

THE DUALISTIC IMPACT OF INHERITED ADHD ON THE DESIGN OF ARCHITECTURAL ACADEMIC SPACES

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ABSTRACT

With the rapid advancement of digital devices and the pervasive influence of social media, several challenges facing the university community have been brought to the forefront. Among these are often overlooked conditions and latent symptoms, most notably Attention-Deficit/Hyperactivity Disorder (ADHD). This neurodevelopmental disorder, which originates in childhood and persists into adulthood, is characterized by a spectrum of symptoms, including the inability to maintain sustained concentration, hyper-focus on specific details, disorganized task execution, and emotional dysregulation. These manifestations frequently result in functional impairment across various domains of daily life. Consequently, this study aims to enhance awareness regarding this marginalized disorder and to identify evidence-based strategies and interventions for its management.

This study investigates the influence of Attention-Deficit/Hyperactivity Disorder (ADHD) on students within architecture programs. While architectural education relies heavily on iterative design processes and creative problem-solving, it also demands rigorous executive functioning for project management and theoretical coursework. Through a mixed-methods approach, this research examines how ADHD symptoms—characterized by inattentiveness, hyper-focus, and forgetfulness—impact student performance. The findings indicate a "creative-functional paradox," where ADHD students often excel in design studios through hyper-focus while struggling significantly with the structured, sustained attention required for theoretical examinations and long-term project administration. This paper concludes with pedagogical recommendations for inclusive studio environments.

KEYWORDS: Attention Deficit Hyperactivity Disorder (ADHD); Architectural Pedagogy; Executive Functioning; Design Studio; Cognitive Diversity; Inclusive Education.

1. INTRODUCTION

It is critical to distinguish Attention-Deficit/Hyperactivity Disorder (ADHD) from other mental health conditions and to consider its specific impact on university students, particularly those in architectural programs where symptoms often intersect with the intense pressures of project-based workflows and meticulous drafting requirements. With a documented annual increase in the prevalence of mental health-related distractibility among university students, the necessity for differential diagnosis becomes paramount. For instance, Major Depressive Disorder (MDD) exhibits a partial overlap with ADHD symptoms, such as impaired concentration. However, in MDD, such symptoms are transient, occurring specifically during episodes of low mood and anhedonia, often accompanied by negative ruminations and appetite disturbances—features that are not diagnostic hallmarks of ADHD.

Following an extensive review of studies on university students across various regions aimed at understanding the broader educational impact of ADHD, the findings are summarized as follows:

1.1 Academic and Social Domains:

- Academic Performance: Diminished performance, particularly in time-constrained assessments of theoretical courses.
- Social Dynamics: Challenges in developing interpersonal skills and social relationships, alongside diminished self-esteem within social contexts.

1.2 Academic Achievement and Success Paradoxes:

- Cognitive Capacity: High intelligence quotients (IQ) are frequently observed among individuals with ADHD, often translating into exceptional performance in practical, studio-based courses compared to theoretical ones.
- Diagnostic Barriers: High-achieving students with ADHD are at an elevated risk of remaining undiagnosed and untreated due to their apparent academic success, which may mask underlying symptoms. (Hallowell, 2025)

1.3 The Role of Modern Technology:

- Behavioral Reinforcement: Modern technology may exacerbate or perpetuate behaviors associated with ADHD.
- Digital Dependency: Individuals with ADHD exhibit a higher propensity for Internet addiction.
- Clinical Implications: Assessing usage patterns of modern technology should be an integral component of the clinical evaluation for ADHD. (Figure 1)

Architecture education is uniquely demanding, requiring a synthesis of artistic intuition, technical precision, and long-term project management. Recent shifts in inclusive education have highlighted the presence of neurodivergent students, particularly those with ADHD, within architecture studios. Unlike traditional engineering disciplines, the architectural studio requires an "open-ended" cognitive workflow that can be both a challenge and a strength for ADHD brains. This research aims to delineate the cognitive landscape of ADHD architecture students, focusing on the tension between creative output and the structured academic demands of the curriculum. (Heller,2026)

Figure 1: Word cloud diagram of Approaching ADHD

The architectural studio is a unique pedagogical space that functions differently from traditional engineering or science classrooms. It demands a fusion of abstract creative thinking and technical precision. For students with ADHD, this environment presents both unique advantages and profound challenges. This section should define the "Architectural Paradox": the student who can conceptualize a complex building massing in an hour of hyper-focus but struggles to remember to submit a minor report for a history class. The goal here is to establish that architectural education is currently designed for neurotypical executive functioning, which may systematically disadvantage students with ADHD. (Colin , 2022)

