Transcript Details
This is a transcript of an educational program. Details about the program and additional media formats for the program are accessible by visiting: https://reachmd.com/programs/innovations-in-medicine/seeing-the-full-picture-of-adhd-beyond-core-symptoms/56357/

ReachMD
www.reachmd.com
info@reachmd.com
(866) 423-7849

Seeing the Full Picture of ADHD: Beyond Core Symptoms

Announcer:
You're listening to ReachMD. This program, titled "Seeing the Full Picture of ADHD: Beyond Core Symptoms," is sponsored by Otsuka. Here are your hosts, Drs. Andrew Cutler and Julie Carbray.

Dr. Cutler:
Welcome to ReachMD. I'm Dr. Andrew Cutler. I'm a Clinical Professor of Psychiatry at SUNY Upstate Medical University and the Chief Medical Officer of the Neuroscience Education Institute, and I'm located in Lakewood Ranch, Florida.

My good friend and colleague, Dr. Julie Carbray, is joining me today as we take a closer look at attention-deficit hyperactivity disorder, or ADHD, and importantly, its associated features: executive dysfunction and emotional dysregulation. Julie, welcome to the program.

Dr. Carbray:
Thanks so much, Andy. It's great to be here with you today.

And I'm Dr. Julie Carbray. I'm the Director of the Pediatric Mood Disorder Clinic, as well as a Clinical Professor of Psychiatry and Nursing at the University of Illinois Chicago. I'm also a co-chair of Psych Congress.

And Andy, these associated features are commonly encountered by treating clinicians like the two of us, and they may substantially impact patients' day-to-day functioning. So I'm looking forward to our discussion today.

Announcer:
Chapter 1: Full Clinical Presentation of ADHD Beyond Core Symptoms

Dr. Cutler:
So let's begin with the big picture. We often see our patients with ADHD continue to struggle despite effective treatment of the core symptoms of inattention, hyperactivity, and impulsivity. So Julie, why do you think it can be so challenging to treat ADHD, the complete picture effectively?

Dr. Carbray:
Well, you know, Andy, very well that ADHD can look very different from one patient to another, and it's more than just those diagnostic core symptoms. It's a neurodevelopmental disorder that affects both children and adults, and typically, we see symptoms of inattention, hyperactivity, and/or impulsivity, and then these associated features, as well as common comorbidities—things like anxiety, depression, sleep disturbances, and even substance use disorders.[1-3]

The associated features we're going to be talking about are executive dysfunction and emotional dysregulation.[1] And we know the proportion of patients who experience these symptoms despite ADHD treatment really can be quite large.[4-8] I'm thinking myself of a patient who recently started a new job, and while his ADHD seemed well-treated, the demands of the new job resulted in some challenges for him in terms of his working memory—remembering different components of that job to take from one place to the next. So the need to address the broad presentation of ADHD versus just focusing on the management of core symptoms really becomes quite important for us.

Dr. Cutler:
Yeah, these symptoms are very common in their presentation and, sadly, often residual after treatment.

Dr. Carbray:

And Andy, what's been your experience in managing those associated features in patients with ADHD?

Dr. Cutler:
Well, Julie, I have to tell you, early in my career, I was not clued into this. You know, I was sort of trained on those core features. But, the more patients I saw, the more experience I got, the more I realized there was a lot more to this. And I started reading and found that even in historic descriptions of ADHD, they talked about this emotional dysregulation and some of the higher order executive dysfunctions we're talking about. So I started looking for it more, and I started incorporating it not only into my diagnostic evaluation but into my treatment plan.

So Julie, we've talked about the importance of these symptoms, but now let's talk more about how executive dysfunction and emotional dysregulation actually present—what do they look like? So let's start with executive dysfunction. What are the symptoms of this that are most common to patients?

