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Executive Skills and Early Childhood Education: Developing Self-Regulation in Young Children.
By Zachary T. Barnes and Kelly B. Cartwright. Copyright © 2027.
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CHAPTER 1

Executive Skills and Self-Regulation

What Are They, and Why Are They Important?

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Ever wonder why children seem irresistibly drawn to playing (with objects, with language, with others), anytime, anywhere? Sometimes, it seems that they can turn even the most mundane of activities into a game, like sitting still at the dinner table. Imagine that a group of preschoolers is having dinner when one shouts that the space shuttle is about to take off and they all need to be still for liftoff. All of a sudden, the squirmy, busy children become absolutely still as one of them counts down from 5. All the adults in the room must stay still, too, or the launch will have to be aborted. Once the pretend shuttle takes off, the children start to move again and eat dinner from their space shuttle. These children are engaging in pretend play. While it may be disruptive for dinner (luckily there was no mess involved), there's a reason children play with *everything*: it's because play is a central aspect of children's development. Play serves important purposes that support children's language, literacy, and self-regulation skills.

Let's take the preceding scenario as an example. Although it's not always obvious to adults, this kind of pretend play recruits and strengthens a number of important self-management skills that will support children's healthy development throughout life. For example, to get ready for liftoff, the children had to regulate their bodies to be as still as they could. This means that they had to manage their actions (*behavioral self-control*), but they also had to remember the purpose of their game, keeping it in mind (*working memory*), resist distractions and control impulses (*inhibitory control*), and shift from thinking about dinnertime to thinking about the pretend space shuttle scenario (*flexible thinking*). The children who were counting down had to use their knowledge of numbers (*developing numerical knowledge*), remembering the names and order of numbers (*vocabulary and background knowledge*), and then reverse that order in their heads before saying the numbers aloud (*updating in working memory*). So, even though this pretend shuttle-watching activity was short-lived, it recruited

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many, many skills that support later academic and life success, including key higher order thinking skills, called *executive function (EF) skills* (e.g., working memory, inhibitory control, and cognitive flexibility), that are essential for self-regulation. In fact, we know that children who engage in pretend play more often are better able to regulate their bodies, thinking, and emotions to a greater degree than children who don't have these experiences (Hoffman & Russ, 2012; Savina, 2014). Not only that, but these important skills continue to get stronger over time for those who play often (White et al., 2021). Though this example illustrated child-directed play, research also shows that play can be leveraged by educators and caregivers to support children's learning, a process known as *playful learning* (Hassinger-Das et al., 2017). Play is just one of the many contexts that support the development of executive skills and self-regulation. In this book, we aim to show the importance of executive skills and self-regulation in early childhood, as well as provide concrete steps for educators and caregivers to help develop these skills to support children's development.

Purpose of This Book

The students who enter early childhood classrooms are eager to learn. Every day, they learn new words and concepts, interact with friends, and develop new interests. What and how children learn is related to the relationships they have with family, teachers, and friends (Bernier et al., 2016; Hughes & Devine, 2019). It's also related to the environment they experience at home and school (Ellis et al., 2025). For the purposes of this book, unless otherwise specified, early childhood includes children who are toddlers up until third grade. While that is a large swath of a child's lifetime, it's one of the most critical periods of a child's development, because it's during this time that children are developing key self-regulation, literacy, social–emotional, and other learning skills; it's also the period during which children's brains are still rapidly developing (Bjorklund, 2022; Gilmore et al., 2018). The hours that educators spend with children are thus critical because they create an environment in which young children develop key executive function and self-regulation skills for managing their own thinking, actions, and feelings across a variety of contexts that will help them throughout school and throughout life. The purpose of this book is to provide educators in early childhood education (ECE) contexts with explicit information about the development of executive skills and how teachers and caregivers play a role in nurturing that development across many areas of children's lives. These skills are important for providing the best chance for learning, but also for living life to the fullest potential.

Over the past few years, research into executive skills and self-regulation has grown exponentially, but this research rarely makes it into practice. As you will see in the next section, these skills measured in preschool are predictive of academics, behavior, and mental health all the way into adulthood (Koepp et al., 2023; Moffit et al., 2011). While it has been years since the shutdown for the COVID-19 pandemic, the pandemic showed researchers, teachers, and parents the importance of well-developed self-regulation. When measured before and during the pandemic, researchers found significant decreases in children's self-regulation, specifically a lack of focus and

attention and more impulsivity (Raghunathan et al., 2022). Back in the classroom after years of disruptions, teachers have taken to social media to report significant decreases in their students' executive skills and self-regulation (e.g., Stout, 2023).

