
Building Executive Functioning from the Bottom-Up: Practical Insights across the Lifespan
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Play to Learn Neurodiversity Consulting
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HELLO
Introductions & Disclosures
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Learning Objectives

Define	Participants will define executive functioning and explain how pertinent skills are represented in daily living.
Analyze	Participants will analyze the connection between executive functioning and social-emotional development in order to understand how they are intertwined.
Explore	Participants will explain the core deficits in ADHD and demonstrate how to support foundational growth across environments.
Recognize	Participants will recognize how various stressors impact executive function skills in order to understand the importance of regulation.

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Introduction to Executive Function Skills

(Sesame Street, 2013)

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Cookie Monster: An Executive!

- impulsivity
- decision making
- thinking like an "executive"
- cognitive flexibility
- self-regulation strategies

Fandom. (n.d.). *Characters with shirtless collars and ties* [Digital image]. Retrieved from https://muppet.fandom.com/wiki/Characters_with_shirtless_collars_and_ties

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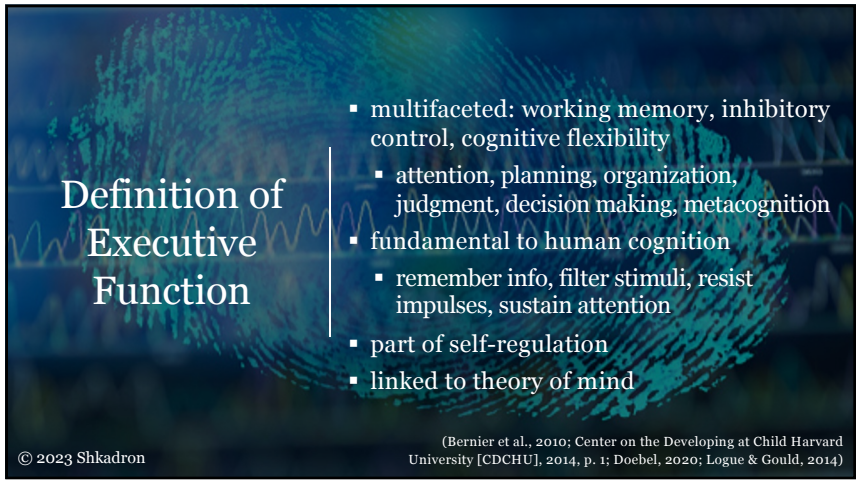
Definition of Executive Function
multifaceted: working memory, inhibitory control, cognitive flexibility
attention, planning, organization, judgment, decision making, metacognition
fundamental to human cognition
remember info, filter stimuli, resist impulses, sustain attention
part of self-regulation
linked to theory of mind
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(Bernier et al., 2010; Center on the Developing at Child Harvard University [CDCHU], 2014, p. 1; Doebel, 2020; Logue & Gould, 2014)

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Definition of Executive Function
involved in goal-directed thought and action
especially when a task competes with impulses, habits, desires
influenced by individual differences
sleep, stress, nutrition, overstimulation
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(Bernier et al., 2010; Center on the Developing at Child Harvard University [CDCHU], 2014, p. 1; Doebel, 2020; Logue & Gould, 2014)

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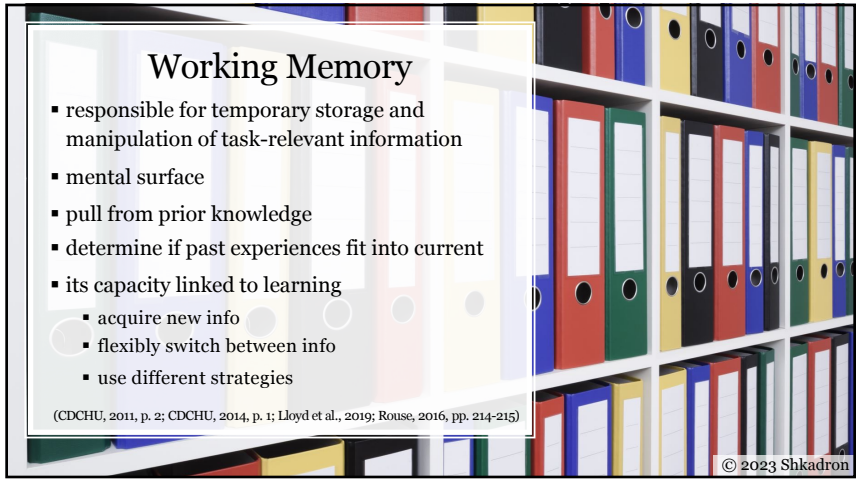
Working Memory
▪ responsible for temporary storage and manipulation of task-relevant information
▪ mental surface
▪ pull from prior knowledge
▪ determine if past experiences fit into current
▪ its capacity linked to learning
▪ acquire new info
▪ flexibly switch between info
▪ use different strategies
(CDCHU, 2011, p. 2; CDCHU, 2014, p. 1; Lloyd et al., 2019; Rouse, 2016, pp. 214-215)
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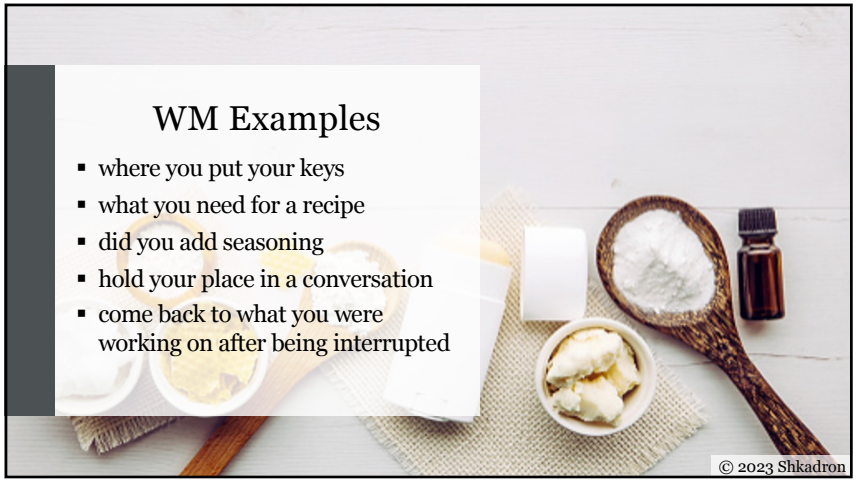
WM Examples
▪ where you put your keys
▪ what you need for a recipe
▪ did you add seasoning
▪ hold your place in a conversation
▪ come back to what you were working on after being interrupted
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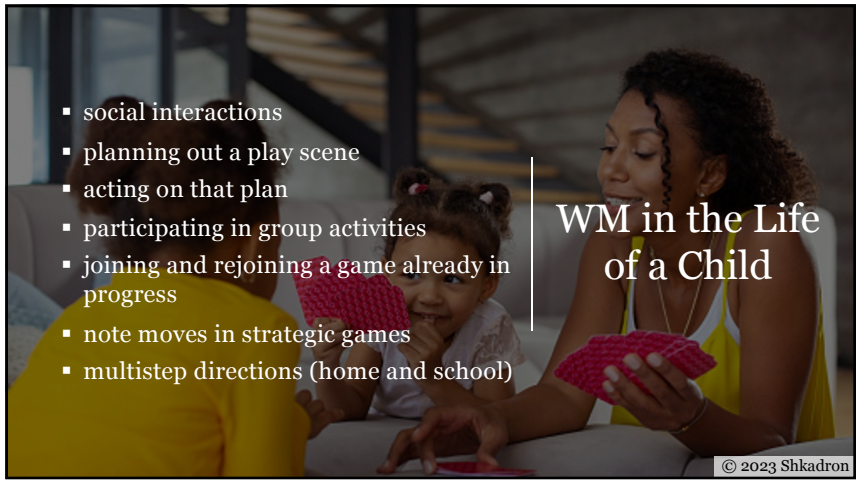
social interactions
planning out a play scene
acting on that plan
participating in group activities
joining and rejoining a game already in progress
note moves in strategic games
multistep directions (home and school)
WM in the Life of a Child
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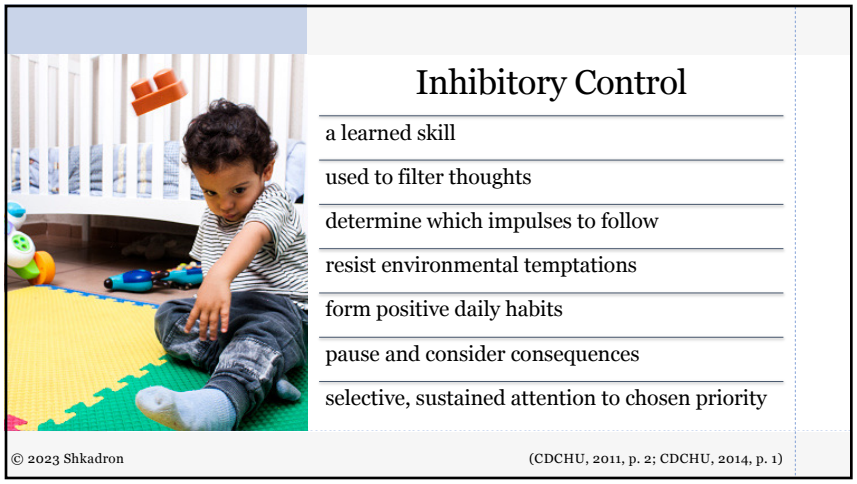
Inhibitory Control
a learned skill
used to filter thoughts
determine which impulses to follow
resist environmental temptations
form positive daily habits
pause and consider consequences
selective, sustained attention to chosen priority
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(CDCHU, 2011, p. 2; CDCHU, 2014, p. 1)

