The Importance of Executive Function in Understanding and Managing ADHD

A chat with Russell A. Barkley, PhD

ONE OF THE MOST INFLUENTIAL RESEARCHERS in the field of ADHD, Russell A. Barkley has also been one of the strongest advocates on behalf of children and adults affected by the disorder. He has received numerous awards over his career for his work on ADHD and in the field of psychology for his career-long efforts to dispel misconceptions and to educate the public and other professionals about the science of ADHD. The National Resource Center on ADHD: a program of CHADD conducted this chat in January 2011.

Barkley has authored, coauthored, or coedited twenty books and clinical manuals, published more than two hundred scientific articles and book chapters related to ADHD, founded a bimonthly newsletter for clinical professionals called *The ADHD Report* (Guilford Publications), created seven professional videotapes on ADHD (three of which have won national awards), and served on the editorial boards of eleven scientific journals. He was the president of the Section of Clinical Child Psychology, Division 12, of the American Psychological Association (1988), and was president of the International Society for Research in Child and Adolescent Psychopathology (1991).

In your opinion, are all five executive functions discussed in your video affected to the same degree in a person with ADHD?

No. Although all of them are affected to some extent, this can vary from person to person. That variation may have to do with how the person came to have ADHD (acquired brain damage, genetics, etc.) and with which parts of the executive system are more or less impaired in their case. It also may have to do with their pre-existing level of other abilities, such as verbal and spatial skills.

In my view, executive functioning (EF) is self-regulation. People do things to themselves in order to modify their own behavior so that they are more likely to attain a goal or change some future consequence to improve their welfare. That is self-regulation. There are at least five to six things people do to themselves.

- Self-direct their attention is one that produces self-awareness.
- A second is to visualize their past to themselves.
- A third is to talk to themselves in their mind.
- A fourth is to be able to inhibit and modify their emotional reactions to events. This can also assist with self-motivation.
- A fifth is that they are able to restrain themselves, or what one could call self-discipline. They inhibit strong urges to act.
- Finally, people are able to play with information in their mind. To take it apart, manipulate it in various ways, and recombine it to form new arrangements.

That is what they do when they are engaged in mental problem-solving. They play around with ideas until they find a good combination that seems to overcome the obstacle or problem. By adulthood, people are able to do all of these things in their mind—a sort of Swiss army knife of mind tools for self-control toward the future. Our self-control is always aimed at changing our future. That is what makes an EF executive in nature. It is self-change in order to achieve some goal.

Are treatment methods like working memory training showing any promise with ADHD?

So far, working memory training has some initial promise in small studies, but the results still need to be replicated by other labs whose investigators do not have a conflict of interest—i.e., own the company or get royalties. Those replications are now ongoing in the United States and results should be available soon.

If they continue to show benefits of such practice, then the next question is one of cost—is it worth it? Some commercial WM training programs can be quite expensive, running $1,000 to $2,000. It may turn out that using Nintendo DSS with the Brain Age software is just as effective at one-tenth the

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cost. Or it may turn out that the professional supervision provided in the commercial program is indispensable to get the gains. Time will tell if the cost is worth the benefit for the commercial version of training.

Even then, there may be cheaper ways to deliver the same sort of training. And so far research shows that the gains may last just three to six months before retraining is needed.

Can executive function be improved without medication therapy, and if so, how?

Yes, but probably not quite as much as with medication. One means to try and improve EF is just what we discussed above—working memory training. Another way to help with EF deficits is to try and arrange the setting so that it boosts or facilitates limited EF. You all do this when you write yourself a note and place it where you need to remember something, or when you make a to-do list to help organize yourself for that day. This aids your self-regulation and helps you get your work and goals done, but it is not really expanding your working memory or any other EF.

Another way to boost EF is to understand that it is based on a limited capacity. We have a limited fuel tank for EF and self-control and if we have to use a lot of it over an extended time we exhaust our fuel and become prone to poor self-control.

A few things we can do to replenish our EF fuel tank are:

- Take frequent breaks during the time we need to be using EF (about one every ten minutes for adults).
- Exercise regularly during the week.
- Give yourself pep talks during the task that is so demanding of self-control. These should be self-statements of encouragement and striving for success.
- Visualize the goal and its reward and reward yourself with small rewards throughout the work situation.
- Finally, keep your blood sugar (brain glucose) up. Sometimes keeping a sport drink available during times of strenuous self-control (EF) can help.