Our hope is that this book helps to close the gap between the wealth of research on these topics and the everyday work of teachers in early childhood classrooms. By providing educators with key information about the development of children's executive skills and self-regulation, we can continue to prepare children for the next steps on their journey through education and life. As you work through this book, you will find real-world examples of students and teachers intentionally working to develop these important skills in a variety of contexts. You will also find explicit strategies that can be taken directly from the book and implemented in your classrooms. Finally, at the end of each chapter, you will see discussion questions that will help guide professional learning with other educators. We hope this text will be shared in schools and classrooms to help more educators learn about and implement research-based strategies for supporting students' self-regulation and executive skills in early childhood classrooms.

In the remainder of this chapter, we define executive skills and self-regulation, explain how they are related, share information on how these important skills develop and how they can be measured, reasons why they may vary from child to child, and the powerful role of teachers in shaping these key life skills. We close with a preview of what's to come in the remainder of the book and offer discussion questions to guide your thinking and learning.

What Are Self-Regulation and Executive Skills, and How Are They Related?

When scrolling through social media, browsing professional book catalogs, or attending professional development sessions at schools, it seems like self-regulation and executive skills are mentioned a lot without diving deeper into what they are and how they relate to the important work of educators. It can be hard to drill down into these concepts in a professional development session that is held during planning time or after school has ended for the day, and you are ready to leave for the day. The following sections of Chapter 1 take a deeper dive into what executive skills and self-regulation are and how they are related to each other. This explicit knowledge-building will assist you as you make your way through the remainder of this book and when you try to implement the strategies mentioned throughout in your own classroom.

Self-Regulation

First, let's start with *self-regulation*, a popular topic in early childhood for many decades (McClelland et al., 2010; Montroy et al., 2016; Schunk & Zimmerman, 1997). As you can see in Figure 1.1, self-regulation is multidimensional. It includes socioemotional skills, cognitive abilities, and physiological states (McClelland et al., 2010). In its simplest form, self-regulation is all about a person's ability to control (or regulate) their thoughts, emotions, motivations, behaviors, and attention (McClelland

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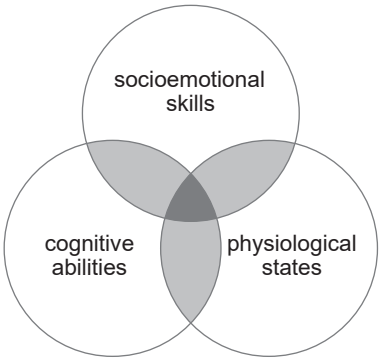


FIGURE 1.1. Dimensions of self-regulation.

& Cameron, 2011; Schunk & Greene, 2018). Additionally, self-regulation involves how a child may be "controlling, directing, and planning cognitions, emotions, and behaviors" (McClelland & Cameron, 2011, p. 32). Based on these definitions, self-regulation plays a role in everything a child does, from sitting down for lunch, or planning to complete a math activity, or calming down after another student hurts their feelings. It can also help a toddler refrain from becoming fully dysregulated in difficult situations or keep themselves from throwing an item. Most importantly, this kind of self-regulation takes place to achieve a goal, which is important in academic settings.

We can easily think about all the goals we have for our students for each day or lesson. When we are applying self-regulation to academics, it is known as *self-regulated learning* (SRL). Zimmerman (2000) describes SRL as the ability to transform students' abilities into academic outcomes. To do that, students must be able to set goals, determine the correct strategy to meet those goals, implement the strategy, and monitor how effectively they are doing that. When children are presented with a learning task, the process of self-regulation begins even before starting the task. As shown in Figure 1.2, a child's interaction with a task can be split up into three steps: forethought, performance, and reflection (Schunk & Usher, 2013; Zimmerman, 2000).

Before a task begins, students need to plan for the task and set a goal for what they need to accomplish. Because the ability to plan and set goals is still developing during early childhood, educators play important roles in helping young students set goals. Motivation plays a large role here, too. Someone who lacks motivation will want

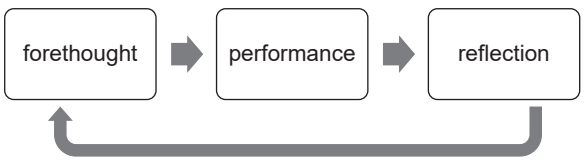


FIGURE 1.2. Steps in self-regulated learning.

