

ADHD and Co-Occurring Anxiety: Understanding Overlaps in Cognitive and Emotional Processes

Gauri Verma¹

India

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1. INTRODUCTION

Attention-Deficit/Hyperactivity Disorder (ADHD) is a developmental disorder of the brain that is present across the lifespan, characterised by a triad of symptoms, namely inattention, impulsivity, and hyperactivity, that adversely affect the person's life significantly. ADHD was, for a long time, thought to be a condition that only affects children, but now it is recognised as a disorder that follows a person into adolescence and adulthood. Deficits in executive functions such as working memory, inhibition, cognitive flexibility, and sustained attention often characterise its cognitive profile. In addition to these mental problems, people with ADHD are also emotionally sensitive and may develop internalising symptoms such as anxiety, which can confuse the diagnosis and treatment of the disease.

Anxiety disorders are conditions characterised by excessive worries, restlessness, hyperarousal, and avoidance that interfere with the anxious person's lifestyle. Anxiety, in cognitive terms, is persistent rumination, intrusive thoughts, and a tendency to concentrate on the dangers perceived, all of which make concentration and working memory worse. The implications of ADHD and anxiety overlap, co-interaction, rather than mere summation of the problem, thus they influence in concert on an individual's functionality. For instance, an existing ADHD client's difficulty in maintaining concentration can be further aggravated by anxiety that, among other things, increases the amount of mental noise and self-criticism, which are likely to result in poor task performance and emotional control.

The coexistence of ADHD and anxiety is not rare at all. The findings show that about 25-50% of people diagnosed with ADHD experience anxiety symptoms to a clinically significant level. Nearly four out of ten children diagnosed with ADHD show signs of an anxiety problem. The comorbidity rates in adults could be much higher, which may suggest that the long-term stress of living with an untreated ADHD might be the reason why people develop anxiety later in life. This massive overlap reveals that ADHD hardly ever comes alone, and that the emotional and cognitive aspects are frequently intertwined in its presentation.

The presence of both ADHD and anxiety can severely limit the individual's capability to perform in academic, social, and vocational areas. These kids may repeatedly face the consequences of their presence in the school, which may include incomplete homework, a bad relationship with their peers, and low self-esteem. Adults, on the other hand, may find difficulties in keeping their jobs, meeting deadlines, and maintaining interpersonal relationships. Anxiety usually helps to increase the person's emotional reactivity, which makes the ADHD-related irritation, impatience, and self-doubt, to be even more intense. Therefore, the clinical picture becomes more complex and severe; thus, the traditional ADHD procedures become less effective.

ADHD and anxiety also have many commonalities from a cognitive neuroscience viewpoint. Both disorders are related to impairments in executive control that impact working memory, attentional flexibility, and inhibit control of irrelevant information. During tasks involving attention and inhibition, individuals with ADHD often show less activation in regions like the prefrontal cortex and striatum. In contrast, anxiety may lead to increased activation in emotion-related regions like the amygdala, hence making the person more alert and emotionally aroused. The presence of both conditions means that the sensitive emotional brain circuits demanding one thing and the not-so-active cognitive control systems demanding another may result in even less mental efficiency and self-regulation.

Emotional dysregulation is another area where ADHD and anxiety overlap. ADHD individuals are often characterised by rapid changes in mood, impatience, and difficulty getting over stress. Anxiety worsens these symptoms by raising

physiological arousal and promoting mental processes such as catastrophizing and overthinking. Together, they destroy the emotional stability of an individual, making the person more susceptible to the effects of stress, social isolation, and low self-esteem. The co-occurrence also significantly increases the risk of secondary illnesses, among them major depressive disorder and substance use disorder, thus reflecting the emotional side of the toll caused by overlapping cognitive and affective deficits.

Despite increased recognition, there is a paucity and scatter of studies focused on ADHD and co-occurring anxiety. One of the main gaps is understanding the dynamic interaction of these two situations rather than treating them as separate entities. Most of the existing literature treats one condition (either ADHD or anxiety) while hardly acknowledging the mutual effect of both. It is not clear if anxiety worsens the symptoms of ADHD by draining cognitive resources or if a person's dissatisfaction with chronic ADHD symptoms leads to the development of anxiety. There are very few longitudinal studies that talk about this developmental interaction, which thus creates a very important gap in the understanding of causative pathways.

The other gap lies in the neurobiological and cognitive field of research. Even though brain imaging has found differences in brain activation of people with ADHD vs. people with anxiety, there has only been minimal research on how these neural networks interact in the presence of both conditions. Similarly, cognitive tasks mostly focus on attention, memory, and executive function separately while ignoring the emotional impact of anxiety. The lack of integrated models poses a problem for developing accurate biomarkers and diagnostic tools that can accommodate the complex interaction of cognition and emotion in comorbid conditions.