A critical gap exists in contemporary architectural design standards tailored for university students exhibiting hereditary-linked symptoms of **Attention Deficit Hyperactivity Disorder (ADHD)**. Traditional academic environments often fail to accommodate the neurodivergent needs of university students, particularly those enrolled in rigorous architectural design programs. The physical learning environment frequently exacerbates attentional fragmentation and behavioral dysregulation. Environmental factors—such as spatial configuration, color schemes, lighting design, spatial ergonomics, furniture layout, and the integration of biophilic elements—profoundly influence cognitive performance and behavioral regulation. Consequently, mitigating the dual-impacting manifestations of hereditary ADHD within academic architectural spaces necessitates empirical investigation. The core problem centers on quantifying the psychological and behavioral impact of interior architectural design on undergraduate architecture students diagnosed with ADHD, aiming to establish evidence-based design interventions that foster psychological comfort and enhance academic performance.

This research aims to formulate an optimized physical environment for university students with ADHD through the following primary objectives:

- Identifying appropriate interior design elements, empirical standards, and rigorous design guidelines necessary to rectify existing spatial and architectural deficiencies.
- Analyzing the specific environmental and psychological requirements of students with ADHD to ensure psychological well-being, cognitive focus, and physical safety. (Hallowell, 2025)
- Proposing actionable design, spatial, and social solutions tailored to accommodate the specialized psychological and functional needs of undergraduate students with ADHD. (Heller, 2026)

2. METHODOLOGY

This study adopts a rigorous case-study methodology applied to clinically diagnosed cases of ADHD among architecture students, evaluated and verified by licensed clinical specialists. The research framework systematically integrates empirical data collection and etiological tracking across five structured phases:

Phase I: Theoretical Framework & Literature Review. Establishing a robust theoretical foundation by reviewing precedent literature pertinent to environmental psychology, neuroarchitecture, and ADHD accommodations.

Phase II: Observational Assessment Protocol. Developing a structured observation checklist to systematically

evaluate student behavior within the design studio environment against established spatial criteria. Observations were categorized using a three-point Likert scale ('Applicable', 'Not Applicable', 'Partially Applicable') across four core dimensions:

- **Architectural Studio Configuration:** Assessing compliance of spatial layouts with neurodivergent educational requirements.
- **Lighting and Chromatic Design:** Evaluating how artificial/natural illumination and color palettes align with ADHD cognitive thresholds.
- **Furniture Ergonomics and Layout:** Examining spatial distribution and furniture arrangement to minimize distraction and maximize focus.
- **Safety and Security Standards:** Ensuring physical safety parameters integrate seamlessly within the studio environment.

Phase III: Qualitative Stakeholder Interviews. Designing and administering semi-structured interviews with academic faculty members and studio instructors to assess perceived satisfaction levels and gauge the impact of specific interior elements on student behavior.

Phase IV: Data Synthesis and Analysis. Compiling and analyzing qualitative and quantitative data derived from field interviews and observations to extract critical findings.

Phase V: Computer-Aided Spatial Optimization. Utilizing computer-aided modeling and simulation to propose alternative furniture layout configurations and derive comprehensive architectural guidelines and recommendations.

3. SCOPE AND DELIMITATIONS

- **Sample Scope:** Investigation focused on 15 formally diagnosed undergraduate architecture students exhibiting hereditary ADHD.
- **Typological Boundaries:** Design studios within the Department of Architecture, Faculty of Engineering.
- **Geographical Boundaries:** Department of Architecture, Umm Al-Qura University, located in the Abidiyah district, Makkah Al-Mukarramah, Saudi Arabia.
- **Temporal Boundaries:** Field experiments and evaluations were conducted on Sundays and Wednesdays of each week throughout the second semester of the 2025/2026 academic year.
- **Demographic Boundaries:** First-year undergraduate students enrolled in the architecture program diagnosed with ADHD.

