



Play By Play

The DSCN Lab Newsletter
Summer 2018

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Emotional Interference

By Andrei Semenov

Thanks to millions of years of our evolutionary ancestors being on the lookout for threats of all sorts, our brains are naturally primed to react to things we find emotionally triggering even if it comes at the cost of concentrating on our work. Part of improving our self-regulation and attention skills involves knowing when to suppress our reactions to something emotional and instead pay attention to the task at hand.

To study how we react to our emotions, researchers have developed the Adult Emotional Interference Task. Performance on this task gives us an idea of how our brains hijack our attention when faced with something scary or arousing. The Adult Emotional Interference Task requires participants to pay attention to a computer screen and listen for a tone. If the sound is high-pitched, they need to press a specific key and if the sound is low-pitched, they need to press a different key. Prior to each sound, participants are shown a picture for one second. The picture is either a positive image (e.g., kittens, puppies), a neutral image (e.g., clock, table) or a negative image (e.g., spider, wounded soldier).

For each presentation of the high/low pitched sound, we calculate the reaction time it takes to press the correct button.

In previous research with undergraduates, we observed that they take longer to press the correct button if shown negative pictures when compared to being shown positive/neutral pictures. These findings suggest that our emotional reaction to the negative pictures slows down our reaction time on this simple task, suggesting the presence of some emotional interference. Furthermore, we found that if we exposed the undergraduates to eight weeks of mindfulness meditation and gave them the emotional interference task again, the emotional interference effect disappeared. These findings suggest that through training, we can reduce the interfering influence of our emotions on our attention.

Our current study is inspired by the study with undergraduates and we are hoping to demonstrate that a new, child-adapted version of the Emotional Interference Task, equipped with more child-appropriate images can elicit the same pattern of responses. If we are able to replicate our adult findings, we will be able to use our new tool for evaluating emotion regulation strategies in children.

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Examples of a negative image (top left), neutral image (top right) and positive image (bottom left).

Adolescent Decision-Making

By Brandon Almy

Adolescence is an exciting period of development that includes many physical and social changes. With the start of puberty, adolescents experience changes in how sensitive they are to rewards. Research suggests that the balance between self-control skills and reward sensitivity is important for decision-making. The adolescent decision-making (ADM) study comprehensively assesses adolescents' developing reward sensitivity and self-control skills, including their executive function, emotion regulation, and their beliefs about how well they can manage their emotion and attention to complete tasks, to begin to understand how decision-making develops in early adolescence (ages 10-15).

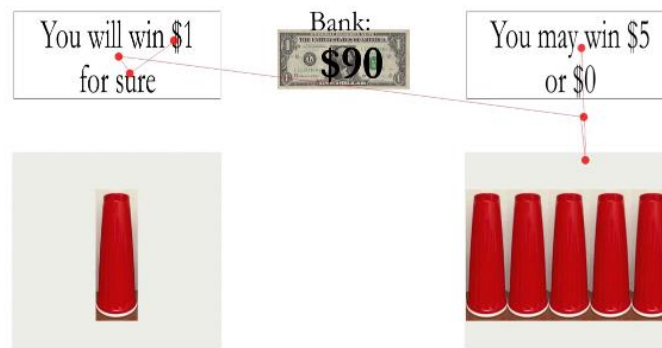
To assess decision-making, adolescents complete the Cups Task. In this task, teens make various decisions about winning and losing money. For some of these decisions, they choose between a sure gain of \$1, represented by one cup on the side of the screen, and a risk to earn more than \$1, represented by a set of cups. For some decisions, it is considered advantageous to take the risk, whereas for others, it is advantageous to take the sure gain. The adolescents make 162 decisions in all and can exchange the dollars earned during the task for actual money in the study. We are interested in how the ability to make optimal decisions improves with age and might be associated with reward sensitivity and self-control.

Previous studies have used the Cups Task with adolescents and found improvements with decision-making as adolescents mature. The innovation of the ADM study is the use of eye-tracking to better understand how teens process information during the task. Before making a decision, we will be able to analyze what pieces of information teens attend to and how long they spend on certain pieces of information by recording where their eyes are on the screen.

