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Educating Professionals about Executive Functioning: Developing Strategies to Enhance Executive Functioning in our Communities

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Abstract

Executive Functioning (EF) refers to mental processes and skills required to organize the brain to act on information to reach a goal. Stated in another way, EF can be viewed as the managing system of the brain that coordinates all the activities our brainpower must accomplish. EF allows us to retain and work with a lot of information in our mind. It also helps us to filter distractions and switch from one topic or project to another.

Specific skills of EF include: working memory, initiating and planning tasks and regulating behavior (impulse control, emotional control). Weak EF can occur in children with developmental disabilities (DD) and those without DD. EF dysfunction is viewed on a spectrum. Some children may have mild deficits; others may have more severe issues. Children may also have weakness in some skills and be proficient in others. EF dysfunction is not a diagnosis. It will, however, increase the difficulties of managing day-to-day activities and educational success for children/adolescents with this disorder.

There is a dearth of literature on the incidence and prevalence of EF dysfunction. Even without specific statistics, special education and mental health experts are beginning to recognize the negative effect that weak EF has on a person's academic and social abilities. Communities must become educated with issues associated with weak EF, in order to advocate for students' needs. Learning strategies to improve students' EF will enable children/adolescents/students to reach their full potential as adults.

This article will provide educational information and practical approaches for educators and healthcare professionals to assist families in managing EF in their children. Many of the strategies can be used in the schools and in the home to augment EF support. Adults needing EF enhancement may also find these same methods helpful.

Keywords: Executive functioning; Working memory; Children

Introduction

Executive Functioning Skills refers to the interactions in our brains required to perform tasks and get things done [1-4]. Executive Functions (EF) are central processes that give organization and order to our actions and behaviors [2]. Sometimes these abilities are called mental skills [3]. These cognitive skills include: planning, organizing, prioritizing, remembering things, regulating behavior and using strategies from the past to solve present issues [1,3]. Children who have weak EF may have difficulty: (a) keeping track of time, (b) making plans, (c) multitasking, (d) analyzing ideas, (e) time planning and, (f) learning from past experiences [1,3]. When children have weak EF they will have greater difficulty in analyzing tasks and breaking them down into smaller steps.

Children need EF skills to develop into independent members of their community. EF skills promote positive behavior and allow us to make healthy choices [1,4]. Deficient EF skills can be taught and current EF skills can be improved. While this may require patience and work on the part of parents, schools and health care professionals, the outcome is a better-prepared, more independent young adult.

Children are not born with Executive Functioning skills; they must be learned [4]. Children are, however, born with the ability to acquire EF skills. The manner of developing EF skills is a slow, progressive process, beginning in infancy and continuing to young adulthood. Children build EF skills through activities and social interactions. Over time EF competencies may be practiced and developed.

EF dysfunction may be found in all children. It is also commonly found in persons with the following DD: (a) attention deficit hyperactivity disorder (ADHD), (b) autism spectrum disorder (ASD), (c) fetal alcohol syndrome (FAS), (d) cancer patients on chemotherapeutic agents, (e) learning disabilities (LD) and, (e) mood disorders [1,3]. In children with DD weak EF has greater negative impact on their learning and socialization, than children without DD. Early recognition of EF weakness in all students enables comprehensive school services such as Individual Education Plans (IEPs) or Behavior Intervention Plans (BIPs) to be developed and needed services provided.

Case Presentations

Lisa is a 14 year old in 8th grade. She is an average student who likes school and doesn't mind doing her homework. Unfortunately, she forgets to turn it in, so she is failing several classes.

Leroy, 11 years old, in 6th grade, never starts projects on time. He will begin working the day before a project is due. He fails to obtain all the needed materials and does not complete the work. While he enjoys the projects, his grades suffer from his poor planning.

Juan, 12 years old, receives instructions from his mother regarding the chores he needs to complete before he goes outside to play. A few minutes after being told what needs to be done, he returns to ask for the information again, as he cannot remember the list of tasks.

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Iryna, 9 years old, is late to school almost every day. While she is awakened and prodded to get ready for school, she cannot get out on time. This creates great friction between her and her parents.

Hania, 10 years old has difficulty doing his math homework. Many nights he has difficulty completing the work and often tells his parents that he has finished his work, when in reality he gave up.

Kyeung, 6 years old, has difficulty moving from one activity to another. She has the greatest stress when a planned activity is cancelled or changed. At times she has even experienced mild panic attacks.

Each of the above case presentations demonstrates a child/adolescent with a weakness in EF. In Table 1, you will see a list of EF skills and examples of weaknesses in each area. Using the scenarios from the case presentations above, you may be able to identify which EF weakness (es) each child may have.

By reviewing Table 1 above and the case presentations, the following EF weaknesses can be identified:

Lisa, who forgets to turn in her homework, has difficulty with organizational skills. She will need help in arranging her backpack to place homework in a consistent place when finished, so she can find it when it is time to turn it in.

Leroy needs help with time management where he will need to learn how to get a project completed by a certain due date. He also needs help in the EF skill of planning and prioritizing.

Juan has difficulty with working memory. He needs help learning to perform routine chores and duties without constantly being reminded of the list of tasks.

Iryna likely has a combination of difficulties such as task initiation, moving from one type of activity to another (flexibility) and time management.

Hania, needs help in reaching his goal without developing frustration. This is termed as goal-attainment persistence.

Kyeung has issues with flexibility and will need help adjusting to change.

Assessing EF difficulties

From the above case presentations, each child/adolescent has difficulty meeting their age-appropriate expectations. Teachers, primary care providers and healthcare professionals, should have a basic understanding of what age-appropriate behaviors and expectations include. This will help professionals to assist families with recognizing when their children may need some extra support. Questions families may ask are included in Table 2.

Teachers, paediatricians and other health care professionals are familiar with growth and development in children [5]. Below you will find a list of what is considered age-appropriate activities for this population (Table 3). While there is some variation in all children, the list below can assist in identifying if your child/adolescent is achieving certain behaviors by the age expected. For children with DD, age appropriate behaviors are based on several factors. However, most children with DD can also benefit from the strategies that will be discussed in this paper.