4. RESULTS

4.1. The Role of Color and Its Psychological Impact on University Students

Scientific research indicates that the human organism requires specific chromatic wavelengths to optimize cognitive and physical performance, often gravitating toward deficient color spectra during various life stages. This phenomenon has historically served as a therapeutic modality for diverse psychological and neurological conditions, ranging from clinical depression to Attention Deficit Hyperactivity Disorder (ADHD). Consequently, the therapeutic application of chromatic stimulus plays a pivotal role in modulating human mood, cognitive processing, and behavioral patterns. Specifically, its psychological impact on students diagnosed with ADHD directly influences vitality, individual focus, and collective engagement. This integration supports the functional objectives of interior design—namely behavioral modification and cognitive regulation—by leveraging student physiological and psychological responses to color. When synthesized with lighting design and spatial ergonomics, color acts as a profound regulator of mental and muscular equilibrium, enhancing attention span and mitigating distractibility. (Kristin,2025)

Chromatic Characteristics, Psychological Impact, and Functional Integration

The Yellow Spectrum

Yellow is universally associated with vitality and intellectual stimulation. Among its primary positive attributes are the enhancement of cognitive activity, the maintenance of mental alertness and clarity, and the fostering of creative expression and academic writing. It is recognized as one of the most potent stimuli for activating cognitive memory cells in young individuals (Duyan, 2022). Given that attentional deficit and low concentration are core diagnostic traits of students with ADHD, yellow can be strategically harnessed if applied with precise spatial intent to serve specific functional tasks.

Application in Lecture Halls: Rather than saturating all interior vertical surfaces with high-chroma yellow, it is pedagogically advantageous to apply it selectively to the primary focal wall specifically the wall hosting the instructional board—to anchor visual focus and attention. Furthermore, utilizing yellow boundary lines on flooring surfaces to demarcate workstation perimeters has proven highly effective; empirical studies demonstrate that human subjects instinctively adhere to yellow boundary lines due to the color's inherent organizational and warning properties (Al-Ayash, 2016).

The Blue Spectrum

Blue is widely acknowledged as a chromatic agent of tranquility and relaxation, evoking serenity, soothing the nervous

system, and offering a cool visual temperature. Its primary psychological benefits include stress mitigation via the dissipation of negative energy and the restoration of positive psychological equilibrium (Al-Ayash, 2016). Numerous empirical investigations indicate that blue exerts a profound calming effect, effectively reducing physiological tension—particularly in students diagnosed with ADHD. Research highlights that targeted exposure to blue chromatic tones induces muscular relaxation, calms hyperactive students, and significantly suppresses distractibility, establishing it as an instrumental supportive modality in managing ADHD behavioral challenges.

Application in Laboratories and Workshops: Blue should be implemented within functional work zones that demand deep concentration and acoustic/visual quietude (Duyan, 2022). Utilizing light-tinted blue flooring within academic laboratories and workshops creates a serene spatial atmosphere that fosters calm and focused engagement during instructional sessions. (Figure 2&3)



Figure 2: Using blue in lecture halls as a color criterion



Figure 3 : The use of colors in drawing halls before and after modification to align with the design standards of the Arab Academy for Science and Technology

The Green Spectrum

Green is universally recognized as a chromatic symbol of prosperity and hope, exerting a soothing and relaxing effect on the optic nerves while evoking a profound sense of psychological comfort and tranquility. Notably, green possesses the unique characteristic that even when dominant across an entire spatial environment, it does not induce visual fatigue, confinement, or boredom. Its psychological profile closely mirrors that of the blue spectrum (Duyan, 2022), rendering it exceptionally well-suited for students with ADHD by fostering emotional ease and promoting motor self-regulation. (Figure 4)

Application in Design Studios: It is pedagogically advantageous to apply light green tints to the vertical wall surfaces of drawing and design studios to visually relieve students' eyes. Given that students with ADHD are highly susceptible to distraction from extraneous external stimuli, colors must be deployed with meticulous care within spaces where neurodivergent students spend extended periods. Consequently, employing light chromatic values or blending them with white is essential to prevent hyper-stimulation and preclude attentional fragmentation. (Kristin ,2025)



Figure 4 :Using colors in the studio before and after modification to align with the design standards of the Arab Academy for Science and Technology

4.2. The Role of Lighting, Its Impact, and Functional Integration

Lighting constitutes a critical determinant in architectural space success, imbuing interiors with diverse psychological dimensions ranging from mystery, calm, and psychological comfort to, conversely, dynamic stimulation and arousal. Effective lighting harmonizes functional and aesthetic requirements into an integrated whole. Notably, illumination plays a pivotal role in modulating chromatic perception within interior spaces; variations in luminous intensity alter apparent color values and reflected hues, directly influencing the psychological and emotional states of human occupants in general, and students diagnosed with ADHD in particular. (PJC Sleepers, 2022).