There is also a large gap in treatment research. Medications such as stimulants and behavioural interventions, which are used to treat ADHD symptoms of inattention and hyperactivity, are typical ADHD therapies. Nevertheless, these therapies may not alleviate anxiety symptoms completely, and there is a possibility that under certain circumstances, stimulants could increase anxiety in sensitive individuals. Treatments for anxiety, like cognitive-behavioural therapy, may also not completely solve the problem of attention. Research on combining or modifying therapy regimens to target both executive dysfunction and anxiety control is limited, thus providing little guidance from the evidence base to clinicians working with comorbid patients.

Hence, the necessity for integrated knowledge and practice at the very core of co-occurring ADHD with anxiety issues is the main reason for this study. Clinically, it is important to distinguish between symptoms of true ADHD and anxiety-induced inattention to have an accurate diagnosis and individualised treatment. Understanding the interaction between excessive emotional arousal and cognitive control deficits may provide insight into the patient's course of action. By looking into the similar mechanisms, researchers can understand transdiagnostic routes - neural and psychological processes beneath conventional diagnostic boundaries- thus getting closer to the most accurate mental health models.

From a developmental perspective, the early identification of co-occurring anxiety in children with ADHD might be a way of preventing the sequelae of the disorder. Undiagnosed anxiety can cause ADHD treatment to be ineffective, thus leading to a continuous emotional burden and academic failure. By understanding these similarities, the teachers, parents, and clinicians will most probably be highly committed to the implementation of early screening and supportive interventions that are targeted at building emotional resilience and cognitive control. Using frameworks focused on comorbidity in public health can also contribute to the alleviation of the aggregate cost of untreated mental health issues.

The overlaps between the senses and cognitive processes are also very important from a theoretical point of view. Traditionally, anxiety is seen as a disorder of over-control and hypervigilance, while ADHD is a disorder of attention and impulse control. Unravelling their intersection challenges, these simplified dichotomies suggest that both might involve dysregulation—either hypo- or hyper-activation—of shared neural circuits that govern emotional processing and executive function. Such an integrated view has the potential to radically alter our understanding of mental disorders as not being separate phenomena but rather interconnected consequences of common disruptions in the regulatory system.

Due to their high prevalence and compounded deficits, the study of ADHD with co-occurring anxiety is both necessary and urgent. It calls for a multidisciplinary approach involving behavioural therapy, psychiatry, neuroscience, and cognitive psychology. Addressing this overlap can result in social cost reduction of mental health illnesses, improved diagnostic systems, and better individualised therapies. By focusing on the interconnected cognitive and emotional processes, researchers may move closer to more unified models of human functioning, which also consider the mind's management of emotion along with attention.

2. OBJECTIVES

To examine the overlapping cognitive deficits in individuals with ADHD and co-occurring anxiety, and to understand how these shared impairments contribute to functional difficulties.

To analyse the emotional regulation patterns in people with both ADHD and anxiety.

To identify integrated diagnostic and therapeutic approaches that address both cognitive and emotional dimensions of

ADHD-anxiety comorbidity.

3. EXPLORING OVERLAPPING COGNITIVE DEFICITS IN ADHD AND CO-OCCURRING ANXIETY

Comprehending the interaction between ADHD and anxiety at the cognitive level would help in figuring out why individuals having both conditions are more severely functionally impaired than those with either disorder alone. The subsections below discuss the three main areas of overlap - working memory, attention regulation and inhibitory control - to show how the cognitive processes involved are damaged and intertwined in the comorbid ADHD-anxiety presentations.

3.1. Working Memory Deficits: The Cognitive Load of Dual Disruption

Working memory, the cognitive system capable of temporarily storing and manipulating information, is fundamentally involved in reasoning, learning, and decision-making. The most prominent cause of working memory impairment in individuals with ADHD has been identified in studies, and it is associated with the dysfunction of the prefrontal cortex and impaired neural connectivity with the parietal and subcortical regions. Such individuals become forgetful, have difficulties in following instructions, and struggle with multitasking as these deficits manifest themselves. On the other hand, anxiety also puts a burden on working memory, but via different routes. Excessive worrying and intrusive thoughts take up the limited cognitive resources, thus leaving very little capacity for actual task processing and problem-solving.

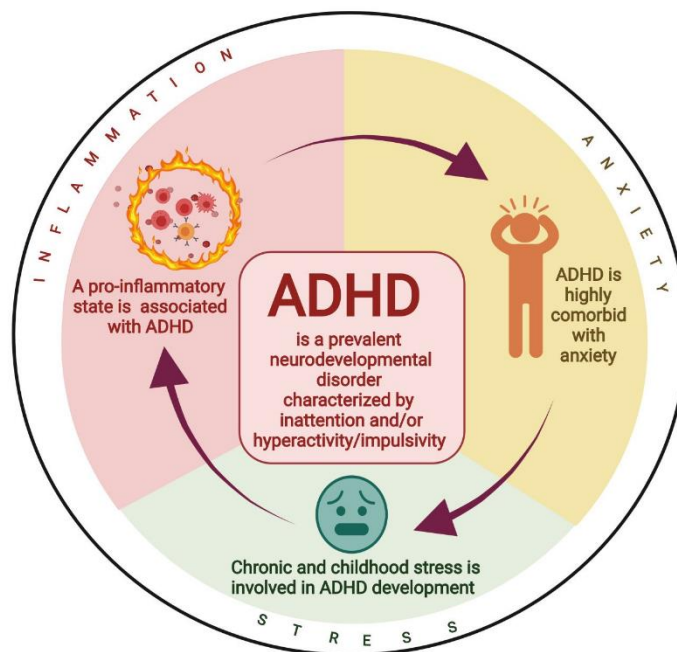


Figure: Links between inflammation, stress, and anxiety in attention-deficit/hyperactivity disorder. (Source: Saccaro et al, 2021).

