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Perspectives on ADHD in children and adolescents as a social construct amidst rising prevalence of diagnosis and medication use

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The diagnosis of attention-deficit hyperactivity disorder (ADHD) is based on the presence of pervasive, persistent symptoms of inattention and/or hyperactivity/impulsivity typically emerging early in life and resulting in significant functional impairment. In contrast to a worldwide epidemiological prevalence of approximately 5% in children and 2–3% in adults, there are significant variations in the prevalence of administrative ADHD diagnoses and medication use. We assert that in order to explore the underlying dynamics of this phenomenon, a thorough understanding of the construct ADHD is necessary. We contend that ADHD is not a natural entity that unfolds within an individual and can be understood independent from societal and environmental factors, but rather that ADHD as a diagnosis can better be conceptualized as a valid and pragmatically useful social construct. Decisions to diagnose and treat ADHD should follow a person-centered approach and be focused on functional impairment within a socially constructed, context-dependent and environmentally contingent model.

KEYWORDS

ADHD, attention-deficit/hyperactivity disorder, prevalence, overdiagnosis, treatment, stigma

1 Introduction

The concept of attention-deficit hyperactivity disorder (ADHD), like the concepts of other psychiatric disorders, has undergone refinement and development over the past five decades, to its current inclusion in DSM-5 (1) and ICD-11 (2).

First clinical descriptions of children with problems of focus, hyperactivity and lack of impulse control appeared around the time of enlightenment and industrialization, when most governments in Western Europe and the US adopted policies of compulsory education, turning most children from workers into students (3). It has been argued [e.g., (4)] that despite the undeniable neurobiological basis of ADHD, the problematic patterns of behavior are substantially uncovered in “classroom”-settings with a special focus on

conformity and learning. As the importance of academic performance (especially in the face of a growing competition for jobs and prosperity in a globalized world) has significantly increased over the last decades (or even centuries), this “push for performance” might explain and predict the increasing prevalence of ADHD diagnoses (4, 5).

The current categorical diagnosis of ADHD is based on the presence of pervasive, persistent symptoms of inattention and/or hyperactivity/impulsivity typically emerging early in life and resulting in significant functional impairment. A crucial criterion involves the presence of symptoms across multiple settings (e.g., home and school) and their consequential impact on academic, social, or occupational functioning.

ADHD is a common disorder with a worldwide epidemiological prevalence of approximately 5% in children (6–8) and 2–3% in adults (9). A multitude of epidemiological and clinical studies point to the common co-occurrence of ADHD with other psychiatric disorders, including depression, anxiety disorders, dyslexia, autism spectrum disorders, conduct disorder, oppositional defiant disorder, and substance use disorders (10). ADHD has been linked to significant decreases in quality of life and functioning, and has been found to be associated with higher risks of school failure, parental and family conflict, social rejection by peers, low self-esteem, and delinquent behavior in children and adolescents, and with academic and vocational underachievement, reduced occupational functioning, obesity, emotional dysregulation, unemployment, and suicide attempts in adolescence and adulthood (11).

2 Matters of consideration

In a comprehensive meta-analysis involving 19 studies and over 55,000 participants, it was found that 5.9% of youths meet the diagnostic criteria for ADHD (6). Another extensive meta-analysis, which included approximately a quarter of a million youths across 135 studies, revealed no significant differences in ADHD prevalence between North America and other global regions such as Europe, Asia, Africa, South America, and Oceania. Notably, these rates have remained consistent over the past three decades (7). However, despite the global consistency in epidemiological rates, there are significant disparities in administrative rates of diagnosis.

It is evident that there is significant variation in administrative prevalence rates among continents, among countries as well as within countries, such as US states, and among different ethnic groups (12–20). It should be noted that no comprehensive literature could be identified for Asia beyond reports of administrative prevalence rates at the country level [e.g., (21–23)]. Studies conducted in various countries, primarily in the “global North,” have highlighted a noticeable increase in the administrative diagnosis of ADHD in recent years (9, 10, 24–27). Furthermore, recent studies have revealed a clear divergence in the administrative prevalence of ADHD diagnosis when examining specific subpopulations within 48 different studies. This prompts a critical ongoing debate concerning the drivers behind this rise, including whether it is due to genuine increases in ADHD frequency, improved detection practices, or diagnostic inflation (25, 28).

