Longitudinal Insights into the Neurophysiology of Cyberbullying Involvement in Adolescence: A Bayesian Approach Using EEG Spectral Power

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Abstract

The impact of cyberbullying on mental health is a significant concern among adolescents, yet there is limited research on the neurophysiological markers of cyberbullying. This study aims to address this by exploring whether resting state electroencephalography (EEG) power, among traditional frequency bands (delta, theta, alpha, beta), predicts cyberbullying experiences over time. Participants (N=167 with n=904 datapoints; aged 12.0-17.9 years) completed EEG and other assessments at 4 monthly-intervals for five years. Results revealed several associations between EEG power across brain regions and various cyberbullying roles. Key findings include a decrease in EEG power across all frequency bands over time across the entire sample, aligning with typical developmental patterns. However, in early adolescence, cyberbully-victims exhibited lower delta power compared to other groups, which may suggest heightened emotional reactivity. Conversely, later in adolescence there were decreases in delta power among cyberbullies, potentially reflective an adaptive stress response. Longitudinally, cyberbully-victims retained more alpha power over time (i.e. into later adolescence) in frontal and central regions, suggesting greater cognitive effort in processing emotional experiences. Conversely, cyberbullies showed a relative steeper decline in alpha power (into later adolescence) in frontal regions, possibly linked to impulsivity and higher levels of general aggression. Longitudinal analyses highlight the importance of early interventions to target cognitive and emotional processes that may be implicated in cyberbullying in order to reduce the impact of cyberbullying and protect the mental health of adolescents. Future research should involve larger, more diverse samples to improve our knowledge of complex relationships in this research area.

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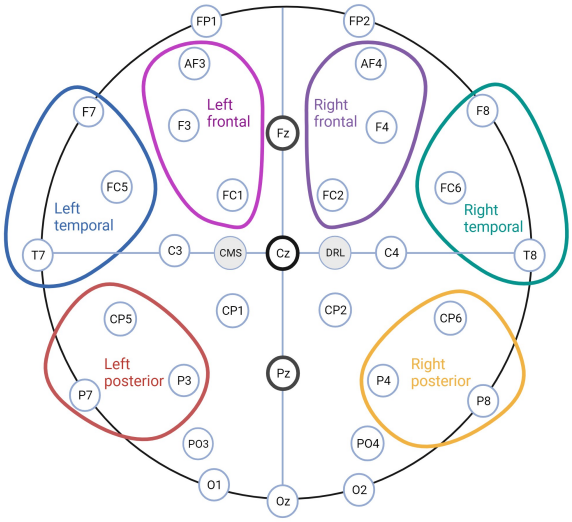

