

## Editorial: ‘Shine bright like a diamond!’: is research on high-functioning ADHD at last entering the mainstream?

With the publication of the paper by *Greven and colleagues* (Greven, Buitelaar, & Salum, 2018), which follows up on their paper in JCPP from 2016 (Greven et al., 2016), the time is ripe to intensify discussion about how research on attention-deficit/hyperactivity disorder (ADHD) can be moved away from the deficit-focused view to a concept that is oriented towards resources a patient might be able to recruit, thus, from a psychopathologic definition to the affected individual's potential to function at a high level despite impairments in attention, motor control, cognition and emotion regulation. In this paper, the assessment instrument Strengths and Weakness of ADHD Symptoms and Normal behaviour scale (SWAN) was used to screen adolescent twins from an UK population-representative cohort for ADHD as a continuous trait. Compared to other validated and commonly used rating scales, only the SWAN reliably differentiated between participants in terms of interindividual differences in attention, motor and impulse control measured across the entire spectrum of continuous ADHD latent traits, from the extremely high (supernormal) to the extremely low ends of the spectrum. Scales such as the SWAN allow the identification of indicators of positive traits, also called skills or resources, that may moderate and potentially compensate ADHD-related deficits and impairment.

An individual who fully meets the criteria for ADHD, but still is able to function relatively well, is described as having high-functioning (HF)-ADHD, with some ADHD expressions being severe and others located more towards the mild end of the diagnostic spectrum. Both may still be relatively impairing compared to an individual's potential, although to the outside observer the less impaired individual may not appear to be struggling (Torralva, Gleichgerricht, Lischinsky, Roca, & Manes, 2013). Furthermore, some dimensions of ADHD may even be adaptive rather than impairing. However, the residual suffering from deficits and diminished quality of life, even in these cases, can be very real. For instance, HF-ADHD individuals are frequently running late, missing appointments, busses, trains or planes or deadlines at work as a consequence of poor time management which is often combined with procrastination. They may also not be able to sit still and to read for extended periods of time. On the other hand, if they manage to (hyper)focus on anything long enough, they may benefit considerably from a near-photographic memory and eidetic

learning. HF-ADHD individuals may compensate by studying extra hard – lucubration in the best sense of the term – or putting in twice as much effort at work. They cope with hyperactivity by selecting tasks and jobs which allow them to move around or travel extensively and they create compensatory systems that allow them to manage life. For some HF-ADHD individuals, rigid self-organisation and maintaining order are practical tools that can allow them to accomplish more uniform transitions and efficient resolutions, but any external interference can lead to confusion and rapid mood swings. After making huge efforts to control distractibility, these HF-ADHD individuals often complain of feeling deeply humiliated by setbacks. Nevertheless, the sequelae of deficits in social competence and interaction are manifold. Constantly being reprimanded for impulsive interrupting of others, leaving things unfinished or constantly multitasking during social interaction, results in feelings of embarrassment, low self-esteem and negative self-concept are frequently associated with an increased risk for anxiety disorders and depression.

To adequately treat HF-ADHD in adulthood, effective therapy needs to support and promote the transition from risk to resilience, to enable the person to adapt to their difficulties and find their niche. The challenge is to move affected individuals from being controlled by their persisting deficits (Ward, Wender, & Reimherr, 1993) to being able to take advantage of their skills and resources. This overarching goal should be pursued preferentially

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following medication, coaching, particularly to avoid feelings of loss of authentication, and environmental restructuring. Adopting a resources-based model of ADHD can therefore provide a first step towards enablement of HF-ADHD patients. According to the Rasmussen's model for representing human performance at the skill-, rule- and knowledge-based levels (S-R-K model) (Rasmussen, 1983), HF-ADHD may be described in a three-level heuristic: (a) functional status of high motivation incited and maintained by few external stimuli; (b) various resources with

high-level energy, extraordinary creativity, out-of-the-box thinking and spontaneity, exploration of novelty, craving for knowledge facilitated by the ability to hyperfocus as well as positive emotionality with enthusiasm and passion; and c) instantaneous re-enforcement of the major functional consequence. The expression of these traits may be enhanced by flanking and largely independent dimensions of personality, such as above-average openness to experience or intellectual abilities in general, high agreeableness and conscientiousness. In addition, these socially advantageous traits may be facilitated in an interactive manner by adaptive self-regulatory mechanisms on the developmental trajectory to compensate for ADHD-related deficits. Further systematic research is required to dissect these processes involving most likely gene-by-environment interaction and epigenetic modification of gene function.

From this perspective, it is not surprising that historical and anecdotal reports as well as common clinical experience have documented or observed many overachievers with HF-ADHD, particularly in the areas of entrepreneurship, technology, research and development as well as in politics and sport, who were diagnosed or would fulfil the criteria for ADHD at the high-functioning end of the spectrum. They have been coping reasonably well by controlling their deficits and taking advantage of their resources. However, studies focussing on the long-term course of HF-ADHD and its response to treatment (e.g. dialectical behaviour therapy and mindfulness-based cognitive therapy) are largely lacking. Individuals with HF-ADHD can stand out as born doers, troubleshooters and problem-solvers. If something needs to be done, they figure out how to do it, no questions asked; they are exceptional in swift decision-making and achieve this without obsessing over the consequences of a decision and the means it would take. Despite positive emotionality, enthusiasm, drive and passion, which commonly inspire others, subsensitivity of their brain's reward network frequently can result in dissatisfaction with their achievements leaving them at risk of mental health problems. Remarkably, these "go-getters" do not let challenges and obstacles stand in their way: the harder it is, the more they want to achieve. While overcoming various setbacks, many desperately need to win and never admit defeat. Thus, stereotypically, they have no patience with and no tolerance for bureaucracy, at times resulting in civil disobedience – with outbursts of temper with a harmful ending as exemplified by the fate of Robert Devereux, 2nd Earl of Essex, an incident already occurring during the Elizabethan era (1558–1603) – to accomplish goals (Geissler & Lesch, 2011). The process of mitigating dysfunction may take effort to maintain ethical behaviour and distinguish what is right from what is expedient – the ends justifying the means. Hence, providing HF-ADHD individuals with

the appropriate environmental influences and allowing the development of resilience, they – as the popular songs goes – may crave for the exclamation: "Shine bright like a diamond!"

In conclusion, although recognition of the concept of ADHD as a life-spanning disorder has come a long way, HF-ADHD is still underresearched and under-recognised. However, it is now beginning to enter the mainstream. To promote understanding of this condition, more longitudinal studies are required employing neuropsychologic, neuroimaging and neurobiologic approaches, with focus on compensatory mechanisms during fronto-striatal-amygdalar maturation and adult plasticity as well as epigenetic modification marker screening strategies to identify homeostatic processes of resilience in endophenotypic traits related to coping styles of target groups, such as established entrepreneurs, high-level managers, elected political representatives or competitive athletes. Only then, we can start to really understand the psychological costs of maintaining such a high level of energy and performance despite substantial deep seated deficits.

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