Working memory impairments caused by anxiety and ADHD are mutually reinforcing when the two coexist. The distractibility that is characteristic of ADHD will thus lead the anxiety, which in turn leads to a very intense competition over where focus should be - the external stimuli or the inner fears. Hence, such a double interference will have a devastating effect on one's ability to do mental updating and manipulations of information. To illustrate, anxious thoughts may break the chain of rehearsing information in working memory; at the same time, ADHD-related lapses hinder its stable encoding. The combination thus leads to sporadic recall, bad planning, and difficulties in maintaining goal practice.

Besides that, the emotional stress mounts due to anxiety, which contributes to physiological arousal that is going to affect prefrontal neural efficiency. So it means that even under the condition of a person's high level of motivation, he/she might still find it difficult to keep the mental effort that is required in cognitive tasks. It is through sustained information processing that many educational and workplace environments exert their demands; however, the cognitive overload experienced by individuals suffering from both ADHD and anxiety makes such work almost impossible. The knowledge of this intersecting issue explains why treatment targeting both executive control and emotional regulation would be more effective than just dealing with one of them separately.

3.2. Attention Regulation: The Dual Battle Between Distraction and Vigilance

Attention regulation—the capacity to maintain, shift, and selectively allocate mental resources—is just one of the fundamental cognitive abilities that are impaired in ADHD. People suffering from ADHD have difficulty maintaining focus

during monotonous or uninteresting tasks, have frequent loss of concentration, and also tend to quickly shift their attention without thinking. These behaviours are due to malfunctions of the brain's fronto-parietal and dopaminergic systems, which are responsible for sustaining attention and engaging in the task. Contrarily, anxiety gives rise to an opposite albeit equally damaging pattern: instead of distractibility, it often leads to over-concentration on possible threats, negative feedback, or inner feelings of fear.

The combination of ADHD and anxiety may result in the opposing attentional tendencies that, in turn, cause cognitive chaos. The attention system of ADHD, which is under-aroused, is met with the hyperaroused state due to anxiety. Consequently, this leads to very erratic attention patterns, i.e. at times the person might be able to focus on the emotionally laden or threatening stimuli, while on other times he/she might be totally disengaged or his/her mind would be wandering. Thus, depending on the situational triggers, the affected individuals may look like they are inattentive or, on the contrary, overly fixated, which confuses both academic and clinical settings. Such fluctuation makes diagnosis difficult since inattention symptoms can be a result of either anxiety-induced worry or ADHD-related deficits.

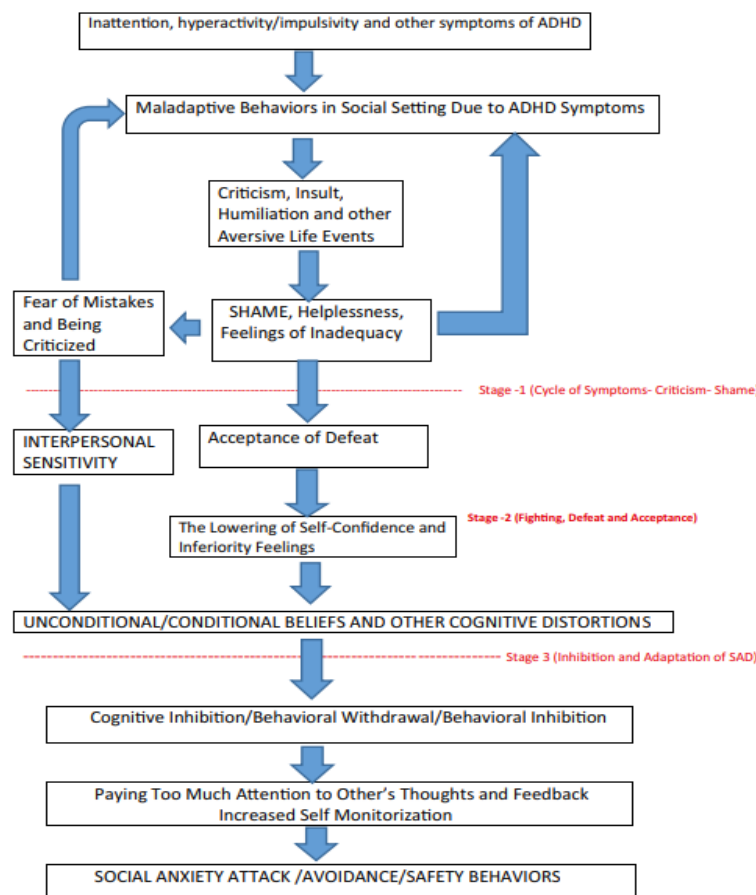


Figure: The hypothesis of SAD development secondary to childhood ADHD (Source: Koyuncu et al, 2022).