A meta-analysis of 25 studies, involving over eight million participants, revealed a distinctive pattern: children and adolescents who are relatively younger compared to their classmates are more likely of receiving an ADHD diagnosis (29). This finding is supported

by other studies (30, 31) highlighting the relative age effect on ADHD diagnosis, showing an increased proportion of younger children diagnosed in more recent birth cohorts.

Regarding medication trends, there has been a clear and consistent increase in prevalence of ADHD medication use over the past two decades, particularly in high-income countries. However, there are significant variations in medication use between different regions. Comparative analyses of medication consumption rates across various countries and regions highlight these disparities, with North America having the highest ADHD medication consumption, followed by Oceania and Northern and Central Europe, and other regions exhibiting significantly lower medication consumption rates (23, 32–36).

The situation in the United States is particularly noteworthy, as statistics indicate that stimulant medication was administered to 8–12% of male and 5% of female school-aged children in 2014 (37). Interestingly, these rates vary significantly across different US states, influenced by factors such as family and cultural values, healthcare infrastructure, media reports, and federal variations in educational policies linked to demands for performance and achievement (38–41).

The rise in administrative prevalence and medication usage in Western countries raises questions about the underlying dynamics. Is the increase in administrative prevalence and medication usage due to a real rise in cases or are there other factors at play? Have the definitional boundaries of ADHD changed, leading to the observed rising rates of diagnosis and treatment? Are environmental factors, such as changes in schooling practices and media coverage, contributing to the upward trend in diagnosis and medication usage? Could the increased awareness among physicians and patients about the potential of ADHD be a factor? And more broadly, the question arises: is the increasing administrative prevalence of ADHD and the rising prevalence of ADHD medication use essentially a positive development or should it rather be a cause for concern?

Comprehensive and conclusive answers to the aforementioned questions are beyond the scope of this commentary. However, we assert that in order to approach the answers to these questions, a thorough understanding of both the construct ADHD and the misconceptions that sometimes exist in this context are necessary.

We contend that ADHD is not a natural (and even less a homogeneous and uniform) entity that unfolds within an individual and could be understood independently of societal and environmental factors. Instead, we postulate that ADHD as diagnosis can better be conceptualized as a valid, pragmatical and useful social construct. Viewing ADHD as a social or cultural construct, in our opinion, does not entail its etiological reduction to culture (42). In our perspective, ADHD is not caused by culture but is constructed through categorization and classification, influenced by societal factors. This is reflected in the history of operational diagnostic criteria, notably with the introduction of ‘Attention-Deficit Disorder with or without hyperactivity’ in DSM-III in 1980 (11, 43). Recognizing ADHD as a social construct entails the conceptualization of ADHD as a disorder and the decision when to pursue medication treatment should be based on the benefits or harms it brings to individuals. This consideration should take into account the extent of impairment in relation to societal demands, as well as potential negative consequences stemming from stigmatization effects, which may need to be weighed against each other. Additionally, ethical aspects regarding symptom alleviation versus neuro-enhancement should be discussed when considering the indication for medical treatment.

3 Discussion

ADHD was typically conceptualized as a distinct and categorical entity with clear and definable boundaries that distinguish between individuals with the disorder and without, as well as demarcating its separation from other disorders. This conceptualization posits that ADHD originates within the individual [for a critique see also: (44)]. However, the disorder is characterized by marked heterogeneity on clinical, etiological, and pathophysiological levels. Individuals diagnosed with ADHD differ in terms of their core symptom combinations, level of impairment, comorbidities, and demographic characteristics. Patients also exhibit significant variation in their symptom profiles, symptom trajectories, clinical outcomes, and biological and neuropsychological correlates. No single factor or combination of factors serves as a definitive and comprehensive foundation for the condition. Consequently, ADHD cannot be classified as a distinct causal condition or a uniform entity. Instead, ADHD is best conceptualized as the extreme end of a spectrum, with individuals on the ADHD spectrum differing from those without ADHD primarily in term of degree rather than in fundamental nature. The impact of short or tall stature, which varies depending on conditions in daily life, may be considered an illustrative example of this concept with great height being more common in Western countries than in Southeast Asia.