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Inhibitory Control in the Life of a Child
wait until you're called on
avoid name calling
understand/follow rules of a game
manage unfavorable social situations
supports academic achievement
ignore distractions
remain on task
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possible due to working memory and inhibition
capacity to switch gears
adjust to demands, priorities, perspectives
adapt thoughts based on environment
revise given new information
reconsider current position
Cognitive & Mental Flexibility
(Blakey et al., 2016; CDCHU, 2011, p. 2; CDCHU, 2014, p. 1)
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Cognitive Flexibility in the Life of a Child
modulate vocal volume
adjust to different rules
use various strategies to resolve conflict
accept thoughts of others
explain your thought process
bring ideas together
alter your idea to match someone else's
begins to emerge at age 4
(Blakey et al., 2016)
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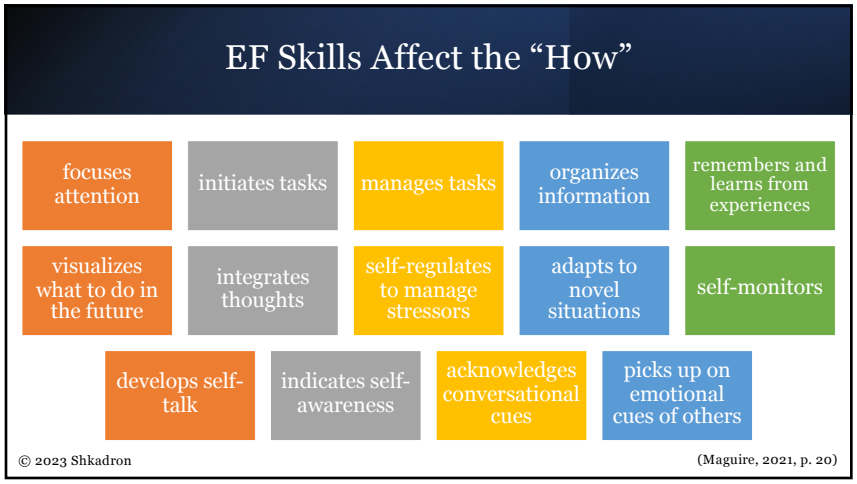
EF Skills Affect the "How"
focuses attention
initiates tasks
manages tasks
organizes information
remembers and learns from experiences
visualizes what to do in the future
integrates thoughts
self-regulates to manage stressors
adapts to novel situations
self-monitors
develops self-talk
indicates self-awareness
acknowledges conversational cues
picks up on emotional cues of others
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(Maguire, 2021, p. 20)