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TABLE 1.1. Examples of Self-Regulation

Self-regulation	Age	Example
Thoughts	First grade	When working on painting in art class, a student keeps reminding herself that it's OK to make mistakes. The art teacher has reminded the students over and over again that it's OK to make mistakes and to keep painting.
Emotions	Toddler	A toddler wants to go outside even though it's raining. After being told no, the toddler was initially upset, and upon prompting from a parent, they take a big belly breath and choose something else to do.
Motivation	Third grade	Before writing an essay, a third grader writes self-motivating words at the top of her paper to encourage herself while writing, such as "Yes, I can!" (see Laud, 2025, for recommendations).
Behavior	Preschool	Before grabbing an attractive toy out of a friend's hands, a child stops and chooses to wait his turn.
Attention	Kindergarten	While sorting pictures into groups based on beginning sounds (e.g., *pig, pen, pie, cat, cake, cookie*), a child regulates her attention by focusing on the beginning sounds of the pictures and not getting distracted by her peers or irrelevant features of the task (such as that some are living and some are not).

to avoid the upcoming task. When working (performing) on the task, a student will need to be able to monitor and regulate their emotions and cognition, determine what the task needs or what strategy to use, and what to do when stuck. After the task is completed (the goal has been reached), a period of reflection will take place. For example, the child may consider whether the goal was reached and/or whether they learned anything new. Other factors may involve whether there were any rewards for achieving the goal or a lack of reward for not completing the task. A review of the goals will take place, and—ideally—one's perception of the task (positive or negative) will then inform the forethought stage the next time the task is completed. Table 1.1 highlights some of the areas of self-regulation that you may see take place in a school day.

Executive Skills

To illustrate the operation of executive skills in early childhood classroom contexts, we start this section with a vignette.

> There are many more students than usual in Tyler's first-grade classroom today. A teacher is out sick, and with no substitute, they had to distribute the extra students in other first-grade classrooms. Tyler's teacher, Mr. Yanaham, has set up six science centers for Tyler's class to work through. The students from the other class will also participate in the centers. After Mr. Yanaham explains the lesson, the students get to work on going from center to center.

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> Tyler notices right away that the students from the other class are not following the usual procedures that Mr. Yanaham has set up. They are being too noisy, they are not sticking with their group, and they aren't rotating to the next center at the correct time. Tyler finds himself so distracted by the other students that he can't focus on his work. He is having trouble remembering what he needs to complete at each center, and then he has to keep looking at the directions to remind himself of each center's goals. When he has to move to a new center, he is frustrated that he has to leave a center he hasn't finished, and it makes it harder for Tyler to start up the tasks at the new center. At the end of the rotation, Tyler is so frustrated by how the centers went that he decides to go into the quiet corner and put on some headphones to help himself calm down.

In this example, Tyler is struggling to adapt to extra students in his classroom. The struggles that he is having are directly related to his *executive functions,* also called *executive skills,* which are mental skills we use to manage our thoughts, feelings, and behaviors to achieve goals (Diamond, 2013). There are many internal mental processes that are being used by students in a classroom each day. As you see in Table 1.2, the three basic, or core, executive functions are *inhibition*, *mental (or cognitive) flexibility*, and *working memory*. These skills underlie higher order executive skills like planning and organization, and they work together to help people achieve goals (Diamond, 2013), such as making it through all six rotations.

Tyler was very distracted by the extra students in his class. He was not able to just forget about those students and work toward finishing the centers. He was struggling with his *inhibition*. Inhibition can look different based on the task. For Tyler, he could not inhibit attention to the other students in the classroom. While other students were able to focus their attention on the rotations, this wasn't true for Tyler. Other times, inhibition can impact specific academic tasks like reading and math. When reading a word problem in math, a student will have to ignore—or not be distracted by—the irrelevant information that is not important for understanding the text. Teachers will sometimes teach students to cross out information that is not important. Someone who struggles with inhibition may get bogged down in that information and struggle with understanding which words are—and are not—important for the problem.

When Tyler had to move from center to center, he really struggled with making this switch. This is one example of *cognitive flexibility*. This is the ability to switch your attention from one task to another, switch between ideas in your mind, or to switch from one strategy to another. Some students really struggle with being flexible and adapting to changes. This mental flexibility is also used in reading when switching from sounding out words to figuring out the pronunciation and meaning of a whole word. Students (and adults) need to be flexible when they decode words but then they need to think about the meanings of the words to figure out what a sentence means. This kind of flexibility is also seen when a child is struggling to figure out a puzzle. In this situation, they may need to be able to use their cognitive flexibility to try a new strategy for a piece that isn't fitting quite right. Kids who love puzzles most likely have great mental flexibility to try new strategies when they get stuck in

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TABLE 1.2. Examples of Executive Skills

