

Why Focus on Healthy Social-Emotional Development? Executive Function and Its Central Role in School Success

By Laura Fish, MS, LMFT

It's free-play time at the Lynden Child Development Center. Four children cluster together as they have every day this week. Melanie, age 5, calls out excitedly to the group, "Hey, guys, let's play family again!" Taking charge, she points to the others in turn and says, "You be the daddy, you be the sister, and you're the baby." Four-year-old Tess pauses—and then decides that being the daddy will be fun because this means she'll get to have the largest helping of food. Degitu, also 4, thinks back to yesterday's play and agrees to her role as sister saying, "Ok, but I get the silver necklace this time!" Melanie, playing the role of mom, looks at the necklace and agrees because she wants the gold one anyway. Samantha, age 3, walks toward one of the baskets and picks up a cell phone. "Nooooo, Samantha," says Tess. "That is for mommies only! Babies don't talk on the phone." Tess takes the phone and gives it to Melanie. Samantha goes back to the closet, gets her doll as she did yesterday, and puts it in the stroller.

The children set the rules of engagement and define their roles as they begin to plan, initiate, and organize their play. Experience from the previous family-play episodes moves the action forward. Taken together, this activity constitutes typical dramatic play in a preschool classroom.

Throughout their play, members of this "family" will make decisions ("Should we eat rice or pasta?"), solve problems ("We only have three bowls and four people! Give baby a plate instead."), and resolve conflicts ("Here baby, you can have the blue chair, I'll use it next time. Don't cry!"). This example demonstrates the complex social politics at work in a pre-school setting and evidence of how children are afforded the opportunity to practice and refine their skills in executive functioning as they engage of the hard "work" of play.

What Is Executive Functioning?

Executive functioning involves the complex problem solving and critical thinking that leads to the ability to accomplish intentional goals—from playing a schoolyard game to studying nanotechnology. More specifically, executive functioning (EF) refers to the set of cognitive processes that support an individual's capacity to engage in goal-directed behavior.

EF skills include those abilities that *control* behavior—such as attention, motivation, and emotion regulation—and that *guide* behavior—such as planning, organizing, monitoring, reasoning, problem solving, and responding flexibly. According to the Center on the Developing Child at Harvard University (the Center at Harvard), EF is that group of skills in the brain that "helps us to focus on multiple streams of information at the same time, monitor errors, make decisions in light of available information, revise plans as necessary and resist the urge to let frustration lead to hasty actions."

It doesn't take any great cognitive leap to see how integral these skills are to success in the classroom at every level, from preschool through college and beyond. In fact, a student will simply not be able to access the rigorous demands of the upcoming common core state standards if they have not developed decent EF skills. Because we now know that EF skills begin developing—or not—in very early childhood, attention to them is vital from the moment a child is born.

How do these executive functioning skills work in the brain? And what do parents and teachers need to know and be able to do so that children come to school with these functions in place?

Components of Executive Function

The neurologically based skills that make up executive functions can be organized under three domains:

Working memory keeps information in mind long enough to initiate and complete tasks. Working memory helps with the planning and organizing required for such things as following rules while engaging in a task, collecting and keeping track of needed materials, following directions, solving problems with multiple steps, and creating the roles and rules involved in any kind of complex activity, from playing “house” to (later in life) programming computer software.

Inhibitory Control—or impulse control—helps a person pause to think before acting. This skill is necessary to filter out distractions, delay gratification, and break habitual behaviors. It is crucial for regulating emotions and making choices about appropriate ways to express those emotions. We all need this skill to forego doing what we want to do in place of doing what we are supposed to do—essentially to be able to discern the right choices to make and the most important things to attend to in any given moment. A child, for example, uses these skills when continuing to build a block tower despite children running through the area; when waiting to eat lunch until everyone is served; when playing such games as “Red Light/Green Light” and “Simon Says”; and when, after being hit by another child, calling for help instead of hitting back, despite being very angry. Adults use these skills when they go to work rather than stay in bed after a late night, when they don’t yell at their boss for a harsh performance evaluation, and when they get up to comfort a crying child when they’d rather sleep.