Dr. Carbray:
Well, Andy, the impaired ability to regulate cognition and behavior is the hallmark of executive dysfunction, and this can result in problems with self-observation and with initiation, monitoring, and inhibition of appropriate behavior,[9-11] and also with problems initiating new tasks like projects or homework or switching from one task to the other.[1,6,8-13]

The clinical manifestations of executive dysfunction deficits are working memory and having a hard time managing time, forgetting instructions, losing things, losing your train of thought or forgetting what to say, or when someone says an example, forgetting about it. For instance, a patient who says, "I can't remember more than three things when I have to go to the grocery store. If she gives me a fourth item, I mess it up." So that's working memory.

Task initiation and management is that hard time starting tasks. It might look like procrastination. I have a hard time getting going, trouble shifting from one task to the other. Patients might talk about it as problems with motivation. We hear about it with children who have a hard time starting their homework after a long day at school and then that period of rest. It's hard to get back to reconnecting with something that you were connected with before.

And then lastly, inhibitory control. This looks like interrupting others, blurting things out, acting on first impulses, and really trying to stop a behavior once it gets started. So we see things like impulsive spending and compulsive or addictive behaviors. Patients will say, "I need to learn to shut my mouth," or, "My wife always says I say the wrong things in these social environments." So some of those can be hallmarks of what we call executive dysfunction.[1,6,8-13]

Dr. Cutler:
Yeah. I call it sometimes “reading the room.” You know, it's the self-observation and self-monitoring of reacting appropriately. And then, of course, planning and judgment, time management. It can get people into a lot of trouble, you know, with financial things—paying bills and taxes, even. People get in trouble. So there's a whole lot of ways that this can present, and it's really sort of higher order functions that help you with what we call “adulting.”

Dr. Carbray:
So if we shift over to emotional dysregulation, Andy, how does that typically manifest?

Dr. Cutler:
Yeah, emotional dysregulation means the impaired ability to process and control emotions and to regulate your emotional responses. So this may be problems with overreacting to the situation and not being able to control your emotions or being out of proportion.[14,15]

As we said before with executive dysfunction, very common—up to 45 percent of children and up to 70 percent of adults with ADHD have these emotional dysregulation symptoms.[4,5]

So what does it look like clinically? Well, emotional lability. These people are easily frustrated. They have low frustration tolerance, abrupt mood shifts, sudden dysphoria or sadness that are out of proportion to the situation. Irritability- this gets people into a lot of trouble where they can get easily annoyed or angered and yell or scream or just be in a funk and hold a grudge. They often have what I call “bottle rocket temper,” where they have these explosive outbursts that are out of proportion to the situation, and then they often feel guilty or ashamed afterwards.

They also can be overly reactive and even have an incredible rejection sensitivity, so they're hypersensitive to criticism. As I said, strong reactions to minor triggers and trouble regulating the intensity of their emotional response. Sometimes it's appropriate to feel something, but they feel it more intensely. And, what ends up happening, unfortunately, because of all these things is it causes great problems in work, in school, in relationships, and this starts getting hardwired and incorporated into how the person feels about themselves—their

self-image, their self-esteem—and of course, anxiety and depression can start becoming hardwired too.

They can often have trouble calming down. They have trouble regulating emotions. You know, The brain doesn't always decide, "Hey, is this something I need to get freaked out about or not?"[1,4,5,14-17] You know, that kind of thing.

Dr. Carbray:
You know, Andy, I see too that, unfortunately, this dysregulation can result in shame and can really impair a sense of one's self-esteem and ability to regulate. And you see a lot of impact on relationships, as you've mentioned, and that can really lead to more problems and really how a person views themselves as being capable across their life.

Dr. Cutler:
Yeah, I vividly remember a seven-year-old boy that I was treating, and a couple weeks into treatment, the mother comes in crying in my office and I thought, "Oh no, I hope I didn't hurt her child." And I said, "What happened?" She said, "He was finally invited to a birthday party."

Dr. Carbray:
Oh, it's such a celebration. Yes.

Dr. Cutler:
Because before, he was so emotional that nobody wanted to be around him.