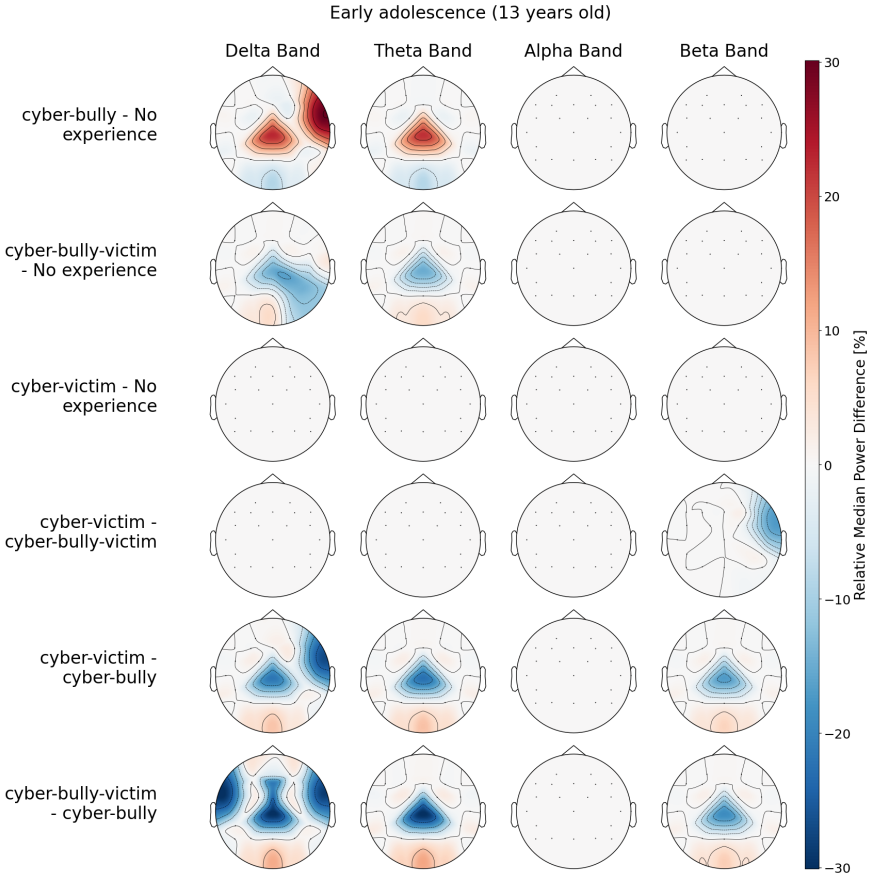

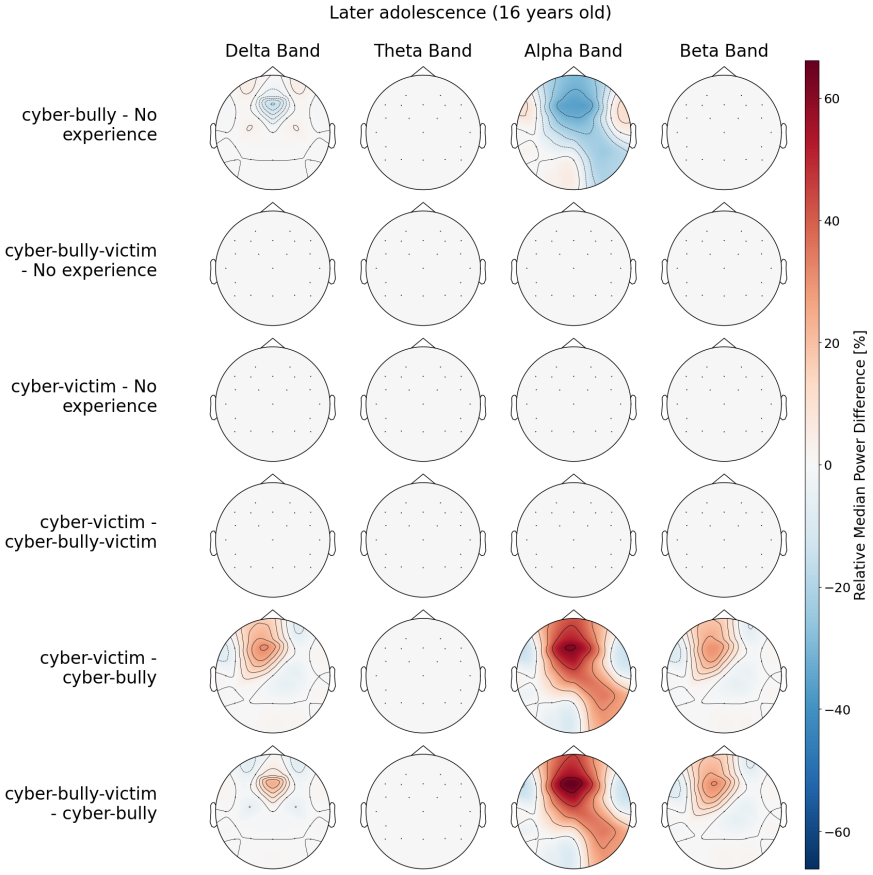

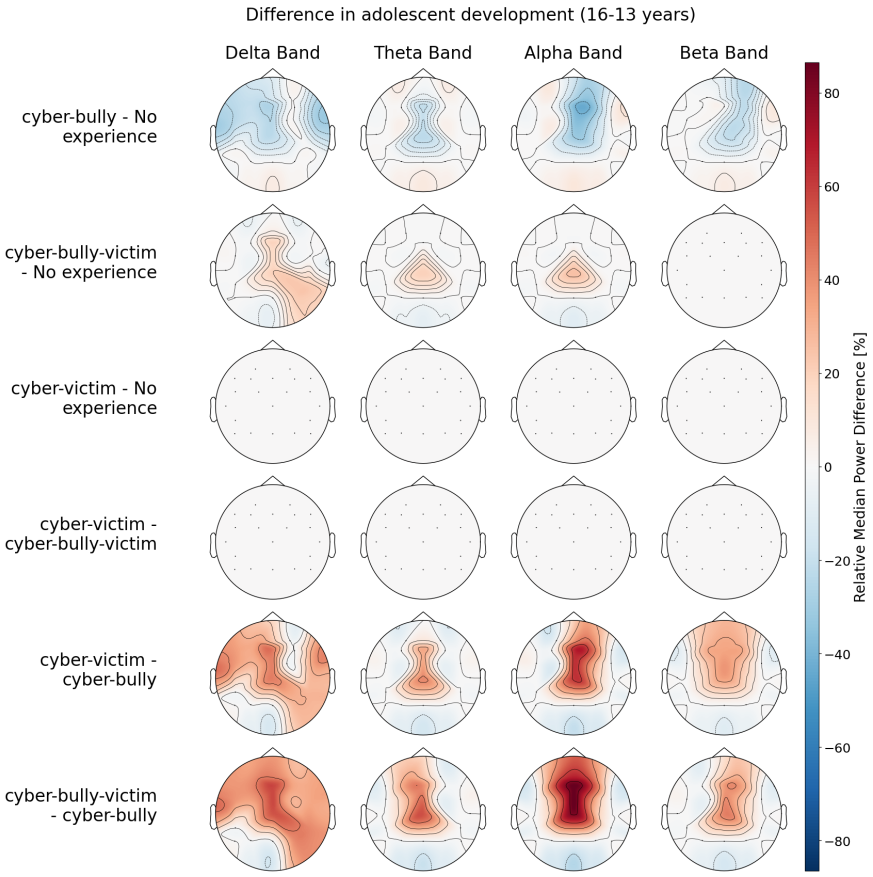

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