

Executive Function and Its Development in Individuals

Guest Sam Iwinski: But you can also look for different preventions or support for families and parents that help you establish these routines. Looking for outside resources is a great way to alleviate some of the pressure for yourself as well, and also trying to find ways to lower unhealthy food intake in children, especially since we see that their intake when they're about 2 years old is associated with their executive function.

Host Sal Nudo: You are listening to the family Resiliency Center podcast. I'm your host, Sal Nudo. The family Resiliency Center is a transdisciplinary research and policy center at the University of Illinois Urbana-Champaign.



In this podcast, I'll be talking to Samantha Iwinski, a predoctoral fellow in the Department of Human Development and Family Studies. Samantha's research interests include parent-child, attachment and executive function within the home environment, a topic that will be covered in our conversation.

Samantha recently coauthored a study with Professor Kelly Bost that analyzed data on hundreds of young children, with the goal of finding out how the regular consumption of sugary snacks and other foods, in conjunction with chaotic living environments, may impair the executive function skills of children.

Hi Samantha. Welcome to our podcast.

Sam Iwinski: Thank you for having me, Sal. I appreciate being able to talk about these topics and share some of my work with you.

Sal Nudo: Let's start out by talking about what executive function refers to.

Sam Iwinski: Sure. Executive function really refers to a set of processes that help people regulate thoughts and behaviors, and this may affect how children react to situations and relationships across various contexts. So it really occurs within the brain's prefrontal cortex and consists of a lot of control mechanisms that really help individuals regulate thoughts and behaviors.

And we also see within the literature and within conversations that executive function can be developed into two main concepts. We know that cool executive function really refers to purely cognitive information, so this might be measured by inhibitory control, which involves controlling ones. And working memory, which allows people to hold information within memory for future goals and aspirations, and then cognitive flexibility, which allows people to shift between tasks and goals.

And then we also have hot executive function, which involves more reward and emotion processing. This is where people have the ability to regulate one emotions so as you can see, there's a lot of

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different things that executive function refers to, but we see that it really comes from a cognitive and emotional perspective.

Sal Nudo: And when does executive function and a person begin developing?

Sam Iwinski: So this question is very interesting because it rapidly develops throughout childhood. But we also see that it continues developing in adolescence, but the significant changes really start between ages of 2 and 5 years of age. But we see that this development is happening so rapidly that they're being able to develop these skills throughout their lifespan as well, so since it is developing and altering throughout childhood, it's essential to really look at this from a developmental perspective. Because each year that they age, we see that changes are happening in their executive function. So we do know that it starts early on and it can continue into adolescence.

Sal Nudo: How does executive function play a role in socio emotional and physical health?

Sam Iwinski: It can influence a lot of capabilities in a child, so starting with physical health, it has been hypothesized that this plays a role in childhood obesity, and this might be due to the self-regulatory processes that are happening and other words. Children with obesity may have more problematic executive function capabilities because they might not have primary behaviors to allow them to self-regulate themselves. So this might be choosing to do physical activity or healthy foods, and this may then influence their secondary behaviors, which might include creating a home environment that feels safe or them and then we also see within the literature involving socioemotional health that executive function has lasting effects throughout childhood and then into adulthood.

So people have found that levels of self-control might predict physical health, substance dependence, finances, and even criminal offending outcomes in adults. We see that child executive function can influence them throughout the lifespan, that it doesn't just end once they enter into adolescence or adulthood.

Sal Nudo: How does parent-child, attachment, household environment, and nutrition factors affect and relate to young children's executive function?

Sam Iwinski: So this is a great question and really essential for my current research. I just wanted to start by talking a little bit about secure attachment. This is really thought to provide the child with a haven of safety in a sense, being worthy of care and protection. Within a secure attachment, you might be more responsive to your child and you might especially do that in times of threat when the child feels like they need help within the household environment.

A lot of my research focuses on household chaos. This describes an environment that's high in noise and crowding and usually low in routines when there are high levels of household chaos within the home. This might cause the child to be unsure of the current structure or the parents themselves might view their home environment as chaotic, so it might be a kind of a bidirectional relationship with the child not understanding, but then the parent also thinking it's difficult to manage.

So involving these connections within the executive function, we see that in addition to genetic contributions that children with more secure attachment have been shown to have higher executive function capacities. So the overall caregiving environment is really critical in promoting the development of executive function. Attachment is especially important from when the child is born up until about 2

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years of age. Age researchers have talked about that there's a large window of plasticity that you might be affecting your child cognitive development without even being aware, and then regarding household chaos we see that higher household chaos is associated with lower executive function skills as well. So if there's more chaos within your home, your child might not have as many abilities to focus and that might then impact their behavior regulation.