We anticipate that teens who have more advanced self-control skills will make better decisions during the task. Better decision-

making might be associated with more time making a decision, and/or adolescents attending to each of the various pieces of information on the display before making a decision. To make advantageous decisions, adolescents need to consider both the amount of money to win on the trial and the number of cups involved with the risk.

The research team has enrolled 86 adolescents over the last year. Preliminary data show improvements in decision-making with age, indicating that the modified Cups Task is working as expected. The goal is to finish collecting data for the study by the end of the summer and enroll 150 adolescents overall.



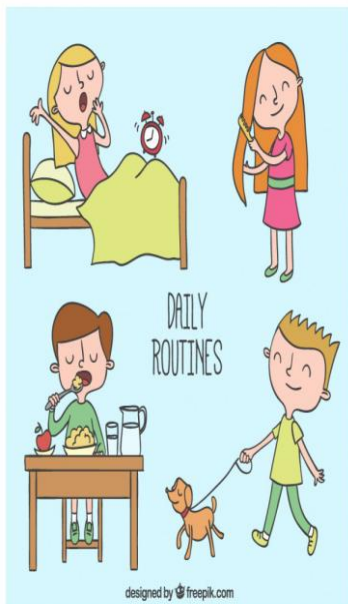
The picture shows eye-tracking data from an adolescent. The red circles and lines represent where the adolescent was looking when making a decision.

The data will be used for the author's doctoral dissertation.

Undergraduate research assistants who are helping with the study plan to use the data for their senior research projects. These projects are made possible by the kindness of adolescents and their families. We greatly appreciate their participation and time!

Ready 4 Routines

By Andrei Semenov



The hustle and bustle of everyday life may seem like a lot to keep track of. Whether you are shuttling your child from soccer practice to music lesson or coordinating the daily routine of getting the family ready for dinner, our lives are filled with routines and activities. Although some research has suggested that too many routines and activities and not enough free play time is associated with less ability to proactively regulate one's behavior, other research suggests that the absence of routines and regularity could introduce high levels of chaos which is detrimental to the developing mind. As with most things in life, striking a balance between too many and too few routines and daily activities seems to be key in promoting healthy development. A recent line of research in our lab has looked at how we can use the context of daily routines to introduce high-quality parenting practices in at-risk families in an effort to reduce household chaos and increase parent and child cognitive outcomes.

The Ready4Routines project, in collaboration with Acelero Learning, Frontiers of Innovation and the Los Angeles-based Westside Infant Network, is designed to introduce and reinforce high-quality daily routines for

parents who may find themselves in a chaotic and unpredictable environment. Ready 4 Routines delivers an 8-week parenting intervention to Early Head Start and Head Start families across the nation. Over the course of the intervention, parents learn about the importance of predictable routines as well as activities and routines that are specifically designed to reinforce the development of self-regulation skills. Parents learn routines around meal preparation, bedtime wind-down and even activities based on mindfulness meditation that aim to reduce tantrums and increase emotional regulation.

Over the past three years our lab has been working with our collaborators on developing, revising and implementing Ready4Routines across the country and measuring its effect on self-regulation skills, parent-child relationships and various other outcomes. To date, we have seen substantial improvements in children's executive function skills after their parents participated in this 8-week program. We also have seen associated decreases in parenting-related stress among parents who participated in the program. Our next steps in this program are to understand how parent-child relationships may change as a result of these high-quality routines as well as to explore how we can best make Ready4Routines accessible to all families.

THE UMN ICD PARTICIPANT POOL

What is it?

The IPP is a central database containing around 67,000 participants for over fifteen faculty-led research labs within the Institute of Child Development at the University of MN.

PARTICIPANT POOL FAST FACTS

6,129

In 2017, 6,129 new participants were enrolled in the IPP!

127

In 2017, the IPP provided 127 participant lists to ongoing studies within the ICD!

JOIN US!

