Awards

Search Awards
Recent Awards
Presidential and Honorary Awards
About Awards

How to Manage Your Award

Grant Policy Manual
Grant General Conditions
Cooperative Agreement Conditions
Special Conditions
Federal Demonstration Partnership
Policy Office Website

Award Abstract #1540854

SL-CN: Contributions of Executive Function Subdomains to Math and Reading Cognition in the Classroom

NSF Org:	SMA SBE Off Of Multidisciplinary Activities
Initial Amendment Date:	August 18, 2015
Latest Amendment Date:	August 18, 2015
Award Number:	1540854
Award Instrument:	Standard Grant
Program Manager:	Soo-Siang Lim SMA SBE Off Of Multidisciplinary Activities SBE Direct For Social, Behav & Economic Scie
Start Date:	September 15, 2015
End Date:	August 31, 2018 (Estimated)
Awarded Amount to Date:	$750,000.00
Investigator(s):	Adam Gazzaley adam.gazzaley@ucsf.edu (Principal Investigator) Fumiko Hoeft (Co-Principal Investigator) Melina Uncapher (Co-Principal Investigator) Bruce McCandliss (Co-Principal Investigator) Silvia Bunge (Co-Principal Investigator)
Sponsor:	University of California-San Francisco 1855 Folsom St Ste 425 San Francisco, CA 94103-4249 (415)476-2977
NSF Program(s):	Science of Learning, DISCOVERY RESEARCH K-12
Program Reference Code(s):	7298, 7956, 8089
Program Element Code(s):	004Y, 7645

ABSTRACT

Understanding how the brain of a student learns new information and flexibly applies that information in real-world settings is critical for guiding efforts to improve the U.S. education system. How a student learns is fundamentally related to core aspects of cognition, termed executive functions (EFs). EFs are known predictors of academic achievement across multiple content areas (e.g., math and reading); however, there remain many unanswered questions regarding exactly how EFs contribute to academic performance and whether weak EFs can be enhanced with cognitive training. It is important to build a precise understanding of how these abilities develop over childhood and how they can be improved in order to supply educators with precise tools and insights about whether, when, and how to intervene when a student is struggling.

The study of how EFs contribute to academic achievement has advanced rapidly in recent years, but has not typically included the investigation of EFs in middle childhood. Because middle childhood is a period of high neural plasticity, it promises great opportunity to intervene when EFs are weak. This research program develops an innovative approach that improves both diagnostic and intervention methodology for detecting and remediating EF weaknesses in educational settings. The program leverages a novel, precision EF assessment tool in order to rapidly assess and longitudinally track the multidimensional profile of EFs in children over time. The critical advancement is the adaptive nature of the assessment tool, which increases in difficulty as the learner improves. This adaptivity allows multiple, precise assessments over time and thus enables unprecedented understanding of how different EF profiles develop across middle childhood and, critically, how these profiles contribute to math and reading achievement. Additionally, by utilizing a novel intervention that uses each student's multidimensional EF profile to selectively challenge subdomains of EF during physical fitness training, the research will inform us if personalized, multi-factor EF training can improve math and reading outcomes. Specifically, the research will: (1) fill gaps in existing knowledge about the relationship between EF profiles and academic skills beyond early childhood, (2) characterize how these relationships evolve across age, (3) determine whether EFs are more critical to certain content areas (subdomains of math and reading), and (4) advance the field's understanding of the feasibility and timeline of personalized EF interventions. Importantly, this research will serve to lay a definitive foundation for future science of learning research to build upon. In particular, the proposed investigations of the typically developing mind will inform efforts to understand disorders of development such as ADHD and autism. Finally, the EFs assessment tool will be made publicly available, to promote widescale investigations of EFs across the diverse range of student learners. A precise understanding of how the multidimensional profile of EFs contributes to academic achievement promises tremendous societal impact by guiding efforts to intervene when students are struggling academically.

Please report errors in award information by writing to: awardsearch@nsf.gov.