This combined attentional imbalance has tangible, real-world effects. In school settings, children with ADHD and anxiety may miss important details due to distraction, yet simultaneously ruminate on perceived mistakes or upcoming evaluations. Adults may experience workplace inefficiency, where anxiety heightens self-monitoring to the point of paralysis, while ADHD undermines sustained task completion. The interaction of anxiety's cognitive over-control and ADHD's under-control creates an unstable attentional system that hampers learning, memory encoding, and adaptive behaviour. Recognising this dynamic interplay underscores the need for treatments that balance attentional stimulation with anxiety reduction—such as mindfulness training and cognitive-behavioural interventions tailored for dual symptom profiles.

3.3. Inhibitory Control: Struggling Between Impulsivity and Over-Caution

Inhibitory control refers to the ability to suppress inappropriate or irrelevant responses in favour of goal-directed actions. It is a key component of executive functioning that allows for self-regulation, delay of gratification, and impulse management. Individuals with ADHD often show deficits in inhibitory control, leading to impulsive decision-making, difficulty pausing before acting, and challenges in adapting to feedback. Neural imaging studies link these deficits to underactivity in the anterior cingulate cortex and inferior frontal gyrus—regions essential for cognitive restraint and

behavioural regulation.

Anxiety, in contrast, is frequently associated with heightened inhibition, as individuals become excessively cautious, avoidant, or hesitant due to fear of negative outcomes. When ADHD and anxiety coexist, these opposing forces—impulsivity and over-caution—can alternate or coexist within the same individual, creating a unique pattern of cognitive and behavioural inconsistency. At times, impulsivity may dominate, resulting in rash decisions or emotional outbursts. At other times, anxiety-induced inhibition may lead to avoidance, indecision, or excessive rumination. The result is a paradoxical self-regulatory loop where individuals vacillate between acting too quickly and overthinking to the point of inaction.

This imbalance in inhibitory control extends beyond behaviour to affect emotional regulation. ADHD's impulsivity can intensify anxiety symptoms by producing negative social or academic outcomes, which then reinforce fear and self-doubt. Conversely, anxiety can impair inhibitory processing by flooding the cognitive system with threat-related stimuli, leaving little capacity for controlled inhibition. The interplay creates a feedback cycle where failed inhibition increases anxiety, and anxiety further undermines inhibition. Understanding this cycle helps explain why individuals with both ADHD and anxiety may display unpredictable behavioural patterns—sometimes reckless, sometimes withdrawn—depending on emotional context.

Addressing inhibitory control deficits in such comorbid conditions requires nuanced therapeutic approaches. Interventions that emphasise cognitive flexibility, emotional awareness, and metacognitive strategies may help balance the dual extremes of impulsivity and over-inhibition. Training that integrates mindfulness, emotion labelling, and impulse delay can simultaneously strengthen inhibitory circuits while reducing anxiety-driven hyper-control. This balance is essential for restoring functional regulation and improving overall psychological well-being.

4. EMOTIONAL REGULATION IN ADHD AND ANXIETY: THE INTERPLAY OF AROUSAL, WORRY, AND IMPULSIVITY

Emotional regulation—the ability to monitor, evaluate, and modify emotional reactions—is often impaired in both ADHD and anxiety disorders. When these conditions coexist, the emotional system becomes a site of intense conflict, as physiological arousal, cognitive worry, and impulsive reactions interact to shape behaviour and perception. The following sections explore how emotional dysregulation emerges in this comorbidity through three interrelated aspects: heightened arousal, persistent worry, and maladaptive stress responses linked to impulsivity and inattention.

4.1. Heightened Arousal and Emotional Reactivity

A core feature of both ADHD and anxiety is heightened physiological arousal, yet the nature of this arousal differs between the two disorders. In ADHD, emotional hyperarousal often manifests as irritability, frustration, or overexcitement in response to minor triggers. The central nervous system operates in an under-regulated state, leading to quick emotional shifts and a low threshold for distress. Anxiety, by contrast, involves chronic hyperarousal marked by tension, muscle tightness, and autonomic overactivation, such as elevated heart rate or sweating, even in the absence of external stressors.

When ADHD and anxiety coexist, the combined hyperarousal produces a constant state of internal tension that heightens emotional reactivity. Individuals experience rapid emotional shifts, oscillating between restlessness and fear, agitation and withdrawal. This excessive arousal disrupts cognitive control networks, reducing the brain's capacity to regulate emotional impulses effectively. Over time, persistent hyperarousal can impair sleep, increase irritability, and hinder concentration, further aggravating the cognitive symptoms of ADHD.

