

**Commentary: “Ready or not here I come”: Developmental immaturity as a driver of impairment and referral in young-for-school-grade ADHD children. A reformulation inspired by Whitely et al., (2019).**

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The search for objective biological tests, sufficiently reliable, and predictive enough to be diagnostic of psychiatric disorders, continues apace - yet their discovery remains a distant dream. It seems increasingly unlikely that current diagnostic structures and concepts map biologically in a straight forward way - with heterogeneity within, and sharing across, existing diagnostic boundaries being the biological rule rather than the exception. Indeed, it now appears that the science of biological psychiatry is more likely to redraw those boundaries than it is to confirm and mark them (Sonuga-Barke, 2016). Clinical identification of childhood psychiatric disorders therefore remains, for the foreseeable future at least, an exercise in regulated social perception - reliant on the fallible and subjective judgements of parents, teachers and clinicians. Social perception of this sort is an active and motivated process and therefore prone, like all social perception, to bias and distortions - both systematic and idiosyncratic. Progress has certainly been made over the last fifty years in reducing such judgement bias by, for instance, filtering perceptions through the lens of standardised instruments (questionnaires and interviews) with carefully operationalised items and a degree of reliability and validity. However, such instruments often play only a peripheral role in actual diagnostic encounters and when they are used there is still sufficient ambiguity to leave open plenty of room for interpretation. When we acknowledge that psychiatric diagnoses are social constructions - we are not saying that symptoms of inattention, impulsivity and hyperactivity are not real or don't cluster together in meaningful ways or that they don't cause real distress and disability but that their interpretation and meaning is often informed by social constructs such as ethnic or gender norms and stereotypes (Meyer et al., in press).

The impressive and thoughtful review by Whitely and colleagues confirming that ADHD diagnosis and/or medication treatment is more common in children who are *young-for-school-class/grade* make us think about this socially constructed nature of ADHD diagnosis - but from new angle. Across 19 studies including 15.4 million patients from 13 countries using different

methodologies and statistical approaches, they found, with just two exceptions, a higher proportion of ADHD cases in children with a later birthdate in their school class. Notably, the exceptions tend to prove the rule, in that those studies differ from the others in specific ways. The authors go on to highlight the most commonly invoked explanation of this phenomenon - age-related observer/rater bias. In essence, this model follows a simple logic - 1) Individual decisions to refer, and subsequently diagnose, a child with ADHD are made against implicit socially grounded thresholds regarding what constitutes a sufficiently severe and impairing presentation; 2) These implicit thresholds likely vary systematically as a function of a range of factors - age, gender and ethnicity. In fact, the diagnostic formulae are explicit with regard to age - the seriousness of the symptoms should be benchmarked against a notion of their “developmental appropriateness”; 3) That the ADHD diagnostic process is nearly always either driven, or at least heavily shaped, by teachers’ judgements and actions; 4) That, crucially, teachers reference their judgements of developmental appropriateness, and so their estimates of the seriousness of the problem, against school-class/grade rather than actual age norms; 5) That within each class, actual levels of inattention, hyperactivity and impulsivity vary as a function of age - with younger children showing more of these behaviours than the older; 6) Therefore, more young-for-class/grade children get recognised as having ADHD. In simple terms, teachers fail to adjust their judgements to take account of the maturity of the child relative to their classmates when making judgements about who to highlight for help. It is hard to test this hypothesis within the context of the current review - it would require data with a much higher level of granularity - with a comparison of teacher ratings of symptoms and directly measured behaviours in the classroom for example. In support of the argument, however, the authors do highlight the indirect evidence that in one or two studies where relevant data is available - parents don’t rate young-for-class/grade children as having more symptoms than their older for class/grade counterparts, even where they are getting disproportionately referred.

It would actually be positive if it turned out that the disproportionate number of young-for-class/grade children with ADHD was the result only of this sort of perceptual bias rather than

anything more deep-seated or profound as it would be relatively easy to fix: Teachers would simply need to be helped to re-calibrate their referral decisions and their ratings of symptoms in a way that takes actual age rather than school class/grade as their thresholding reference. However, we believe that this is unlikely to be the whole story and that different, more complex and more difficult to address processes are at work here. One possibility is that the elevated levels of ADHD in young-for-class/grade children are not due to their age per se but rather to their season of birth - which typically coincides with class/grade-relative-age. The idea here is that children who were born during summer, and who enter school young-for-grade the following autumn, are exposed either in-utero or early in the post-natal period to seasonal ADHD-related risks during critical or sensitive periods of development. For some considerable time there has been speculation around the possible role of first trimester infection and related inflammation during the winter months increasing ADHD later in the year (Werenberg Dreier et al., 2016). However, while this account has a degree of biological plausibility, the direct evidence is largely lacking and it seem rather far-fetched as an explanation for effects on the scale reported here by Whitely et al (2019).