So with all this in mind, Julie, do you consider executive dysfunction and emotional dysregulation distinct entities, or do they overlap and interact somehow?

Dr. Carbray:
Well, as you know, Andy, there tends to be this shared mechanism where this impaired self-regulation and impaired self-observation, inhibitory control, and monitoring of actions and behaviors can only impact emotional reactivity.[9,18,19]

And so while they are interdependent, there does seem to be this overlap where emotional reactions are typically triggered by those executive failures I just mentioned, including the inadequate or appropriate processing of those emotions in real time.[9,18,19]

Dr. Cutler:
Yeah. One of the things I've noticed is when someone has that executive dysfunction, and they're not planning ahead, and they end up doing things at the last minute, and of course they get really frustrated, and they have this emotional reaction or they get super anxious. So there is an interaction there as well.

Announcer:
Chapter 2: Complexity of Executive Dysfunction and Emotional Dysregulation in ADHD

Dr. Carbray:
So building on our discussion on associated features, another complexity in recognizing these ADHD associated features is distinguishing them from other symptoms. For example, Andy, how do you differentiate between executive dysfunction and inattention in a clinical setting?

Dr. Cutler:
Well, Julie, you're right. There's some overlap there, and they sound similar in some ways. But when we're talking about attention, we're talking about orienting to a new stimuli and then sustaining attention.[19] People with ADHD can often orient and pay initial attention. They have a lot of trouble sustaining attention.

But executive dysfunction is higher order functions, and this is trouble with monitoring and controlling and regulating and kind of "reading the room," as we said before.[19] So this can include problems with organization, either in time or space, and initiating, shifting tasks and ending them on time. Time management in general is a very big challenge, as we know, with people with ADHD, and they're not good at planning ahead. They do things at the very last minute. They have a lot of trouble prioritizing.[8,20] What they end up doing is whatever's interesting to them, not necessarily what's important that should be done.

Attention, as I mentioned, is more trouble with paying attention, concentrating, focusing, and listening.[1,8,20] But, inattention is often a clinical manifestation of executive dysfunction, and boy, those certainly can drive the functional impairments that we see.[8,19,20]

Dr. Carbray:
Yeah, and Andy, I was thinking as you were talking that, our patients talk with us about their focus, or they talk about their ability to sort

of maybe just have sustained or not very sustained focus. But it's these details of starting a task, prolonged and over time going from A to Z, that they're unable to do, and that they're not as tuned in to sharing those types of details with us.

And so that's a really important and distinct differentiation between executive dysfunction and inattention.

Dr. Cutler:
Similar to executive dysfunction, there can also be overlap of emotional dysregulation in ADHD with mood and anxiety disorders. So Julie, how do we distinguish between these two?

Dr. Carbray:
When we think about it, emotional dysregulation in ADHD tends to look like reactive emotional responses—very distinct from typical autonomous and sustained states that we see in mood and anxiety disorders. Those reactive emotional responses usually can be triggered by specific events only when we tell him "no," or only when he's in this environment rather than being more sustained.[21]

The emotional dysregulation also is more episodic, reactive, inappropriate, and intense and disproportionate to the situation. It usually requires a shorter recovery time—minutes instead of hours and days—and lacks other symptoms of a mood and anxiety disorder, of course.[4]

And when we're thinking about mood disorders, we tend to see more autonomous, sometimes even trauma-driven and more sustained mood dysregulation.[21] And more pervasive across the course of that person's day, weeks even, with a longer recovery time. And of course, you're going to be meeting diagnostic criteria for a mood or anxiety disorder—something like MDD, bipolar disorder, or even generalized anxiety disorder, and those would require specific treatment.[22,23]

The challenge here, Andy, that I see frequently is that mood dysregulation where children come to our clinic, parents are talking about this mood dysregulation, and they've been treated for some time with ADHD. But they're really seeing this as a separate entity rather than an associated feature, for instance.