Lighting Typologies and Functional Utilization

- **General (Ambient) Lighting:** Illuminates the entire room uniformly (PJC Sleepers, 2022).. It is preferentially deployed in lecture halls to render all room corners clearly visible and minimize shadows, thereby mitigating environmental risks to which ADHD students might otherwise be exposed.
- **Focused Lighting:** Directs illumination onto specific targeted areas, such as reading zones or instructor lecterns. This introduces measured visual variety, preventing ADHD students from experiencing fatigue or monotony during lectures.
- **Task (Localized) Lighting:** Concentrates illumination on specialized zones such as drafting studios, drawing spaces, or model-making workshops. Soft, subtle gradients are preferred to foster a calm atmosphere that enhances concentration across the work plane and minimizes distraction.

Design Guidelines for Lighting Distribution in Educational Spaces

To ensure optimal spatial ergonomics for neurodivergent learners, the following distribution controls must be rigorously observed: (PJC Sleepers, 2022).

- **Alignment with Activity:** Ensuring lighting systems directly correspond to the functional requirements of lectures, design studios, or practical workshops.
- **Thermal Regulation:** Avoiding halogen and incandescent lamps in classrooms, as their thermal emission generates uncomfortable indoor temperatures that induce stress and impair concentration.
- **Source Stability:** Guaranteeing absolute stability of light sources; optical flickering or shifting light paths heavily induce visual fatigue and attentional fragmentation.
- **Shadow Reduction:** Achieving optimal spatial distribution of luminaires to eliminate cast shadows within instructional spaces.
- **Glare Mitigation:** Positioning visible lighting fixtures outside direct lines of sight while directing beams cautiously to prevent glare. Utilizing louvers or baffles eliminates harsh reflective hot spots that cause visual discomfort, agitation, and focus disruption.

4.3. The Significance of Nature, Gardens, and Holistic Interventions

Empirical studies demonstrate that access to green spaces significantly reduces aggressive behavior and hostility while enhancing focus and behavioral discipline through the calming influence of nature. Biophilic integration is paramount for students' psychological, intellectual, emotional, and physical development. This can be achieved by incorporating interior courtyard gardens that facilitate natural sunlight penetration, establishing a secure, tactile environment for play and outdoor exploration that satisfies innate curiosity while maintaining strict safety boundaries. Furthermore, encouraging structured physical exercise allows students to channel excess motor energy constructively. Combined with dietary modifications—such as reducing refined sugar intake—these holistic measures act as powerful auxiliary strategies in mitigating hyperactivity and managing ADHD symptoms within academic settings.

4.4. Field Survey and Assessment Criteria

A comprehensive census was conducted for first-year undergraduate architecture students exhibiting ADHD within the Faculty of Engineering at Umm Al-Qura University. Questionnaires and evaluative instruments were administered to the target sample—comprising the affected students, faculty professors, and teaching assistants. The evaluation framework was structured around key performance indicators and design criteria, including:

- Color application standards within lecture halls.
- Color utilization inside architectural design studios.
- Application of focused lighting to enhance student concentration.
- Provision of adequate natural illumination.
- Provision of specialized lighting suitable for studio drafting.
- Illumination levels within model-making and prototype workshops.
- Appropriate distribution and ergonomic arrangement of furniture and seating in lecture halls.

Initial Findings and Pre-Modification Evaluation

The evaluation revealed that existing color, lighting, and interior design standards critically failed to align with the needs of the study sample (15 diagnosed students out of a total cohort of 130). Low compliance percentages were recorded, with an average overall standard fulfillment rate of only 35%, severely restricting the educational process. This underscores the profound impact of interior architecture in mitigating ADHD-related challenges. Utilizing chromatic concepts and their psychological impacts across specialized interior spaces—particularly those where students spend extended periods, such as the architectural studio—serves as a primary objective. The design strategy employs targeted colors and visual stimuli equipped with spatial cues to help students overcome difficulties stemming from hereditary neurodivergent conditions. Pre-modification analysis indicated that the average compliance rate reported by students was 36.42%, while faculty members evaluated the average compliance rate at 34.28%.