Enroll your child in research or update your information by visiting:

<http://www.cehd.umn.edu/icd/research/ipp/>



This year, **Dr. Zelazo** and **Dr. Carlson** were interviewed for episodes of the podcast, *Full PreFrontal: Exposing the Mysteries of Executive Function with Sucheta Kamath!*

Find them at the following link:
<http://cerebralmatters.com/podcast/episodes/>

Episode 23: *The Power to Resist* (Duration: 40:50)

Episode 24: *Know Thyself* (Duration: 43:47)

Episode 25: *Most Visible in its Absence* (Duration: 35:23)

Episode 26: *The Homer Simpson Effect* (Duration: 32:23)

OUR GRADUATE STUDENTS



Brandon Almy



Rebecca Distefano



Jessica Faber



Amanda Grenell



Andrei Semenov



Julie Vaisarova

Incoming Graduate Students,
Fall 2018

Lauren Eales is joining us from UC Berkeley! Her research interests include the role of executive function in the development of healthy and maladaptive behaviors. She's excited to move from Southern California to Minnesota and finally experience seasons.

Jasmine Ernst is joining us from Western Kentucky University! Her Research interests include school readiness, academic achievement, and promotion of executive function through teaching practices.



GRANTS, HONORS & AWARDS

Rebecca Distefano was awarded the University of Minnesota Interdisciplinary Research Fellowship and the ICD Small Grant! Congratulations Rebecca!

Julie Vaisarova was awarded the ICD Departmental Small Grant! Congratulations Julie!

Amanda Grenell was awarded the ICD Departmental Small Grant! Additionally, she received the CEHD Hague Scholarship and CEHD Jeanette Paul Scholarship. Congratulations Amanda!

Stephanie Carlson received the University of Minnesota Distinguished McKnight University Professorship! Congratulations Dr. Carlson!

Brandon Almy and Rebecca Distefano were awarded University of Minnesota Doctoral Dissertation fellowships! Congratulations to them!

DID YOU KNOW?

There are estimated to be 86 to 100 BILLION neurons in the adult brain!

Creativity and Executive Function: Opposites, or not?

By Julie Vaisarova

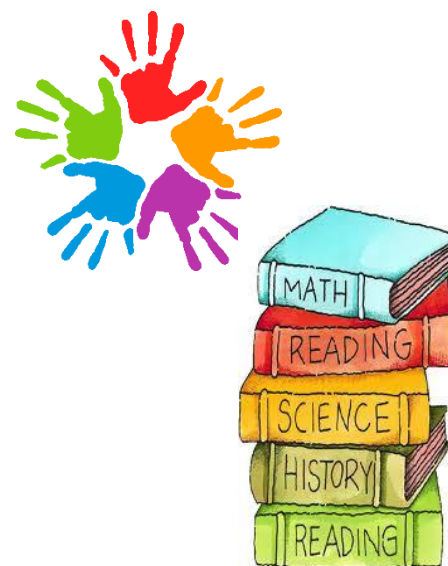
At first glance, “creativity” and “self-control” may seem like opposites. “Creativity” brings to mind images of children finger painting or running around, playing pretend. “Self-control” is more likely to bring up an image of children sitting quietly in a classroom and listening to their teacher. One of the questions we are currently exploring in our lab is whether creativity and self-control might be more closely related than they seem. Specifically, we are studying whether having better executive function (EF) – a set of cognitive skills that are important for planning and self-control – might actually help children be more creative. In a recent study, we looked at whether EF might support children’s creativity by helping them override the first, most obvious idea that pops into their minds. Over 100 4- and 6-year-old children visited our lab and completed a test of EF as well as the Alternate Uses task – a game that measures their ability to come up with creative ideas. In the Alternate Uses task, children were asked to come up with as many different uses as possible for several objects.

Some children played this game with objects that were very familiar to them (e.g., a chair), some played it with objects

that were only somewhat familiar (e.g., a paperclip), and some played it with objects they had never seen before (e.g., an herb stripper). We expected that children would have more trouble coming up with creative ideas for more familiar objects, because they would need to override what they already knew about the object’s “normal” function.

In this study, we found that children did generally come up with more creative ideas for objects they had never seen than objects that were more familiar. This supports our idea that EF might help children be creative by helping them override obvious ideas (in this case, an object’s usual function). However, we were surprised to find that how children performed on the EF task was not related (in either direction) to how many creative ideas they came up with during the Alternate Uses task. We also found no difference in how many creative ideas 4-year-olds and 6-year-olds came up with, despite the fact that 6-year-olds had stronger EF and verbal skills.

We suspect that EF is just one of many factors – including a child’s personality, vocabulary, and their desire to give



correct answers – that come together to affect how creative they are in a specific situation. We are currently working on a new study that will consider more of these factors together, and hopefully help to clarify the role of EF skills in children’s creative thinking.