Are there any specific associations between styles or characteristics of parenting and executive function impairments in ADHD?

Not that I am aware of. Certainly typical parenting teaches children self-regulation. Parents naturally encourage children to wait, count to themselves, and think about their choices before making them. They also encourage children to consider the consequences of what they are about to do or what options they are considering.

They may even coach children in EF strategies, such as writing notes to yourself, organizing a to-do list, giving yourself encouraging self-statements during hard work, and even using timing devices and calendars to stay on top of work deadlines.

This does not create EF. What a parent is doing is teaching to the child's

specific level of EF development at that particular age. And that serves to help lead the development of EF further and consolidate developmental progress. EF results from the interaction of native brain-based EF abilities and the environment.

For more ideas, see some of the recent books for parents on EF, such as Peg Dawson's *Smart but Scattered*. Thank you. And good question.

I'd like to understand the relationship of executive function to ADD well enough to be able to explain to others why someone, who is otherwise capable and intelligent, is not just "plain lazy." Can you recommend resources or examples of ways to communicate executive functions with others who are not familiar with ADHD?

My books, *Taking Charge of ADHD* (for parents) and *Taking Charge of Adult ADHD* (for adults) give a brief summary of EF in layman's terms. As for the relationship of EF to ADD, the inattentive type, this remains an important topic. Studies using tests of EF show that people with this inattentive type, which some call ADD, have far fewer if any EF deficits.

Researchers call this subset of people SCT for sluggish cognitive tempo. SCT includes problems with daydreaming, staring, being easily confused, mentally preoccupied, and sluggish, lethargic, and slow-moving. It is not clear if SCT is a subtype of ADHD or a separate disorder, but recent studies of mine do show that people with SCT may not have much trouble on EF test batteries, other than slow speed of working.

In my view, executive functioning (EF) is self-regulation. People do things to themselves in order to modify their own behavior so that they are more likely to attain a goal or change some future consequence to improve their welfare.

But they do have more EF problems in daily life as measured by rating scales, such as my new one due out in a few weeks, the B-DEFS. Even there, we found that people with ADD (SCT) had as much trouble with self-organization and problem-solving and self-motivation as those with ADHD, but adults with ADHD had far more trouble with time management, emotional self-regulation, and self-restraint (inhibition). So it looks like people with SCT have some EF deficits that are milder and form a different profile than those with ADHD, at least as EF is reflected in daily life.

A study I have under review for publication used more than 1,200 U.S. adults. Out of that group, we identified those with ADHD and those with ADD/SCT (about six percent for each disorder). When we compared these two disorders, they overlapped about twenty to thirty percent. That is, only about twenty to thirty percent of people with each disorder had the other disorder. What this proves is that ADD/SCT is not a subtype of ADHD. It is a different disorder of attention entirely.

But, it can overlap (be comorbid) with ADHD in some cases. Interestingly, we found that people who had the ADHD Inattentive Type, seventy-six percent qualified for SCT. However, only twenty-five percent of people with SCT had any ADHD at all. Just more evidence that the disorders are separate but overlapping. This is all very new information.

Regarding the inhibition of emotions, how effective are medications? And are any therapy techniques helpful for learning to inhibit better?

The ADHD medications do work but each seems to manage the impulsive emotions of ADHD a bit differently. The stimulants may work by essentially suppressing the emotional brain. If you dose too high with them, you get blunted emotion, but if you dose them right, you do get some inhibition of emotional impulses. The problem here is that the trouble ADHD is causing with emotional regulation does not come out of the emotional brain (limbic system).

ADHD is a "top-down" disorder of managing the emotions that occur. And so drugs that suppress the emotional brain may be getting at the problem from the wrong direction. Some nonstimulants like atomoxetine or guanfacine XR appear to enhance the parts of the brain that are regulating the emotional brain (this is the executive brain).

They may eventually prove to be a bit better at handling the emotional aspects of ADHD. This is not certain. But brain imaging studies do show that the drugs are working in somewhat different brain regions, and from them we can speculate that they may be dealing with the emotional difficulties differently.

As for psychosocial treatments of the emotional problems, there are five strategies one can teach to help manage them better, besides the recommendations I gave above for boosting EF.