The construct of ADHD has faced challenges and criticisms, primarily stemming from the perception that its diagnosis is “subjective,” lacking objective criteria. Critics argue that disorders should correspond to natural kinds and categories be defined by objective criteria. However, the argument that diagnosis and treatment are only justified if disorders represent a natural kind (based on objective criteria), seems unfounded especially in the realm of mental disorders. The question rather is whether a diagnosis holds pragmatic and clinical utility. ADHD has been acknowledged as meeting the standard criteria for validity of a mental disorder outlined by Robins and Guze (45). These criteria include inter-individual agreement, predictive of future outcomes, external correlates, such as associated biological factors, comorbidities, functional impairment, and response to treatment. Thus, as emphasized by Karalunas & Nigg (46), it is possible for different observable features to cluster in informative ways without necessitating the assumption of correspondence to a true or natural kind.

The assessment of ADHD is significantly challenged by the criterion of impairment. While this criterion is crucial, it is important to acknowledge that impairment does not solely originate from the individual but rather emerges from the interaction between the individual and their environment. More specifically, it is influenced by the interplay between environmental demands and the individual's capacity to meet or adapt to these demands. This highlights that ADHD cannot be comprehensively understood as a natural entity confined within the individual, but rather as a phenomenon that arises within the context of external demands. Moreover, the concept of impairment attributed to ADHD is not inherent but is rather socially constructed, context-dependent, and contingent upon the environment. If ADHD were conceptualized and taught as a social construct, embracing a holistic approach that avoids reducing individuals solely to ADHD, recognizing the profound implications of diagnosis on identity development, and rejecting a reductionist perspective that focuses on isolated symptoms or behaviors, while also critically considering societal factors such as the pressure to perform,

it could be hypothesized that both the diagnosis and treatment of ADHD would undergo a transformative paradigm shift.

When considering the social context, it is important to also account for differences between children and adults. For instance, in children the degree of impairment is highly associated with performance evaluation in the tightly structured educational setting and the largely predetermined family framework. In contrast, adults usually engage in professional and private contexts, bearing a higher level of personal responsibility, choice and control while often receiving less social support. The presence of an excessively restrictive and demanding setting may emphasize individual differences in attention, inhibitory control, and self-regulation. Educational policies, coupled with mounting pressure for heightened achievement and performance, can therefore contribute to elevated diagnostic rates (39).

In addition to the benefits that a diagnosis can bring to individuals, it is important to consider potential negative consequences, particularly the consideration of stigma effects. While the naturalistic view has contributed to reducing stigma surrounding mental health, it can still unintentionally reinforce the idea that mental disorders are solely brain-based conditions. This view might inadvertently perpetuate the notion that individuals with mental health issues are somehow fundamentally different from those without such conditions. Data highlighting the negative outcomes associated with diagnosis include nationally representative survey data from the United States. These findings from the Early Childhood Longitudinal Survey (ECLS) indicate that teachers perceive students with ADHD to be less successful in reading and math compared to their peers without ADHD. Interestingly, these perceptions were more negative than what would be expected based on actual differences in test scores, suggesting that negative attitudes toward ADHD may influence teachers' evaluations of their students' academic abilities. Similarly, parents also tend to evaluate their children's academic abilities more negatively if they have been diagnosed with ADHD, even when accounting for actual differences in test scores (47). In addition to external stigma, self-stigma is a relevant aspect to consider, especially among children and adolescents. This phenomenon can result in the formation of a negative self-perception, as individuals come to see themselves as fundamentally different from their peers due to the ADHD label assigned to them (48).

ADHD medication not only effectively addresses the core symptoms of ADHD but also enhances overall functioning and quality of life (49–51). Additionally, there is a growing body of evidence supporting the long-term benefits and safety of ADHD medication (52, 53). Consequently, one might initially perceive the increased prevalence of ADHD medication users as a positive development, as it indicates that more individuals with impairments are receiving the help they need. However, this trend may also be influenced by an expansion of diagnostic criteria over the last decades, e.g., DSM-I through DSM-5 (54). Furthermore, there is an ongoing debate regarding the use of pharmacological treatment for individuals with milder ADHD symptoms. This debate extends to whether “healthy” individuals should have access to ADHD medication to boost their performance. In both scenarios, the central considerations (again) revolve around utility and functionality. It is crucial to carefully weigh the negative effects, such as potential side effects and experiences of stigma, against the positive outcomes, including improved overall functioning, performance and quality of life rather than merely reduction of symptoms (55). In complex cases with major psychiatric

comorbidities (e.g., affective disorders) and additional medication (e.g., SSRIs), an even greater emphasis needs to be laid on potential adverse events (56).