Announcer:
Chapter 3: Assessing and Monitoring Executive Dysfunction and Emotional Dysregulation in Practice

Dr. Carbray:
Given the complexity of associated features, a significant challenge is actually identifying executive dysfunction and emotional dysregulation in a patient who has ADHD.

So Andy, in the absence of standardized clinical approaches,[32,33] what strategies help you to assess and monitor executive dysfunction and emotional dysregulation in your practice?

Dr. Cutler:
So if you're following DSM criteria, you might miss this. As I said earlier in my career, I wasn't clued in and wasn't good at assessing them, but I've gotten better. So what I do is I think about the "why now." I mentioned this before—ADHD, you've had symptoms for years, even children, adolescents.

Now, one of the things that I like to do is understand what that person's life specifically is like, not just in generalities. And so I'll go through a typical day or find out what their life is like, and

one of the tools I've developed is what I call the four Rs. And the four Rs help me organize my thinking about how to get specific about their life and what the issues are. So I start with their roles. What is their role? Are they a student? Are they the breadwinner? Are they a homemaker? What are the responsibilities? Are they caring for children or adults? Again, are they the one that has to earn the money? What are their relationships like—important relationships, both romantically, family, also socially? Is this affecting those?

And finally, recreation. What do you do for fun? When people are struggling with ADHD, they stop having fun. They don't take care of themselves. So, I find this a way of organizing my evaluation.

Dr. Carbray:
Andy, I really like this, the four Rs, because it really is a nice way to frame overall functional impairment and also identify strengths, and to be able to get into some of the nitty-gritty of how these symptoms can impair a person across the scope of their life, really going beyond symptoms and more into functional challenges for the individual with ADHD. I really like that.

Dr. Cutler:
Yeah, and it's specific to that particular patient, and so I can track and monitor them more specifically.

Now, Julie, let me turn it over to you. What have you found helpful in assessing and monitoring executive dysfunction and emotional dysregulation in your practice?

Dr. Carbray:
And Andy, as you've noted, we have some screeners, but they might have a couple of items, but my overall view is my clinical interview, observation, and getting collateral information from people also involved in that person's life.[36]

For executive functioning, I do like to explore some real-world self-management in a semi-structured way with them. I'll talk about, "What are some of the systems or approaches that really have helped you to manage your ADHD?" or what we think of as ADHD. Ask them about hacks—things that may really get them through their day that they've learned over time really can be instructive. And also to investigate their approach to planning, organization, follow-through, and their emotional control when things get hot and they feel a lot of demands. Asking them questions around their day and how they manage those work routines and school routines, and what seems to get into the way? And when does that heat really show up?

And then for emotional dysregulation, getting some detailed examples of their emotional and interpersonal challenges. Remember that self-reflection may be impaired, so again, collateral information or, "What do your friends say about you when you lose it like this?" Or "Give me some feedback that you've heard from people you care about." And really assessing those emotional outbursts and any rumination that comes afterward because that'll give us a sense of how internalizing the reactivity can become. Any difficulties with self-soothing—this might give us some hints around coping strategies.

And then also, I may ask about keeping a mood chart or starting to journal just to assess mood in between visits, really monitoring their symptoms across their ADHD treatment and looking for signals that those associated features are getting in their way of their day, of their goals, of their relationships, along with also where they're having wins. When are they getting those wins with organization or emotional regulation? And then taking a look, as you said before, neurodevelopmentally at a longitudinal perspective and checking in with others who they care about.

Announcer:
Chapter 4: Executive Dysfunction and Emotional Dysregulation: Limitations of Current Management Strategies

Dr. Cutler:
Well, now that we've talked about identification and assessment of these associated features, let's explore some of the limitations of the treatments that we use to only address the core symptoms of ADHD. Julie, how do you address executive dysfunction or emotional dysregulation in your patients with ADHD in your management?