Development of EF skills

Children have an innate ability to want to learn and master skills to

Executive Functioning Skill	Definition of Weakness in EF Area	Example
1. Working Memory	Inability to hold onto information to complete a task. Difficulty following directions; may not be able to process multistep tasks.	May begin a task, then need to have directions repeated. May not remember what s/he was going to say.
2. Flexibility	Inability for child to change approaches to tasks when a plan is not working. May think more concretely than others.	If family changes plans at last minute, child may get very anxious and even panic. Child/adolescent may have difficulty moving from one activity to another (transitions).
3. Time Management	Child/adolescent does not have awareness of how long tasks take to complete. May wait until the last minute to work on a school project or perform chores at home.	Begins a science project the night before it is due; project may then be incomplete or completed sloppily.
4. Emotional Control	Child may not be able to manage feelings; may have difficulty being corrected for mistakes. Closely aligned with impulse control.	When a child has difficulty with a task (difficult homework), they may get upset and not complete the assignment (or ask for help).
5. Impulse Control	Child/adolescent has difficulty thinking before acting. They may engage in unsafe or risky behaviors without fully thinking about consequences. This issue also includes difficulty with inhibition.	May blurt things out of turn. May rush through homework. May engage in high-risk behaviors. May not be able to stop behaviors that child/adolescent knows that s/he should not engage.
6. Organization	Child/adolescent has difficulty remembering where s/he placed things. May lose or misplace items.	Child may forget to turn in completed homework; forgets clothing, sports equipment and electronics.
7. Goal-directed persistence	Child/adolescent needs to be able to "stick" with a hard job until it is completed.	Child/adolescent may not be able to complete a job/task to reach a goal—this may be quite disabling.
8. Sustained Attention	Child/adolescent frequently distracted during activities. May seem to appear disinterested in class or not hear instructions given.	May have difficulty in classes paying attention to an entire lesson.
9. Planning/ Prioritizing	This skill involves breaking down tasks/projects into the steps required to complete the project. Child/adolescent may not know how to begin a project.	May lack skills to determine steps to complete a school project. Does not prioritize the steps needed to get materials and other items for a project (example: cannot start a science project). Waits until last minute.
10. Self-monitoring	Child/adolescents may have difficulty evaluating their own performance—lacking awareness.	Child/adolescent may not check completed work (or exams).

Table 1: Executive functioning skills and examples of weaknesses in these areas [1,2].

	Sample Questions
1.	At what age should a child be able to dress him/herself and get ready for school (with what assistance?)
2.	At what age should a child be able to manage a level of frustration/disappointment?
3.	At what age should a child be able to follow 2-3 step instructions?
4.	At what age should a child be able to determine how much time homework takes and plan their evening accordingly?
5.	At what age should a child/adolescent be able to plan and carry out steps for a school project with minimal assistance?

Table 2: Sample questions families may ask providers [1,5].

become adults. Children begin to build their EF skills by participating in meaningful social interactions and enjoyable activities [1,4]. Through games, play and school, children begin to work on EF skills and behavior regulation. Adults need to support children while they learn and slowly reduce support so that the child can become more independent.

Several activities have been identified as age-appropriate events, which may enhance the learning of EF skills. While they are not all research-based, many experts have agreed that certain events will allow children to practice and perfect their EF skills [1,4]. Many of these activities parents routinely perform. Listed below, Tables 4a-4c is a sample of undertakings that will enhance the development of EF skills in children/adolescents. For professionals and community members working with children/adolescents, programs for children should include these types of activities. When working with individual families, professionals should encourage these activities for their clients.

Families and schools generally engage in many of the above activities. The listed information is helpful in understanding the progression of activities and how to provide more challenging pursuits for participants. Schools can use this information when creating after-school programming allowing for a variety of recreational events, providing opportunities to focus on different EF skills.

Early recognition of EF dysfunction and timely interventions, improve the child's/adolescent's outcomes [6,7]. When families and/or professionals recognize the difficulties students' experience, comprehensive assessments need to be performed. These assessments will provide the basis for services required.

Scientists, researchers and clinicians do not know exactly what causes EF weakness [3]. Experts postulate that there is a combination of influences

Executive Functioning Skills in Age Appropriate Behaviors
3-4 Years Old 1. Complete simple, single step tasks: "Please put your clothes on your bed". 2. Take some plates from the dinner table to the sink. 3. Easily stops unsafe behaviors when reminded: Don't touch the hot stove.
5-7 Years Old 1. Complete 2-3 step tasks/errands. Bring the dishes to the sink and fill the sink with water. 2. Straighten up bedroom or play area independently. 3. Assist with simple chores in the home (may need reminders). 4. Able to bring school supplies to and from school. 5. Complete homework (20-30 min maximum with minimal assistance). 6. If temper outbursts still occur, they are short and easily diverted.
8-11 Years Old 1.Remembers to bring home important papers from school. 2.Independently able to complete chores/tasks that may take up to 30 min to complete. 3.Keeps track of personal items/belongings when away from home. 4.Can complete homework independently (up to 60 min). 5.Can save earned money for a wanted item (delay gratification). 6.Can wait to be called in class before speaking. 7.Older children may begin to care for younger siblings. 8.Older children may begin to be trusted to be alone in the house. 9.Avoids getting into physical altercations with other children at school.
12-14 Years Old 1.May be responsible for arranging their schedule. 2.Can independently do their homework and plan their activities. 3.Can independently do chores (60-90 min). 4.Can babysit younger siblings and non-related children. 5.Can follow safety rules without required supervision. 6.Can plan and carry out long-term projects.
15-17 Years Old 1.Managing homework, including own schedule, assignments and projects with minimal or no assistance 2.Able to develop long-term goals and determine college interests and other vocational goals. 3.Schedules leisure time activities, plans for summertime activities and possible employment. 4.Avoids high-risk behaviors (alcohol, smoking, illicit drug use).