During this past year, our Directors gave several invited talks, including...



Dr. Zelazo:

The 54th Learning Disabilities Association of America Annual Conference. Baltimore, MD (Feb 2017).

The Mindfulness in Education Summer Institute, Center for Spirituality and Healing, University of Minnesota. Minneapolis, MN (June 2017).

The 12th Annual Early Childhood Conference, Purdue University Northwest. Westville, IN (April 2018).

Dr. Carlson:

The Simms/Mann Institute Think Tank. Beverly Hills, CA (February 2017).

The Goldman Colloquium Series in Developmental Psychology, University of Florida. Gainesville, FL (October 2017).

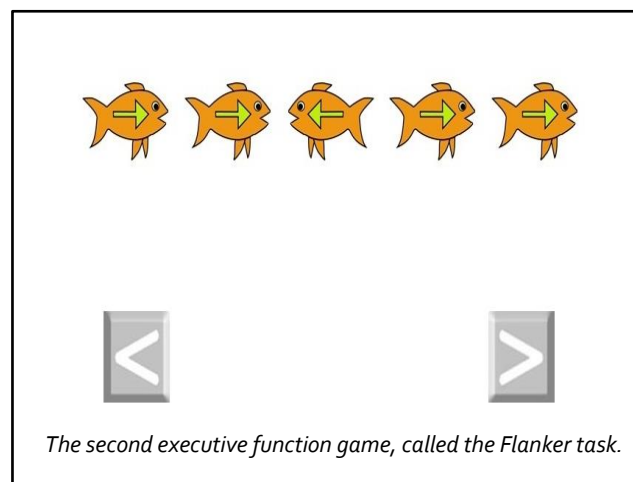
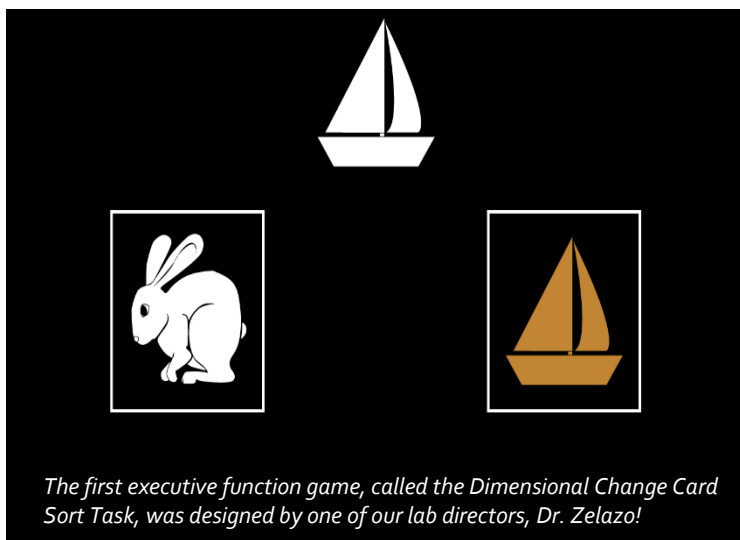
The Colloquium Series in Educational Neuroscience, Vanderbilt University. Nashville, TN (February 2018).

School Readiness and Stressful Life Events: The Protective Role of Executive Function Skills

By Rebecca Distefano, Amanda Grenell, and Alyssa Palmer

Executive function (EF), or the ability to control one's thoughts, emotions, and actions, is important for young children's school readiness. More specifically, EF is linked to early math and literacy knowledge, as well as the behaviors that support learning (e.g., sitting still, paying attention, and ignoring distractions). Because early school success predicts long-term achievement, it is important to better understand how EF relates to school readiness; this is particularly true for children exposed to early life stressors, who may have more difficulties in school. In the current study, we explored if good EF skills help buffer young children from the effects of early life stressors on school readiness.

To do so, we invited parents and their 4- to 6-year-old children to come to the lab. Children completed a math and letter game to measure early numerical and literacy knowledge. They also participated in two games on a tablet to measure their executive function. In the first game (below), children had to sort cards into boxes based on different rules (e.g., first sort by shape and then by color). The sorting game required children to keep the rules in mind, switch flexibly between sorting by shape and color, and inhibit using a previously learned, but incorrect, rule.