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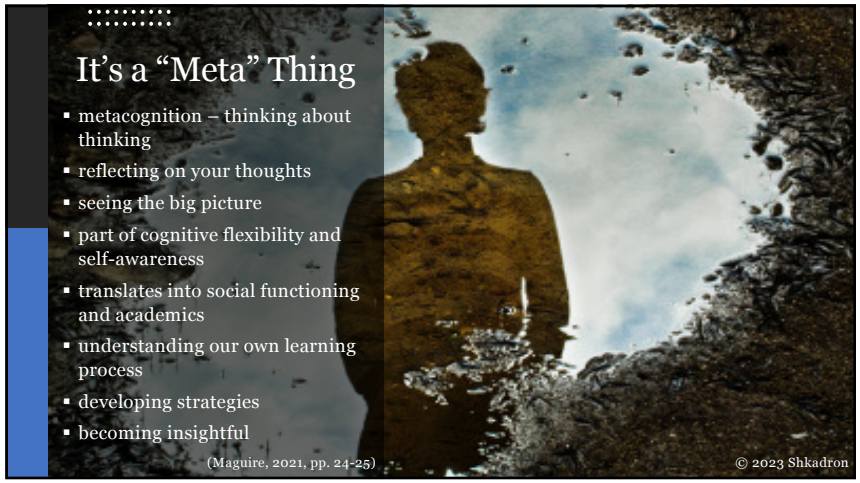
It's a "Meta" Thing
metacognition – thinking about thinking
reflecting on your thoughts
seeing the big picture
part of cognitive flexibility and self-awareness
translates into social functioning and academics
understanding our own learning process
developing strategies
becoming insightful
(Maguire, 2021, pp. 24-25)
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Developmental Trajectory of EF
gradual, through interactions between frontal and posterior brain regions
underlie the following skills
analogical reasoning,
theory of mind,
social-emotional development,
academics
skills in "self-control" serve specific goals
(Doebel, 2020)
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caregivers act as external regulators
respond to infant's rhythm and affect
appropriate, consistent responses provide successful experiences
parents need to recognize their own signals
gradually facilitate child's capacity to self-regulate
co-regulation is a sacred space
promotes safety through adult's regulated nervous system
EF in Infancy Begins with Co-Regulation
(Bernier et al., 2010; Desautels, 2020, p. ix; Shanker, 2016, p. 24)
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Developing EF in Infancy
engaging in predictable, repetitive games with consistent rules
peekaboo
working memory (who's hiding)
self-control (wait for the reveal)
timing of reveal
(CDCHU, 2014, pp. 2-3)
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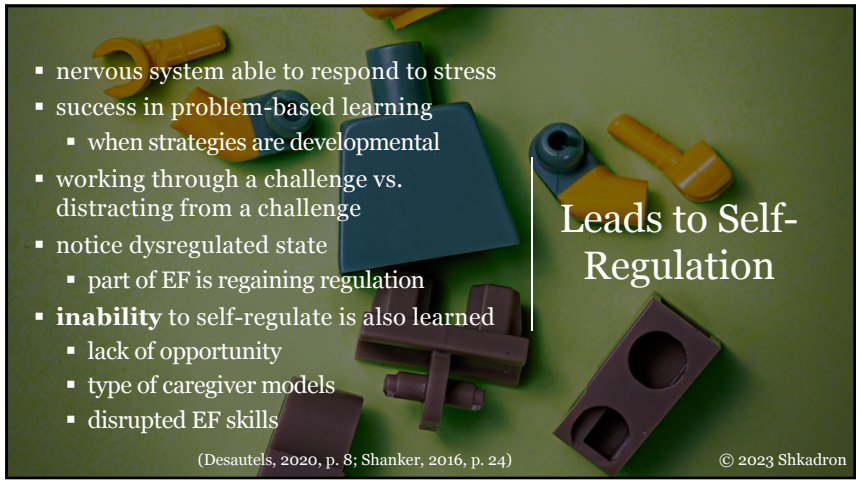
Leads to Self-Regulation
nervous system able to respond to stress
success in problem-based learning
when strategies are developmental
working through a challenge vs. distracting from a challenge
notice dysregulated state
part of EF is regaining regulation
inability to self-regulate is also learned
lack of opportunity
type of caregiver models
disrupted EF skills
(Desautels, 2020, p. 8; Shanker, 2016, p. 24)
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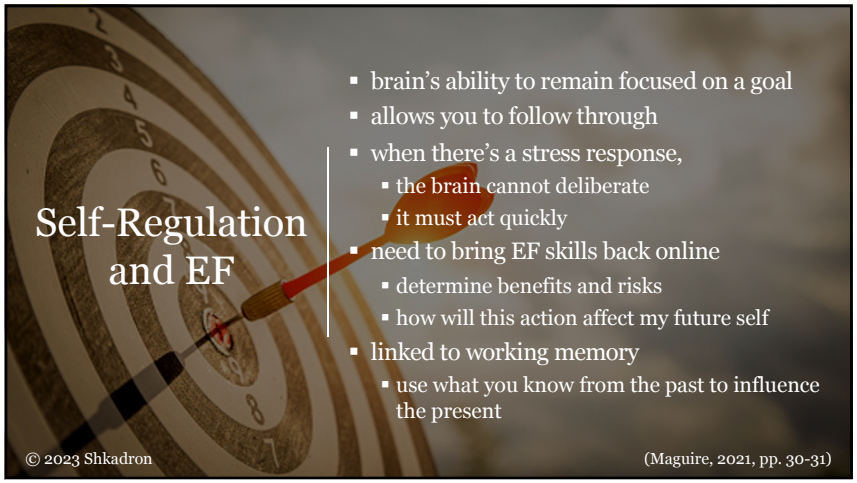
Self-Regulation and EF
brain's ability to remain focused on a goal
allows you to follow through
when there's a stress response,
the brain cannot deliberate
it must act quickly
need to bring EF skills back online
determine benefits and risks
how will this action affect my future self
linked to working memory
use what you know from the past to influence the present
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(Maguire, 2021, pp. 30-31)

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EF in Toddlerhood: 18-36 months
language contributes to EF
identify thoughts, actions
reflect on them
make plans, hold plans in mind, use them
understand and follow more complex rules
focus/sustain attention on a goal
inhibit actions
first attempt fails, try a new way
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(CDCHU, 2014, pp. 4-5)

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Developing EF in Toddlerhood
include organized movement
imitation games – Follow the Leader
song games with multiple movements – The Hokey Pokey
active inhibition – Freeze Dance
play narration
(CDCHU, 2014, pp. 4-5)
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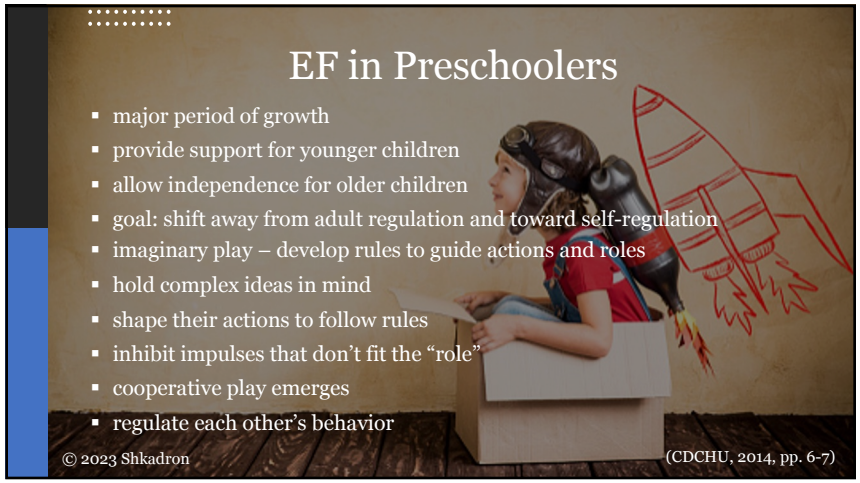
EF in Preschoolers
major period of growth
provide support for younger children
allow independence for older children
goal: shift away from adult regulation and toward self-regulation
imaginary play – develop rules to guide actions and roles
hold complex ideas in mind
shape their actions to follow rules
inhibit impulses that don't fit the "role"
cooperative play emerges
regulate each other's behavior
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(CDCHU, 2014, pp. 6-7)

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Developing EF in Preschool
provide opportunities for higher-level play
reuse familiar, household objects in new ways (cognitive flexibility)
construct own props
figure out what's needed (attention)
hold info in mind (WM)
follow through (planning)
if original plan doesn't work, readjust (cognitive flexibility)
plan in a group (social problem solving)
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(CDCHU, 2014, pp. 6-7)