Ethical concerns, such as issues related to competitiveness and fairness, as well as the impact of detrimental, “unhealthy” performance pressure, must also be thoroughly addressed. In future discussions and debates on this topic, it is important to keep these factors as a central focus, all the while considering how the concept of ADHD can be understood, as well as what it is not.

In summary, we think that ADHD should not be viewed as a natural homogeneous entity within an individual, independent of societal and environmental influences. Instead, it is more appropriately conceptualized as a social construct because the (varying) diagnostic criteria (agreed upon by experts based on evidence) define who will fall within this category, assessment procedures and clinical practice systems will determine who will receive a diagnosis, and the diagnosis (and consequences) will at least potentially alter the self-concepts of those diagnosed (i.e., may lead to (self-)stigmatization or de-stigmatization). The model presented here corresponds with the recent debate as to whether the application of the concept of neurodiversity to neurodevelopmental disorders could lead to the development of new approaches to therapeutic interventions for people with ADHD or autism (57). In contrast to the previous “disorder model”, in which therapy is always primarily aimed at eliminating the core deficits of the disorder, the primary therapeutic target according to the neurodiversity concept would be to change the context, which should be designed in such a way that neurodiverse people can make positive and affirmative experiences and draw on their resources and specific characteristics (58).

To sum things up, there is no “true” ADHD against which the diagnostic criteria could be verified or falsified, and there are no purely natural courses of individuals with ADHD that develop outside a specific societal-cultural context. This does imply that a notion such as “ADHD does not exist” does not make sense but also that “objective” diagnostic biomarkers are by no means necessary or sufficient to validate the diagnostic category of ADHD.

References

1. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders*. 5th ed. Washington, DC: American Psychiatric Association (2013).
2. World Health Organization. *International statistical classification of diseases and related health problems*. 11th ed. Geneva: World Health Organization (2021).
3. Taylor E. *Development of the concept. Oxford textbook of attention deficit hyperactivity disorder*. Oxford: Oxford University Press (2018).
4. Hinshaw SP, Scheffler RM. ADHD in the twenty-first century: biology, context, policy, and the need for integrative perspective In: T Banaschewski, D Coghill and A Zuddas, editors. *Oxford textbook of attention deficit hyperactivity disorder*. Oxford: Oxford University Press (2018).
5. Hinshaw SP, Scheffler RM. *The ADHD explosion: Myths, medication, money, and today's push for performance*. Oxford: Oxford University Press (2014).
6. Willcutt EG. The prevalence of DSM-IV attention-deficit/hyperactivity disorder: a meta-analytic review. *Neurotherapeutics*. (2012) 9:490–9. doi: 10.1007/s13311-012-0135-8
7. Polanczyk GV, Salum GA, Sugaya LS, Caye A, Rohde LA. Annual research review: a meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. *J Child Psychol Psychiatry*. (2015) 56:345–65. doi: 10.1111/jcpp.12381
8. Thomas R, Sanders S, Doust J, Beller E, Glasziou P. Prevalence of attention-deficit/hyperactivity disorder: a systematic review and meta-analysis. *Pediatrics*. (2015) 135:e994–e1001. doi: 10.1542/peds.2014-3482
9. Song P, Zha M, Yang Q, Zhang Y, Li X, Rudan I. The prevalence of adult attention-deficit hyperactivity disorder: a global systematic review and meta-analysis. *Journal of Glob Health*. (2021) 11:11. doi: 10.7189/jogh.11.04009
10. Faraone SV, Banaschewski T, Coghill D, Zheng Y, Biederman J, Bellgrove MA, et al. The world federation of ADHD international consensus statement: 208 evidence-based conclusions about the disorder. *Neurosci Biobehav Rev*. (2021) 128:789–818. doi: 10.1016/j.neubiorev.2021.01.022
11. Faraone SV, Asherson P, Banaschewski T, Biederman J, Buitelaar JK, Ramos-Quiroga JA, et al. Attention-deficit/hyperactivity disorder. *Nat Rev Dis Primers*. (2015) 1:15020. doi: 10.1038/nrdp.2015.20
12. Akmatov MK, Steffen A, Holstiege J, Hering R, Schulz M, Bätzing J. Trends and regional variations in the administrative prevalence of attention-deficit/hyperactivity disorder among children and adolescents in Germany. *Sci Rep*. (2018) 8:17029. doi: 10.1038/s41598-018-35048-5
13. Espinet SD, Graziosi G, Toplak ME, Hesson J, Minhas P. A review of Canadian diagnosed ADHD prevalence and incidence estimates published in the past decade. *Brain Sci*. (2022) 12:1051. doi: 10.3390/brainsci12081051
14. Fulton BD, Scheffler RM, Hinshaw SP, Levine P, Stone S, Brown TT, et al. National variation of ADHD diagnostic prevalence and medication use: health care providers and education policies. *Psychiatr Serv (Washington, DC)*. (2009) 60:1075–83. doi: 10.1176/ps.2009.60.8.1075
15. Hire AJ, Ashcroft DM, Springate DA, Steinke DT. ADHD in the United Kingdom: regional and socioeconomic variations in incidence rates amongst children and adolescents (2004–2013). *J Atten Disord*. (2018) 22:134–42. doi: 10.1177/1087054715613441
16. Madsen KB, Ersbøll AK, Olsen J, Parner E, Obel C. Geographic analysis of the variation in the incidence of ADHD in a country with free access to healthcare: a Danish cohort study. *Int J Health Geogr*. (2015) 14:24. doi: 10.1186/s12942-015-0018-4

