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Title

Prescribed Psychostimulants and their Impacts on Brain Development

Abstract

Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder that interferes with cognitive processing systems. An increased use of stimulants in the treatment of ADHD has been observed at rates not seen prior to the 2000s. Analyzing trends in stimulant use from 2006-2016 revealed that, in the last decade, total stimulant use in the United States has doubled. Today it is estimated that at least 3 million children ages 5-17 in the United States who are diagnosed with ADHD use prescribed psychostimulants to help manage symptoms. There is limited research on the effects of stimulant medications on brain development in individuals. Neuroimaging methods have helped to better describe notable differences in development between those who do and do not use prescribed medication. Techniques such as MRIs can be used to capture structural components of the brain for interpretation and in addition computer software programs such as CIVET and MAGeT allow for the identification and measurement of these cerebral tissues. Studies showed that upon psychostimulant use there were normalizing and diverging effects on certain structures within the brain that are typically abnormal in cases of ADHD. In major structures that control motor movement, basal ganglia normalization patterns were observed within stimulant-treated individuals. In contrast, increasing dosage and duration of drug treatments were positively correlated to reduced hippocampal CA1 size compared to medication naïve participants. Understanding the full comprehensive impact of stimulant medication requires additional studies due to the complexity of normalizing and diverging effects on cerebral development. Further studies are warranted to confirm the replicability of results and investigate whether or not these differences affect the quality of life of individuals.