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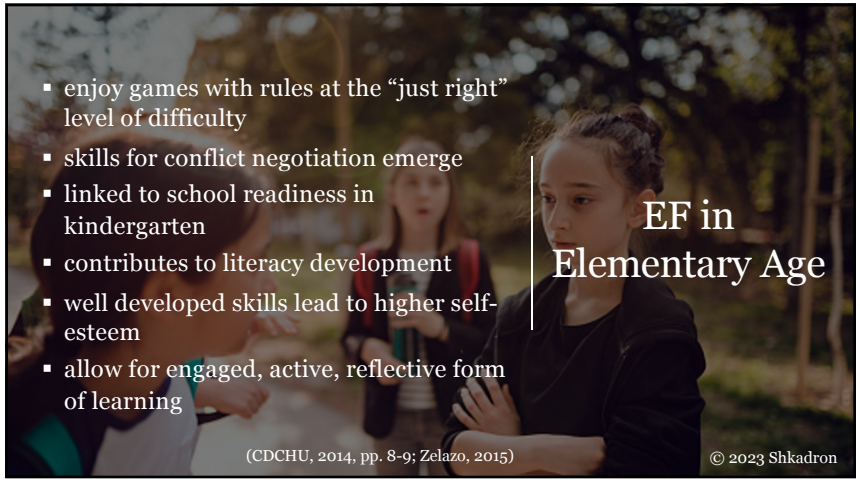
EF in Elementary Age
enjoy games with rules at the “just right” level of difficulty
skills for conflict negotiation emerge
linked to school readiness in kindergarten
contributes to literacy development
well developed skills lead to higher self-esteem
allow for engaged, active, reflective form of learning
(CDCHU, 2014, pp. 8-9; Zelazo, 2015)
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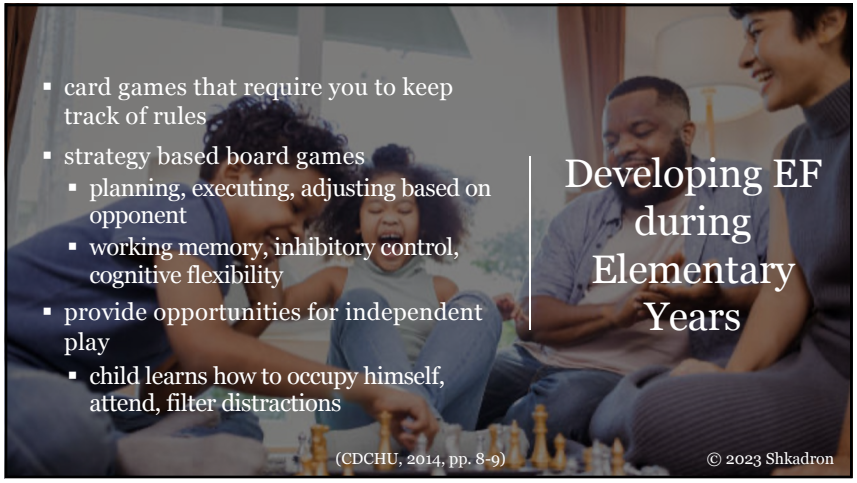
Developing EF during Elementary Years
card games that require you to keep track of rules
strategy based board games
planning, executing, adjusting based on opponent
working memory, inhibitory control, cognitive flexibility
provide opportunities for independent play
child learns how to occupy himself, attend, filter distractions
(CDCHU, 2014, pp. 8-9)
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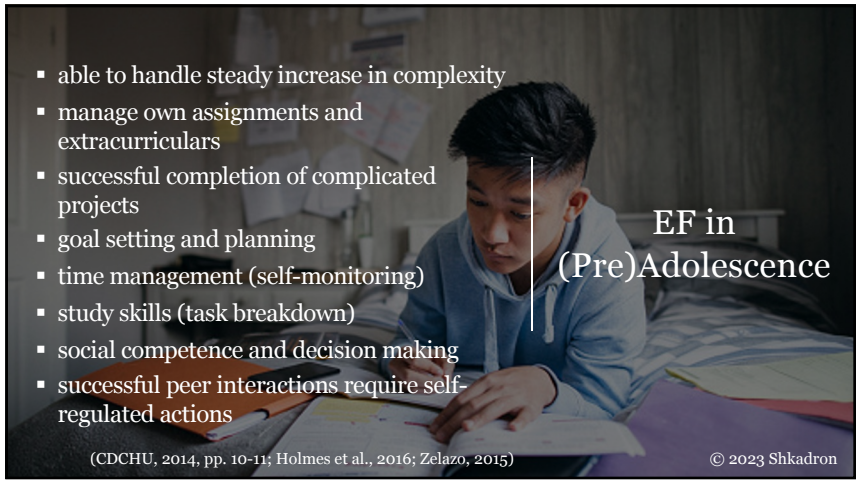
EF in (Pre)Adolescence
▪ able to handle steady increase in complexity
▪ manage own assignments and extracurriculars
▪ successful completion of complicated projects
▪ goal setting and planning
▪ time management (self-monitoring)
▪ study skills (task breakdown)
▪ social competence and decision making
▪ successful peer interactions require self-regulated actions
(CDCHU, 2014, pp. 10-11; Holmes et al., 2016; Zelazo, 2015)
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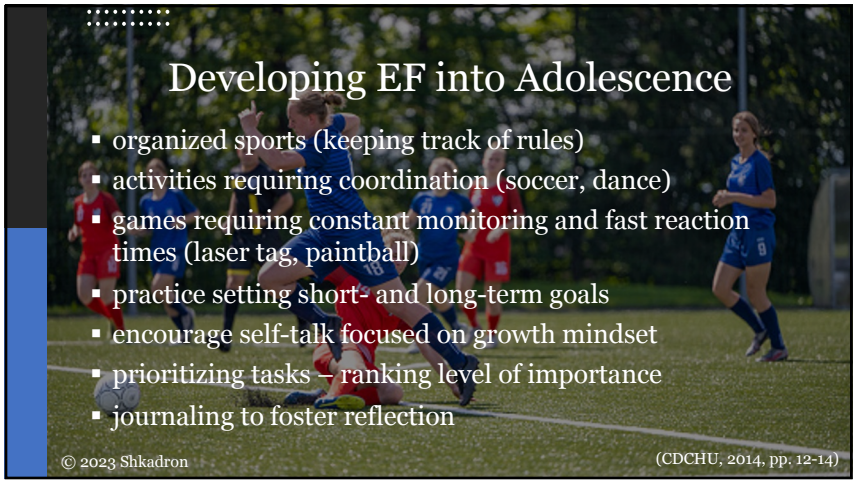
Developing EF into Adolescence
▪ organized sports (keeping track of rules)
▪ activities requiring coordination (soccer, dance)
▪ games requiring constant monitoring and fast reaction times (laser tag, paintball)
▪ practice setting short- and long-term goals
▪ encourage self-talk focused on growth mindset
▪ prioritizing tasks – ranking level of importance
▪ journaling to foster reflection
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(CDCHU, 2014, pp. 12-14)

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EF in Adulthood
well developed skills linked to
better physical health,
higher socioeconomic status (SES),
fewer drug-related problems and criminal convictions,
job performance
responsively care for children
manage household responsibilities
community contribution
self-regulation with intent – conscious and proactive
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(Holmstrand, 2016; Zelazo, 2015)