In the second executive function game (above), children were told to press a button that matches the way the *middle* fish in a row of fish is pointing. To answer correctly, children need to pay attention to the middle fish and ignore the distractor fish. Children also participated in an emotion regulation task in which a fun toy is locked in a clear box, and they were asked to find the right key on a ring of keys to unlock the box (though none of them actually worked!).

Finally, we measured biological indicators of self-regulation by having children wear a heart rate monitor during the study session. While the children completed the tasks, parents answered a number of questionnaires about family background, stressful events in the children's lives, and their children's behaviors – the latter was used as a measure of behaviors that support school readiness. An example item is, "My child has a good attention span, sees work through to the end."

The study is in progress, but we have some initial findings to share! We found that children with higher executive function skills showed more school readiness behaviors, regardless of the number of stressful life events. This suggests that early EF skills may buffer some of the effects of early life stress on learning behaviors that support school readiness (e.g., paying attention to the teacher and ignoring the child who is kicking your chair). We are still working on coding the emotion regulation behaviors in the locked box task and scoring the heart rate data, so be sure to look out for updates in our next newsletter!

DID YOU KNOW?

You could have neurons in your brain that are 3 feet long!



New Publications!

Almy B., Kuskowski, M., Malone, S., Myers, E., & Luciana, M. (2017). A longitudinal analysis of adolescent decision-making with the Iowa Gambling Task. *Developmental Psychology*, 54(4): 689-702. doi: 10.1037/dev0000460.

Budwig, N, Turiel, E., **Zelazo**, P. D., **Carlson**, S. M., Wainryb, C., Nasir, N. and Nelson, K. (Eds.) (2017). *New perspectives on human development*. New York: Cambridge University Press.

Carlson, S. M., Shoda, Y., Ayduk, O., Schaefer, C., Sethi, A., Wilson, N., Aber, L., & Mischel, W. (in press). Cohort effects in children's delay of gratification. *Developmental Psychology*.

Distefano, R., Galinsky, E., McClelland, M. M., **Zelazo**, P. D., & **Carlson**, S. M. (in press). Autonomy-supportive parenting and associations with child and parent executive function. *Journal of Applied Developmental Psychology*.

Fuglestad, A., Demerath, E. W., Finsaas, M., Moore, C., & **Carlson**, S. M. (2017). Maternal executive function, infant feeding responsiveness, and infant growth during the first three months. *Pediatric Obesity*, 12: 102-110. doi: 10.1111/ijpo.12226.

Galinsky, E., Bezos, J., McClelland, M., **Carlson**, S. M., & **Zelazo**, P. D. (2017). Civic science for public use: Mind in the Making and Vroom. *Child Development*, 88: 1409-1418. doi: 10.1111/cdev.12892.

Grenell, A., Prager, E. O., Schaefer, C., White, R., Kross, E., Duckworth, A. L., & **Carlson**, S. M. (in press). Individual differences in the effectiveness of self-distancing for young children's emotion regulation. *British Journal of Developmental Psychology*.

Karatekin, C., Almy, B., Mason, S. M., Borowsky, I., & Barnes, A. (2017). Documentation of child maltreatment in electronic health records. *Clinical Pediatrics*, 0009922817743571. doi: 10.1177/0009922817743571.

Karatekin, C., Almy, B., Mason, S. M., Borowsky, I., & Barnes, A. (2018). Health care utilization patterns of maltreated youth. *Journal of Pediatric Psychology*, jsy004. doi: 10.1093/jpepsy/jsy004.

Meuwissen, A. S., Anderson, J. E., & **Zelazo**, P. D. (2017). The creation and validation of the Developmental Emotional Faces Stimulus Set. *Behavior Research Methods*, 49(3), 960-966. doi: 10.3758/s13428-016-0756-7.

Meuwissen, A. S., & **Carlson**, S. M. (in press). The role of father parenting in child school readiness: A longitudinal follow-up. *Journal of Family Psychology*.

Morton, J. B., & **Carlson**, S. M. (2017). The bilingual advantage: Evidence and alternative views. In M. Hoskyn, G. Iarocci, & A. Ruth (Eds.), *Executive functions in children's everyday lives*. New York: Oxford University Press.

