

ADHD and Comorbid Conditions – A Conceptual Model

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Abstract

A very high proportion of both children and adults with ADHD have at least one other psychiatric disorder. These comorbid disorders can be dynamic, implying that they may change with age or may wax and wane over the lifetime of the individual. “Subthreshold” psychiatric disorders, that do not meet strict diagnostic criteria but nevertheless impair the quality of life of the individual significantly, can also occur with ADHD. It is suggested that ADHD is a “foundational disorder” underlying many other psychiatric conditions and increasing the vulnerability to them.

Introduction

Despite the increased recognition of attention deficit hyperactivity disorder and the benefits of its treatment, overly simplistic understanding of ADHD persists among many professionals in medicine, psychology, and education, as well as in much of the general public. Many continue to see this syndrome as simply a behavioural disorder characterized by excessive restlessness and distractibility, a problem that usually remits during childhood but occasionally persists into adulthood. They are unaware of important new understandings, supported by considerable evidence, that provide the basis for a new paradigm to describe attention deficit disorders. Key elements of this new paradigm include the following.

1. ADHD is essentially a complex disorder in unfolding development of the unconscious self-management system of the brain.
2. Impairments resulting from ADHD usually include chronic difficulties in self-regulation of emotion and in self-regulation by emotion.
3. ADHD symptoms may be noticeable during early childhood but often are not apparent until the individual encounters challenges of adolescence or adulthood.
4. ADHD appears to be a problem of insufficient willpower, but it is actually a problem in chemical dynamics within the brain.
5. Causes of ADHD appear to be primarily genetic, although environmental stressors and supports may modify expression of symptoms.
6. ADHD is not just one of many different psychiatric disorders; it is a foundational disorder that substantially increases a person's risk of experiencing additional cognitive, emotional, or behavioural disorders across the life span.

This article will elaborate on the sixth new understanding about the syndrome currently known as ADHD or attention deficit hyperactivity disorder and its relation to other disorders; it concludes with a discussion of how this new conceptualization of ADHD and its comorbidities is related to a broader change of paradigm in psychiatry, psychology, and neuroscience.

Comorbid—or co-occurring—disorders

More than any other psychiatric diagnosis, ADHD tends to appear in combination with other disorders of learning, emotions, and behaviour. This comorbidity has been reported in both children and adults. The Multimodal Treatment Study of Children with ADHD found that 70% of 579 children ages 7-9 years

met full diagnostic criteria for at least one other psychiatric disorder within the year preceding their enrolment in that study(1). Adults with ADHD assessed in the replication of the National Comorbidity Survey had more than six-fold incidence of having had at least one, and often many more than one, other psychiatric disorder at some point in their life (2). Several different types of comorbidity are seen.

Among various studies, comorbidity is not always consistently defined. In some cross-sectional studies (such as the MTA), a child was considered to have a comorbid disorder if that child fully met DSM-IV diagnostic criteria for that additional disorder within 6-12 months preceding the child's entry into the study. In other studies (2), respondents were asked whether they had ever experienced symptoms associated with various comorbid disorders at any point in the last year or at any other point in their lifetime. Cross-sectional and longitudinal measurements yield quite different estimates of psychiatric comorbidity.

In the cross-sectional view, depression is rarely comorbid with ADHD if the sample includes only prepubescent children, yet the overlap of ADHD and depression is very substantial if assessment is undertaken in adolescence or adulthood. Some psychiatric disorders emerge during childhood and may worsen or improve as the child grows older. Other psychiatric disorders do not usually appear during childhood; they are typically characterized by an onset late in adolescence or sometime in adulthood.

Types of comorbidity

Both the cross-sectional and the lifetime analyses of comorbidity have another fundamental problem: neither is sensitive to what has been referred to as the dynamic comorbidity of ADHD and other disorders. This term refers to the tendency of some disorders to wax and wane over an individual's life span, possibly in response to situational influences, the presence or absence of specific stressors or supports, or unfolding developmental factors.

Some individuals with significant psychiatric impairments at some point in childhood or adolescence do quite well as adults. Other individuals, similarly impaired during their earliest years, continue to fare poorly throughout their lives. Data from most surveys of lifetime or cross-sectional comorbidity of psychiatric disorders do not provide a way to differentiate these very different outcomes. In a survey of lifetime comorbidities in adults, a 45-year-old person with ADHD who had experienced a year of drug or alcohol abuse while in university at age 19 years would be counted as having ADHD comorbid with substance abuse, even if the person had experienced no problems with substance abuse over the subsequent quarter century. Most clinicians are familiar with many patients who have had one or numerous episodes of depression, substance abuse or dependence, tics, anxiety, conduct disorder, obsessive-compulsive disorder, or other psychiatric disorders while having no indications of such impairments over many years of their lives. Much of comorbidity is dynamic.