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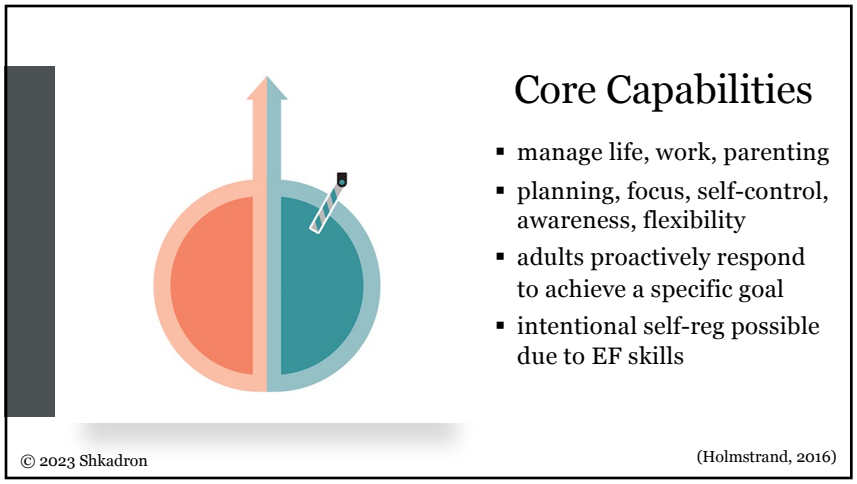
Core Capabilities
manage life, work, parenting
planning, focus, self-control, awareness, flexibility
adults proactively respond to achieve a specific goal
intentional self-reg possible due to EF skills
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(Holmstrand, 2016)

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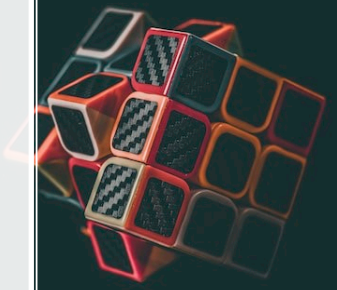
Putting It All Together

- group of integrated cognitive processes that
  - enable individuals to orient toward the future,
  - demonstrate self-control, and
  - successfully complete goal directed behavior
- all while avoiding distractions
- EF skills function together
- provide the capacity for metacognitive development
  - self-reflection and social awareness
- individual differences in EF



(Bernier et al., 2010; Logue & Gould, 2014; Maguire, 2021, pp. 24-25; Sumpter, 2021, p. 2; Zelazo, 2015)

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EF Derailed

- early adversity and trauma
  - increased risk of health difficulties
  - challenges modulating emotions
  - difficulty appraising emotions
- chaotic, unpredictable environments
  - poor self-regulation and impulse control
  - low self-efficacy
- highly rewarding stimuli
  - food and drugs
  - hijack brain's attention
- poverty
  - overloads self-reg system
  - inadequate resources

(Holmstrand, 2016)

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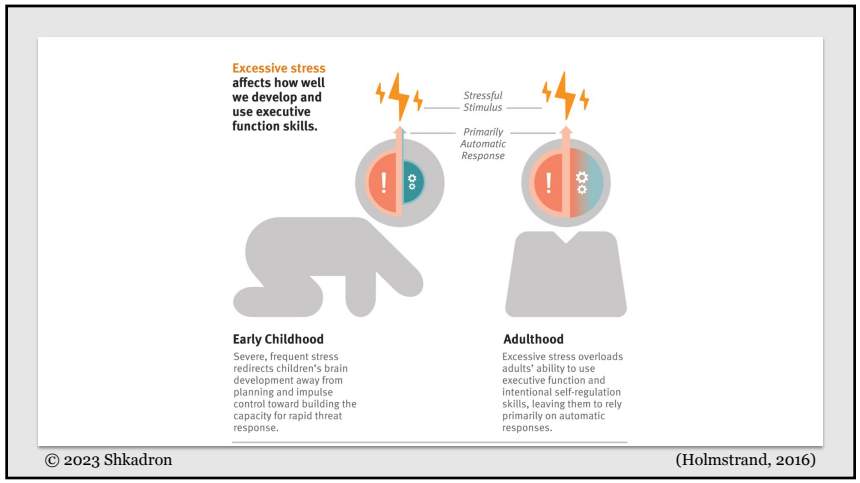
Excessive stress affects how well we develop and use executive function skills.
Stressful Stimulus
Primarily Automatic Response
Early Childhood
Severe, frequent stress redirects children's brain development away from planning and impulse control toward building the capacity for rapid threat response.
Adulthood
Excessive stress overloads adults' ability to use executive function and intentional self-regulation skills, leaving them to rely primarily on automatic responses.
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(Holmstrand, 2016)

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Sources of Stress
anything that disrupts homeostasis
unpredictable event
sudden change in routine
lack of focused attention
new or challenging social event
persistent discomfort
lack of sleep
too hot, cold, loud, bright
internal response to pain
adverse environment
parent's heightened stress
different for every child
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(CDCHU, 2011, p. 7; Hamlin, 2015, pp.64 – 66; Shanker, 2016, pp. 68, 97-98)

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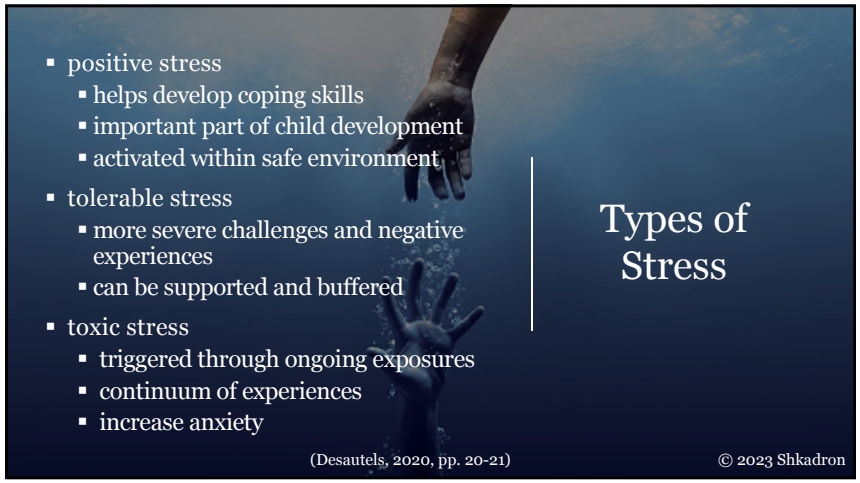
Types of Stress
positive stress
helps develop coping skills
important part of child development
activated within safe environment
tolerable stress
more severe challenges and negative experiences
can be supported and buffered
toxic stress
triggered through ongoing exposures
continuum of experiences
increase anxiety
(Desautels, 2020, pp. 20-21)
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Your Brain on Stress
impaired cognitive learning
lack of integration
responding from a fear state
depleted resources
increased cortisol and adrenaline
neurological system under siege
no access to EF capacities
difficulties with regulation
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(Desautels, 2020, p. 34)

