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# Assessing The Coexistence of Adhd, Depression, And Substance Abuse Problems: Treatment for Improving Comorbidities

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**Abstract:**

The association between substance addiction and Attention-deficit hyperactivity disorder (ADHD) has been well known for many years. An association between addiction and depression has also been heavily investigated, and in recent years evidence has accumulated to indicate that ADHD increases the risk of depression, but that the causal nature of these associations is still not well understood. Due to certain overlapping psychological characteristics, the most prominent psychiatric comorbidities of ADHD are depression and addiction problems. There is strong evidence for familial and neurobiological commonalities between ADHD and the various other associated psychiatric comorbidities. The overlap in symptom profiles between these mental health issues presents a problem for diagnosis and intervention, both of which suffer from poor validation. This study will assess the implications of a pharmacological method for intervention development and public health messaging, addressing the potential for ADHD to cause or lead to substance use or depression. Early identification and treatment of ADHD and its comorbidities could be key to mitigating the course of later psychiatric morbidity.

**Keywords:** ADHD, Depression, Substance Abuse Disorder, Comorbidity, Cognitive Therapy, Addiction

## 1. Introduction

In modern society, depression, attention deficit hyperactivity disorder (ADHD) and addiction problems occur in a high co-morbidity resulting in many complex mental health challenges. The high neurobiological similarity between depression and ADHD is also related to addiction problems. The complex association of the three mental disorders might have an impact on the success of mental disorder interventions that attempt to reduce the frequency of mental disorders within the population.

Attention deficit hyperactivity disorder (ADHD) is a condition in neurobiology aspect marked by continuous difficulties with attention and excessive activity, as well as impulsivity, affecting 5.3% to 7.1% of children across the globe. Approximately 60% of children with ADHD have persisting symptoms in adulthood. ADHD typically begins in childhood, and is characterised by attention deficits and motor hyperactivity, resulting in considerable impairments in academic, occupational, familial and social activities. In adults, ADHD presents with a more heterogeneous clinical situation rather than the hyperactivity and inattention witnessed within child patients, encompassing a much broader range of emotional instability and functional operational impairments.

While the core symptoms in adults with ADHD are clinically expressed differently than in juveniles, adults frequently pay attention to their inner restlessness, profusely talkative urges and restlessness in situations that require them to stay still. They can be impulsive, impatient, and 'act without thinking' which can provide them with various degrees of trouble, a hallmark of the impulsivity feature. From a practical functional point of view, adults may not be able to maintain a normal personal relationships with others or keep their positions in work places compared to similar aged individuals without this disorder. Other complaints, such as boredom, trouble making decisions, procrastination, and disorganisation, are symbols of inattentiveness in adulthood (Salvi et al.,2021).

Depression, a chronic medical illness that can affect thoughts, mood and physical health, is a very common and often recurring disorder. It is characterised by low mood, chronic fatigue, sadness, insomnia and inability to experience pleasure in life, but so far, there are more conclusive data showing that patients with depression have an extremely high association with addiction problems (Cui et al., 2015). Addiction is a complicated condition which is a brain disease expressed by compulsive substance use despite adverse results. Patients with this problem, also understood to be severe substance use disorder, are intently focused on addicting in substances such as drugs or alcohol that said use virtually consumes all recreational or rewarding activities. To understand this behaviour it is important to understand the concept of comorbidity. Comorbidity is the simultaneous presence of two or more medical or psychological conditions in the same person. In the realm of mental health, comorbidity points to the relatively high prevalence of several conditions (such as ADHD, depression and substance abuse disorders) that co-occur in the same patients.

Consequently, as a result of the significant overlap between ADHD and depression and given that both of these conditions require clinical expertise in their diagnosis and management, this paper has conducted an extensive overview of the published literature regarding adult addiction comorbidity. A specific emphasis was placed on depression comorbidity and ADHD comorbidity, complimented with a discussion on the clinical implications and difficulties of treating patients with co-occurring ADHD, depression and addiction problems.

## 2. Correlation Between the Comorbidity of Adhd, Substance Use Disorder and Depression

### 2.1 Assessing the Association Between ADHD and Substance Use Disorder

The co-occurrence of Attention-Deficit Hyperactivity Disorder (ADHD) and Substance Use Disorder (SUD) has been well-documented within existing literature and research. In recent researches, (Austerman et al. 2015) showed that patients who suffer from comorbid ADHD presented with a significantly earlier age for the onset of substance use compared with those individuals who don't suffer from ADHD. In the general population, (Austerman et al. 2015) indicated that individuals with ADHD were 2–3 times more likely to develop SUDs relating to nicotine, alcohol, marijuana, cocaine and other substances versus those without ADHD. The prevalence of ADHD in adult SUD patients is estimated at 20%. Furthermore, individuals with SUD who also have ADHD initiate substance use at an earlier age, progress into SUD at a faster rate, and are easier to relapse than healthy people.