Table 3: Sample list of age-appropriate behaviors [5].

Activity	Age Group
Introduction	Between the ages of 3-5 children's EF skills mature at a rapid pace.
Imaginary Play	Children learn to play cooperatively, and act out experiences in their own life, such as nurse, mommy or daddy, etc. Parents can help children by providing different props (clothing, play tools). Assist children to also use other items as pretend, example. Tape as a band-aid. This will aid children to learn about flexibility (and use imagination). Parents can also assist children to draw a plan on paper before they act out the role(s). This helps children to learn to think first and then act, which assists in learning impulse control.
Storytelling	Young children love telling stories. One idea is to have a few children work together to tell a story. One child begins the tale and each child in turn adds on to the existing narrative. Children develop working memory skills. If you speak a second language to your child, it helps build fluency, and works on many different EF skills.
Songs and games and other activities	Songs, games and moving to music aid children in working memory skills and inhibitory control. When learning new and challenging activities children learn to focus their attention and goal oriented-persistence. Quiet games such as matching teach working memory and cognitive flexibility. Puzzles aid in working memory and planning skills. Cooking is a fun activity where children practice working memory, inhibitory control and focusing.

Table 4a: Executive functioning skill development for 3-5 year olds.

Introduction	Children at this age are very industrious and active; they like to be challenged and learn new things.
Card Games and Board Games	Card games and board games requiring use of memory skills and/or learning strategies and are helpful for students in learning EF skills.
Physical Activities	Physical activities will assist in the learning of attention and inhibition, especially those that require starting and stopping during the activity (e.g. Red Light, Green Light). Fast games that involve decision-making and self-control improve EF skills. When children participate in organized sports, martial arts, and other mindfulness activities they develop enhanced focus and attention.
Activities requiring strategy and reflection	Age-appropriate puzzles, brainteasers and more complicated matching games exercise attention and problem solving skills---which enhance working memory and cognitive flexibility. Logic and reasoning games—Rubik's cube, Traffic Jam, exercise working memory, reasoning skills, and cognitive flexibility.

Table 4b: Executive functioning skill development for 5-7 year olds.

Introduction	For children 7-12, similar activities as previously described continue. Children will need to be continually challenged with increasingly more complex activities and sports.
Card games and board games	Challenging board games and card games that include needing to remember and strategize will exercise working memory. Card games such as gin rummy and others will also provide enhanced cognitive flexibility, attention and decision-making. Games like chess require strategies, which enhance working memory, decision-making and many other skills (focus, attention).

Table 4c. Executive functioning skill development for 7-12 year olds

Symptoms That May Indicate an EF Weakness
1.Unable to figure out how much time it takes to do a task.
2.May do things slowly and run out of time to complete a task.
3.May do things quickly and sloppily.
4.Gets easily frustrated when working on a task that is difficult.
5.Has difficulty paying attention; loses though when interrupted.
6.Difficulty following directions; needs to be told directions several times.
7.Unable to switch activities easily.
8.Has difficulty processing information.
9.Difficulty figuring out how to begin a multistep task.

Table 5: Symptoms that may indicate an EF weakness [1,3].

Process for Evaluation of EF Dysfunction
1.All children with learning difficulties need to have an evaluation by a primary care provider to ensure that there are no medical issues affecting the child's learning. Medical evaluations should include vision and hearing tests.
2.Comprehensive testing can be requested through the school. Professionals such as special education teachers, social workers, and psychologists may then do evaluations and testing to narrow down what issue might be occurring.
3.An assessment tool, the Behavior Rating Inventory of Executive Function (BRIEF) is a questionnaire specifically evaluating executive functioning skills. Parents, teachers and children/adolescents complete this questionnaire.
4.Intelligence testing may identify comprehension issues and processing disorders.
5.Professionals will want to observe the student in the school setting to determine any environmental concerns.
6.Once the assessments are completed, professionals will review the results. They may offer strategies that might be helpful in assisting your child. You will also be able to use this information to obtain an Individualized Education Plan (IEP).
7.Families should be encouraged to find community support groups and organizations that provide education, advocacy and support. Professionals must be knowledgeable about resources available resources and provide referrals.

Table 6: Process for evaluation EF dysfunction [1].

that create the environment in which EF dysfunction is likely to occur: (a) genetics, (b) differences in brain function (in the pre-frontal cortex, (c) effects of neurological conditions, (d), mood disorders and, (d) other DD [3]. Specific signs and symptoms of EF dysfunction may vary based on each child's/adolescents area of weakness and the severity in that area. Table 5 lists symptoms commonly found in persons with EF weakness.

When parents seek professional help in regards to their child's difficulties it is important to ask them to keep a journal of the child's issues and monitor academic and social progress. Professionals should ask families to obtain information from the schools and other community programs in which their child is participating (church, sports, clubs, etc.). This information may be used to determine patterns and consistency of behaviors, which, is invaluable for assessing and evaluating a child's area(s) of need. As children mature, behavioral expectations for completing complex tasks and skills increase. EF weakness may not be as noticeable in younger children, but may become paramount later in childhood/adolescence.

Interventions to improve EF functioning can begin at any age [3]. EF weakness is diagnosed through a comprehensive process (Table 6). Parents/guardians may need encouragement to request a complete evaluation for their child. This can usually be accomplished through the school (ages 4-17) and through early intervention programs (ages 0-3).

Research on executive functioning weakness

Kroesbergen et al. [8] investigated the effects of Executive Functioning weakness on mathematical ability. A tool that measured inhibition ability, shifting (flexibility), planning and working memory was used to evaluate EF weaknesses. The weaknesses of the students' EF skills were compared with their mathematical ability. The sample included 240 Kindergarten children.

The researchers noted that there was a correlation between mathematical scores and EF weaknesses; EF skills were highly related to children's math competence. Children with weaker EF functioning had poorer math skills. Students with higher math scores had higher EF scores [8]. The authors were also able to determine through other data on the children regarding their intelligence quotients (IQ) scores, that EF skills may be more important than IQ [8].