Dr. Carbray:
Well, Andy, as you know, often we start with the treatment of ADHD with pharmacologic management, really addressing those core symptoms. But we also need to, after this discussion, look at the broader impact and understand that symptoms may not be fully addressed by the standard treatments we have for ADHD. We know that less than 30 percent of our patients with ADHD report full satisfaction with their current stimulant therapy,[28,34,37-43] and 40 to 60% of patients really do not experience improvements in these associated features.[30,34,37]

So often what we're doing here, Andy, as you know, is trying to gather, what percentage more can we gain if we address this psychopharmacologically? Or do we move forward and combine with psychotherapy or lifestyle changes? What more can we do to move this mark to get better overall functional outcomes in these associated features?

Dr. Cutler:
I guess what we're saying here is these associated features are very common in the presentation, but also inadequately addressed by some of our treatments and often can be found residually.

Dr. Carbray:
Yeah, I'd agree, Andy, and I'd love to hear your thoughts on this as well. What challenges have you seen when you're trying to manage executive dysfunction or emotional dysregulation with your patient who has ADHD?

Dr. Cutler:
Well, as we've said, of course, first it's identifying it and making it part of your overall treatment plan. But when we're talking about the medications most commonly used, which are stimulants, you know sometimes, they can worsen the problem. As we talked about, they can cause anxiety or they can cause emotional lability, which are actually side effects listed in the package inserts and the prescribing information. Sometimes, in an attempt to push the efficacy, and especially if you're chasing attention, we overdo it, and we can push the dose too high, and that can even cause dysphoria or rebound or crash or anxiety. So oftentimes what happens, Julie, I think, is we end

up on combinations of medications which have their own inherent problems as far as additive side effects, drug-drug interactions, someone with ADHD trying to manage two prescriptions and remember to fill them, and so on.

But you know, there's also evidence based non-pharmacologic treatments that we could be using more of. Of course, you need skill and experience, and of course, there's the payment issues. But Julie, I'm kind of excited. There are some newer treatments that appear to have the potential to address not only the core symptoms, but maybe some of these broader features we're talking about. So I'm excited about how our treatment could evolve.

Dr. Carbray:
Yeah, those are great points, Andy, and I think one of the challenges does become a layering on of different treatments, and our patients really struggle sometimes just pulling one treatment together. And so while we want to take a holistic view, we also want to, um, continue to help them to see those gains and these associated features.

Dr. Cutler:
Yeah, I absolutely agree.

Well, Julie, I can't believe we're coming to the end of our time. It's been so much fun talking with you. But what key takeaways would you like to share with the audience?

Dr. Carbray:
Well, I think it's important that we recognize these associated symptoms from a developmental framework, and this can help all of us to better address the comprehensive care needs of our patients with ADHD. Ongoing assessment and management across the lifespan is critical. And taking a comprehensive approach to managing all symptoms and really looking at the best life lived, including things like executive dysfunction and emotional dysregulation, makes for the best outcomes, and not only for them, but for those who love them and for those who are sharing that same dream of managing these symptoms most effectively.

Andy, how about you get the final word?

Dr. Cutler:
Well, that's very kind of you, Julie. Thank you. I think I'd like to say that executive dysfunction and emotional dysregulation are very common, they're clinically meaningful, and functionally impactful. As we said, sometimes, they're the "why now" that drive people to seek treatment and they are part and parcel of the broader range of ADHD symptoms and the broader construct of ADHD, both neurobiologically and clinically. And they require active assessment and monitoring, and ideally, as we've said, a more comprehensive approach to monitoring and treating.

Dr. Carbray:
As those insightful final thoughts bring us to the end of today's program, I'd like to thank my colleague, Dr. Andy Cutler, for sharing his practical perspectives on recognizing executive dysfunction and emotional dysregulation in ADHD. Andy, it was really great speaking with you today.

Dr. Cutler:
Absolutely, Julie. I always enjoy our conversations, and thanks for joining me in this discussion, which I really hope was helpful to our audience and ultimately to their patients and families. I want to thank you for your real-world insights on addressing ADHD-associated symptoms so we can better support our patients and their families.