Cognitive or mental flexibility is the capacity to shift gears and scan options for how to respond appropriately—both

intellectually and emotionally. It is the ability to adjust to changes, revise plans, and consider something from a different perspective. This flexibility helps a person sort out competing demands, priorities, feelings and expectations.

For children, cognitive flexibility supports their ability to effectively manage such things as transitions, to try multiple options for conflict resolution, and to understand rules and expectations that might be situational (e.g., “In the morning, we can play with water, but, in the afternoon, we play with the sand”; or, “I can take off my shoes at home, but I have to leave them on at school.”)

The three domains work in an interrelated fashion to support optimal executive functioning. For example, it takes *working memory* to remember that the teacher told you to put your coat and backpack in your cubby before going to the table, *inhibitory control* to resist the urge to throw the things on the floor and run to the table with excitement to start playing, and *cognitive flexibility* to follow the teacher’s expectations—when at home you do get to drop things on the floor and your mom puts them away for you. When fully integrated, skills that make up the executive functions support a person’s ability to engage in purposeful, goal-directed, problem-solving behavior by overriding impulsive thoughts and responses in order to think through possible outcomes and realize goals.

According to research from the Center at Harvard, children’s EF skills facilitate early cognitive achievement in school in the areas of reading, writing, and math. Scientists argue that EF skills “support the process (i.e., the *how*) of learning—focusing, remembering, planning—that enables children to effectively and efficiently master the content (i.e., the *what*) of learning—reading, writing, computation.”

What Happens in the Brain?

The capacity for cognitive processing is dependent upon the healthy development of several systems in the prefrontal areas of the brain, which begin to form during infancy and continue to grow and refine throughout adolescence and into early adulthood. In the book *The Whole-Brain Child*, Daniel Siegel and Tina Payne Bryson (2011) liken the brain to a house that contains both a downstairs and upstairs.

The “downstairs” brain, which includes the limbic system and brain stem, develops first and is responsible for primary bodily functions, such as breathing, heartbeat, and reflexive reactions and impulses. The fight, flight, or freeze response is seated in this part of the brain, as is emotional reactivity.

Much of the typical behavior seen in very young children comes directly from this downstairs brain: random movement from activity to activity, the inability to follow serial directions, distractibility, impulsivity, emotional outbursts, and underdeveloped empathy.

The “upstairs” brain, or the cerebral cortex and its various parts, is where the brain’s executive functioning activity is believed to be headquartered: the ability to focus, think, plan, organize, control impulses, and regulate emotions. Of course, this part of the “upstairs” brain relies on data and connection to the “downstairs” brain to carry out its functions. Current understanding is that the upstairs brain isn’t fully developed until a person’s mid-20s, but evidence of executive functioning begins to appear in early childhood.

As children develop, they begin to attend to tasks for longer periods of time; can follow multiple-step directions; and show a burgeoning capacity to stop, think, and act before grabbing a toy, running into the street, or hitting their friends. What’s more, they

begin to identify, understand, express, and manage their emotions in appropriate ways—evidence that the upstairs brain is becoming integrated with the downstairs brain. Siegel and Bryson call this process “vertical integration,” as the “staircase in the mind” connects the downstairs brain, which developed early, with the upstairs brain, which is still under construction. This vertical integration allows children to gradually and progressively engage in more intentional, thoughtful, and controlled ways by regulating their emotions, choosing appropriate behaviors, and using logic and reasoning to initiate, plan, organize, and carry out tasks.

While a child’s genetic makeup establishes the potential and capacity for brain development and integration, the child’s experiences are what affect the likelihood that this potential will be realized—and that a child will be able to successfully tackle a rigorous academic curriculum.

When does Executive Function Develop?

The early building blocks of EF skills are acquired as infants engage in rudimentary planning and problem solving tasks, which at first are largely grounded in meeting immediate needs: “If I cry, they come feed me [or hold me or change my diaper].” Responding and relating to infants in these most basic ways helps them to develop the belief that they matter and that it’s worth their while to engage with the world. They begin to learn how to plan, initiate, and organize their behavior to get their needs met and to manage their emotions.

