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Multivariate analytical approaches for investigating brain-behavior relationships

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Background: Many studies of brain-behavior relationships rely on univariate approaches where each variable of interest is tested independently, which does not allow for the simultaneous investigation of multiple correlated variables. Alternatively, multivariate approaches allow for examining relationships between psychopathology and neural substrates simultaneously. There are multiple multivariate methods to choose from that each have assumptions which can affect the results; however, many studies employ one method without a clear justification for its selection. Additionally, there are few studies illustrating how differences between methods manifest in examining brain-behavior relationships. The purpose of this study was to exemplify how the choice of multivariate approach can change brain-behavior interpretations.

Method: We used data from 9,027 9- to 10-year-old children from the Adolescent Brain Cognitive Development™ Study (ABCD Study®) to examine brain-behavior relationships with three commonly used multivariate approaches: canonical correlation analysis (CCA), partial least squares correlation (PLSC), and partial least squares regression (PLSR). We examined the associations between psychopathology dimensions including general psychopathology, attention-deficit/hyperactivity symptoms, conduct problems, and internalizing symptoms with regional brain volumes.

Results: The results of CCA, PLSC, and PLSR showed both consistencies and differences in the relationship between psychopathology symptoms and brain structure. The leading significant component yielded by each method demonstrated similar patterns of associations between regional brain volumes and psychopathology symptoms. However, the additional significant components yielded by each method demonstrated differential brain-behavior patterns that were not consistent across methods.

Conclusion: Here we show that CCA, PLSC, and PLSR yield slightly different interpretations regarding the relationship between child psychopathology and brain volume. In demonstrating the divergence between these approaches, we exemplify the importance of carefully considering the method's underlying assumptions when choosing a multivariate approach to delineate brain-behavior relationships.

Multivariate Procedures For The Behavior

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Multivariate Procedures For The Behavior:

Multivariate Procedures For The Behavior Book Review: Unveiling the Magic of Language

In an electronic era where connections and knowledge reign supreme, the enchanting power of language has become more apparent than ever. Its capability to stir emotions, provoke thought, and instigate transformation is actually remarkable. This extraordinary book, aptly titled "**Multivariate Procedures For The Behavior**," compiled by a very acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound impact on our existence. Throughout this critique, we will delve into the book's central themes, evaluate its unique writing style, and assess its overall influence on its readership.

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