Adverse Childhood Experiences and Increased Functional Connectivity: Multifactorial Mechanisms of Musician's Dystonia

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Musician's dystonia (MD) is a task-specific focal dystonia affecting 1–2% of professional musicians, characterized by involuntary muscle contractions and loss of motor control while playing an instrument. Although it is the most common form of focal task-specific dystonia, its exact pathophysiological mechanisms remain unclear. Recent research suggests MD may result from dysfunctional communication within the cortico-basal ganglia-thalamo-cortical circuit and the cerebellum. This study aimed to deepen our understanding of these neural alterations and simultaneously assess the role of adverse childhood experiences (ACEs), which have been proposed as a potential risk factor.

Forty professional musicians with focal hand dystonia and a matched control group of 39 healthy musicians underwent resting-state functional magnetic resonance imaging (fMRI) and completed psychological assessments, including the Childhood Trauma Questionnaire. Functional connectivity was analyzed using a seed-to-whole-brain approach focusing on motor cortices, the prefrontal cortex, the basal ganglia, and the thalamus.

MD patients showed increased functional connectivity between the dorsolateral prefrontal cortex, the putamen, and the globus pallidus, as well as between the thalamus and premotor cortex—particularly among patients affected in the right-hand. These findings support previous evidence of altered motor planning and network dysfunction in focal dystonia. While MD patients reported more ACEs than controls, these experiences were not associated with functional connectivity changes.

Overall, this study presents results from the largest sample of MD patients thus far investigated. The findings reinforce the model of MD as a network disorder where movement inhibition is disrupted at an early stage of motor planning. Though ACEs may not directly impact neural alterations associated with MD, results indicated that they could play a role in the individual vulnerability profiles of some patients. These insights support holistic, individualized treatment approaches that integrate both neurological and psychological factors.