By age three, most children have the potential for more complex problem solving, such as “the square block goes here, the round one goes there.” This requires working memory (holding two rules in mind simultaneously), inhibitory control (resisting distraction or any strong emotional response such as frustration in order to complete the task), and cognitive flexibility (shifting

attention from one rule to the other and trying different solutions until one works to complete the task). Many older preschoolers begin to show strengthened inhibition in the face of strong temptations (e.g., “I really want to kick the ball now, but I’ll wait my turn.”), and cognitive flexibility as demands change (e.g., “I thought I had enough blocks to build a tower, but I don’t. I will build a track instead.”). It is important to note that the ability to regulate emotions is being strengthened during this time, as well, supporting optimal functioning in all three domains as children begin to (sometimes) use rational thought to overcome emotional reactivity.

What Supports EF Development?

Young children develop and refine EF skills during cooperative play: they make plans to organize activities, create rules and roles for the players, organize materials needed, adjust rules and ideas to support the progress of the play, and solve problems, resolve conflicts, express and regulate their emotions. Those building blocks for initiating, planning, organizing, focusing, and problem solving (the “*how*”) that are so necessary to carrying out school-age academics (the “*what*”) begin to take shape during children’s play during early childhood.

Make-believe play, in particular, “is such a powerful tool for building self-discipline,” according to researcher Laura Berk, “because during make-believe, children engage in what’s called private speech: They talk to themselves about what they are going to do and how they are going to do it. This type of self-regulating language has been shown in many studies to be predictive of executive functions.”

It is also known that safe, supportive, enriching environments with responsive and caring adults give children the best chance of optimal EF development. Research from the Center at Harvard points to a healthy

“environment of relationships” as foundational for executive functioning to develop.

Siegel and Bryson identify the tenets of a quality relationship as one in which engaged adults do three things for and with children:

1. They ask children open-ended questions.
2. They listen to and help children tell their stories.
3. They consider children’s ideas, and validate their feelings.

Recent studies show that curricula that enhance social and emotional learning also have the potential to strengthen executive functioning. Two studies found that classroom-level interventions that promote social and emotional competence for all children—universal interventions—such as those included in the framework of CA CSEFEL’s Teaching Pyramid produced improvements in young children’s EF skills and in their engagement in learning (Bierman, K., 2010).

Children with disabilities typically benefit from universal interventions used in conjunction with individualized supports. This may prove particularly important for developing executive function skills. Special educators and parents of children with disabilities already use many of the strategies that help children improve EF, such as breaking directions down into steps; creating individualized, visual mini-schedules; using visual cues, peer buddies, first-then cues; and providing consistent support with identifying, expressing and managing emotions.

Scaffolding children’s entry into play and providing support during classroom routines constitute crucial opportunities for all children to practice EF skills with their peers. The key is to link the EF functions to behaviors through acknowledgments: for example, “You are waiting for Maxwell to

finish. You are being patient,” or “You washed your hands, then came to snack. You are following the rules.” Adjusted for age, developmental level, ability, and situation, these kinds of acknowledgments are helpful to all children, especially those who might be struggling to develop social and emotional skills.

Based on the research findings regarding disparities in development, the Council for Exceptional Children (2011) is calling for the provision of targeted instruction in EF skills for children with disabilities, which includes creating structured play environments that have predictable rules and routines as well as consistent acknowledgement for appropriate behavior.

What Interferes with EF Development?

Early stressful experiences have a deleterious effect on EF development. Extended exposure to chaos, threats, violence, and neglectful environments—and to the strong emotions that a young child must manage as a result—all keep the brain in a “fight, flight or freeze” mode so that higher-level thinking skills are difficult to development. In fact, prolonged experience of stress can permanently—and detrimentally—alter the brain in a young child. What is often overlooked, however, is the stress caused for a child who does not experience consistent connection to an attuned, responsive, caring adult. Without the presence of an attuned other, children may miss important opportunities to develop a sense of self-understanding that helps to strengthen their skills.