Dr. Carbray:
It's been a pleasure.

Announcer:
This program was sponsored by Otsuka. If you missed any part of this discussion, visit ReachMD.com, where you can Be Part of the Knowledge.

References:

1. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. American Psychiatric Association Publishing; 2022.
2. Centers for Disease Control and Prevention. Data and Statistics on ADHD. Accessed April 28, 2025, https://www.cdc.gov/adhd/data/index.html
3. Barbaresi WJ, Campbell L, Diekroger EA, et al. Society for developmental and behavioral pediatrics clinical practice guideline for the assessment and treatment of children and adolescents with complex attention-deficit/hyperactivity disorder. *J Dev Behav*

Pediatr. Feb/Mar 2020;41(Suppl 2S):S35–S57. doi:10.1097/DBP.0000000000000770
4. Shaw P, Stringaris A, Nigg J, Leibenluft E. Emotion dysregulation in attention deficit hyperactivity disorder. *Am J Psychiatry*. Mar 2014;171(3):276–93. doi:10.1176/appi.ajp.2013.13070966
5. Perugi G, Pallucchini A, Rizzato S, Pinzone V, De Rossi P. Current and emerging pharmacotherapy for the treatment of adult attention deficit hyperactivity disorder (ADHD). *Expert Opin Pharmacother*. Aug 2019;20(12):1457–1470. doi:10.1080/14656566.2019.1618270
6. Kofler MJ, Irwin LN, Soto EF, Groves NB, Harmon SL, Sarver DE. Executive functioning heterogeneity in pediatric ADHD. *J Abnorm Child Psychol*. Feb 2019;47(2):273–286. doi:10.1007/s10802-018-0438-2
7. Adler LA, Faraone SV, Spencer TJ, Berglund P, Alperin S, Kessler RC. The structure of adult ADHD. *Int J Methods Psychiatr Res*. Mar 2017;26(1)doi:10.1002/mpr.1555
8. Kosheleff AR, Mason O, Jain R, Koch J, Rubin J. Functional impairments associated with ADHD in adulthood and the impact of pharmacological treatment. *J Atten Disord*. May 2023;27(7):669–697. doi:10.1177/10870547231158572
9. van Stralen J. Emotional dysregulation in children with attention-deficit/hyperactivity disorder. *Atten Defic Hyperact Disord*. Dec 2016;8(4):175–187. doi:10.1007/s12402-016-0199-0
10. Willcutt EG, Doyle AE, Nigg JT, Faraone SV, Pennington BF. Validity of the executive function theory of attention-deficit/hyperactivity disorder: a meta-analytic review. *Biol Psychiatry*. Jun 1 2005;57(11):1336–46. doi:10.1016/j.biopsych.2005.02.006
11. Silverstein MJ, Faraone SV, Leon TL, Biederman J, Spencer TJ, Adler LA. The relationship between executive function deficits and DSM-5-defined ADHD symptoms. *J Atten Disord*. Jan 2020;24(1):41–51. doi:10.1177/1087054718804347
12. Adler LA, Faraone SV, Spencer TJ, Berglund P, Alperin S, Kessler RC. The structure of adult ADHD. *Int J Methods Psychiatr Res*. Mar 2017;26(1):10.1002/mpr.1555. doi:10.1002/mpr.1555
13. Cleveland Clinic. Updated March 15, 2024. Accessed February 12, 2026. https://my.clevelandclinic.org/health/articles/executive-function.