Moreover, this state of heightened emotional activation creates a feedback loop between body and mind. Physiological signals—such as increased heart rate or shallow breathing—amplify feelings of anxiety, while ADHD-related impulsivity makes it harder to use calming strategies or pause before reacting. Everyday frustrations that neurotypical individuals might manage easily can escalate into emotional outbursts or shutdowns in those with ADHD and anxiety. This reactivity not only affects self-esteem and relationships but also reinforces avoidance and fear-based behaviours. Effective management, therefore, must target physiological regulation through strategies like mindfulness, deep breathing, and sensory modulation to stabilise the body's arousal system before addressing cognitive patterns.

4.2. Worry, Rumination, and Emotional Interference

Worry and rumination are cognitive-emotional processes that dominate anxiety but also play a disruptive role when coupled with ADHD. Worry involves repetitive, anticipatory thoughts about potential future threats, while rumination centres on re-evaluating past failures or distress. In anxiety disorders, these thought patterns are attempts to gain control over uncertainty, but paradoxically, they amplify distress and reduce cognitive flexibility. In ADHD, similar repetitive thought patterns may emerge, not from fear, but from frustration and difficulty disengaging attention from emotionally charged stimuli.

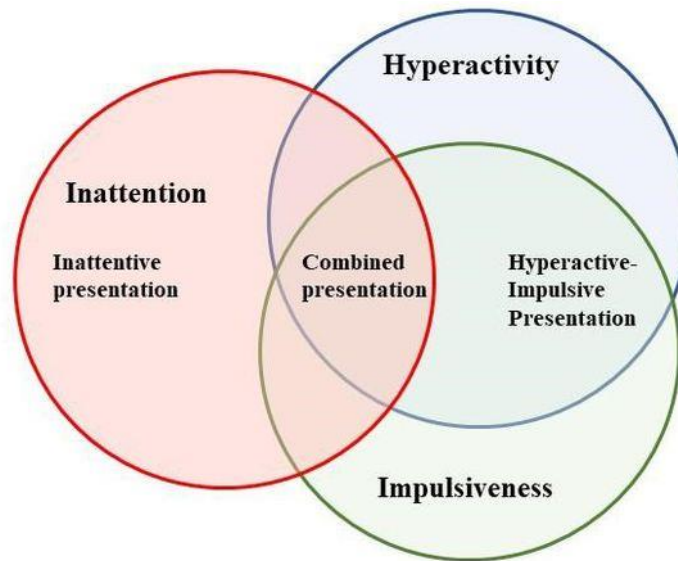


Figure: Inattentive (ADHD-I), Hyperactive-Impulsive (ADHD-H/I) and Combined (ADHD-C) (Source: https://www.foothillsacademy.org/community/articles/confusing_adhd_and_ld)

When both conditions co-occur, worry and rumination interact with attentional deficits to create an emotional “traffic jam.” The anxious mind floods working memory with intrusive concerns, while the ADHD brain struggles to filter them out. As a result, individuals experience an ongoing internal dialogue of self-criticism, fear of mistakes, and negative prediction. This cognitive overload consumes mental resources needed for problem-solving, decision-making, and emotion regulation. Over time, worry becomes not just a symptom of anxiety but also a mechanism that maintains ADHD-related dysfunction.

The overlap between worry and inattention produces a paradoxical pattern of engagement and disengagement. On one hand, individuals may hyperfocus on perceived threats or social judgments; on the other, they may disengage entirely when cognitive fatigue sets in. This inconsistency can appear as poor motivation, avoidance of challenges, or procrastination. Emotionally, chronic worry heightens sensitivity to failure and rejection—factors already linked to ADHD’s “rejection sensitivity dysphoria.” The result is an emotional environment dominated by fear of evaluation, perfectionism, and self-doubt. Interventions must therefore target not only cognitive attention training but also metacognitive awareness to help individuals recognise and reframe maladaptive worry cycles.