Proposed Interventions and Post-Evaluation Results (Figure 5 to 9)

Following the identification of spatial deficiencies via the initial survey, multiple design modifications were proposed to align with the psychological profile of ADHD students. Utilizing digital tools and artificial intelligence simulations, alternative spatial layouts and chromatic schemes were modeled and presented to the target stakeholders. Subsequent re-evaluation demonstrated a significant relative alignment with color, lighting, and interior design theories. After photographing current classrooms, lecture spaces, and design studios utilized by the students, alternative interventions were implemented, and the questionnaire was re-administered. The post-modification results differed markedly, with student satisfaction regarding interior design compliance surging to an average of 84.28%. (Table 1)

Table 1: Comparative Evaluation of Spatial Compliance and Student Satisfaction Pre- and Post-Intervention

No.	Design Criteria	Before		After	
		Students	Staff	Students	Staff
1	Utilizing colors in lecture spaces	20%	30%	90%	95%
2	Utilizing colors in studio	10%	10%	80%	90%
3	Using lighting in student concentration	5%	10%	70%	80%
4	Providing natural light in an appropriate amount	50%	40%	80%	90%
5	Providing suitable lighting for the drawing studio	70%	50%	90%	90%
6	Illuminance level in model workshops	50%	50%	90%	90%
7	Appropriate distribution of furniture and chairs in the lecture halls and studio	50%	50%	90%	95%
	Average	36.42%	34.28%	84.28%	90%



Figure5: The use of recommended colors in the studio after the questionnaire and the possibility of applying them



Figure 6: Suggesting the recommended colors, lighting focus, and the method of arranging tables in the studio after the questionnaire



Figure 7: Suggestions for using colors and focused lighting in the discussion and presentation hall



Figure 8: Visualizing the use of colors on walls, chairs, and flooring in lecture halls after the questionnaire

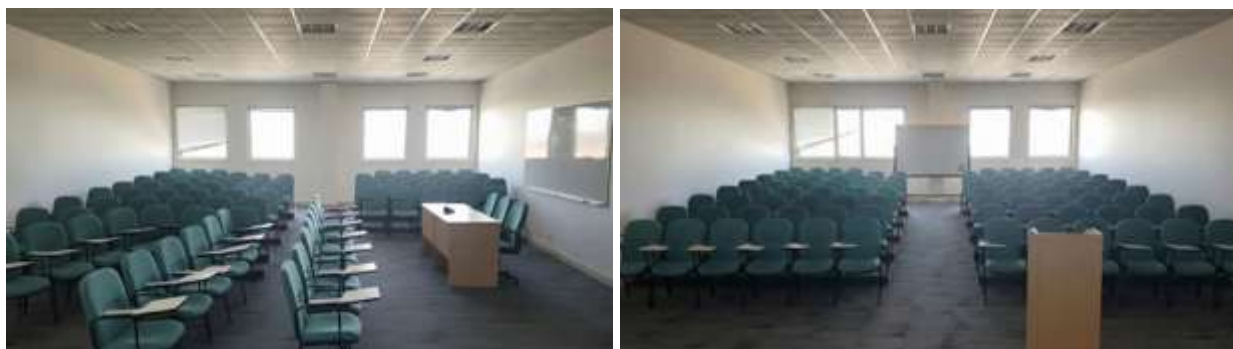




Figure 9: Suggestions and alternatives for the method of redistributing furniture layout in lecture halls and seminar rooms after the questionnaire.

5. DISCUSSION

The "Architectural ADHD" phenomenon is defined by a high threshold for creative stimulus but a low threshold for administrative monotony. The studio culture, with its long hours and immediate visual feedback, acts as a "natural habitat" for ADHD, provided that the academic structure allows for non-linear project management. From an expert perspective, non-pharmacological interventions hold paramount significance for university students striving to master the management of Attention Deficit Hyperactivity Disorder (ADHD) and overcome associated learning difficulties. While pharmacological treatment alone may suffice for a small subset of university students, persistent functional challenges frequently manifest, necessitating auxiliary support through optimized internal architectural design standards. These essential environmental criteria encompass:

- Strategic color utilization within lecture halls.
 - Optimized chromatic application inside architectural design studios.
 - Implementation of focused lighting systems to enhance student concentration.
 - Provision of adequate natural illumination.
 - Integration of specialized, appropriate lighting suitable for studio drafting spaces.
 - Regulation of illumination levels within model-making and prototype workshops.
 - Ergonomic distribution and spatial arrangement of furniture and seating in lecture halls.
- Comparative Evaluation of Spatial Compliance and Student Satisfaction Pre- and Post-Intervention (Table2)