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17. Stevens J, Harman JS, Kelleher KJ. Ethnic and regional differences in primary care visits for attention-deficit hyperactivity disorder. *J Develop Behav Pediatr.* (2004) 25:318–25. doi: 10.1097/00004703-200410000-00003
18. Surén P, Bakken IJ, Lie KK, Schjølberg S, Aase H, Reichborn-Kjennerud T, et al. Differences across counties in the registered prevalence of autism, ADHD, epilepsy and cerebral palsy in Norway. *Tidsskr Nor Laegeforen.* (2013) 133:1929–34. doi: 10.4045/tidsskr.13.0050
19. Widding-Havneraas T, Markussen S, Elwert F, Lyhmann I, Bjelland I, Halmøy A, et al. Geographical variation in ADHD: do diagnoses reflect symptom levels? *Eur Child Adolesc Psychiatry.* (2023) 32:1795–803. doi: 10.1007/s00787-022-01996-7
20. Zgodic A, McLain AC, Eberth JM, Federico A, Bradshaw J, Flory K. County-level prevalence estimates of ADHD in children in the United States. *Ann Epidemiol.* (2023) 79:56–64. doi: 10.1016/j.annepidem.2023.01.006
21. Huang CL, Wang JJ, Ho CH. Trends in incidence rates of diagnosed attention-deficit/hyperactivity disorder (ADHD) over 12 years in Taiwan: a nationwide population-based study. *Psychiatry Res.* (2020) 284:112792. doi: 10.1016/j.psychres.2020.112792
22. Joseph JK, Devu BK. Prevalence of attention-deficit hyperactivity disorder in India: a systematic review and meta-analysis. *Indian J Psychiatr Nurs.* (2019) 16:118. doi: 10.4103/IOPN.IOPN_31_19
23. Wang LJ, Lee SY, Yuan SS, Yang CJ, Yang KC, Huang TS, et al. Prevalence rates of youths diagnosed with and medicated for ADHD in a nationwide survey in Taiwan from 2000 to 2011. *Epidemiol Psychiatr Sci.* (2017) 26:624–34. doi: 10.1017/S2045796016000500
24. Bachmann CJ, Philippen A, Hoffmann F. ADHD in Germany: trends in diagnosis and pharmacotherapy. *Deutsches Arzteblatt Int.* (2017) 114:141–8. doi: 10.3238/arztebl.2017.0141
25. Kazda L, Bell K, Thomas R, McGeehan K, Sims R, Barratt A. Overdiagnosis of attention-deficit/hyperactivity disorder in children and adolescents: a systematic scoping review. *JAMA Netw Open.* (2021) 4:e215335. doi: 10.1001/jamanetworkopen.2021.5335
26. Rydell M, Lundström S, Gillberg C, Lichtenstein P, Larsson H. Has the attention deficit hyperactivity disorder phenotype become more common in children between 2004 and 2014? Trends over 10 years from a Swedish general population sample. *J Child Psychol Psychiatry.* (2018) 59:863–71. doi: 10.1111/jcpp.12882
27. Xu G, Strathearn L, Liu B, Yang B, Bao W. Twenty-year trends in diagnosed attention-deficit/hyperactivity disorder among US children and adolescents, 1997–2016. *JAMA Netw Open.* (2018) 1:e181471. doi: 10.1001/jamanetworkopen.2018.1471
28. Gyngell C, Payne JM, Coghill D. Conceptual clarity needed in ADHD diagnosis and treatment. *Lancet Psychiatry.* (2023) 10:658–60. doi: 10.1016/S2215-0366(23)00184-0
29. Caye A, Petresco S, de Barros AJD, Bressan RA, Gadelha A, Gonçalves H, et al. Relative age and attention-deficit/hyperactivity disorder: data from three epidemiological cohorts and a meta-analysis. *J Am Acad Child Adolesc Psychiatry.* (2020) 59:990–7. doi: 10.1016/j.jaac.2019.07.939
30. Kuntsi J, Larsson H, Deng Q, Lichtenstein P, Chang Z. The combined effects of young relative age and attention-deficit/hyperactivity disorder on negative long-term outcomes. *J Am Acad Child Adolesc Psychiatry.* (2022) 61:291–7. doi: 10.1016/j.jaac.2021.07.002