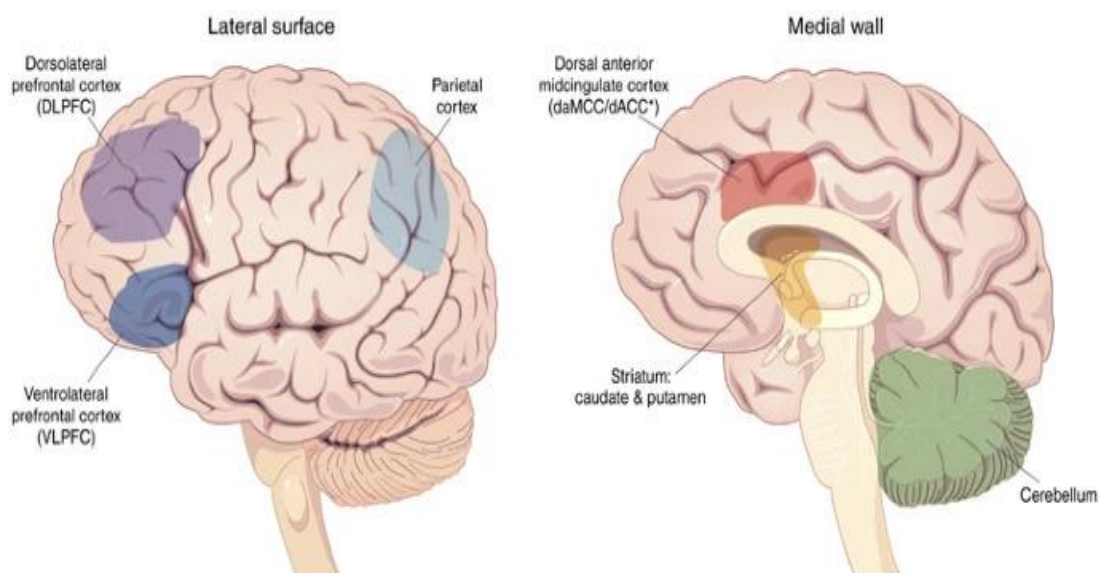


Figure: Brain structures implicated in ADHD. Interacting neural regions have been implicated in ADHD (Source: Bush, 2010)

4.3. Stress Reactivity, Impulsivity, and Emotional Spillover

Stress reactivity is another critical link between ADHD and anxiety, where emotional regulation failures directly influence impulsive and inattentive behaviour. In stressful situations, individuals with ADHD tend to respond with immediate emotional outbursts or withdrawal rather than measured coping. The prefrontal cortex—responsible for self-control and planning—becomes less active under stress, while subcortical structures like the amygdala dominate, producing impulsive, emotionally charged reactions. Anxiety intensifies this pattern by maintaining the body in a state of chronic readiness, where even mild stressors trigger exaggerated responses.

This heightened stress sensitivity disrupts both cognition and emotion. Impulsivity in ADHD may lead to quick decisions aimed at escaping distress, such as abruptly quitting a task, lashing out, or avoiding responsibilities. Anxiety compounds this with overthinking and anticipatory stress, preventing emotional recovery after a setback. Together, they form a self-perpetuating cycle: impulsive actions increase anxiety through guilt or negative feedback, while anxiety, in turn, fuels impulsive avoidance to escape discomfort. The interplay produces emotional “spillover,” where stress in one area of life—like academics or relationships—rapidly spreads to others.

Furthermore, chronic stress exposure alters physiological systems, elevating cortisol levels and affecting sleep, appetite, and energy. This hormonal imbalance further impairs attention and self-regulation, reinforcing both ADHD and anxiety symptoms. The inability to down-regulate stress responses also hinders learning from mistakes, as emotional arousal overrides reflective processing. Behaviorally, individuals may appear unpredictable—sometimes acting rashly, other times paralysed by fear. Interventions focusing on stress tolerance, emotion labelling, and delayed response training can help break this reactive loop. By strengthening awareness of bodily cues and cognitive triggers, individuals can gradually shift from impulsive reacting to intentional responding, reducing emotional volatility and cognitive fatigue.

5. INTEGRATIVE DIAGNOSTIC AND THERAPEUTIC APPROACHES FOR ADHD-ANXIETY COMORBIDITY

ADHD and anxiety often coexist, creating a complex clinical picture where cognitive dysfunction intertwines with emotional dysregulation. Traditional diagnostic and therapeutic strategies that treat these conditions separately often fail to capture their shared mechanisms. A holistic, integrated approach—encompassing assessment, psychological intervention, and neurobiological treatment—is essential to improve accuracy and outcomes. The following sections discuss key diagnostic frameworks, therapeutic integration, and multimodal intervention strategies that address both cognitive and emotional dimensions of ADHD-anxiety comorbidity.

5.1. Integrated Diagnostic Framework: Bridging Cognitive and Emotional Assessment

Accurate diagnosis of ADHD with co-occurring anxiety remains a major challenge in clinical psychology and psychiatry. Traditional assessments tend to evaluate each disorder separately, overlooking its mutual influence. An integrated diagnostic framework should combine behavioural observation, neuropsychological testing, and emotional profiling to capture the complexity of cognitive-emotional interactions. For instance, clinicians should assess not only attention span and executive function but also emotional regulation, physiological arousal, and coping patterns. Multi-domain assessment can prevent misdiagnosis—such as labelling anxiety-driven inattention as ADHD—or underrecognition of internalised distress masked by impulsivity.