A second, and we feel much more likely, alternative possibility hinted at, but not stated explicitly, in the Whitely paper relates more to the issue of ADHD-related impairment rather than ADHD symptoms per se. In ADHD lecture 101 we learn that both symptoms and impairment are required before a diagnosis of ADHD can be made - ADHD symptoms need to adversely impact daily functioning before a diagnosis can be made. But the relationship between symptoms and impairment is complex; being both state- and context-dependent. By context dependent we mean that it will vary depending on the extent to which a situation places demands on cognitive processes and systems known to be deficient in ADHD (e.g., executive and attention control). In demanding settings impairment will be greater and where children are struggling to cope, this may even undermine children ability to develop effective self-regulatory strategies. In contrast, where the setting runs with the grain of ADHD, impairment is unlikely to be seen. There may even be functional advantages of ADHD symptoms in some settings (Sherman et al., 2006). This situation is complicated

further because such contextual factors will interact with individual state-related variations. For instance, ADHD is likely to have a larger adverse effect on functioning in a demanding setting when children are tired. Crucially, for the current case, the impact of ADHD symptoms will also vary as a function of the age and/or developmental level of the child - a setting that was too demanding for a child with ADHD at one age might present no problems for a similar child who is a few months older and so more mature. **Put simply, our hypothesis therefore is that young-for-class/grade children are more likely than older children to struggle with the academic and social demands imposed by the classroom, an effect that is exacerbated for children who meet diagnostic thresholds for ADHD symptoms. According to this view ADHD symptoms are *not* elevated in young for grade/class children, but given the same level of symptoms, younger children will find it more difficult than older children to function effectively in the classroom.** A good teacher will recognise the mismatch between the demands of the setting and the child's abilities and seek to help the young child with ADHD in their class to cope with these demands. In some cases this will lead to children being referred for clinical help, which in turn can lead, in many systems, to pharmacological treatment. Hence, the findings of more treatment in young-for-class/grade children reported by Whitely et al (2019) paper.

There are a range of potential remedies to this mismatch between the developmental abilities of the young-for-class/grade ADHD child and the demands of the classroom. All essentially involve trying to reduce the impairing effect of ADHD symptoms by better matching the academic and social demands of the classroom to levels of developmental competence of the young for class/grade child with ADHD. Vygotsky's concept of the zone of proximal development (ZPD) - that zone of active engagement between what a learner can do unaided and what they can't do, even with help - might be especially informative here. From this perspective, the essence of a child-centered approach to education involves always challenging children to do more, but supporting that goal with appropriate scaffolding, while never being so demanding as to undermine the child's sense of agency and confidence (Bowles et al. 2018). In this sense when a young-for-class/grade

developmentally immature child with ADHD enters the typical classroom they are very likely to be placed beyond their personal ZPD - where demands substantially exceed competence. The potential remedies include the following non-mutually exclusive options.

First, one can try to reduce this mismatch by altering the age of class/grade entry. This could involve changing the whole educational system so that all children enter school at the same age indexed to their birthday. The logistical challenges where this involves a whole-sale change are both obvious and enormous. In this situation age banding within classes may be a sensible compromise. Alternatively, young-for-class/grade children with high levels of ADHD or other developmental challenges could be held back to the next class year - what is reported to have occurred in two of the Danish studies in the Whitely review. While it is an empirical question as to what the impact of this would be on the child affected, there is a risk that it could be stigmatizing and therefore damaging on self-esteem. From a ZPD perspective, it may also lead them to fail to make the developmental gains that they are capable of in a more challenging but supported setting. Second, one can intervene to accelerate the child's development, bringing them within the ZPD of their older, developmentally more mature classmates as whole. These specific interventions may try to improve underlying cognitive functioning through, for instance, cognitive training. Judicious use of medication may legitimately play a role in this strategy by reducing symptoms and improving underlying executive control. In this sense the higher rates of medication in young-for-class/grade children may not actually be such a cause for concern, but a practical response to a significant problem. Third, and in conjunction with the above, the classroom setting and curriculum could be altered to bring its demands within the individual child's ZPD. This could be achieved by tailoring the curriculum to the specific needs of the young-for-class/grade ADHD child, providing additional specialist educational support or altering the environment in ways that reduce the negative impact of ADHD symptoms. With regard to the latter point there is considerable debate regarding how this should be achieved with some arguing for more structure and less distraction and others for greater flexibility and freedom of expression. Alternatively, some theorists of ADHD consider symptoms to

be a functional expression of a drive for stimulation and look for ways to allow children with ADHD to elicit such stimulation without interfering with their work or that of other children in the class - either by providing additional “noise” or encouraging non-distracting fidgeting.

Whitely et al (2019) have done a great service to our field in highlighting the significant needs of an often-overlooked group - young-for-class/grade children with ADHD. It is now time to respond systematically to these needs and to provide these children and their families with the support they deserve. We would focus energies (and financial resources) on a combination of; (i) better preparing children to meet the challenges of the general classroom, including therapeutic interventions to reduce ADHD symptoms and improve executive control; (ii) tailoring classroom settings to make them more ADHD-friendly, (iii) providing targeted specialist support; (iv) adjusting curricula and (v) giving better training to teachers in recognising and adapting to children’s age-dependent developmental capabilities. This should all be done within the mainstream provision in a way that doesn’t either stigmatize the affected child or disadvantage the other members of the class - perhaps by introducing age bands within classes. Making such changes in the context of controlled research studies would also throw crucial light on the causal mechanisms involved in the associations identified by Whitely and colleagues.



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