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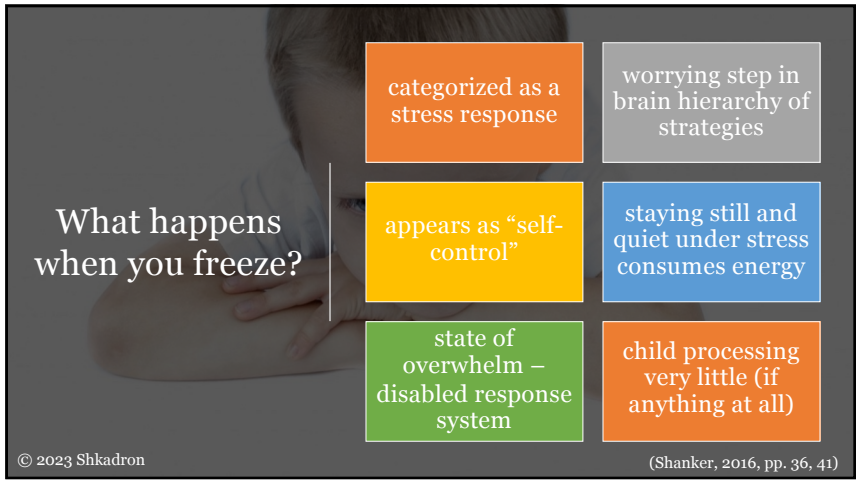
What happens when you freeze?
categorized as a stress response
worrying step in brain hierarchy of strategies
appears as "self-control"
staying still and quiet under stress consumes energy
state of overwhelm – disabled response system
child processing very little (if anything at all)
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(Shanker, 2016, pp. 36, 41)

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ADHD: A Paradox
lack of focus and hyperfocus
lack of direction and highly directed entrepreneurialism
procrastinate and achieve high efficiency
impulsive decision making and inventive problem solving
interpersonal challenges and intuitive, empathic
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(Hallowell & Ratey, 2021, p. 7)

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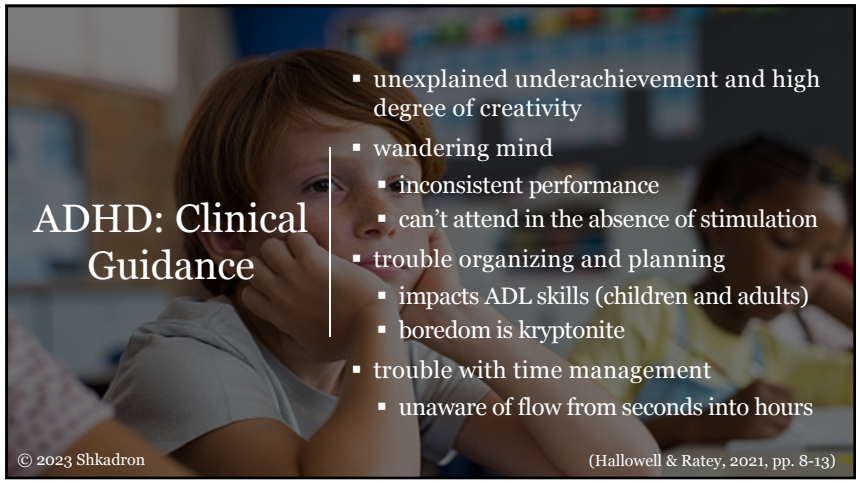
ADHD: Clinical Guidance
unexplained underachievement and high degree of creativity
wandering mind
inconsistent performance
can't attend in the absence of stimulation
trouble organizing and planning
impacts ADL skills (children and adults)
boredom is kryptonite
trouble with time management
unaware of flow from seconds into hours
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(Hallowell & Ratey, 2021, pp. 8-13)

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ADHD: Clinical Guidance
strong will, stubbornness
generosity
restlessness
impulsiveness and impatience
operate on "fire, aim, ready"
unique sense of humor
transparency
lie impulsively when on the spot
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(Hallowell & Ratey, 2021, pp. 8-13)

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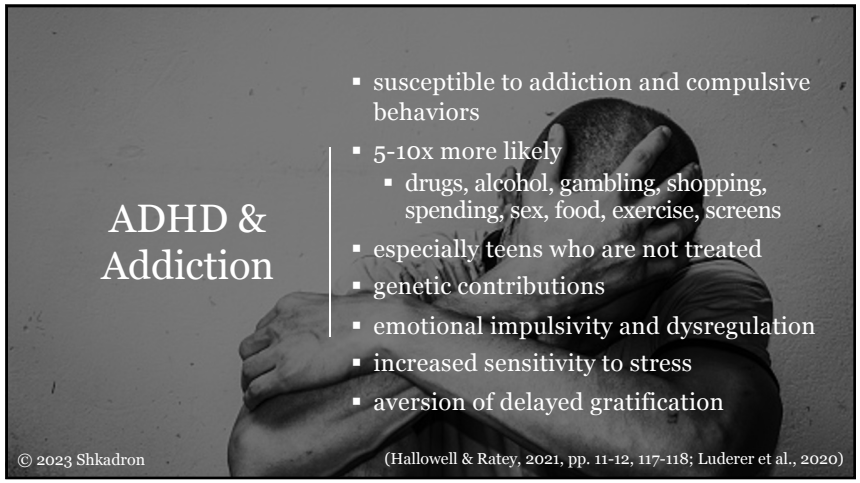
ADHD & Addiction
susceptible to addiction and compulsive behaviors
5-10x more likely
drugs, alcohol, gambling, shopping, spending, sex, food, exercise, screens
especially teens who are not treated
genetic contributions
emotional impulsivity and dysregulation
increased sensitivity to stress
aversion of delayed gratification
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(Hallowell & Ratey, 2021, pp. 11-12, 117-118; Luderer et al., 2020)

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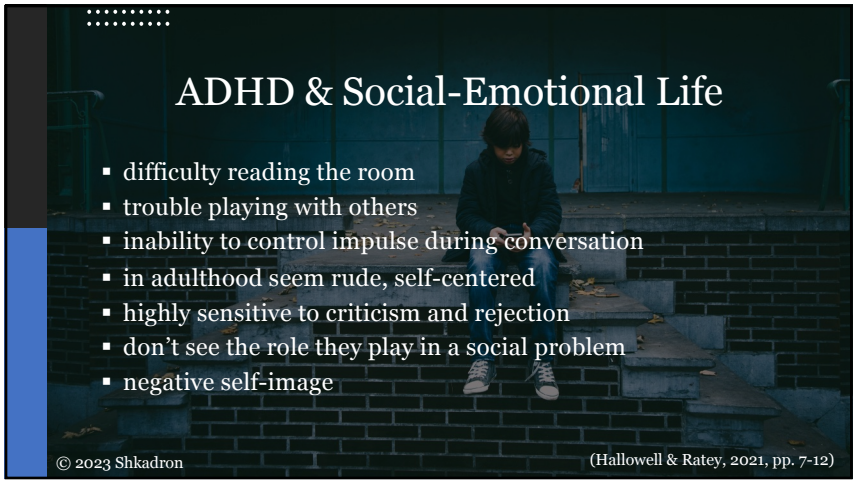
ADHD & Social-Emotional Life
difficulty reading the room
trouble playing with others
inability to control impulse during conversation
in adulthood seem rude, self-centered
highly sensitive to criticism and rejection
don't see the role they play in a social problem
negative self-image
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(Hallowell & Ratey, 2021, pp. 7-12)

