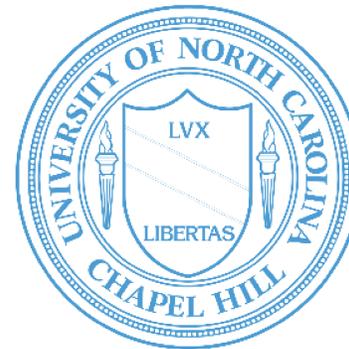


Longitudinal Investigation of the Neurobiological Underpinnings of Risk Behavior in ADHD throughout the Adolescent Transition



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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

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

Participant Testing

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

*Adapted from RO1MH119091

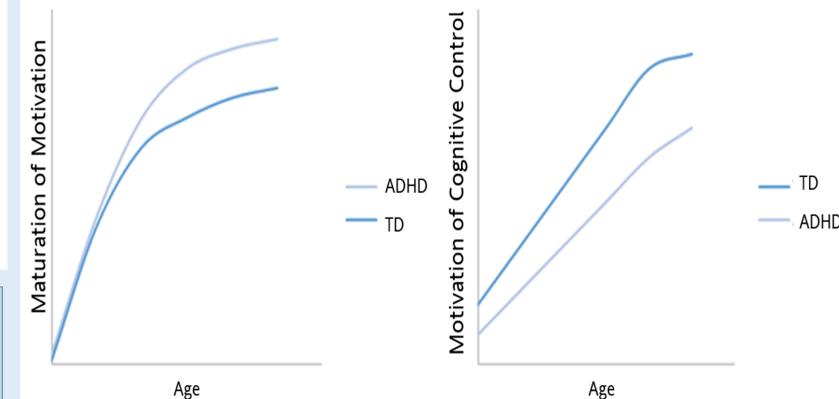
OBJECTIVES

- 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
- 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
- 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

Behavioral Domain	Task	Definition	Description
Cognitive Control	Standard go/no-go	<ul style="list-style-type: none"> Sustained Attention % Successful Commissions 	<ul style="list-style-type: none"> Low response time variability on go trials % no-go responses withheld
Motivation	Rewarded go/no-go	<ul style="list-style-type: none"> Reward Earned 	<ul style="list-style-type: none"> Total amount of money won
Cognitive Control – Motivation Interaction	Standard vs. rewarded go/no-go performance change	<ul style="list-style-type: none"> Δ Sustained Attention Δ % Successful Commissions 	<ul style="list-style-type: none"> Response time variability STD - REW % no-go responses withheld REW - STD
Risk-Taking	Balloon Analogue Risk Task (BART)	<ul style="list-style-type: none"> # Pumps # Explosions 	<ul style="list-style-type: none"> Total # pumps of rewarded balloons Total # of rewarded balloons exploded

Table 1. Definitions and descriptions of behavioral metrics of interest. STD – standard go/no-go; REW – rewarded go/no-go
 * Adapted from RO1MH119091

Maturation of Motivation and Cognitive Control in TD and ADHD Youth



* Adapted from Casey et al. 2008

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

- Casey, B. J., Getz, S. & Galván, A. The adolescent brain. *Developmental Review* 28, 62–77 (2008).
- Cohen, Jessica. *Longitudinal Investigation of the Neurobiological Underpinnings of Risk Behavior in ADHD throughout the Adolescent Transition*. RO1MH119091.