Executive skill	Definition	Example
Inhibition	The ability to stop and think before acting, ignore distracting information, or restrain habitual responses.	A student who can ignore extra students in the classroom and stay focused on their assigned task is exhibiting inhibition.
Mental flexibility	The ability to actively switch between activities or aspects of a task; also called *shifting* or *switching*.	The ability to sort a set of pictures (e.g., *box, bunny, bear, bucket, car, cow, cat,* and *crayon*) by type (living and nonliving things) and then change sorting rules and sort them by beginning sound instead (things that start with /b/ and things that start with /k/).
Working memory	The ability to hold information in mind while completing a task; working memory involves both storage and processing.	Remembering all the steps in multistep directions while carrying them out, such as when a teacher asks students to "put your backpacks in your cubbies, pick up a paper from the table, and then go to your square on the carpet."
Organization	The ability to recognize order and impose order on information, tasks, or objects.	Students rely on organization to arrange topic sentences and evidence logically when writing an essay.
Planning	The ability to decide which tasks are necessary, and in what order they should be completed, in order to reach a goal.	When a child takes on a large task, such as cleaning their room, and breaks that task into manageable steps (e.g., pick up toys, pick up books, put away clothes, make bed), they are showing good planning.

puzzle construction. Do you know of any students who, when they get stuck on a task, continue to try to do the same thing and expect a new outcome? This is called *perseveration*. They are not thinking flexibly, and that can be difficult for students to overcome.

Finally, the third core executive skill is *working memory*. This may be a skill you have already heard of before, as it's probably the most widely studied of the executive skills. When Tyler has to keep re-reading the directions over and over again for his centers, that shows he may be having trouble keeping them in his working memory. Working memory is the ability to hold information temporarily while you are doing something else, and draw on that stored information as needed. So, as Tyler was trying to remember the directions for the center at hand, something else would happen and he would lose track of all that information. It becomes hard to complete a task when you are struggling with holding instructions in mind (i.e., in your working memory) to support task completion. Likewise, when students are reading a text, they use working memory to remember who the word "she" refers to in a story, such as in the following

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sentences: *Cordelia loved puppies. That's why she ran across the playground.* ("She" refers to Cordelia.) At the same time, students need to hold information inside their mind to construct a mental image of what is being read to them, to imagine and remember the meaning of the text. Are they able to hold enough information to create a mental image of a character? Finally, math also draws on children's working memory because they must remember how to do multiple steps to solve problems, remember what symbols mean, and hold this information in mind to try to do mental math in order to work through problems.

Connections of Executive Skills and Self-Regulation to Children's Emotions

One interesting feature of these executive function skills is that while they are different, there is a lot of overlap between them; researchers call this "unity and diversity" (Miyake et al., 2000). In addition, executive skills, which are the key cognitive processes associated with the frontal lobes in the brain, can be undermined by emotions and stress responses. For Tyler, it seems like all three core areas of executive function were hindered that day because of the stress caused by the sensory overload of having many extra students in his class and the disruption of usual routines. As a consequence, Tyler was having a lot of trouble regulating his emotions by the end of the centers. He knew he was overstimulated. But what he did next is something that shows how executive skills and self-regulation go hand-in-hand. Tyler used a self-regulation strategy that he must have learned from his teacher. Tyler could sense that he needed to calm down to avoid acting out in some way. Tyler's teacher had a quiet center already set up in the classroom for this specific situation, and he likely had taught his students to go to the "quiet table" when needed. When we think back to the different stages in the process of self-regulation, we can see that there had been some forethought to consider what students in Mr. Yanahan's class may need when overstimulated or when they feel like they have trouble regulating their emotions. So, while Tyler struggled a lot in the activities, Mr. Yanaham was proud to see that Tyler was able to identify that he needed the quiet table to reduce his overstimulation, regulate his emotions, and allow him to continue to engage his executive skills to complete the centers. Earlier in the school year, before he had learned these self-regulation skills, Tyler would act out in this situation. He would yell in frustration and sometimes throw things. This past year Mr. Yanahan has been working on building self-regulation with all of his students, but with a special focus on Tyler.

To learn more about executive skills and their links to self-regulation, check out this video from Harvard's Center on the Developing Child.

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Understanding the Development of Executive Skills and Self-Regulation

Based on the overview of executive function, we can see even more similarities between executive function and self-regulation. As educators, we cannot discuss one without the other. Self-regulation and executive function are tightly linked in development. Some may even say self-regulation and executive function are the same thing, but that's not quite the case. There are differences between the two. First, executive function skills develop before self-regulation and then help support the development of self-regulation throughout early childhood and beyond (Cartwright et al., 2024).

Children start to develop their executive skills within the first year of life. During that time, infants are learning how to direct their attention to a single object as well as learning how to switch their attention between different objects. Not only that, but they start to develop inhibition as well, such as when they must wait for the "big reveal" in a game of peek-a-boo. They are building those early executive skills to sustain attention, to wait, and shift their thinking. In fact, these early abilities are related to later executive skills (Johansson et al., 2015; Conejero et al., 2023). Let's also think about all the other skills that infants and toddlers are doing that require attention in those first 2 years. From babbling to crawling, to walking and talking, each and every step of the way the brain is developing these new skills. It takes a lot of attention to walk or talk! As early as 18 months, researchers are able to measure executive function skills (Morgan et al., 2024). These early executive function skills are the foundation to building strong self-regulation skills.