31. Sayal K, Chudal R, Hinkka-Yli-Salomäki S, Joelsson P, Sourander A. Relative age within the school year and diagnosis of attention-deficit hyperactivity disorder: a nationwide population-based study. *Lancet Psychiatry.* (2017) 4:868–75. doi: 10.1016/S2215-0366(17)30394-2
32. Chan AYL, Ma TT, Lau WCY, Ip P, Coghill D, Gao L, et al. Attention-deficit/hyperactivity disorder medication consumption in 64 countries and regions from 2015 to 2019: a longitudinal study. *EClinicalMedicine.* (2023) 58:101780. doi: 10.1016/j.eclinm.2022.101780
33. Man KKC, Ip P, Hsia Y, Chan EW, Chui CSL, Lam MPS, et al. ADHD drug prescribing trend is increasing among children and adolescents in Hong Kong. *J Atten Disord.* (2017) 21:1161–8. doi: 10.1177/1087054714536047
34. Raman SR, Man KKC, Bahmanyar S, Berard A, Bilder S, Boukhris T, et al. Trends in attention-deficit hyperactivity disorder medication use: a retrospective observational study using population-based databases. *Lancet Psychiatry.* (2018) 5:824–35. doi: 10.1016/S2215-0366(18)30293-1
35. Steinhausen HC. Recent international trends in psychotropic medication prescriptions for children and adolescents. *Eur Child Adolesc Psychiatry.* (2015) 24:635–40. doi: 10.1007/s00787-014-0631-y
36. Yoshida M, Obara T, Kikuchi S, Satoh M, Morikawa Y, Ooba N, et al. Drug prescriptions for children with ADHD in Japan: a study based on health insurance claims data between 2005 and 2015. *J Atten Disord.* (2020) 24:175–91. doi: 10.1177/1087054719843179
37. Burcu M, Zito JM, Metcalfe L, Underwood H, Safer DJ. Trends in stimulant medication use in commercially insured youths and adults, 2010–2014. *JAMA Psychiatry.* (2016) 73:992–3. doi: 10.1001/jamapsychiatry.2016.1182
38. Bokhari F, Mayes R, Scheffler RM. An analysis of the significant variation in psychostimulant use across the U.S. *Pharmacopidemiol Drug Saf.* (2005) 14:267–75. doi: 10.1002/pds.980
39. Hinshaw SP, Scheffler RM. *The ADHD explosion and today's push for performance: Myths, medication, and money.* Oxford: Oxford University Press (2014).
40. Nyarko KA, Grosse SD, Danielson ML, Holbrook JR, Visser SN, Shapira SK. Treated prevalence of attention-deficit/hyperactivity disorder increased from 2009 to 2015 among school-aged children and adolescents in the United States. *J Child Adolesc Psychopharmacol.* (2017) 27:731–4. doi: 10.1089/cap.2016.0196
41. Visser SN, Danielson ML, Bitsko RH, Holbrook JR, Kogan MD, Ghandour RM, et al. Trends in the parent-report of health care provider-diagnosed and medicated attention-deficit/hyperactivity disorder: United States, 2003–2011. *J Am Acad Child Adolesc Psychiatry.* (2014) 53:34–46.e2. doi: 10.1016/j.jaac.2013.09.001
42. Timimi S, Taylor E. ADHD is best understood as a cultural construct. *Br J Psychiatry.* (2004) 184:8–9. doi: 10.1192/bjp.184.1.8
43. Varga S. *Naturalism, interpretation, and mental disorder.* Oxford: Oxford University Press (2015).
44. Sonuga-Barke EJS, Becker SP, Bølte S, Castellanos FX, Franke B, Newcorn JH, et al. Annual research review: perspectives on progress in ADHD science - from characterization to cause. *J Child Psychol Psychiatry.* (2023) 64:506–32. doi: 10.1111/jcpp.13696
