation Seeking Scale). **Conclusions**: Findings support the hypothesis that childhood sexual assault may influence young adult AUD and INT via alterations in genetic, brain and behavioral development in adolescence and young adulthood. However, future studies are needed to disentangle complex interactions among genetic and psycho-social influences on neurobiological development.