Executive Skills, Self-Regulation, and Developing Brains: Understanding the Tug-of-War between "Survival Brain" and "Learning Brain"

Let's take a second to think about what's going on in the brain during the development of executive skills and self-regulation, and how these relate to children's behavior. Executive skills and self-regulation are higher level skills associated with the frontal lobes in the brain, and they support learning. However, when children are stressed, feel unsafe, or are emotionally dysregulated, other parts of their brain are engaged that undermine good learning. We'll say more about this below, but here we offer vignettes to illustrate how this tug-of-war plays out in school settings. First, let's read about Briana.

> When kindergartener Briana hears that it's time to start a math lesson, she freezes, and her heartbeat starts to race. She lets out an audible "No." She then starts to shrink in her seat and tries not to look at the teacher, who is passing out a worksheet for the class to complete. Briana is usually bubbly and extremely friendly to her peers, but her whole personality changes when it comes to math. She hates math, and she lets everyone at school know it. She believes she is bad at it. Briana misses important instruction because, overwhelmed by negative emotions, her

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behavior changes dramatically before the lesson begins. She then gets confused about what is asked of her to do. She refuses to work in small groups and does not want to even work with her teacher. When the lesson is over, she still talks about her dislike of math. This continues in a cycle, which leads Briana to continue to struggle and fall behind in math.

Briana is stuck in a cycle of dysregulation related to math. This has most likely been building over time. When the word math is mentioned, we can see effects in all three of the different areas of self-regulation. Her physiological state moves into high gear. If we hooked Briana up to a heart rate monitor, her heart rate would go up when math is mentioned. Her socioemotional state changes dramatically, and she experiences negative emotions. Her behavior changes, too, leading her to try to avoid the math task. She is unable to manage her emotions, and because of her emotional dysregulation, her cognitive abilities are limited. Because of that, she is not able to actually complete her work. Briana is going to be stuck in this cycle until a specific intervention for her is put into place. This intervention will have to be targeted to both academic and self-regulation skills.

When a child is stuck in a cycle of dysregulation like Briana, it's hard for her to learn. For Briana, she is just trying to survive and get through this math lesson that has caused her so much stress before. Even though it may be hard for us to see this as adults, Briana's fight-or-flight response is affecting her behavior and undermining her learning. And, these fight-or-flight responses associated with stressful situations are activated automatically without any forethought or awareness from students like Briana. The skills that make up executive function are amazing skills that help us through our day. Yet, even with highly developed executive skills, stress can rapidly diminish our ability to engage them. This is clearly seen in the example above. Briana's stress related to math puts so much pressure on her executive function and self-regulation that she is not able to learn.

This tug-of-war between these learning and stress responses occurs because there is a connection between your body's emotion areas (limbic system) and where executive function is housed in the brain (frontal lobes; Blair, 2017). The prefrontal cortex (PFC) is where the majority of executive function skills are housed. The limbic system, also called your emotional nervous system, is directly linked with the PFC. So when you need to concentrate on an important task, your limbic system tells your PFC to turn up the attention. However, when your limbic system is overwhelmed, as Briana is showing, it may overwhelm the PFC, thus reducing your ability to access these cognitive skills.

Some psychologists and educators refer to these areas of the brain as the "learning brain" (the executive skill areas) and the "survival brain" (the emotional areas; Ham, 2017). When the learning brain is engaged, a child can recruit her executive skills and self-regulation to think, learn, and manage her behavior and emotions. But, if a child feels unsafe, due to prior negative (or traumatic) experiences, the emotional, or survival, part of the brain is engaged, triggering an automatic "fight-or-flight response"—a child may act out (fight), avoid (flee), or just shut down (freeze) in the face of a stressful situation. In fact, children who struggle to learn in school,

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such as those with reading difficulties like dyslexia, experience school as extremely stressful, and even traumatic, which further hinders their ability to learn (Alexander-Passe, 2015; Livingston et al., 2018; Zambo & Brem, 2004). For children like these, interventions that support both reading/learning and self-regulation/anxiety reduction are more effective than reading/learning interventions alone (Francis et al., 2021; Vaughn et al., 2021).



The video at this QR code illustrates the differences between children's responses when their learning brain or their survival brain is engaged.

As the video in the QR link explains, Briana's survival brain is engaged in our example. She is trying to get finished with the math as quickly as possible, which undermines her ability to reason and learn about math. This is why there needs to be an intervention for Briana to regulate emotions, start feeling safe, and allow her to move into the learning brain, engaging her executive skills and self-regulation abilities. Compare the story of Briana to Tyrone below.