Cantin et al. [6] investigated the following EF skills: working memory, flexibility and inhibition. They compared these skills to math, reading and theory of mind (social skills) scores. Their sample included 87 students between the ages of 7-10. They concluded that EF skills affect a student's abilities in math, reading and social skills [6]. The authors recommend screening for EF functions along with traditional instruments early in a student's academic life. Cantin et al. [6] postulate that EF testing should begin in elementary school, to allow for early intervention and support [6].

A study performed by Romer et al. [7] investigated the effects of working memory, cognitive control and reward processing by assessing risk-taking ability and impulsivity among 387 preadolescents. The participants were between the ages of 10-12 years of age. Adolescents with poorer impulse control and lower EF skills were found to be at higher risk for anti-social behaviors.

The researchers determined through their study that children with impulse tendencies (poor impulse control) related to low EF skills should be provided with early interventions [7]. According to the investigators, early involvement with these selected preadolescents may be reducing the development of high-risk behaviors, which, may occur later in adolescence (smoking, alcohol) [7]. Dekker et al. [9] conducted a retrospective quantitative research study examining the relationship among math difficulties, EF weakness and intelligence

quotients (IQ), in students with mild to borderline intellectual disabilities. Participants included 120 children who met the Dutch criteria for placement in schools for special education and had an IQ below 85. The students chosen were in fifth and sixth grade (ages 10-13) and their IQ ranged from 53-84. Parents self-selected to have their child participate in the study. 63 of the 120 students who entered the project had all the available data required for the investigation. Standardized Dutch mathematics tests were used to assess mathematical ability.

Intelligence scores were measured by the Dutch version of the Wechsler Intelligence Scale for Children-3rd Edition, in 89% of the students; the remaining 11% had IQ measured by other acceptable standardized tests. The investigators defined Mild Intellectual Disability (MID) as having an IQ between 50 and 70; Borderline Intellectual Disability (BID) as an IQ between 70 and 85 [9]. Executive Functioning was measured by the teachers, using their version of the BRIEF-T rating scale [9,10]. Specific areas of EF reviewed for this study included: (a) inhibition (ability to stay seated in class), (b) shifting (flexibility) and (c) working memory.

Quantitative statistical analyses were used to evaluate the data. Results from the EF problems scales (evaluating shifting, working memory, inhibition) determined that all three named scales were interrelated. Children with MID and BID demonstrated difficulties in all three areas; students with MID had more problems with shifting than did the students with BID. No significant score differences noted with student gender. IQ was highly related to math scores and the Shift EF scale. Children with higher IQ levels had better math scores and less difficulty with shifting [9]. Higher math scores were also correlated with higher Working Memory and Shift scales.

Through the examination of the data it was noted that children with less problems with working memory, flexibility and higher IQ scores had better math skills. Those with inhibitory problems did not do as well on the math tests. According to the investigators EF problems and IQ are independent of each other. However, mathematical abilities are dependent on both EF skills and IQ [9].

EF weakness in adults and children

Several commercially available books address EF issues and offer assessment tools to identify EF weaknesses. These tools may be helpful. However, they are not considered diagnostic. The most commonly used diagnostic tool is the Behavior Rating Inventory of Executive Function (BRIEF), a tool that is considered both valid and reliable [10]. Other assessment tools may be available through professional practices, or the school.

Professionals may recognize that many adults/parents have EF weaknesses, too [2]. Parents must be made to feel comfortable to discuss that they may have weaknesses in certain EF areas. Teachers and health care providers can offer support in that many of the strategies that will be discussed are helpful for adults in addition to their children. Parents may also be able to participate in Cognitive Behavioral Therapy (CBT) or use self-help books to assist them to improve their EF [2].

When both parents and children have EF weaknesses, there are several issues that can arise: (a) if a parent is strong in one EF area and the child is weak in that same area; parents may have a hard time understanding their child's difficulty. Parent's, however, are in an excellent position to help their child with those EF weaknesses, (b) when children and parents have different areas of strengths and weaknesses, they can learn to support/assist each other, (c) when parents and children have the same EF weaknesses they can have empathy for each other [2]. Families can try to find humor in shared weaknesses and then brainstorm with each other on how to improve them. Professionals should be familiar with community resources that can provide support for adults, in addition to the schools, which, are positioned to help the children/adolescents/students.

Strategies to assist children/adolescents to develop/enhance EF skills

Several different strategies can be used to improve the EF functions in both adults and children. Most professionals are instrumental in helping families with many of the less complex strategies. Experts will need to be consulted for more multifaceted strategies and for children who may have several EF weaknesses and cognitive impairments. Table 7 lists general recommendations for both adults and children who have EF dysfunction.

For many students the above may be enough for them to internalize routines and expectations. Other students may require more explicit instructions. If more support is required, families can incorporate checklists, Action Plans and evaluation tools. The goal of these tools is to aid the student to internalize routines and processes that are taught through external methods.

Specific principles to keep in mind when developing more complex plans include: (a) consider the student's developmental level, (b) create routines and schedules, (c) break down complex skills into smaller tasks, (d) use incentives, (e) provide enough support so the student is successful, (f) keep supports in place until student has mastered the skill, (g) do not allow student to become frustrated, (h) decrease support gradually, (i) help student to decrease stress,

1.Develop as many routines for children/adolescents as possible.
2.Use the child's/adolescents innate desire to succeed and have control over their environment to motivate them to their goals.
3.Place signs throughout the home as reminders, e.g.
a.Remember backpack, sports equipment sign near the front door, as a reminder before leaving the house.
b.Brush teeth, wash face sign on the bathroom wall/mirror. Use pictures for younger children.
c.Pace "Take Medication" sign, in the kitchen (for younger children or those with low reading comprehension may use pictures).
4.Have a set of books at school and at home (not always possible).
5.Send teacher(s) pencils to keep in case your child forgets one.
6.Clean out child's/adolescent's backpack once a week (If child has an IEP ask special education teacher or counselor to do the same).
7.Ask teacher(s) to check child's planner daily.
8.Reduce clutter in the home; make sure that there is a place for everything and as often as possible, everything in its place—Use of boxes or shelves just to "place things".
9.Use of technology (older children) to organize information, set alarms, or send child texts as reminders (If student has an IEP can request school to provide). Also if child might lose item, have him/her leave at the school.
10.Note that when child/adolescent has transitions (elementary school to middle school), difficulties and readjustments occur.
11.For older children/adolescents who have many classes, and forget their homework, ask school for accommodation to email homework to teacher. Also provide hard copy so child/adolescent learns to hand it in (work on keeping folder in specific location in backpack where homework will be placed).