Another type of comorbidity occurs when clusters of symptoms of a disorder that may not fully meet the official diagnostic criteria for one or both disorders overlap, yet the symptoms have a significant effect on the individual, possibly over a long time. This has been referred to as comorbidity of "subthreshold conditions" or as the overlap of "shadow syndromes". For example, an individual may fully meet official diagnostic criteria for ADHD and also struggle with chronic obsessional worries that do not fully meet diagnostic criteria for either obsessive compulsive disorder or generalized anxiety disorder. Although full diagnostic criteria are not met, that person's excessive worrying may interfere with his or her daily life in a variety of ways, one of which may be worrying about whether it is safe to take medications prescribed for ADHD.

Another type of comorbidity that has received insufficient attention thus far is the overlap and reciprocal influence of medical and psychiatric conditions—that is, situations in which a person has a medical problem (e.g. diabetes, asthma, infection) that overlaps with a psychiatric problem such as depression, anxiety, or ADHD. Some studies suggest that a psychiatric disorder may contribute significantly to a medical condition. Studies of the onset of obsessive-compulsive disorder after certain types of streptococcal infection suggest that a medical condition may be causative of a psychiatric

condition. Ample evidence shows a more-than-chance correlation between certain medical disorders and specific psychiatric disorders, but much remains to be learned about the mechanisms and timing of reciprocal influences over the life span. More research could be useful in this area; data is insufficient to address medical comorbidities that may be especially important to ADHD (such as the influence of diabetes on cognition or the effect of menopause on working memory).

A foundational disorder?

Regardless of how comorbidity between ADHD and other disorders might be defined and measured, the incidence of overlap tends to be much higher than for other combinations of disorders. One obvious question arises from these high rates of comorbidity. Why are individuals with ADHD so much more likely to have additional psychiatric disorders? The sequence of appearance of these disorders offers a clue: usually ADHD is the first psychiatric disorder to appear, whereas other disorders emerge later in childhood, adolescence, or adult life.

One possible explanation is that ADHD is not just one more among other psychiatric disorders; it may be foundational in the sense that a person with ADHD-related impairments of executive function is more vulnerable to other psychiatric disorders. One might compare ADHD to chronic problems in the operating system of a computer that affect a wide range of software used, as distinguished from problems in a specific computer software program that impair a narrower range of functions. ADHD impairments can bring a cascade of additional problems in adaptation. It may also be linked to increased genetic vulnerability to other disorders that exacerbate problems in adaptation.

Our current diagnostic system in psychiatry, DSM-IV, describes more than 200 disorders as distinct entities. Within the current system, each psychiatric diagnosis is conceptualized as though it were a particular kind of fruit, each growing on its own type of tree, totally independent of any others. Comorbidity among these disorders is often discussed as though it were simply a chance composite in which separate fruits just happen to fall together to form a salad. This model is not adequate to describe relations between comorbid disorders in which impairments of one disorder may cause an individual to have increased vulnerability to another and in which many psychiatric disorders are complex hybrids.

Bruce Pennington, a leader in the emerging field of developmental cognitive neuroscience, has challenged the notion of psychiatric disorders as totally separate entities (3). He highlighted common neurobiological factors underlying various disorders and noted that current definitions of disorders are “regions with fuzzy boundaries in continuous multivariate space”. He suggested that various disorders are likely to be distinguished more by variable weighting of different risk factors, and by different epigenetic (other than genetic) and developmental interactions that result from that weighting, than by a distinct set of risk factors for each disorder.

Some researchers have observed that executive function impairments are not specific to ADHD but are characteristic of many other disorders as well. This observation suggests a view of ADHD comorbidity quite different from the fruit salad construct. The high incidence of comorbidity of ADHD with other psychiatric disorders and the typically earlier onset of ADHD suggest that this syndrome is a primary or foundational disorder, underlying many other disorders, heightening vulnerability of affected individuals to other psychiatric impairments. For many individuals with ADHD, it is not only that the conductor of the brain’s orchestra is impaired but also that elements of the woodwinds and/or another instrumental section may fail to function adequately.

How might disorders be related?

ADHD and other disorders might be related in two primary ways:

1. ADHD may cause adaptive impairments that render an individual more vulnerable to environmental stressors that increase risk of another disorder, or

2. an individual with ADHD may have genetic vulnerability to additional disorders that combine to cause more specific impairment than ADHD alone might bring.

Or there may be a combination of both of these factors.

Substance use disorders offer an example of how adaptational problems resulting from ADHD may heighten risk of another disorder. Unless children with ADHD are treated with appropriate medications, they have at least double the risk of developing a substance use disorder sometime during adolescence compared with children without ADHD.

Researchers who studied substance use in adolescents with ADHD compared with that in adolescents without ADHD found that severity of inattention symptoms of ADHD in adolescence, more than hyperactive or impulsive symptoms, was associated with lower academic grades and with increased risk for heavier use and abuse of tobacco, alcohol, and other drugs by the teenage years (4). They suggested that students with inadequately treated ADHD are more vulnerable to academic failure and are thus more likely to gravitate away from peers who value academic success and toward nonconformist peer groups in which heavier substance use is modelled and tolerated. Thus, the ADHD impairments may indirectly cause affected individuals to be exposed to increased risk for developing a substance use disorder.