These five things are:

- **Situation Selection.** Know the situations that make you emotional and learn to avoid them when possible.
- **Situation Modification.** If you are in a setting and you are getting emotional, see if you can change the setting in some way to help calm yourself—such as get up and walk about a bit, move your chair to a different location away from what or who is provoking the emotion, or even leave to use the bathroom or get a drink of water.
- **Attention Deployment.** If you are in an upsetting situation, try to divert your attention away from the event that is provoking you. Look away, even cover your eyes if you can, and think of something else more pleasant. As Mom said, count to ten and go to your happy place.
- **Cognitive Reappraisal.** Talk to yourself, reason with yourself, and re-evaluate the importance or emotional aspect of the event. Is it that serious? By re-evaluating the event you can diminish its importance and emotional impact. This is like traditional cognitive therapy.
- **Response Modification or Suppression.** Finally, and least effectively, you can try to quell the emotion itself, by focusing on your breathing, using deep muscle relaxation or other stress management tips, inhibiting the emotion as hard as you can, and other methods to self-calm.

Is the person with the diagnosis of ADHD always going to have the symptoms, and just cope with them differently using compensation, as opposed to remediation?

As usual, it depends. My follow-up study shows that about fourteen to thirty-five percent of kids with ADHD no longer had it by age twenty-seven. So there is less for them to cope with or to have to medicate. They were okay. About sixty-five percent or more remained fully symptomatic and had some impairment from their ADHD as young adults. For this group, continued use of medication or returning to meds if they had stopped could be helpful. So could participating in the newly developed cognitive behavioral therapies for adults with ADHD, such as those by Steve Safren at Harvard Medical School or the program by Russ Ramsey at the University of Pennsylvania Medical

School, or that by Mary Solanto at Mount Sinai School of Medicine in New York City.

All have books out on these therapies. They essentially focus on training EF strategies for compensating for one's EF deficits and ADHD symptoms. They do not train out the EF deficits but help people better cope with them. They also boost improvements from medications.

So I don't think we can remediate or train out the ADHD EF symptoms, but in time some people outgrow them while most will need some assistance coping with and compensating for those deficits. To me the issue is not so much getting rid of the ADHD entirely as I do not see that happening for most cases. More important is minimizing the impairment from the symptoms. Impairment is always situation-specific.

Change the situation so that the person is more effective and less impaired in that situation and you have addressed their suffering even if the symptoms are still present.

Think of it like the diabetes of the EF system. You can manage the diabetes, use meds to help control it, alter your lifestyle, and lead a relatively normal life. But we don't eliminate the diabetes. We manage the secondary harms that could arise from not managing it.

What are the chances that ADHD will be renamed to reflect deficiency in executive functions, not focused on attention? I dislike the reference to attention; it is a misnomer!

I agree that ADHD is no longer a good name for the disorder. If naming disorders was just a matter of science, then ADHD would be EFDD or SRDD (self regulation disorder), but, renaming disorders has legal and political consequences (and educational ones).

If the new name you give it does not appear in special education laws, for instance, your child won't get services. And EFDD is not in the ADA law, so you won't get protections for having it.

And let's not give insurance companies another reason to deny benefits because the new name does not appear in their lexicon of reimbursable disorders.

So for these and other reasons, ADHD remains ADHD for now even if we think of it as EFDD, which I do.

What are the best methods of formal assessment of executive functioning deficits in individuals with ADHD?

We used to think that the best means to assess EF was through a test battery, until studies began to appear more than fifteen years ago showing that many people with frontal lobe injuries could actually pass these EF tests. Then came studies showing that only thirty to fifty percent of people with ADHD (kids or adults) did poorly on them. This led some researchers to declare that ADHD could not be EFDD because only a minority had EF deficits. What they did not question was their premise—that only EF tests are good at assessing EF.

At this same time, over the past few years, studies have shown that EF tests also do not correlate with impairments in most major life activities that involve EF. They also do not correlate well with rating scales assessing EF in daily life. So lately, some of us have been writing scientific articles pointing out that EF tests are actually not good at assessing EF as people use it in daily life and are not good at predicting impairment in life.

These same studies showed that rating scales of EF were up to ten times better at predicting life impairments than were any combination of EF tests. So I now think that EF tests may be good if you want some kind of very brief test of EF while you are neuroimaging someone in a study of brain function and EF, but they are not good if the purpose of the test is diagnosing ADHD, measuring EF as it will be used in routine daily life, or predicting if someone may be impaired. The rating scales do better.

So after sixteen years of developing and studying an EF rating scale compared to various tests, I would say that the EF ratings are the most ecologically valid measures right now. And that is why I finally published my scale this year. It beats the tests every time. And the scales are very inexpensive compared to the tests. I don't recommend the testing any longer.