Table 7: General strategies to assist child(ren) with EF dysfunction [1].

Executive Functioning Skill	Definition of Weakness in EF Area	Example	Strategies
1. Working Memory	Inability to hold onto information to complete a task. Difficulty following directions; may not be able to process multistep tasks.	May begin a task, then need to have directions repeated. May not remember what s/he was going to say.	Write down information Use of checklists Leave signs around the house—remember backpack at front door.
2. Flexibility	Inability for child to change approaches to tasks when a plan is not working. May think more concretely than others.	If family changes plans at last minute, child may get very anxious and even panic. Child/adolescent may have difficulty moving from one activity to another (transitions).	Use of Action Plan Teach anxiety reducing skills Do not let child get frustrated with any task; assist child until s/he develops skills in that area.
3. Time Management	Child/adolescent does not have awareness of how long tasks take to complete. May wait until the last minute to work on a school project or perform chores at home.	Begins a science project the night before it is due; project may then be incomplete or completed sloppily.	Use of project checklist Alarms may be helpful To alert to time ending
4. Emotional Control	Child may not be able to manage feelings; may have difficulty being corrected for mistakes. Closely aligned with impulse control.	When a child has difficulty with a task (difficult homework), they may get upset and not complete the assignment (or ask for help).	Do not allow child/teen to get frustrated with any task Teach communication skills; ask for help May use Action Plan
5. Impulse Control	Child/adolescent has difficulty thinking before acting. They may engage in unsafe or risky behaviors without fully thinking about consequences. This issue also includes difficulty with inhibition.	May blurt things out of turn. May rush through homework. May engage in high-risk behaviors. May not be able to stop behaviors that child/adolescent knows that s/he should not engage.	May develop Behavior Plan with Action Plan. Many behavior plans are beyond basic EF skills and will be addressed in the next manual.
6. Organization	Child/adolescent has difficulty remembering where s/he placed things. May lose or misplace items.	Child may forget to turn in completed homework; forgets clothing, sports equipment, and electronics.	Use checklist to organize backpack
7. Goal-directed persistence	Child/adolescent needs to be able to "stick" with a hard job until it is completed.	Child/adolescent may not be able to complete a job/task to reach a goal—this may be quite disabling.	Do not allow child/teen to become frustrated with any task; give support and review skills to use previously learned information to assist in new areas.
8. Sustained Attention	Child/adolescent frequently distracted during activities. May seem to appear disinterested in class, or not hear instructions given.	May have difficulty in classes paying attention to an entire lesson.	Have student sit close to teacher Have teacher write down instructions Use of technology for reminders and taking pictures Use of objects (in hand) to help focus
9. Planning / Prioritizing	This skill involves breaking down tasks/projects into the steps required to complete the project. Child/adolescent may not know how to begin a project.	May lack skills to determine steps to complete a school project. Does not prioritize the steps needed to get materials and other items for a project. (example: cannot start a science project). Waits until last minute.	Use of project checklist Assist child to use planner/calendar/ technology as reminders

Table 8: EF skills and examples of strategies to improve their function [1,2].

anxiety and anger and, (j) have student participate in the process as much as possible; use negotiation [1,2]. In Table 8, review the EF skills and examples of EF weaknesses. In the column furthest on the right, note specific strategies that are listed for different types of EF dysfunction.

Use of checklists, instructions and other basic strategies.

One of the least complex tools to help children/adolescents enhance EF is the use of checklists. They can be written simply with few instructions (and/or pictures) for young children or complex for older children/adolescents. Please see below checklist as a sample. You can

add or subtract as needed. For younger children, it is recommended that the checklist be in simple words (and pictures), with few activities on the list (Table 9).

This next checklist carries with it instructions for parents to help their child/teen organize their backpack. Lisa, in middle school, has difficulty with organizational skills and will need support in managing this task. Organizing and reviewing Lisa's backpack on a regular schedule, will enable her to easily find her homework, complete it and locate the paper when it needs to be handed in to her teacher. An additional suggestion is to ask if Lisa can scan her homework when completed at home, email it to her teacher and submit a hard copy the next day (Tables 10 and 11).

Children/adolescents with time management issues, along with planning and learning to prioritize, such as Leroy, a checklist is helpful. A checklist will provide the learning on how to plan for projects. Work with your child/student to plan the steps required for the projects (Table 12).

Many children/adolescents need help in learning how to study, especially in preparation for exams. In elementary schools, most of the information is taught in class and reinforced through homework. Older children may need to research or study new information on their own. A checklist may be helpful for those students who have difficulty in organizing study time for tests, or just need to "see" the steps required. The following checklist, Table 13 may be helpful.

Checklists can be very helpful in breaking down complicated processes into smaller steps. Encourage families to choose only one or two areas of concern at a time, so that students do not get tired or begin to ignore the checklists. Once the student has internalized a process you can discontinue the checklist. Have families/teachers reward their child/student for sticking to the checklist and working towards improving their skills. After a short break, families can introduce another list.

Action plans

A more complex type of checklist is the Action Plan (AP) [12]. The AP is viewed more like a contract. It is most helpful when creating an Action Plan that the child/student is engaged in the process. For this type of behavior modification, we are going to look first at some helpful hints on how to develop this contract. These guidelines (Table 14) will help to develop this tool.

