Predictors of response to behavioral therapy in children with Tourette syndrome – results of the machine learning study
Was moderation explored or only prediction (CBIT+PST or CBIT-only)?

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Background:

• While the European Society for the Study of Tourette Syndrome and the American Academy of Neurology consider behavioral therapy to be the first line treatment of Tourette syndrome (TS), predictors of treatment response remain unclear.

• Initial studies using the combined child-adult sample from the Comprehensive Behavioral Intervention for Tics (CBIT) studies found that the presence of tic medication predicted worse outcome, while greater tic severity and positive participant expectancy predicted greater tic improvement.

• Meanwhile, other reports suggest that co-existing psychopathologies (e.g., anxiety disorder), and stronger premonitory urges predict lower tic reduction.

• Notably, these prior reports studied mixed age samples and have only applied standardized analytical methodology (e.g., linear and logistic regression models), which have some limitations.

• In response, this study utilized machine learning approaches to determine predictors of treatment response to behavioral therapy in a large clinical trial of children with TS.

Methods:

• Participants were 126 children (aged 9-17 years) with TS or a chronic tic disorder of at least moderate severity, who were enrolled in randomized controlled trial (NCT00218777) testing the efficacy of the comprehensive behavioral intervention for tics (CBIT) relative to an active control intervention (psychoeducation and supportive therapy, PST)

• Participants were randomly assigned to receive 8 sessions of either treatment over a period of 10 weeks (61 CBIT, 65 PST).

• We compared a standardized logistic regression model with two multivariable approaches to elucidate possible predictors of treatment response: recursive partitioning and random forests.

• A post-treatment Yale Global Tic Severity Scale (YGTSS) reduction of ≤ 30% indicated response.

Results and Conclusions:

• Logistic regression did not consistently identify significant multivariate predictors.

• Meanwhile, recursive partitioning and machine learning approaches both found ADHD to predict treatment response.

• Adequate model accuracy (67%-76%), sensitivity (67%-78%), and specificity (70% - 85%) were observed.

• Post-hoc analyses indicated that treatment responders had significantly lower rates of ADHD (p=0.04) compared to non-responders.

• Findings suggest that multivariable approaches may be superior to classical regression models for identifying predictors of treatment response in pediatric TS.

• Moreover, these statistical approaches may play a key role in leading to personalized treatment recommendations for youth with TS, and lead to the development of targeted treatments for youth who are less responsive to behavioral therapy.