14. Soler-Gutierrez AM, Perez-Gonzalez JC, Mayas J. Evidence of emotion dysregulation as a core symptom of adult ADHD: A systematic review. *PLoS One*. 2023;18(1):e0280131. doi:10.1371/journal.pone.0280131
15. Bodalski EA, Flory K, Meinzer MC. A scoping review of factors associated with emotional dysregulation in adults with ADHD. *J Atten Disord*. Nov 2023;27(13):1540–1558. doi:10.1177/10870547231187148
16. Cleveland Clinic. Updated November 13, 2025. Accessed February 3, 2026. https://my.clevelandclinic.org/health/symptoms/25065-emotional-dysregulation.
17. Weir K. American Psychological Association. April 1, 2024. Accessed February 3, 2026. https://www.apa.org/monitor/2024/04/adhd-managing-emotion-dysregulation.
18. Pozo-Rodriguez M, Cruz S, Conde-Pumpido-Zubizarreta S, Carracedo A, Tubio-Fungueirino M, Fernandez-Prieto M. A systematic review on the association between executive function and emotional regulation in autism, ADHD, and autism/ADHD. *Neurosci Biobehav Rev*. 2026;183:106570. doi:10.1016/j.neubiorev.2026.106570
19. Groves NB, Wells EL, Soto EF, et al. Executive functioning and emotion regulation in children with and without ADHD. *Res Child Adolesc Psychopathol*. 2022;50(6):721–735. doi:10.1007/s10802-021-00883-0
20. Bogdanska-Chomczyk E, Majewski MK, Kozlowska A. ADHD in adulthood: clinical presentation, comorbidities, and treatment perspectives. *Int J Mol Sci*. 2025;26(22):11020. doi:10.3390/ijms262211020
21. Richard-Lepouriel H, Etain B, Hasler R, et al. Similarities between emotional dysregulation in adults suffering from ADHD and bipolar patients. *J Affect Disord*. 2016;198:230–6. doi:10.1016/j.jad.2016.03.047
22. Sekhon S, et al. StatPearls Publishing; 2026. Updated May 8, 2023. Accessed March 16, 2026. https://www.ncbi.nlm.nih.gov/books/NBK558911.
23. Cleveland Clinic. Updated August 4, 2022. Accessed March 10, 2026. https://my.clevelandclinic.org/health/diseases/17843-mood-disorders.
24. Faraone SV, Bellgrove MA, Brikell I, et al. Attention-deficit/hyperactivity disorder. *Nat Rev Dis Primers*. Feb 22 2024;10(1):11. doi:10.1038/s41572-024-00495-0
25. Faraone SV, Larsson H. Genetics of attention deficit hyperactivity disorder. *Mol Psychiatry*. Apr 2019;24(4):562–575. doi:10.1038/s41380-018-0070-0
26. Pourhamzeh M, Moravej FG, Arabi M, et al. The roles of serotonin in neuropsychiatric disorders. *Cell Mol Neurobiol*. Aug 2022;42(6):1671–1692. doi:10.1007/s10571-021-01064-9
27. Gagnon-Sanschagrin P, Schein J, Childress A, et al. Treatment patterns among patients with attention-deficit/hyperactivity disorder and comorbid anxiety or depression in the United States – a retrospective claims analysis. Poster presented at: ACMP Nexus; October 2022; National Harbor, MD. F36.