Perone, S., Almy, B., & **Zelazo**, P. D. (2018). Toward an understanding of the neural basis of executive function development (pp. 291-314). R. L. Gibb & B. Kolb (Eds.), *The neurobiology of brain and behavioral development* (2nd ed.). Amsterdam: Elsevier.

Perone, S., Palanisamy, J., & **Carlson**, S. M. (2018). Age-related change in brain rhythms from early to middle childhood: Links to executive function. *Developmental Science*, e12691. doi: 10.1111/desc.12691.

Semenov, A. D., & **Zelazo**, P. D. (2018). The development of hot and cool executive function: A foundation for learning and a framework for early childhood education. In L. Meltzer & J. Dunstan-Brewer (Eds.), *Executive function in education: From theory to practice* (2nd edition) (pp. 82-104). New York: Guilford.

White, R. E., Prager, E. O., Schaefer, C., Kross, E., Duckworth, A. L., & **Carlson**, S. M. (2017). The "Batman Effect:" Improving perseverance in young children. *Child Development*, 88(5): 1563-1571. doi: 10.1111/cdev.12695.

Zelazo, P. D., Forston, J. L., Masten, A. S., & **Carlson**, S. M. (2018). Mindfulness plus reflection training improves executive function in early childhood. *Frontiers in Psychology*, 9:208. doi: 10.3389/fpsyg.2018.00208

Zelazo, P. D., Blair, C. B., & Willoughby, M. T. (2017). *Executive function: Implications for education* (NCER 2017-2000). Washington, DC: National Center for Education Research, Institute of Education Sciences, U.S. Department of Education. This report is available on the Institute website at <http://ies.ed.gov/>.

Zelazo, P. D., & **Carlson**, S. M. (2018). Embracing complexity in the study of executive function and its development. In A. S. Dick & U. Müller (Eds.), *Advancing developmental science: Philosophy, theory, and method* (pp. 110-118). New York: Routledge.

Reflection Sciences

Founded by the Developmental Social Cognitive Neuroscience Lab Co-directors, Drs. Stephanie Carlson and Phil Zelazo, **Reflection Sciences** provides professional development, training, and tools for assessing and improving executive function skills. Our Minnesota Executive Function Scale (MEFS™ App) is the first objective, scientifically-based, and normed direct assessment that validly and reliably measures EF skills in children from age 2 years and up. The MEFS App is a quick (5 minute), fun game for children, but it provides vital data for researchers, educators, and parents on a child's functioning. Executive function data can help examine developmental trends, explore correlations between EF and other variables (e.g., academic performance or outcomes, such as reading and math levels), make comparisons among individuals and groups, and determine the impact of curricular changes or interventions, ultimately helping to better meet the needs of children.

Since the MEFS App was released in September 2014, it has been...



Learn more about Reflection Sciences by visiting them on the web: www.reflectionsciences.com

Selected Presentations

Almy, B., Schreiner, M.W., Carstedt, P., Thai, M., Cullen, K & Klimes-Dougan, B. (2017, April). *Investigating Decision-Making in Adolescents who Self-Harm*. Poster presented at the biennial meeting of the Society for Research in Child Development. Austin, TX.

Carlson, S. M., & Zelazo, P. D. (2018, April). *Why executive function matters for school success and social-emotional skills*. Invited keynote address at the 12th Annual Early Childhood Conference, Purdue University Northwest, Westville, IN.

Carlson, S. M. & Zelazo, P. D. (2017, April). *Executive function and the developing brain*. Invited colloquium, Program in Educational Psychology, City University of New York, NY.

Carlson, S. M. (2018, March). *Executive function in childhood*. Invited speaker for Grand Rounds, Columbia University Medical Center. New York, NY.

Carlson, S. M. (2018, February). *Learning science-based education: New tools bringing cognitive research into practice*. Invited panel speaker, LearnLaunch "Across Boundaries" Conference. Boston, MA.

Distefano, R. (2017, August). *Measuring executive function: A foundation for learning and adaptation*. Presentation given at the A+ Education Conference. St. Paul, Minnesota.

Distefano, R., Galinsky, E., McClelland, M. M., Zelazo, P. D., & Carlson, S. M. (2017, May). *Mind in the Making-Vroom intervention: Improving parenting to support preschool executive function development*. Poster presented at the annual meeting of the Society for Prevention Research. Washington D.C.