And then within nutrition literature, which is still developing because we see that this is changing quite frequently, we do see that young children who eat more healthy foods and then fewer snack foods or processed meats tend to have more optimal executive function abilities. However, a lot of the research I just talked about is within older children around the ages of 5 and then adolescence, so there's not a lot of research surrounding young children because of this rapid development of executive function.

Sal Nudo: Almost 300 families took part in a recent study that you and Kelly Bost conducted surrounding poor diet and household chaos, and how those things may impair young children's cognitive skills. You touched on this a little bit with the previous question, but can you talk about the results and impact of this study?

Sam Iwinski: We did find significant associations between dietary intake within our sample and executive function. We specifically found that assorted snacks and processed foods were related to children's lower ability to shift their emotional control as well as lower abilities in their working memory and planning and organizing, so we do see a consistence with the literature I just talked about – that assorted snacks and processed foods were related to those lower executive function.

But we also saw similar results that I discussed earlier with household chaos, so we saw that household higher levels of that was also related to children having lower executive function abilities. So even though within this study our children were aged 18 to 24 months, we saw that the children might not understand the signals around them, which could then lead to them not being able to regulate and use their behaviors effectively as well.

So really, what does this mean? It means that diet quality even at a young age, 18 to 24 months, could potentially be associated or influence executive function-related tasks. So we really need to dive deeper into how diet quality across cultures and across access might influence developing executive function abilities. And this also can then impact other facets, including other scholars and policymakers, to help advocate for developing more routines and healthier lifestyles, which can then potentially influence children executive function overall.

Sal Nudo: The cohort of people who participated in that study are part of the ongoing STRONG Kids 2 research project here at the Family Resiliency Center. Tell listeners what was novel about the study.

Sam Iwinski: The STRONG Kids 2 project, which stands for the synergistic, theory, research, obesity, and nutrition group, is a birth cohort study and it's very important and novel for many reasons, one being that it examines multi-level predictors that can influence weight trajectories and dietary habit. That's so we take into account the individual biology, the social, emotional and behavior characteristics, as well as diving deeper into the family and childcare environment.

We've been collecting data with these kids since they were born, and we're going to continue until they're about 7 years old, which is very novel because there's not a lot of longitudinal studies that look

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at all of these components over time, which, as I said in the beginning, is essential for developmental research to really know what is affecting a child's development.

And so overall, this study allows us to look at different time points and understand how children's health might be affected by biological, social behavior, family organization, and also how it might be affected by the community that they're in. This study allows us to really look at multiple facets of child development.

Sal Nudo: How might this research on executive function evolve as you and your colleagues continue to explore it?

Sam Iwinski: This question is actually really essential to my research. I've been looking at executive function for a few years now and we've noticed that the literature is constantly changing, and that's due to people having different executive function outcomes, people naming it different things, which you might yourself see when you're looking things online.

As I discussed in the beginning, people say hot and cold or they use different components like just working memory, so it's really important that we are constantly kind of keeping up with the literature and making sure that we are portraying in a way that's actually accurate. We want to make sure that we're getting this information out correctly and not kind of talking about executive function in the wrong way. It's going to keep evolving over the years, so we hope to keep up with it and make sure we're also engaging in the community and helping.

Sal Nudo: That's great. Tell us how families can use the information you've provided us with.

Sam Iwinski: There are a few things you can do. You can specifically look for activities that help you develop more routines and also help the development of executive function itself for your child and yourself.

But you can also look for different preventions or support for families and parents that help you establish these routines. Looking for outside resources is a great way to alleviate some of the pressure on yourself as well, and also trying to find ways to lower unhealthy foods, especially since we see that their intake when they're about 2 years old is associated with their executive function.

It's important to understand that their food and can impact multiple levels of their lifestyle, and so overall you can look at different types of organizations that might help you, but also try to find ways to incorporate executive function tasks or even just development within your own households.

Sal Nudo: And lastly, where can families get more information on this topic?

Sam Iwinski: So to learn more specifically about executive function, I would definitely recommend going to the Family Resiliency Center website and looking at the several Building Blocks briefs that they created on executive function. Dr. Bost and I wrote one and there also are other ones that really dive deeper into routine executive function and also as resources that you could use to develop those skills within your family.

And if you are interested in learning more about the specific paper that I talked about, it was called "[The Impact of Household Chaos and Dietary Intake on Executive Function and Young Children](#)." And since it's

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within the *Journal of Nutrients* it's free to the public and you can definitely download that and read more specific details on this study, and I also would be happy to answer any questions that you have.

If you would like to discuss this further, feel free to reach out if you want to discuss this in more detail. You can contact me at my e-mail, which is lwinski2@illinois.edu, and that's probably the best way to contact me.

Sal Nudo: Well, Samantha, this has been an informative and interesting conversation. Thank you so much for joining us today.

Sam lwinski: Thank you very much, Sal. I appreciate being able to talk about this and share more on executive function and its development in individuals.