> Tyrone is a preK student who has been given a puzzle to work on in class. When the teacher slides the puzzle in front of Tyrone, he shouts, "I love puzzles!" and gets to work on it. It's more difficult than other puzzles he has completed before, and he gets stuck. He mumbles a phrase his mom and dad use a lot, "stop, think, try again." Tyrone stops working for a moment and thinks about what is missing. His teacher stops by to ask Tyrone if he needs help, and he tells her no because he wants to do it himself. Finally, he figures out that he put a piece in the wrong spot. When he completes the puzzle, Tyone jumps into the air and gives himself a high five. "I knew I could do it!" Later that day, Tyrone asks his teacher if he can do another puzzle. When the teacher provides Tyrone with another puzzle, he is literally jumping with joy as the teacher places it down in front of him.

In this example, Tyrone is very motivated by puzzles. Because of that, he has a positive self-belief about how to solve puzzles. He also has his learning brain activated, and it's not undermined by stress responses. Tyrone is able to use strategies from his family to overcome stressful obstacles. When he completes the puzzle, he gives himself a high five as a reward for completing the task. Tyrone's motivation was clearly intrinsic, and his self-incentive was jumping up and congratulating himself. When hitting an obstacle, he did not give up but was able to stop, think, and act. His regulation allowed him to problem-solve when facing obstacles, which led him to want to complete more puzzles. This cycle will continue as Tyrone becomes more and more capable of regulating his puzzle-working strategies and completing increasingly difficult puzzles.

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Comparing Tyrone and Briana clearly shows the difference in how stress can affect students differently. When Tyrone could not solve his puzzle, his limbic system did not flood his PFC, the part of the brain that manages his executive skills; instead, he was able to engage his executive skills and self-regulation strategies to remain calm and focused. But, for Briana, the opposite happened. This shows the importance of building important executive and self-regulatory skills, but also learning ways to help students get out of cycles of dysregulation so that they can continue to learn and develop.

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Why Is Developing These Skills Important?

It is critical for young children to develop their self-regulation and executive function skills. This is because cognitive skills in early childhood are linked to outcomes all the way into adulthood. In 2020, researchers completed a meta-analysis of all the studies that examined early self-regulation and later life outcomes. The purpose of a meta-analysis is to find all the research that has ever been done on a topic and combine the results together, giving us a better sense of what the research is saying as a whole. Below is a list of all the benefits of children having well-developed self-regulation and executive function skills (Robson et al., 2020).

Self-regulation at age 4 was associated with the following benefits by age 8:

- Better academic performance
- Reduced internalizing of problems (such as depression or anxiety)
- More school engagement
- Improved social competence

Early self-regulation was associated with the following abilities around the time students became teenagers:

- Better math and literacy achievement
- Reduced aggressive behavior
- Reduced childhood obesity
- Reduced cigarette and drug use

By the time these children were almost 40 years old, early self-regulation and executive function was associated with the following:

- Reduced unemployment
- Reduced obesity
- Reduced depression and anxiety
- Reduced cigarette use
- Reduced abuse of alcohol or drugs
- Reduced chances of being sick

Overall, those with higher self-regulation and executive function skills at age 4 go on to live healthier lives, with fewer chances of depression or anxiety, reduced chances of abusing alcohol or drugs, and less chance of being a smoker. The researchers who conducted that meta-analysis noted that to improve the life trajectories of these children, we must understand more fully the factors that go into improving executive function and self-regulation. Robson et al. (2020) also highlight that early childhood is a "period of great vulnerability but also one of great opportunity" (p. 346). We agree with that statement wholeheartedly, and that is a key reason we wrote this book. Some researchers think that many of the troubles facing children and adults throughout life can be traced back to early executive function and self-regulation capacities; that is how critical it is to develop these skills early and maintain them throughout life. While self-regulation and executive function predict later life outcomes, there is also a significant relationship between current self-regulation and executive function and current life outcomes, such as academic achievement, peer relationships, and well-being (Barnes et al., 2022; Ellis et al., 2009; Ogilville et al., 2011) .

Kindergarten Readiness as an Example

Briefly, we wanted to illustrate how the transition to kindergarten shows the importance of well-developed executive skills and self-regulation. The transition into kindergarten can be challenging for all students, and these challenges can be exacerbated for students who struggle to regulate their own thinking, actions, and emotions. These skills are critical for students' academic development, as well as their social and emotional development. Those who start kindergarten struggling with executive function skills are more likely to struggle in math and reading the following year (Morgan et al., 2017). This is especially true for math. Students rely heavily on executive skills to learn math and complete math problems. For example, even the effort of trying to count from 1 to 10 relies heavily on executive skills. If we are counting out loud, we need to remember the last number we said out loud (working memory), try not to get distracted by others (inhibition), and switch from number to number (mental flexibility). Maybe students are using cubes to help them count, and they have to switch between moving the cubes and speaking the answer out loud. Math instruction just seems like a training exercise in executive skills.