45. Faraone SV. The scientific foundation for understanding attention-deficit/hyperactivity disorder as a valid psychiatric disorder. *Eur Child Adolesc Psychiatry.* (2005) 14:1–10. doi: 10.1007/s00787-005-0429-z
46. Karalunas SL, Nigg JT. Heterogeneity and subtyping in attention-deficit/hyperactivity disorder-considerations for emerging research using person-centered computational approaches. *Biol Psychiatry.* (2020) 88:103–10. doi: 10.1016/j.biopsych.2019.11.002
47. Eisenberg D, Schneider H. Perceptions of academic skills of children diagnosed with ADHD. *J Atten Disord.* (2007) 10:390–7. doi: 10.1177/1087054706292105
48. McKeague L, Hennessy E, O'Driscoll C, Heary C. Retrospective accounts of self-stigma experienced by young people with attention-deficit/hyperactivity disorder (ADHD) or depression. *Psychiatr Rehabil J.* (2015) 38:158–63. doi: 10.1037/prj0000121
49. Coghill DR, Banaschewski T, Soutullo C, Cottingham MG, Zuddas A. Systematic review of quality of life and functional outcomes in randomized placebo-controlled studies of medications for attention-deficit/hyperactivity disorder. *Eur Child Adolesc Psychiatry.* (2017) 26:1283–307. doi: 10.1007/s00787-017-0986-y
50. Cortese S, Adamo N, Del Giovane C, Mohr-Jensen C, Hayes AJ, Carucci S, et al. Comparative efficacy and tolerability of medications for attention-deficit hyperactivity disorder in children, adolescents, and adults: a systematic review and network meta-analysis. *Lancet Psychiatry.* (2018) 5:727–38. doi: 10.1016/S2215-0366(18)30269-4
51. Mechler K, Banaschewski T, Hohmann S, Häge A. Evidence-based pharmacological treatment options for ADHD in children and adolescents. *Pharmacol Ther.* (2022) 230:107940. doi: 10.1016/j.pharmthera.2021.107940
52. Man KKC, Häge A, Banaschewski T, Inglis SK, Buitelaar J, Carucci S, et al. Long-term safety of methylphenidate in children and adolescents with ADHD: 2-year outcomes of the attention deficit hyperactivity disorder drugs use chronic effects (ADDUCE) study. *Lancet Psychiatry.* (2023) 10:323–33. doi: 10.1016/S2215-0366(23)00042-1
53. Matthijssen AM, Dietrich A, Biersens M, Kleine Deters R, van de Loo-Neus GH, van den Hoofdakker BJ, et al. Continued benefits of methylphenidate in ADHD after 2 years in clinical practice: a randomized placebo-controlled discontinuation study. *Am J Psychiatry.* (2019) 176:754–62. doi: 10.1176/appi.ajp.2019.18111296
54. Safer DJ, Rajakannan T, Burcu M, Zito JM. Trends in subthreshold psychiatric diagnoses for youth in community treatment. *JAMA Psychiatry.* (2015) 72:75–83. doi: 10.1001/jamapsychiatry.2014.1746
55. Charach A. Editorial: time for a new conversation on stimulant use. *J Am Acad Child Adolesc Psychiatry.* (2020) 59:929–30. doi: 10.1016/j.jaac.2019.10.004
56. Burcu M, Zito JM, Safer DJ, Magder LS, dosReis S, Shaya FT, et al. Association of antidepressant medications with incident type 2 diabetes among medicaid-insured youths. *JAMA Pediatr.* (2017) 171:1200–7. doi: 10.1001/jamapediatrics.2017.2896
57. Sonuga-Barke E, Thapar A. The neurodiversity concept: is it helpful for clinicians and scientists? *Lancet Psychiatry.* (2021) 8:559–61. doi: 10.1016/S2215-0366(21)00167-X
58. Sonuga-Barke EJS. Paradigm 'flipping' to reinvent translational science: outlining a neurodevelopmental science framework from a 'neurodiversity' perspective. *J Child Psychol Psychiatry.* (2023) 64:1405–8. doi: 10.1111/jcpp.13886