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Tag, You're It!
social games require ALL aspects of EF
fast paced environments impact information processing
quick shifts of plans, rules, roles, locations (WM, cognitive flexibility)
acknowledging alternate viewpoints (meta task, cognitive flexibility)
advocating for self while regulating emotions (inhibition)
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EF Difficulties: Impacts into Adulthood
what makes up a dollar
learn how to make change
mathematical quantities related to time
setting alarm for work
knowing how long morning routine takes
counting backward
keeping track of finances
manage bills and spending
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Disruptors to EF
trauma (ACEs)
toxic stress impacts developing brain
early environmental stressors without repair
impacts ALL areas of EF
chaos and unpredictability – poor self-regulation
living in a fear, survival state
related to health disparities
(Murray et al., 2015; Nigg, 2017)
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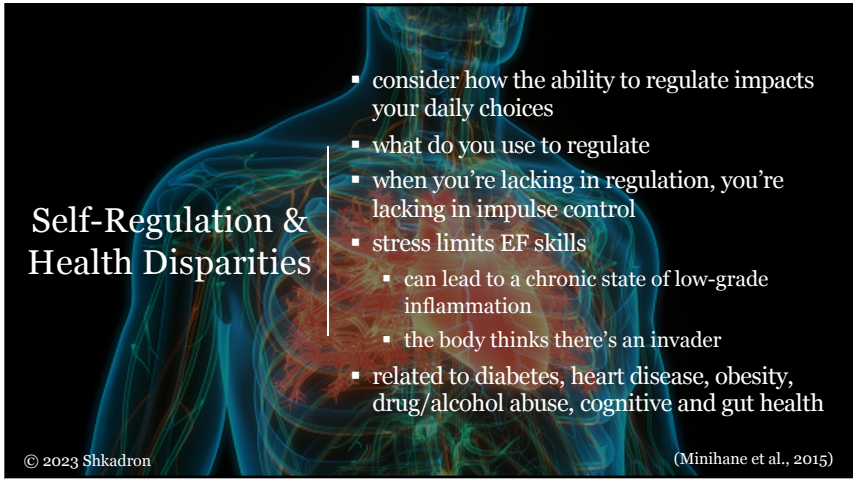
Self-Regulation & Health Disparities
consider how the ability to regulate impacts your daily choices
what do you use to regulate
when you're lacking in regulation, you're lacking in impulse control
stress limits EF skills
can lead to a chronic state of low-grade inflammation
the body thinks there's an invader
related to diabetes, heart disease, obesity, drug/alcohol abuse, cognitive and gut health
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(Minihane et al., 2015)

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All Roads Lead to Regulation
to know how a child is feeling, tap into your own emotions
when the adult has the capacity, listen and validate
adult's heightened stress response, disrupts regulation
depends on individual's window of tolerance
what you can tolerate relates to your experiences
consider what drains your reserves
consider what drains the child's reserves
determine how to replenish both
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(Desautels, 2020, pp. 61-62; Shanker, 2016, pp. 68-69)