In fact, math skills and executive skills develop together in early childhood education (Ahmed et al., 2019; Miller-Cotto & Byrnes, 2020; Willoughby et al., 2019). Students whose EF skills are supported and grow in early childhood also rapidly grow their math ability as they transition to kindergarten (McClelland et al., 2014). For math achievement, starting preschool with well-developed executive skills is critical for those students having better math skills later in elementary school; children who started preschool with lower EF skills never caught up to their peers in developing their EF or math by the end of second grade (Ahmed et al., 2023). The struggles of students entering kindergarten with executive function difficulties continue to undermine their performance in elementary school in math, science, and reading (Morgan et al., 2019). This finding is similar to findings about self-regulation, which show that

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preschool self-regulation is linked to academic struggles throughout elementary school (Gawrilow et al., 2014; McClelland et al., 2007).

Individual Differences: Why We May See Variation in These Skills from Student to Student

Children all develop at different times and rates. If you have children or work with children, you will see this every day. When you get a group of children together who just turned 1 year old, you will see a variety of differences in the ability to walk. Some children will still be crawling, others will be holding on to furniture for support, some will be wobbling while taking tentative steps, and a few will be walking on their own. The differences between children stand out more clearly in early childhood because children learn so much in a short amount of time. If we check back on that group of children in a few weeks, the group could look totally different. When it comes to executive skills, students are all developing these skills at their own pace, as well. However, some common themes have been found through research that may relate to the growth of executive skills.

Early Opportunities and Home Environment

A great deal of research has shown that having limited access to resources in early childhood can influence how children's executive skills and self-regulation develop. This is such a complex area of research that whole books have been written about it. What is clear is that some students may lack access to economic resources at home, and this can cause differences in what is known as the *home learning environment* (Jiang et al. 2024). Home learning environment is just what it sounds like: the availability and readiness of things and people within a child's home that support that child's learning and development. For example, when families lack economic resources, they are less able to make toys and books available for their children. Not only that, but limited access to resources can also affect the type of parental interactions children experience because the parents may be away working multiple jobs, and they may experience more stress than parents with more resources (Finegold & Blair, 2017). These things are not always related to economic resources, though. Other studies have shown that parental education levels are more related to children's executive skills than income (Morgan et al., 2009).

Research into children's home learning environment has just recently started to explore the area of executive functions. A new measure, the Home Executive Function Environment scale, includes five parental practices that have been linked to the development of executive skills (Korucu et al., 2019). Table 1.3 lists five important parental practices that support the development of executive function skills.

If you walk into an ECE classroom, you are most likely going to see these activities taking place. That means that teachers are already working on developing these skills in their students. As we think about the link between home life and the development of these skills, it's important for ECE teachers to know that some students will need more support developing these skills at school than others. As you make your

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TABLE 1.3. Five-Item Home Executive Function Environment Scale

Parents were asked to rate each behavior on a 5-point Likert scale (0 = never/I don't do this, 1 = once in a while, 2 = about half of the time, 3 = very often, 4 = always/I always do this).

- I play games that require my child to stop, think, then act (e.g., Red Light, Green Light).
- I play memory games with my child.
- I play games with my child that require concentration and attention (e.g., puzzles).
- I sing songs with my child that repeat and add on to earlier sections with words or motions (e.g., "She'll Be Coming 'Round the Mountain When She Comes").
- I encourage my child to engage in physical activity for at least 30 minutes per day.

Note. Items are reprinted from Korucu et al. (2019) with permission.

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way through this book, we will provide you with explicit activities that you can do in your classroom to help support all of your students, but especially those who may come into your classroom with a greater need for more support.

Language, Behavior, and Self-Regulation

Those children who may struggle with expressive vocabulary are more likely to struggle with self-regulation (see Chapter 3 for a full discussion). Language and self-regulation develop at the same time (Guedes & Cadima, 2022), which can be challenging for children with expressive language delays (i.e., late talkers). In fact, the expressive vocabulary of a 24-month-old significantly predicted problematic behaviors at the start of kindergarten (Morgan et al., 2015). Those preschoolers who are behind in language are more likely to be disruptive in class, be aggressive to other classmates, and be less likely to help others (Qi & Kaiser, 2004). It's difficult for children not to be able to express themselves to their teachers, peers, or parents. In fact, the behavioral issues that raise concerns in many students can be directly linked to their language ability (Chow & Wehby, 2018). This is not just an issue for those in toddler classrooms. ECE teachers in elementary school will see this link between language and behavior, as well. Chapter 3 will provide you with more information on how to identify students who may struggle in their language and how you can build both language and executive skills in your classroom.