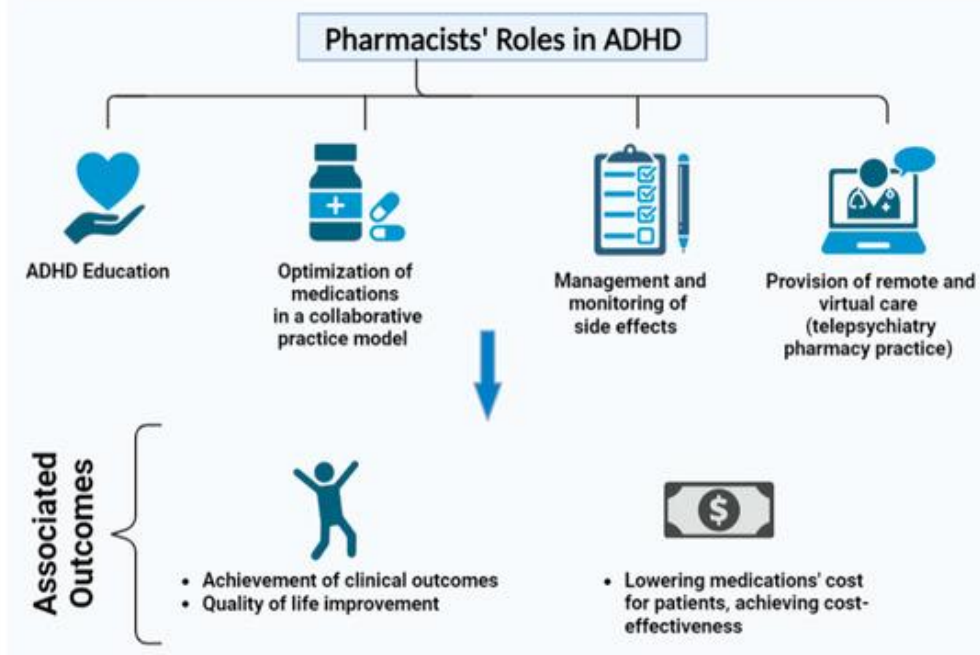


Figure: Pharmacists' roles and associated outcomes in ADHD. (Source: Elnaem et al., 2023).

The use of standardised rating scales is critical in this context. Tools such as the Conners Comprehensive Behaviour Rating Scale or the Behaviour Assessment System for Children can be supplemented with anxiety-specific measures like the State-Trait Anxiety Inventory or Generalised Anxiety Disorder-7. However, self-reports alone are insufficient; integrating physiological and behavioural data—such as heart rate variability, sleep tracking, and attentional task performance—offers a more accurate picture of cognitive-emotional functioning. Neuroimaging and electrophysiological assessments, though not diagnostic by themselves, can reveal patterns of prefrontal underactivation and limbic overactivity, helping clinicians understand how anxiety exacerbates ADHD-related deficits.

Furthermore, contextual assessment—evaluating performance across different environments such as school, home, or workplace—adds depth to the diagnostic process. Emotional reactivity in social settings may differ markedly from that in structured tasks. Therefore, ecological momentary assessment, where symptoms are recorded in real-time using digital tools, can identify triggers and fluctuations in attention and emotion throughout the day. This integrated diagnostic model emphasises the continuum between cognition and emotion, ensuring that both are addressed in clinical formulations rather than treated as isolated domains.

5.2. Therapeutic Integration: Cognitive-Behavioural and Emotion-Regulation Interventions

Therapeutic management of ADHD-anxiety comorbidity requires an integrative approach that simultaneously targets cognitive dysfunction and emotional instability. Cognitive-Behavioural Therapy (CBT) provides a foundation for this integration. Traditionally used to treat anxiety, CBT helps individuals identify and challenge maladaptive thought patterns, while behavioural techniques such as exposure and relaxation reduce physiological arousal. When adapted for ADHD, CBT can include modules on time management, impulse control, and goal-setting, allowing individuals to apply emotional awareness to executive functioning challenges.

Emotion regulation therapy (ERT) and mindfulness-based approaches complement CBT by focusing on emotional awareness, acceptance, and control. For individuals with ADHD and anxiety, these methods are particularly beneficial as they promote attentional stability while reducing worry-driven rumination. Mindfulness exercises—such as breath awareness, sensory grounding, and nonjudgmental observation—help calm physiological arousal, enhancing prefrontal-limbic balance. Dialectical Behaviour Therapy (DBT) techniques, including distress tolerance and emotion labelling, can further teach individuals to manage intense emotions without impulsive reactions.

A key feature of integrated therapy is flexibility. While ADHD requires structured routines, anxiety treatment emphasises gradual exposure and tolerance to uncertainty. Therefore, therapists must balance predictability with adaptability. For example, interventions may begin with structured skill-building to address executive dysfunction, followed by emotional resilience training once cognitive control improves. Psychoeducation for both the individual and family also plays a vital role. Understanding that inattention, procrastination, or avoidance may stem from intertwined cognitive and emotional

processes helps reduce stigma and promotes collaborative coping strategies. Group sessions and digital therapy programs can extend accessibility, enabling continuous reinforcement of coping skills outside clinical settings.

Ultimately, effective therapy for ADHD-anxiety comorbidity must cultivate both cognitive efficiency and emotional flexibility—helping individuals not only manage attention and impulsivity but also respond adaptively to emotional stressors that previously triggered dysregulation.