Distefano, R., Galinsky, E., McClelland, M. M., Zelazo, P. D., & Carlson, S. M. (2017, April). *Minnesota Executive Function Scale with adults: Test-retest reliability and associations with parenting and family demographics*. Poster presented at the biennial meeting of the Society for Research in Child Development. Austin, TX

Faber, J., Hayakawa, M., Reynolds, A. J., & Carlson, S. M. (2017, April). *Child Parent Center impact on executive functioning*. Poster presented at the biennial meeting of the Society for Research in Child Development. Austin, TX.

Grenell, A., Vaisarova, J., & Carlson, S. M. (2017, April). *The effects of character competency on psychological distancing in young children*. Poster presented at the biennial meeting of the Society for Research in Child Development. Austin, TX.

Grenell, A., Prager, E. O., Schaefer, C., Kross, E., Duckworth, A. L., & Carlson, S. M. (2017, April). *Individual differences in personality, temperament, and grit and the effectiveness of the psychological distancing strategy in young children*. Poster presented at the biennial meeting of the Society for Research in Child Development. Austin, TX.

Meuwissen, A. S., & Carlson, S. M. (2017, April). *How do parents affect preschoolers' self-regulation? Establishing the role of autonomy support*. Poster presented at the biennial meeting of the Society for Research in Child Development. Austin, TX.

Palanisamy, J., Perone, S., & Carlson, S. M. (2017, April). *Developmental change in brain oscillations during early childhood*. Poster presented at the biennial meeting of the Society for Research in Child Development. Austin, TX.

Pesch, A., Semenov, A. D. & Carlson, S.M. (October, 2017). *Does working memory predict performance on 3- and 4-option false belief tasks?* Poster presented at the biennial meeting of the Cognitive Development Society. Portland, OR.

Semenov, A. D., ... , Zelazo, P. D (2017, April). *Ready 4 Routines: Building high quality parent-child interactions in low-income families*. Poster presented at the Society for Research in Child Development Biennial Meeting. Austin, TX.

Semenov, A. D. and Zelazo, P. D. (2017, June). *Using structured family routines to improve children's executive function skills*. Poster presented at the Jean Piaget Society meeting, San Francisco, CA.

Semenov, A. D. (2017, June). *The role of reflective practices in the development of children's executive function skills*. Conference presentation delivered at the Center for Spirituality and Healing Summer Institute. Minneapolis, MN.

Vaisarova, J. & Carlson, S. M. (2017, October). *When a spoon is not a spoon: The role of executive function in young children's divergent thinking*. Poster presented at the biennial meeting of the Cognitive Development Society. Portland, OR.

Zelazo, P. D. (2017, Sept). Invited Plenary Lecture, *Executive function, STEM, and learning disabilities*, NSF Research Conference: STEM Education, Learning Disabilities, and the Science of Dyslexia, Alexandria, VA.

Zelazo, P. D. (2018, April). *Executive Function: Implications for learning and creativity*. Plenary lecture, Association Montessori Internationale (AMI), Amsterdam, NL.

The DSCN Lab

Institute of Child Development
University of Minnesota

51 East River Road
Minneapolis, MN 55455



About Us

The Developmental Social Cognitive Neuroscience Lab is located at the University of Minnesota Twin Cities campus and is under the direction of Dr. Stephanie M. Carlson and Dr. Philip David Zelazo. Our research examines many aspects of cognitive and social development across the lifespan but focuses on executive function (related to self-control).

Visit Us on the Web!

<http://www.cehd.umn.edu/icd/research/dscn/>

Join the Participant Pool!

<http://www.cehd.umn.edu/icd/research/ipp/>

Special Thanks!

Thanks to all the families that participated in our research last year!

Additionally, we would like to thank our undergraduate RAs: Ryan Anderson, Hannah Fenwick, Abby Guetter, Carolyn Hansen, Kerry Houlihan, Nicole Jessel, Kitone Johnson, Alex Khan, Mia Koski, Luke Lammers, Caitlin Petersen, Abby Runyon, Maggie Schreiner, Elizabeth Shute, Brittany Simonson, Hank Stuttgen, Pa Houa Vang and Phoebe Wong!