Maximizing the Effects of Physical Activity Interventions on Executive Functions in Children

Guest Lecture by Kimberly Dawn Lakes
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Abstract: There is emerging evidence supporting the hypothesis that physical activity or exercise impacts structural brain growth and functional neurocognitive development, particularly the development of executive functions. I will present research conducted with school-age children that has demonstrated that exercise or physical activity programs that involve greater cognitive engagement produce stronger effects on executive functions than purely aerobic or simple motor skills training activities. Our research is addressing the impact of a variety of exercise programs on the development of executive functions in children with and without developmental disorders (including Attention Deficit Hyperactivity Disorder, Autism Spectrum Disorder, and Cerebral Palsy) using robust approaches to measuring behavioral symptoms and executive function as well as epigenetic and bioassay tools. Given an increasing pressure in school systems to decrease the amount of time spent on recess and physical activity to presumably improve academic outcomes by spending more time in instruction, our research has practical implications. Physical activity is not only important for physical health, it is also critical for cognitive health, and cognitively engaging physical activities may maximize potential positive effects on cognitive outcomes.

Dr. Lakes’ research and clinical interests focus on children with special needs, specifically neurodevelopmental disorders such as Autism and ADHD. Her research is contributing to the emerging field of neuroeducation, which bridges the disciplines of neuroscience, psychology, and education. The central theme of her research is the study of interventions designed to promote the development of executive functions, including inhibition (self-regulation), attention, and working memory in children during critical phases of development. Her research has been recognized as influential in this emerging field – in 2011, she was awarded the Aspen Brain Forum Prize in NeuroEducation Young Investigator Award. Dr. Lakes’ current and future research is focused on applying developmental cognitive neuroscience to the study of exercise, family, and school-based interventions to promote executive functions. One goal for her research is to apply emerging technologies to interventions, helping parents nurture the development of self-regulation in their children, using technology to deliver just-in-time interventions, and web-based application to engage children in a process of self-monitoring, self-evaluating, and self-correcting their behavior.