

DID YOU know...?

Boys Town and UNL were jointly awarded a **\$3,000,000 grant** from the National Institute of Drug Administration to study executive function

The executive function study follows **323 children** from ages three to six years old who are now reaching adolescence

RESEARCH notes

A 2018 study from a previous phase of the executive function grant found that children with low executive function in preschool were more likely to experience symptoms of anxiety and depression in elementary school.

Reference:
Nelson, T. D., Kidwell, K. M., Nelson, J. M., Tomaso, C. C., Hankey, M., & Espy, K. A. (2018). Preschool executive control and internalizing symptoms in elementary school. *Journal of Abnormal Child Psychology*, 46(7), 1509-1520.

Exploring the Role of Executive Function in Adolescent Substance Use



Kai Yin (Queenie) Ho
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IN ADDITION TO STUDYING BOYS Town programs, the Child and Family Translational Research Center (TRC) conducts studies on aspects of child development, such as executive function (EF), which refers to the mental processes related to controlling thought and action.

Dr. Alex Mason, Senior Director of the TRC, and Dr. Tim Nelson, Associate Professor at the University of Nebraska-Lincoln (UNL) Developmental Cognitive Neuroscience Laboratory, were jointly awarded a \$3,000,000 grant by the National Institute of Drug Administration in 2016 to examine EF in adolescents. Specifically, this R01 grant, called the *Preschool Problem Solving Study – Adolescent Phase*, is focused on understanding how the development of EF may relate to substance involvement in adolescence. This research will allow the TRC to gain a better understanding of how

to help youth and families by identifying modifiable risk factors to target for intervention (e.g., environmental factors) and pinpointing the developmental period (e.g., adolescence) to effectively intervene in children's lives.

Executive Function

Research suggests that, by the teenage years, executive function is comprised of three abilities: working memory, inhibitory control, and flexible shifting. Working memory allows a person to process and hold new information, and then to transfer new information from short-term memory to long-term memory for use later. Children with working memory issues may have a hard time remembering the steps involved in getting ready for school or struggle with remembering information from class. Inhibitory control allows one to control their impulses and choose an appropriate response. Children with inhibi-

tory control issues may have difficulty managing frustration, leading to outbursts. Finally, flexible shifting allows people to problem-solve and shift their attention in helpful ways. Children with flexible shifting issues may have a difficult time with changing tasks or learning new skills, because of their struggles with quickly switching modes of thinking. Executive function issues may look different at different ages. For example, young children with inhibitory control issues may be unable to stop themselves from blurting out answers or talking loudly in the classroom, while teenagers may be more likely to engage in risky behaviors, such as using substances.

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Why Study Executive Function?

WE INTERVIEWED DR. ALEX MASON, Senior Director of the Child and Family Translational Research Center, to learn more about the importance of studying executive function in children and adolescents.

Why is Boys Town pursuing executive function research?

Executive function refers to a set of abilities, developed during childhood and adolescence, that help

individuals control their attention, behaviors, and emotions. Although its development is not yet well understood, it is possible that executive function can be shaped through skills training activities by parents, teachers, and others in a child's life.

To this end, the Translational Research Center is studying executive function to learn how it develops and how it might be promoted in positive ways for kids.



Alex Mason
Senior Director
Translational Research Center

What do you hope to learn from this research?

Ultimately, we hope to translate the knowledge we learn from research

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Exploring the Role of Executive Function in Adolescent Substance Use

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Substance use typically emerges in adolescence and is associated with adverse outcomes, such as risky sexual activity, physical injury, or driving under the influence. Understanding the developmental precursors of substance use can help create prevention interventions for adolescent substance use. Differences in EF development have been linked to a range of psychosocial and health outcomes, including substance use. Although EF is thought to be partly rooted in biologically-based temperament, it is also recognized as being shaped by social processes. Research has shown EF to be modifiable, making it a promising target for intervention.

The Study

The aims of this grant include: (1) examining the long-term impact of EF in preschool; (2) describing the development and differentiation of EF in childhood and adolescence; (3) understanding family, school, and peer factors linking EF from preschool into adolescence; and (4) examining the relationship of EF to substance use and co-occurring externalizing and internalizing problems in adolescence. It is hypoth-

esized that deficits in EF at the preschool period will positively predict substance use and externalizing and internalizing problems in adolescence. Further, it is hypothesized that different dimensions of EF will have differential associations to these outcomes (for example, inhibitory control and early onset of substance use). A final hypothesis states that all of these associations will be influenced by family, school, and peer factors.

This study follows 323 children from ages three to six years old who are now reaching adolescence. In addition to an extensive battery of EF tasks, parent, child, and teacher data on relationships, behaviors, and family life have also been collected through previous phases of the study.

The current adolescent phase adds to the existing data by continuing to collect data through laboratory-based EF tasks and a 45-minute telephone interview, covering topics such as family life, school performance, and substance use and attitudes. Examiners from UNL administer all EF tasks and the 45-minute telephone interview is conducted by trained Research Assistants at the TRC.

The project is beginning its third year of data collection. Currently, over 200 adolescent/parent pairs have completed their first wave of data collection, more than 150 pairs have completed their second wave, and 9 have completed their third wave. The final year of data collection will end in 2022. Adolescents between the ages of 14 to 18 years old are eligible to be included in this phase of the study.

Next Steps

The TRC will continue with data analysis and explorations as data collection continues and will share findings with practitioners to discuss ways to utilize the results. For example, findings from this project can help practitioners develop new interventions to improve health and wellness and to help prevent substance use in children by improving EF during key developmental periods.

Through these efforts, the TRC builds research knowledge and promotes the Boys Town Mission by helping to improve practice for the benefit of children and families.

Why Study Executive Function?

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into new practices. In particular, our studies can guide the development of interventions that promote strong executive function development to reduce the chance that kids will develop behavioral and emotional problems going into the challenging years of adolescence.

What is the most exciting thing about this research for you?

This research has allowed us to form strong and productive working relationships with close colleagues at the University of Nebraska-Lincoln.

Another exciting thing about this research is that it draws on methods, such as the use of computerized

tasks to measure executive function, that are new to the Translational Research Center.

Lastly, this research has allowed us to develop our knowledge of these methods for use in future studies, such as randomized controlled trials, that test programs designed to improve executive function in kids.

ABOUT THE authors

Kai Yin (Queenie) Ho (author) is a Research Analyst at the Translational Research Center. She holds an MPhil in Applied Biological Anthropology from St. John's College, University of Cambridge. Queenie serves as the Data Collection Coordinator for this grant.

Amy Stevens (co-author) is a Research Supervisor at the Translational Research Center. She holds an M.A. in Biological Anthropology from New Mexico State University. Amy serves as the Project Manager for this grant and has experience as an Assistant Family-Teacher.

Alex Mason (interview) has a Ph.D. in Social Psychology from the University of Nevada-Reno and has held research and faculty positions in the School of Social Work at the University of Washington. Alex has received funding from the National Institute on Drug Abuse for his research examining the development and prevention of substance use, depression, and related problems among youth. Alex has been at Boys Town since January 2009 and is currently the Senior Director of the Child and Family Translational Research Center.

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