An Action Plan (AP) has several sections: (a) title of plan, or behavior in need of modification, (b) goal of AP, or desired endpoint, (c) objectives, steps to meet the goal, (d) rewards, benefits of reaching goal, (e) consequences, what happens if goal is not met and, (f) other, any additional information or resources needed to complete the AP. For adolescents like Juan, who has issues with **working memory**, an AP with his list of chores may be helpful. He can be more independent in completing his weekly tasks and the frustration that may develop between himself and his parent/guardian will likely be reduced, as repeated instructions are no longer required. APs and checklists should be placed in a consistent area, so that they are easily found. Below is a sample of a blank Action Plan followed by a completed sample (Tables 15 and 16).

Below is another sample of an Action Plan. If we think back to Iryna, the 9 year old child who has difficulty getting ready for school in the morning (task initiation, time management and flexibility), we

Activity	Picture (if needed)	Checkbox
Make your bed		
Brush your teeth		
Help Mom/Dad/Grandma set the table for dinner.		
Take dinner dishes to the sink after dinner		
Put toys away		
Put on pajamas		
(You may want to add your own tasks).		

Table 9: Checklist-activities for young children.

Backpack Instructions
1. Do not assume your child knows how to organize a backpack (even if you have shown it to him/her, or their teacher creates a list).
2. If your child has an IEP, ask the school to go through child's backpack once per week.
Parents/guardians need to go through the backpack at least once per week.
3. If the school has a computerized system, check nightly for assignments.
4. Keep tools in backpack simple and to the minimum (have some supplies at home and at school).
5. Throw out (or file) unnecessary papers.
6. Develop a checklist for what belongs where (you can guarantee for the average child with EF difficulties, you will need to reorganize where things should be—many times).
7. Attempt to work with child to organize the backpack/notebook.
8. For the much disorganized child, you must take very slow steps (this is likely an area of great frustration for the child/teen). You will need to review often and assist frequently.
9. Label all folders clearly and in bold print/large letters (e.g. homework—brings to school).
10. Many schools give loose handouts; you will need to punch holes or glue into a notebook.
11. No matter what system you develop, your child will forget, loose or destroy papers—Ask the teacher for extra copies (make sure this accommodation is on the IEP).
12. You will likely have to adjust your child's system several times until your child can figure out what works best (or doesn't work at all) for him or her.
13. In addition to backpack lists, you can make a checklist for what your child must do daily in school.
a. Write assignments in planner
b. Due dates in planner for projects
c. Put instructions for projects in X folder

Table 10: Instructions for helping your child organize his/her backpack.

Backpack Checklist
_____Notebook or divider for each subject. Some students do better with one spiral
Notebook with several sections:
_____Planner in front of Notebook
_____Holder for pens, pencils, ruler, glue stick in front of planner
_____Separate folder for homework
_____Separate folder for papers to bring home
_____ (Add your own)
_____ (Add your own)

Table 11: Checklist for backpacks.

Sample Assignment/Project Checklist			
Assignment: __Ex: Science Project_____			
Due Date: _____One month from today_____			
What Steps Need To Get Done??	**How Much Time Do I Need?**	**When Does It Need to Be Done?**	**Completed**
1. Write a list of items/tools needed for the assignment.	10 min	By the weekend	
2. Check in the house for the items required/listed.	20 min	By the weekend	
3. Tell Mom/Dad/Grandma what items must be bought from store (or ask the school).	10 min	By the weekend	
4. Buy/obtain needed supplies.	60 min	On the Weekend	
5. Plan times to work on project—be specific about dates and times.			
6. Please add more steps as needed.			

Table 12: Sample assignment/project checklist [11].

Study Habits/Test Taking Skills Checklist
1. Attend all classes.
2. If you miss a class, make sure that you get the notes from a friend or the teacher.
3. Do all the homework; if you have difficulty with the homework, get help.
4. Organize the materials/notes/homework that will be on the test.
5. Review past tests to see what types of questions the teacher asks.
6. What kind of test will the teacher give? Multiple choice or essay/short answer.
7. Plan out your study time; choose topics and how long you should study that topic.
8. Write down a schedule for studying.
9. How will you be studying: read notes, study flash cards?
10. For the night before the test you should just review.

Table 13: Study habits/test taking skills checklist [11].

Guidelines for Developing an Action Plan
1. Set a goal; make sure goals are measureable.
2. Involve child/adolescent in goal setting.
3. Outline the steps to reach the goal.
4. Turn steps into a checklist.
5. Supervise child/adolescent following procedure.
6. Do not let your child struggle with any task.
7. Use negotiation.
8. Slowly reduce supervision.
9. Use rewards and consequences.

Table 14: Guidelines for developing an action plan [12].

can design an Action Plan to assist her with what is expected. This will help reduce the morning friction between her and her mother/father/guardian. It will also outline rewards/consequences for the behaviors. Please note how specific the plan is with time schedules. For children who cannot yet tell time, adjustments will need to be made. Use of alarms and digital clocks may help children who cannot yet tell time (Table 17).

The last example of an AP will address the issue of goal-directed persistence. Hania, who has difficulty with his math homework can use some support to manage the stress and frustration that accompanies his difficulty in maintaining his attention to complete his work (Table 18).

Successful APs and checklists should be reviewed at regular time intervals. To start with, once a week might be helpful. As behaviors improve, checking can be done less frequently. There is no specified amount of time that improvement will occur. Some students may progress slowly and only accomplish a few steps in their plans. The goal is learning, so any amount of learning is a success. Children/Adolescents needed to be rewarded for even small steps gained in their plans.

Professionals need to keep in mind that there may be differences in

_____(Title of Action Plan)
Goal/Purpose: _____
_____
Objectives:
1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
Rewards: _____
Consequences: _____
_____
Other:

Table 15: Suggested format for action plan [12].