Table 2: Evaluation of Spatial Compliance and Student & staff Satisfaction Pre- and Post-Intervention

	Pre-Modification Rate (%)	Post-Modification Rate (%)
	Pre-Intervention	Post-Intervention
Student Evaluation of Spatial Compliance	36.42%	84.28%
Faculty Evaluation of Spatial Compliance	34.28%	90% (Estimated/Optimized)
Overall Average Compliance & Satisfaction	35.34%	87.14%

So.

- Find the right kind of difficult. Use these behavior assessments to discover the work, activity, or creative outlet best suited to an individual's unique strengths. (Hallowell, 2025)
- Reimagine environment. What specific elements to look for at home, at school, or in the workplace—to enhance the creativity and entrepreneurial spirit inherent in the ADHD mind.
- Embrace innate neurological tendencies. Take advantage of new findings about the brain's default mode network and cerebellum, which confer major benefits for people with ADHD.
- Tap into the healing power of connection. Tips for establishing and maintaining positive connection "the other Vitamin C" and the best antidote to the negativity that plagues so many people with ADHD.

6. CONCLUSION

ADHD is not a deficit of capability in architecture but a difference in cognitive processing. Architectural pedagogy should shift from rigid, time-indexed grading to "milestone-based" evaluations that emphasize the quality of the iterative process. Supporting these students requires a reduction in bureaucratic cognitive load, allowing them to channel their hyper-focus toward complex spatial problem-solving.

6.1. Care Provision for Individuals with Hereditary ADHD

University students diagnosed with Attention Deficit Hyperactivity Disorder (ADHD) exhibiting hereditary traits

frequently seek academic counseling, medical care, and disability support services due to concurrent struggles with anxiety and/or depression. Because the intense pressures of university life profoundly impact mental health, anxiety and depression often manifest as comorbid conditions among adults with ADHD. Nevertheless, clinicians must recognize that certain ADHD symptomatology can clinically mimic anxiety and depressive disorders.

6.2. Screening Protocols for University Students in Specialized Programs

Experts strongly recommend routine screening for anxiety and depression among university students, alongside investigating hereditary lineages for individuals reporting persistent learning difficulties. Anxiety and depression can also reflect natural psychological stress responses to educational and psychosocial impairments generated by unmanaged ADHD. Therefore, systematic screening for ADHD should be mandated for all students diagnosed with—or frequently reporting—anxiety, depression, or other mental health disorders, particularly when pharmacological interventions yield limited psychological progress. (Colin , 2022)

6.3. Identification and Diagnostic Criteria for ADHD

Adult ADHD is clinically diagnosed when an individual exhibits five or more symptoms of inattention and/or hyperactivity-impulsivity, with multiple symptoms having manifested prior to the age of 12. These core symptoms must persist for a minimum duration of 6 months. In clinical practice, the developmental trajectory typically mirrors chronic traits originating in childhood or early adolescence. Furthermore, ADHD symptoms must be inconsistent with the individual's developmental level and must induce functional impairments across two or more settings, such as at home, at university, or in the workplace. (Colin , 2022)

6.4. Non-Pharmacological Interventions for ADHD Management

As a primary non-pharmacological approach, psychoeducation is initiated to discuss ADHD and its systemic impacts, followed by targeted environmental modifications. For university students with ADHD, institutions must provide quiet study spaces optimized with specialized chromatic and lighting standards. Additionally, recommendations include scheduling frequent study breaks, breaking down daily objectives into manageable tasks, utilizing digital planners and reminders, and engaging in regular physical exercise. If these environmental and behavioral modifications are rigorously implemented yet functional impairments persist in at least one domain (such as academic performance or study/learning difficulties), it indicates the limitations of non-pharmacological treatment alone, necessitating the serious consideration of pharmacological intervention.

Now, most people have heard of ADHD and know someone who may have it. But lost in the discussion of both childhood and adult diagnosis of ADHD is the potential upside: Many hugely successful entrepreneurs and highly creative people attribute their achievements to ADHD. Also unknown to most are the recent research developments, including innovations that give a clearer understanding of the ADHD brain in action. (Hallowell, 2025)

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