An example of the second type of comorbidity, ADHD with an additional genetic vulnerability for intensified impairment of a specific function, can be found in ADHD with a reading disorder (dyslexia), another inherited syndrome. A child with the executive function impairments that constitute ADHD would be more likely to meet diagnostic criteria for a reading disorder than would one without ADHD impairments because executive functions such as working memory and speed of information processing play a critical role in a person's learning to read, in developing reading fluency, and in being able to comprehend what has been read.

However, a person with an appropriate diagnosis of reading disorder would have additional impairments beyond those involved with ADHD. That person is likely to have specific impairments in speech-language processing and word retrieval that are not characteristic of most other individuals with ADHD. Thus, comorbidity can be seen as involving impairments in the more general foundational cognitive functions and also in more specific cognitive functions involved in speech language processing and word retrieval.

Some researchers have presented evidence that a common genetic cause that increases risk for reading disorder and for ADHD is likely, with each individual's final traits being determined by additional genetic and environmental influences that affect that particular person (5). Findings from that study suggested that information-processing speed is probably the most important cognitive function impaired in both reading disorder and ADHD. Some studies have suggested a specific gene that may be one component of the genetic underpinning of both disorders, although those researchers emphasized that the contribution of that one specific gene falls far short of explaining all the shared variance between the two disorders (6). Other genetic influences, shared and divergent, are also likely to be involved in each disorder. Similar overlap of shared and divergent genetic influences is likely to be involved in many other comorbid combinations.

In many disorders comorbid with ADHD, symptoms overlap - causing uncertainty about whether a given individual simply has a severe variant form of ADHD - or has ADHD and an additional comorbid disorder. In recent years, nowhere has this uncertainty been more controversial than in ADHD and juvenile-onset bipolar disorder. Many child psychiatrists are quick to diagnose bipolar disorder in children with ADHD who show significant impairments in their ability to regulate their moods, especially anger and aggression. Other investigators dispute this approach, stating that moodiness and irritability are common characteristics of children with ADHD and children with bipolar disorder. Sometimes the dispute can be resolved on grounds of the severity of the impairment.

In a large sample of children with ADHD, investigators found that severity of irritability differentiated children with only ADHD from those with ADHD and unipolar depression and from children who also had full bipolar disorder (7). This finding is consistent with the view that many individuals with ADHD have chronic difficulty in regulating their frustration and irritability—but some individuals with ADHD, who can be reliably distinguished by their much more intense levels of chronic irritability and aggression, exceed the normal range of mood problems usually associated with ADHD and have additional symptoms that fully qualify for a specific diagnosis of mood disorder.

In other cases, some individuals who qualify for an ADHD diagnosis also qualify for an additional diagnosis that involves symptoms quite different from a typical ADHD profile. For example, many children with ADHD, particularly those who are hyperactive or impulsive, seem fearless in their willingness to seek out novel situations and to engage in high-risk behaviours, whereas many others who also fully meet diagnostic criteria for ADHD are so fearful that they qualify for the diagnosis of generalized anxiety disorder or multiple phobias.

Alternative new views of ADHD

The six understandings mentioned above constitute one possible model to reconceptualise ADHD. Several researchers have recognized that current diagnostic formulations of ADHD are inadequate. Many have recognized the need to develop a conceptual model of ADHD that more adequately recognizes the diversity among individuals with ADHD and that takes more seriously the two-way interactions between biological impairments of ADHD and changing developmental and environmental influences that alter the ADHD traits during the course of the individual's life experiences.

Most proposed solutions to this problem tend to use approaches that have, thus far, proved inadequate to account for the complex characteristics of ADHD and its extensive comorbidity with other disorders. It would seem that a more radical reconceptualization is needed, one that recognizes that ADHD is essentially impairment in development of executive functions and that these executive function impairments constitute an important aspect of most other psychiatric disorders.

In many areas of psychiatry and psychology, there is increasing recognition that most psychiatric disorders are better seen as dimensional rather than categorical, on a wide spectrum of impairment, often overlapping with other disorders. Much work remains to be done to refine our understanding of ADHD and other psychiatric disorders, both in their own complexity and as they relate to one another.

Adapted with permission of the author from "Developmental Complexities of Attentional Disorders" by Thomas E. Brown, PhD. Clinicians can read the essay in its entirety in *ADHD Comorbidities: ADHD Complications in Children and Adults*, edited by Thomas E. Brown, PhD (American Psychiatric Publishing, 2009).

Editors notes.

1. The original article referred primarily to "attention deficit disorder" which was abbreviated ADD. This has been altered to ADHD, in keeping with UK practice.
2. This paper does not discuss the detailed management of ADHD comorbidities but this important subject is covered, at least in part, in other papers in this issue, including those on Substance Misuse, Learning Disability, Autism and Epilepsy, in association with ADHD.

GP Comment

What have I learned from this paper?

1. A child with ADHD is likely to be at high risk of developing psychiatric disorders, especially in the teenage and adult years.
2. The high rate of other psychiatric disorders in people with ADHD is likely to be the result of both genetic and environmental factors.
3. It is important for GPs to be aware that the child with ADHD is liable to develop other psychiatric disorders so that they can be followed closely and referred promptly for additional specialist help if the need arises.

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