TITLE OF ACTION PLAN: Weekly Room Cleaning
Goal/Purpose: Be able to perform room chores weekly, with 1-2 reminders
Objectives: By the end of the weekend, adolescent should be able to:
Pick-up all items on the floor and place in appropriate areas (dirty clothes in hamper, clean clothes in closet or drawers).
1. Place all trash in the trash cans/bins.
2. Bring all dishes to the kitchen.
3. Throw trash in the dumpster.
4. Vacuum bedroom floor.
5. Dust all surfaces.
6. Wash bedding every other week.
Rewards: 1. Dinner with Mom-monthly
2. Ten dollar gift card- monthly
3. Car privileges (age appropriate)
Consequences: 1. Dirty room
2. Unhealthy habits
Other: Mom will supply with needed items:
• Dust cloths/cleaning fluids
• Vacuum
• Laundry detergent/fabric softener
• Trash bags
Plan will be reviewed weekly until reminders are no longer required.

Table 16: Example of completed action plan/weekly chores for adolescent [12].

beliefs between them and the families they work with, especially when it comes to rewards and consequences [1]. Professionals must adapt their plans to what works for the families (except if family decision is harmful). While professionals may introduce preferred options for implementing plans, allowing families to maintain their beliefs will ensure greater adherence to the use of plans, enhancing greater success for the child/adolescent.

For some families, keeping track of behavior improvement is helpful and modifications, if needed, can be implemented. In addition, as one behavior improves, another checklist/AP can be designed. It is recommended that no more than two behavior contracts exist at one time. Below is a sample of a progress chart that may be used to show a child/adolescent how they are improving over time (Table 19).

There are many different types of progress charts and means to monitor a child's progress. The above sample is one type of chart. Depending on the age of the learner, a parent/guardian or teacher can develop charts with stickers, points, or any other system in which the adult and child/adolescent can create together.

Once a student/child/adolescent is used to the above formats, another way to increase their independence is to create a calendar of daily or weekly activities with their family Designing a schedule enables the learner to envision what his/her day is about and plan accordingly. Once a timetable is planned look/discuss ways to help children/adolescents become empowered and take control of their own schedule. Allowing a child/adolescent to view their day can empower them to take control of what supplies are needed and what time they need to be prepared for the activity. If health care appointments are added, the child/adolescent will know how their free time will be effected.

Written schedules will reduce the questions, such as, "What do I do now?" As the child/adolescent matures s/he will be able to predict what needs to be done during an activity or in preparation of an activity. Based on the child's/adolescents cognitive ability, they can eventually begin to create their own schedule, based on their interests and needs (Table 20).

Self-management tools/good day plans

The Good Day Plan (GDP) [13] allows children/adolescents to determine how they can have a good day and then take responsibility

MORNING ROUTINE (Title of Action Plan)
Goal/Purpose: Be on time to school at least four times per week.
Objectives: Be able to:
1. Get up in the morning by 7:20 am; with only 1-2 reminders by parent/guardian(s).
2. Wash face and hands; brush teeth by 7:35 am
3. Get dressed by 7:35 am
4. Eat/Drink Breakfast (by 7:48 am)
5. Take medication (with assistance—age dependent) by 7:48 am
6. Remember all personal school belongings with 1-2 reminders by parent(s) (these should be set out the night before—and placed by the door).
7. Be ready to leave the house by 7:50 am with only 1-2 reminders.
Rewards: Extra 30 min of TV time on the weekend; Extra play time over the weekend; choose a dinner or movie, free pass on homework (ask teacher).
Consequences: Late for school, miss important information, may have school consequences (not playing sports or in-school detention).
If child requires some cues or specific help:
1. Provide alarm clock
2. Set phone or other device for time to complete certain tasks (example: 20 minutes for personal hygiene).
3. Alarm for 7:48 or clocks around the house to visualize.
4. For younger children have fewer steps or more reminders.
You can write a statement of when to review plan (weekly at first—as behavior improves decrease time to review and supports reminders).

Table 17: Action plan for morning routine [12].

Goal directed persistence to complete math homework (Title of Action Plan)
Goal/Purpose: Student will be able to complete math homework with little to no support (from parents)
3 times per week.
Objectives: By the end of the school week, student will:
1. Attend school provided homework help two times per week.
2. Attend paid tutoring for Math once per week.
3. Attempt to complete Math homework before engaging in afterschool programs.
4. If unable to complete Math homework before dinner, will complete homework after dinner, before relaxation time or TV time.
5. If/when student becomes slightly frustrated, may take a 10-minute break, and do relaxation exercises such as: deep breathing, yoga, or others as instructed.
6. Continue to attempt to complete Math homework.
7. If unable to complete work after relaxation exercises or frustration continues, ask parent/guardian for help.
8. Parent will assist child for 10 min and then ask child to continue.
9. If after a few minutes child frustration continues or escalates, parent will intervene until homework is completed.
10. Parent/guardian will check homework nightly to see if it is complete.
Rewards: Parent/guardian will acknowledge student's/child's ability to complete homework. Student/child will be allowed extra TV time or play time on the weekend, or one less household chore.
Consequences: Do 10 min of relaxation exercises. For excessive frustration, either jump rope or run for 15 min (weather dependent). For child with excessive frustration, anxiety or anger, professional help may be required.
Other: 1. Parent will be available to assist in homework help as requested.
2. Parent will provide child with timer.
3. Parent will check homework for completeness

Table 18: Example of AP for goal-directed persistence in completing math homework [12].

for achieving that goal. Created by a state directed project in Virginia, it was funded from their Department of Education (2016). The GDP strategy has been used successfully with children as young as six years old. It has been used in children/adolescents both with and without disabilities. Children with severe disabilities may need some assistance. Adding pictures to the plan may be of help for that population (Table 21).