Students with Disabilities

Students with disabilities (SWDs) will be included in your classrooms, as well. The K-12 environment has worked hard over recent decades to include more students with disabilities in the regular education classroom. Many disabilities are related to difficulties with executive skills. Sometimes you may not even realize the link between a specific disability and executive skills. The most commonly noted link is in students with attention-deficit/hyperactivity disorder (ADHD). Those with ADHD will have trouble paying attention, have executive skill difficulties, and have trouble with self-regulation (Barkley, 2015). We also see that students who have reading disabilities also

have difficulties with executive function (Altemeier et al., 2008; Locascio et al., 2010). In fact, their struggles in executive function may be one of the many variables leading to the reading disability. In Chapter 6, we will discuss ways to support these students in your classrooms. While those with disabilities are a very broad category of students, there are numerous evidence-based strategies that teachers can use to help students self-regulate and to accommodate their executive function needs.

Why Early Childhood Educators Are So Important

Early childhood teachers are some of the most critical teachers in a child's life. Early childhood is a period of such rapid development, and the early childhood teacher is there every step of the way. The research shows that, through small changes in instruction, teachers can make a huge impact on the academic, executive function, and self-regulation skills of their students. These small changes in instruction can be as easy as making sure students are getting up out of their seats more often. In fact, we see that elementary students who get up and move around more in the classroom during the day have better executive function and increased academic achievement (Allee et al., 2024). The routines and language used day-to-day in classrooms have a dramatic impact on the growth of a child's language development. When teachers provide time and space to have conversations with young children, they are helping students grow in their language ability, which will assist in the development of self-regulation.

As you read through this book, you will see how powerful teachers are in the development of young children. We wrote this book because we believe in the promise of early childhood education. This book serves as an avenue to translate the most up-to-date information on the development of executive function and self-regulation into excellent, science-informed classroom practice. More importantly, the ideas presented in this book can be applied directly to early childhood settings. As we work with early child educators, we find that they know how critical executive function and self-regulation are to their students. However, they report to us that they are not getting enough information through their education or professional development in instructional strategies that can be used in the classroom to support these skills in their students. This is why we have written this book.

Most of the subsequent chapters in this book will focus on some key elements of early childhood development. Chapters 2 to 6 will review the research on executive function and self-regulation and how they relate to play, language development, literacy development, behavior, and students with disabilities. The final chapter will emphasize the power that you have as an early childhood educator to help your students develop into active, engaged, self-regulated learners, thinkers, and doers. Here we provide a general outline so that you know what to expect for Chapters 2 to 6:

- We begin each chapter with a classroom vignette so that you can connect new learning to your prior knowledge and experience in early child education classrooms.
- Then, each chapter thoroughly defines the focal topic. For example, in Chapter

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2 we provide an overview of play, the theories of its importance, and how we measure what play is.
- After building your background knowledge, we delve directly into how that subject area is related to executive function and self-regulation. Using your knowledge from this chapter, we highlight how each chapter topic is related to the development and growth of executive skills and self-regulation.
- Then, we present strategies that teachers can easily implement in early childhood classrooms to support these skills in their students. For example, Chapter 3 provides a variety of strategies teachers can use to support the language development of their students.
- We close each chapter by visiting classrooms and providing real-life examples of how teachers are using some of these strategies to support students.
- Finally, we provide some questions you can use on your own to deepen your thinking about the topics in this book; they are designed to support discussion if you use this book in professional learning community (PLC) contexts.

After reading this book, we expect that you will have a deeper knowledge of executive function and self-regulation, and how they play a role in a variety of areas of your students' development. Additionally, and most importantly, we want you to have knowledge of evidence-based instructional practices that you can use in the classroom to support the cognitive, emotional, and social development of your students by supporting these skills. Finally, we want our readers to use the information in our book to become advocates for a more child-centered approach to early education. We know firsthand that many of the changes to early childhood education are out of the hands of teachers. But through this book, we hope you can use the knowledge at your center or school to advocate for better teaching practices so that more students continue to grow in their executive skills and self-regulation in school and in life.

QUESTIONS TO PONDER AND DISCUSS

1. What did you know about executive skills or self-regulation before picking up this book? Do you recognize these skills in your students? Have you used other terms to describe them?
2. Were you surprised by any of the information you encountered in this chapter?
3. Can you identify students who you think might benefit from supports in executive function and self-regulation?
4. What do you hope to learn from reading this book?

FOR FURTHER READING

Dawson, P., & Guare, R. (2004). *Executive skills in children and adolescents: A practical guide to assessment and intervention*. Guilford Press.

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