We also know that children with certain disabilities¹—those who are slower to develop the cognitive skills necessary to engage in cooperative play, for example, or those who have a more difficult time than most in regulating their feelings—may be

excluded from play, disregarded, or relegated to a role they do not desire. This denigration results not only in fewer opportunities to develop and refine important EF skills, but in the risk of developing or worsening challenging behaviors—an understandable result of the strong emotional response most humans feel to being excluded.

At some point in their development, most children who are typically developing show a weakness in one or more of the EF domains. However, children with certain disabilities are at heightened risk of delayed or impaired development of these skills. Unfortunately, these children often receive interventions for managing their behavior without consideration of teaching EF skills, which have traditionally been considered a school-age concern rather than one belonging in early childhood. We now know that preschool children who have difficulty focusing, who transition poorly, who don’t seem to “listen” to adults’ directions so they appear non-compliant or defiant, and who engage in impulsive or aggressive behaviors may indeed be experiencing delays in the development of executive functioning skills.

What’s Next?

Research confirms that, if children are to realize academic success, early care and education experiences must support the development of their EF skills. Teachers and parents of children with disabilities and children from high-risk families can learn how to systematically and intentionally teach and support EF skills from birth. However, teachers and parents can better support all children at every age by knowing about and implementing strategies to enhance the development of EF skills.

Parents and educators can begin by focusing attuned, responsive, and reflective

¹ Much of the research to date regarding executive functioning and disabilities has focused on school age

children with attention deficit disorder, autism, and learning disabilities, but more work is being done to shed light on children zero to five years.

interactions with children, by making sure the environments they create are caring and supportive to the child's individual needs, and by modeling—in what they say and what they do—what executive function looks and sounds like. Training that helps adults develop and enhance environments that foster EF skills is an important step, as well. One such training, the evidence based framework of the Teaching Pyramid, will help both teachers and parents to understand the particulars of how to develop attuned interactions and healthy environments for all children, including those with disabilities.

A focus on executive function, built upon a deep knowledge of how social and emotional development in young children shapes their cognitive development, can serve as a powerful tool to prepare children to come to school eager to learn and poised to face the rigorous standards of the curriculum. ⌘

Laura Fish is a Senior Program Specialist with the WestEd Center for Child & Family Studies in San Marcos. In her role, she is a trainer and master coach for the CA CSEFEL Teaching Pyramid. She has a varied background as a behavioral health consultant, including maintaining her own therapy practice. She also has background in teaching and training.

References

Bierman, K. (2010). Promoting Executive Functions through Prevention Programs: The Head Start REDI Program. [Power Point Slides]. Retrieved from <http://www.nichd.nih.gov/about/meetings/2010/060810-bierman.cfm>.

Carlson, S. M. (2005). Developmentally sensitive measures of executive function in preschool children. *Developmental Neuropsychology*, 28, 595-616.

Carlson, S.M. (2010). Measurement: Developmentally Sensitive Approaches to Measuring Executive Functions in Preschoolers. [Power Point Slides]. Retrieved from http://www.nichd.nih.gov/about/meetings/2010/upload/Carlson_EF_NICHD.pdf

Center on the Developing Child at Harvard University (2011). *Building the Brain's "Air Traffic Control" System: How Early Experiences Shape the Development of Executive Function: Working Paper No. 11*. Retrieved from www.developingchild.harvard.edu.

Council for Exceptional Children (2011). *Improving Executive Function Skills—An Innovative Strategy that May Enhance Learning for All Children*. Retrieved from <http://oldsitewww.cec.sped.org/AM/Template.cfm?Section=Home&CONTENTID=10291&CAT=none&TEMPLATE=/CM/ContentDisplay.cfm&ContentID=14463>

Densmore, A. & Bauman, M. (2011). The Best Experience - Facilitated Play in Preschool, excerpt from *Your Successful Preschooler: Ten Skills Children Need to Become Confident and Socially Engaged*. Retrieved from www.education.com

Siegel, D (2010). *Mindsight*. New York, NY: Bantam Books.

Siegel, D., & Bryson, T. (2011). *The Whole – Brain Child*. New York, NY: Delacorte Press.