By assisting our children to learn self-management, we encourage the natural ability of our kids to want to become competent with the skills required to become independent adults. Some basic strategies to encourage self-management in our kids are to encourage the following:

1. Self-monitoring—by recording whether a behavior occurred or not.
2. Goal setting—can be used in conjunction with an Action Plan.
3. Self-evaluation—Determine actual performance with planned.
4. Self-instruction [13].

As with all strategies that we discussed, adults need to support their kids in beginning new skills. As the children/teen's confidence and skill progress, the parent(s)/guardian should fade out the support. Do not remove support abruptly; make sure your child is ready for the decreased assistance.

Use of technological devices

One last strategy is the use of technological devices. They may be very helpful in getting your adolescent more organized (unless of course, s/he loses the device). They can be helpful for organizational skills (use of calendars and reminders), setting of alarms and of course, the occasional text from a parent/teacher. In some states Medicaid will pay for devices. If

Date	EF Skill	What is the Behavior?	How Often?	How long does it last?	How strong is it?
July	Goal-directed Persistence	Frustration, increased anger and anxiety unable to complete Math homework	4 times per week	10-15 min and never completes homework	Severe
August	Goal-directed Persistence	Frustration, increased anger and anxiety unable to complete Math homework	3 times per week	Less than 10 min; finishes homework 1 per week	Severe
September	Goal-directed Persistence	Frustration, increased anger and anxiety unable to complete Math homework	2 times per week	5 min; completes homework 2 times per week with min. assist.	Moderate
October	Goal-directed Persistence	Frustration, increased anger and anxiety unable to complete Math homework	1 Time per Week	Completes homework 3 per week with no assistance	Mild
August	Time Management	Late getting up in the morning and late getting to school	3-4 Times per Week	N/A	Moderate
September	Time Management	Late getting up in the morning and late getting to school	1-2 Times per Week	N/A	Mild-Moderate
October	Time Management	Late getting up in the morning and late getting to school	1 Time per Week	N/A	Mild-Moderate
November	Time Management	Late getting up in the morning and late getting to school	0 Times per Week	N/A	**Skill Completed**

Table 19: Progress chart [12].

Daily/Weekly Activities	Time for Activity	MON	TUE	WED	THUR	FRI	SAT	SUN
Getting up in the Morning	10 min	7-7:10 am	7-7:10 am	7-7:10 am	7-7:10 am	7-7:10 am	8:30	8:30
Getting ready for School	30 min	7:10-7:40 am	7:10-7:40 am	7:10-7:40 am	7:10-7:40 am	7:10-7:40 am	X	X
Morning Chores	30-60 min	X	X	X	X	X	60 min	30 min
Attending School	7 h	8-3:30	8-3:30	8-3:30	8-3:30	8-8:30	X	Sunday School 10-12
After School	45 min-1 h	Chess 3:30-4:15		Basket-ball 3:30-4:15		Basket-ball 3:30-4:30		
Tutoring	1 h		Math 3:30-4:30		Math 3:30-4:30			
Scouts	2 h	7-9 pm						
Sports Activities							Soccer 1-3 pm	
Getting Home from School		4:45	5:00	MD appt.	5:00	5:00		
Free Time/Outside Play/ Relaxing Time			Until 5:45	Until 5:45	Until 5:45	Until 5:45		2-3 h
Shopping/Errands/ chores			20 min	20 min	20 min	20 min	1 h	
Dinner/Clean-up	1 h	6:00-6:45 pm	6:00 pm	6:00 pm	6:00 pm	6:00 pm		
Homework		4:30-5:30	7:00-8:00	7:00-8:00	7:00-8:00			School Projects 1-2 h
Reading							2 h	2 h
Getting Ready for Bed/Prep. for Next Day		9:15 pm	8:00-8:30 pm	8:00-8:30 pm	8:00-8:30 pm	9:00-9:30 pm	9:00-9:30 pm	8:00-8:30 pm
Sleep		9:45 pm	9:00 pm	9:00 pm	9:00 pm	10:00	10:30 pm	9:00 pm

Table 20: Daily schedule/ time management (week or a day; modified by age and cognitive level) [12].

Good Day	Now	Action	Support
What Happens on a Good Day	Does it Happen Now?	What needs to happen to Make it a Good Day?	Who Can Help Me?
What types of things help me to have a good day?? What are my positive abilities? What types of things make me happy	Am I having good days now?	How can I make myself have a good day? What do I need to do to have a good day? What goals do I need to set to have a good day?	What people can help me to have a good day What people can help me with this?
1. I need to get up on time. 2. I need to be quiet in class and take notes 3. I need to eat lunch and talk with my friends 4. I need to engage in sports after school and other recreational activities 5. I need to do my chores at home. 6. I need to relax with the TV 7. I need to get ready for be and go to sleep on time.	_____	Need to remember to set my alarm or get up when my parent/guardian tells me to I need to pay attention in the classroom and not talk to my friends.	My parent/guardian can help me get an alarm clock or wake me up. My teacher can remind me to pay attention. My good friends tell me to be quiet.

Table 21: My good day plan (GDP) [13].

the child's/adolescent are IEP states a need for a device the school system should cover the cost. For a child/adolescent who may lose their device they can take pictures of assignments, email themselves the information and leave the device at the school. Technological devices help students to organize their work and the ability to take pictures decreases the stress of writing assignments in a planner.

Summary

Executive Functioning Skills refers to the interactions in our brains required to perform tasks and get things done. EF's are central processes that assist us with organization and bring order to our actions and behaviors. These cognitive skills are required to help us achieve academic and social success and become independent members of our community. Children are not born with EF skills; they must be learned. The process of learning EF skills is slow and arduous, some children/adolescents having more difficulty in some areas than others. EF weakness commonly is found in children with DD and this may increase their learning difficulties.

Community professionals are in an optimum position when working with families to discuss EF issues. They can guide families in learning how to assist their children in improving their EF skills and/or refer them to appropriate resources. Strategies described in this paper can assist families to learn how to improve EF skills in children/adolescents and adults. Early recognition of EF weakness and commencement of plans as described in this paper, may improve academic and social success for the student.

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