28. National Academies of Sciences, Engineering, and Medicine. 2024. *Adult Attention-Deficit/Hyperactivity Disorder: Diagnosis, Treatment, and Implications for Drug Development: Proceedings of a Workshop*. Washington, DC: The National Academies Press. https://doi.org/10.17226/27770.
29. Brown TE, Romero B, Sarocco P, Atkins N, Schwartz EJ, Rhoten S. The patient perspective: unmet treatment needs in adults with attention-deficit/hyperactivity disorder. *Prim Care Companion CNS Disord*. 2019;21(3)doi:10.4088/PCC.18m02397
30. Schein J, Cloutier M, Gauthier-Loiselle M, Bungay R, Guerin A, Childress A. Symptoms associated with ADHD/treatment-related adverse side effects and their impact on quality of life and work productivity in adults with ADHD. *Curr Med Res Opin*. 2023;39(1):149–159. doi:10.1080/03007995.2022.2122228
31. Schein J, Cloutier M, Bungay R, Gauthier-Loiselle M, Childress A. Costs associated with adverse events during treatment episodes for adult attention-deficit/hyperactivity disorder. *J Med Econ*. 2024;27(1):653–662. doi:10.1080/13696998.2024.2342749
32. Musullulu H. Evaluating attention deficit and hyperactivity disorder (ADHD): a review of current methods and issues. *Front Psychol*. 2025;16:1466088. doi:10.3389/fpsyg.2025.1466088
33. Hirsch O, Chavanon ML, Christiansen H. Emotional dysregulation subgroups in patients with adult attention-deficit/hyperactivity disorder (adhd): a cluster analytic approach. *Sci Rep*. 2019;9(1):5639. doi:10.1038/s41598-019-42018-y
34. Moukhtarian TR, Cooper RE, Vassos E, Moran P, Asherson P. Effects of stimulants and atomoxetine on emotional lability in adults: a systematic review and meta-analysis. *Eur Psychiatry*. Jul 2017;44:198–207. doi:10.1016/j.eurpsy.2017.05.021
35. Kaufman EA, Xia M, Fosco G, Yaptangco M, Skidmore CR, Crowell SE. The Difficulties in Emotion Regulation Scale Short Form (DERS-SF): validation and replication in adolescent and adult samples. *J Psychopathol Behav Assess*. 2016;38(3):443–455. doi:10.1007/s10862-015-9529-3
36. Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD). Accessed February 2, 2026. https://chadd.org/about-adhd/diagnosing-adhd.
37. Lenzi F, Cortese S, Harris J, Masi G. Pharmacotherapy of emotional dysregulation in adults with ADHD: a systematic review and meta-analysis. *Neurosci Biobehav Rev*. Jan 2018;84:359–367. doi:10.1016/j.neubiorev.2017.08.010
38. Weisler R, Ginsberg L, Dirks B, Deas P, Adeyi B, Adler LA. Treatment with lisdexamfetamine dimesylate improves self- and informant-rated executive function behaviors and clinician- and informant-rated ADHD symptoms in adults: data from a randomized, double-blind, placebo-controlled study. *J Atten Disord*. 2017;21(14):1198–1207. doi:10.1177/1087054713518242
39. Faraone SV, Gomeni R, Hull JT, et al. Executive function outcome of treatment with viloxazine extended-release capsules in children and adolescents with attention-deficit/hyperactivity disorder: a post-hoc analysis of four randomized clinical trials. *Paediatr Drugs*. 2021;23(6):583–589. doi:10.1007/s40272-021-00470-2
40. Brown TE, Brams M, Gao J, Gasior M, Childress A. Open-label administration of lisdexamfetamine dimesylate improves executive function impairments and symptoms of attention-deficit/hyperactivity disorder in adults. *Postgrad Med*. Sep 2010;122(5):7–17. doi:10.3810/pgm.2010.09.2196
41. Rosenau PT, Openneer TJC, Matthijssen AM, et al. Effects of methylphenidate on executive functioning in children and adolescents with ADHD after long-term use: a randomized, placebo-controlled discontinuation study. *J Child Psychol Psychiatry*. 2021;62(12):1444–1452. doi:10.1111/jcpp.13419
42. Isfandnia F, El Masri S, Radua J, Rubia K. The effects of chronic administration of stimulant and non-stimulant medications on executive functions in ADHD: a systematic review and meta-analysis. *Neurosci Biobehav Rev*. Jul 2024;162:105703. doi:10.1016/j.neubiorev.2024.105703
43. Tamminga HG, Reneman L, Huizenga HM, Geurts HM. Effects of methylphenidate on executive functioning in attention-deficit/hyperactivity disorder across the lifespan: a meta-regression analysis. *Psychol Med*. 2016;46(9):1791–807. doi:10.1017/S0033291716000350

July 2026 US.CORP.V.26.00010