5.3. Multimodal and Neurobiological Treatment Strategies

While psychological interventions form the foundation of integrated care, pharmacological and neurobiological approaches remain essential in managing ADHD-anxiety comorbidity. The challenge lies in balancing stimulant and non-stimulant medications to optimise attention without exacerbating anxiety. Stimulants such as methylphenidate and amphetamine derivatives effectively enhance dopamine and norepinephrine activity, improving focus and executive function. However, they can increase physiological arousal and trigger anxious symptoms in sensitive individuals. Non-stimulant alternatives, including atomoxetine and guanfacine, may be preferable for patients where anxiety is predominant, as they offer cognitive benefits with milder effects on arousal.

Selective serotonin reuptake inhibitors (SSRIs), commonly prescribed for anxiety, can be used concurrently to regulate mood and reduce hyperarousal. Yet, careful titration is necessary to avoid emotional blunting or cognitive slowing. Integrated pharmacotherapy should therefore be individualised, guided by symptom balance and continuous monitoring. Emerging treatments such as transcranial magnetic stimulation (TMS) and neurofeedback have shown promise in modulating neural circuits implicated in both ADHD and anxiety. By targeting prefrontal regions involved in executive control and emotional regulation, these non-invasive interventions can enhance cognitive stability while reducing limbic hyperactivity.

Lifestyle and behavioural strategies serve as complementary tools in this multimodal framework. Regular physical activity improves neurotransmitter balance, enhances focus, and lowers stress hormones. Nutritional management, adequate sleep hygiene, and structured daily routines further support emotional and cognitive stability. Stress-management programs incorporating biofeedback and relaxation training help individuals recognise early signs of emotional overload and prevent escalation. In children and adolescents, coordination among parents, teachers, and clinicians ensures consistency in expectations and reinforcement strategies across environments.

The integration of biological, psychological, and environmental components reflects a holistic treatment philosophy. Rather than treating symptoms in isolation, clinicians aim to restore balance across neural, cognitive, and emotional systems—leading to sustained improvements in functioning and quality of life.

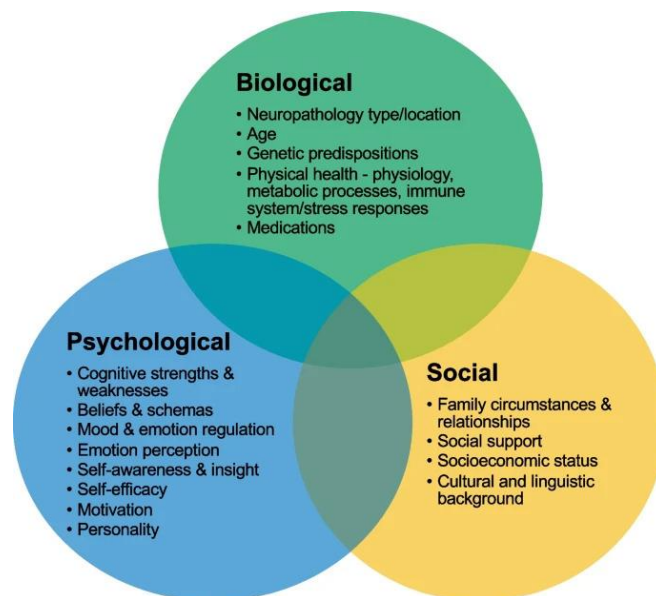


Figure: The biopsychosocial model of case formulation (Source Wong et al, 2024)

6. CONCLUSION

The coexistence of ADHD and anxiety presents a multifaceted challenge that spans cognitive, emotional, and neurobiological dimensions. The study underscores that these two conditions are not merely co-occurring but intricately intertwined through overlapping deficits in executive function, attention control, and emotional regulation. Individuals with

this comorbidity often experience heightened distractibility, worry, and impulsivity, which together create a self-perpetuating cycle of cognitive overload and emotional distress. Recognising this dynamic interaction is crucial for accurate diagnosis and effective treatment planning.

An integrated understanding that bridges cognitive and emotional processes is essential to advance both clinical practice and research. The findings highlight the need for comprehensive diagnostic models that capture the shared mechanisms of dysfunction, rather than treating ADHD and anxiety as isolated entities. Interventions must combine cognitive-behavioural strategies, emotion-regulation training, and neurobiological treatments to ensure holistic recovery. Moreover, individualised care—tailored to symptom balance, developmental stage, and environmental context—remains key to improving outcomes.

From a broader perspective, addressing ADHD-anxiety comorbidity requires collaboration among clinicians, educators, families, and policymakers. Promoting early screening, psychoeducation, and accessibility to multimodal therapies can significantly reduce the long-term impact of these disorders on academic achievement, interpersonal relationships, and quality of life. Future research should continue exploring neurocognitive markers, digital diagnostic tools, and integrative therapeutic innovations to refine the precision of treatment. Ultimately, understanding and managing ADHD with co-occurring anxiety demands a shift from symptom-based intervention to a systems-based approach—one that restores cognitive balance, emotional resilience, and overall psychological well-being.

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