Longitudinal Investigation of the Neurobiological Underpinnings of Risk Behavior in ADHD throughout the Adolescent Transition

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INTRODUCTION

- ADHD, Attention-Deficit/Hyperactivity Disorder
- A disorder defined by difficulty in attention and increased hyperactivity and impulsivity
  - A consequence of disruption in the development of brain networks, especially in cognitive control and motivation
  - Most commonly diagnosed developmental disorder in childhood
  - Can influence high-risk behaviors
    - Poor academic achievement, substance abuse, unplanned pregnancy, and criminal behavior
    - Adolescents with ADHD are more than twice as likely to engage in risky behaviors than typically developing youth
    - Motivational processes could shape cognitive control performance in behavioral tasks other than learning

OBJECTIVES

1. Characterize behavioral trajectories of cognitive control, motivation, and their interaction in ADHD throughout adolescent transition
   - Specifically focused on neural pathways of executive functions and motivation
   - Research the longitudinal pathways of these networks and how it influences the behavior of youth with ADHD
2. Characterize the development of the structural and functional brain network organization in ADHD throughout the transition to adolescence
   - Strengthening the structural and functional connectivity within and between the cognitive control and motivation networks could lead to changes in behavioral performance
   - Discover neural systems that are affected during the adolescent transition
3. Predict mid-adolescent clinical outcomes from pre-adolescent characteristics
   - Understanding the factors and symptoms of high-risk behaviors to find early detectors and accurate treatment/prevention
   - Focus on characteristics of pre-adolescent characteristics and if some could serve as early detection markers

METHODS

- 100 children with ADHD and 50 typically developing children
- Parents of the participants and non-parent adults filled out questionnaires
- Participant Activities
  - Neuropsychological testing
    - WASI-II
    - WIAT-III
    - WISC-V
  - Behavioral tasks
    - Reward Learning Working Memory Task
    - Point Machine Test
    - Executive Functioning Tasks
  - MRI tasks
    - Go/no-go tasks
    - Balloon Analogue Risk Task
- Participants
  - Diagnosis, Preparation
    - Self-Reported Diagnostic Interview
    - Task practice
    - MRI preparation
- Neuroimaging
  - Resting state fMRI
  - Cognitive control, motivation, risk-taking task fMRI
  - Diffusion MRI
- Assessments
  - Neuropsychology: IQ, achievement
  - Hormonal assay

IMPORTANCE

- Spreads information about some of the precursors of high-risk behaviors to look out for
- Using knowledge to seek early treatment to prevent high-risk behaviors
- Builds upon previous studies that showed motivational processes could shape cognitive control performance in behavioral tasks

FUTURE DIRECTIONS

- Future studies could use findings to conduct research on treatment / prevention of high-risk behaviors
  - Formation of new therapies targeting the source of problematic behaviors
  - Look into pharmacological treatments that focuses on neural pathways responsible for adverse outcomes
  - Conduct clinical trials in at-risk youth

RESOURCES

2. Cohen, Jessica. Longitudinal Investigation of the Neurobiological Underpinnings of Risk Behavior in ADHD throughout the Adolescent Transition. RO1MH119091.