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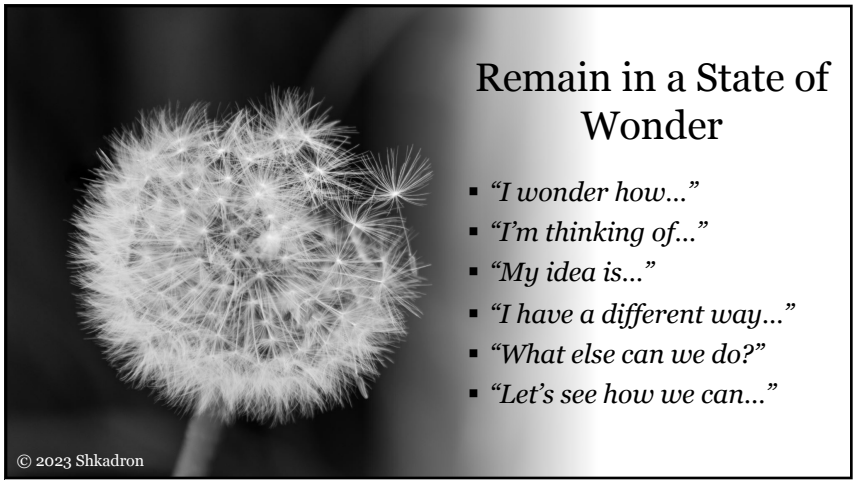
Remain in a State of Wonder
"I wonder how…"
"I'm thinking of…"
"My idea is…"
"I have a different way…"
"What else can we do?"
"Let's see how we can…"
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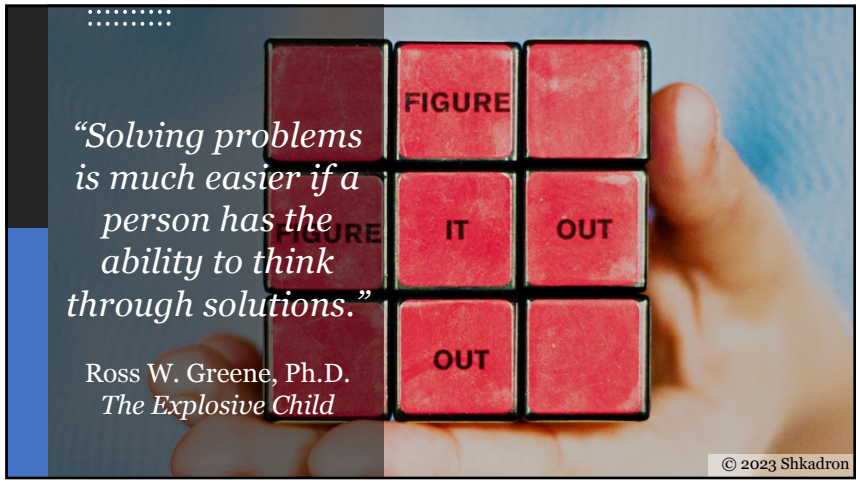
FIGURE
IT
OUT
OUT
"Solving problems is much easier if a person has the ability to think through solutions."
Ross W. Greene, Ph.D.
The Explosive Child
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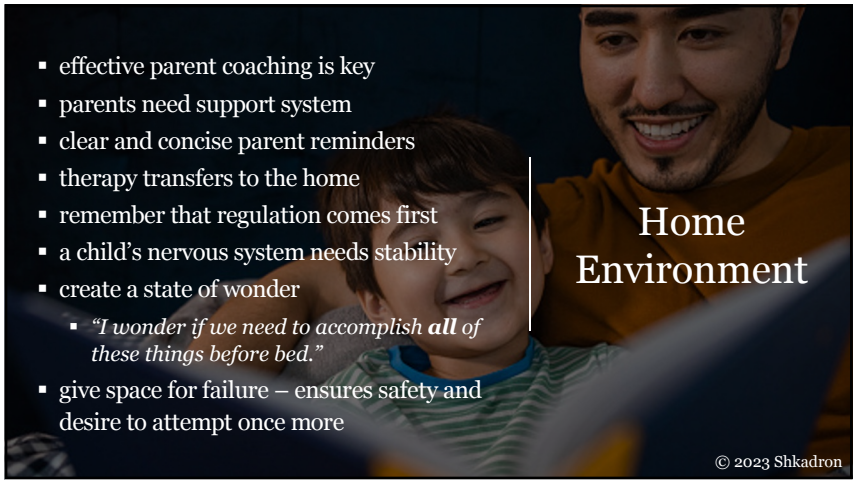
effective parent coaching is key
parents need support system
clear and concise parent reminders
therapy transfers to the home
remember that regulation comes first
a child's nervous system needs stability
create a state of wonder
"I wonder if we need to accomplish all of these things before bed."
give space for failure – ensures safety and desire to attempt once more
Home Environment
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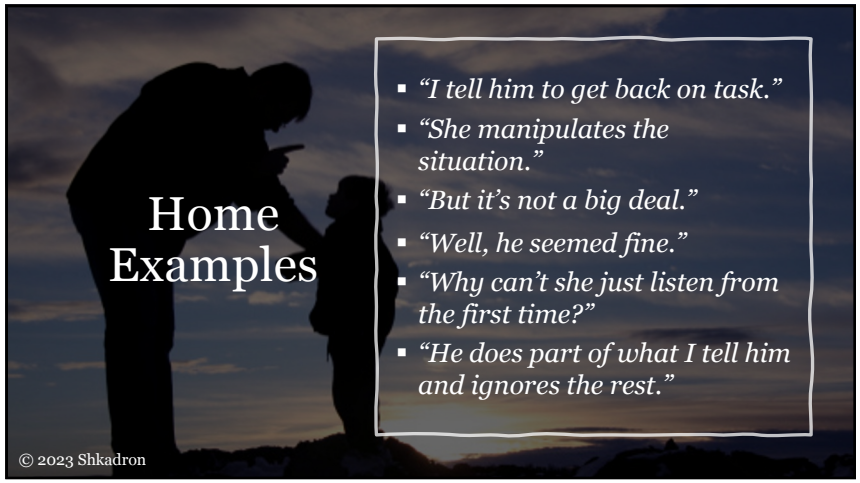
Home Examples
"I tell him to get back on task."
"She manipulates the situation."
"But it's not a big deal."
"Well, he seemed fine."
"Why can't she just listen from the first time?"
"He does part of what I tell him and ignores the rest."
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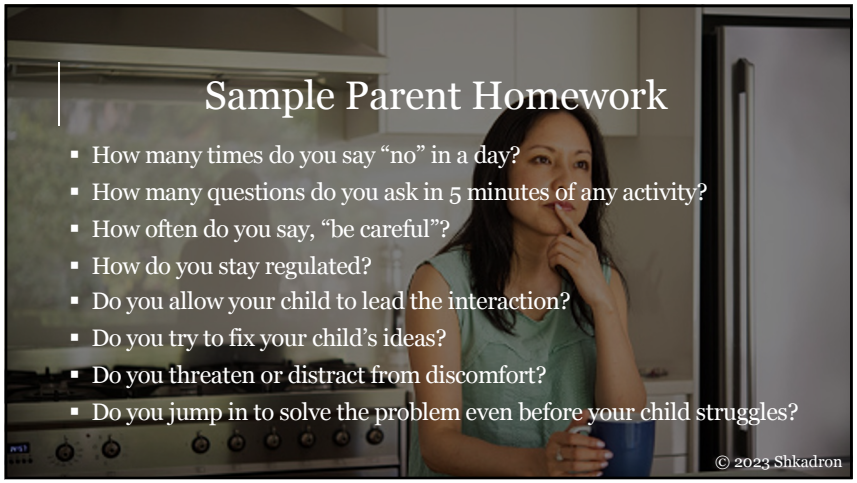
Sample Parent Homework
How many times do you say "no" in a day?
How many questions do you ask in 5 minutes of any activity?
How often do you say, "be careful"?
How do you stay regulated?
Do you allow your child to lead the interaction?
Do you try to fix your child's ideas?
Do you threaten or distract from discomfort?
Do you jump in to solve the problem even before your child struggles?
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Sample Parent Reminders

- There is only the "now" and the "not now." Stay in the present.
- Use simple, direct language. If you find yourself getting lost in your own words, stop talking.
- Focus on the outcome. What exactly do you want to happen?
- Connect to the discomfort. Regulation comes first.
- It's not personal. When dysregulated, we react to the moment.

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Building Life-Long Skills

- **early childhood** begins with self-regulation
- **later childhood**
  - continue to build on regulation
  - working memory for academics
  - inhibitory control with peers
- **(pre)adolescence**
  - planning and organizing
  - setting goals
  - making sure our behaviors match those goals
- **adulthood**
  - skill refinement and efficiency
  - quick decision making
  - effective problem solving
  - advanced project management

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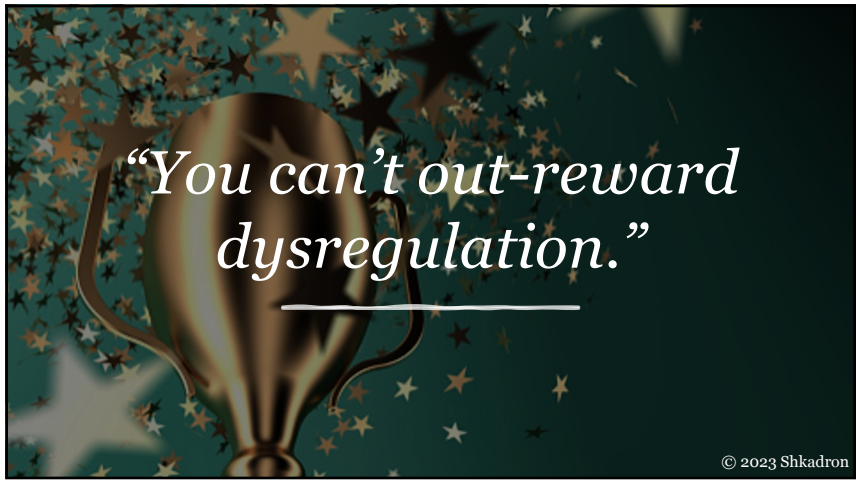

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Connect with Me

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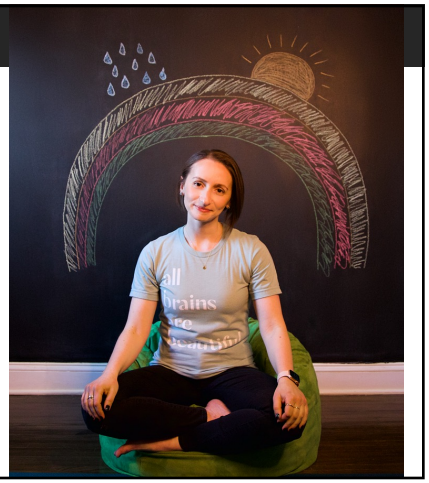

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