More recent data has shown that 21.5% of SUD populations have ADHD (Regan et al., 2020). Over the past decades, there have been numerous attempts to quantify the incidence in the SUD population, ranging from 5.22% (Arias et al., 2008) to 62% (Kumar et al., 2018). It appears from studies on substance addiction in the various SUD populations that practically all of them have a higher frequency of ADHD. It is patients with ADHD who abuse both sedative and stimulant types of drugs on a regular basis. The incidence of ADHD in the communities of cocaine users was found to range from 14.5% (Vergara-Moragues et al., 2011) to 20.5% (de los Cobos et al., 2011). The incidence of ADHD in the communities of patients with alcohol addiction was estimated to be from 7.7% to 62% (Reyes et al., 2019; Kumar et al., 2018); the incidence in opioid users was around 16.8% (King et al, 1999). Based on the information the authors of this paper could obtain the most up-to-date meta-analysis was published in 2012. The paper found that 23.1% of SUD populations had ADHD. The meta-analysis further uncov-

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ered that the prevalence of ADHD was 21% in adults and 25.3% in adolescents [van Emmerik-van et al., 2012]. At that time, however, there was no assessment of ADHD for patients with SUD as part of their routine clinical care, and we used a new meta-analysis method including the newest research studies so that the impact of ADHD on SUD can be emphasized (Rohner et al., 2023).

This data proves a strong correlation between ADHD and addiction but some of the data seems to be out of date. Moreover, the data did not take into account the effects of different countries and regions since every country has different cultures and policies toward opioids. Further, depending on the level of medical advancement and acceptance of individual countries, not everyone with ADHD knows they have it. The result of this is some people who are not aware of their disorder may consider that their lack of motivation is due to their laziness and incompetence. People who develop ADHD but are not aware of this situation may suffer from other mental disorders like depression and substance abuse disorder. Family and social environments, as well as established somatic and psychiatric comorbidities have a strong influence on an individual's proclivity to SUD. This would indicate that ADHD, SUD and depression would tend to be comorbid, rather than ADHD merely existing with substance use disorders. From the given data it can be seen that the utilised data did not stress if the patients were also diagnosed with other mental disorders, opening the potential for SUDs to be correlated with other disorders that were not measured in this instance like depression.

## 2.2 The Comorbidity Between Depression and Substance Use Disorder

The co-occurrence of depression in patients with SUD in dual-diagnosis treatment has long been recognised as an important variable to be considered in the clinical care of these patients. In comparison with either SUD or depression alone, comorbid depression and SUD are generally associated with erroneous diagnoses, worsening clinical courses, greater functional impairment and suboptimal treatment adherence (Abou-Saleh, 2004; Merikangas and Kalaydjian, 2007). Yet clinicians who treat patients with SUD and mental health issues also struggle with the task of providing care to those whose symptoms cross over into two other medical professions.

Many theories were put forth to explain the high levels of comorbidity (Degenhardt et al., 2003). The presence of one condition increases the likelihood that another will be present, and this is the causal explanation for comorbidity. Comorbidity, for instance, can be observed in people who use drugs and the specific psychotropic effects that they may employ to soothe emotional distress and reduce the dysphoric symptoms of depression (Kessler, 2004; Khantzian, 1985; Khantzian, 1997; Swendsen et al., 2010). In this case, directing treatment toward depression would be favourable for treatment. Nonetheless, given the occurrence of depression and SUD together, relatively few double-blind, placebo-controlled trials of antidepressant medication have been performed in substance-dependent subjects who also suffer from depression. Antidepressants have been found to reduce poor mental conditions in patients with concomitant SUD during several clinical trials, but the variable results have not allowed these trials to determine whether they were efficacious in terms of substance use outcomes (Lalanne et al., 2016; Nunes and Levin, 2004; Pettinati et al., 2013).

Conversely, acute intoxication can lead to substance-induced depression (Gawin and Kleber, 1986; Markou and Kenny, 2002). After cessation of drug use, the depression typically resolved in one month or less, particularly when achieved in treatment facilities for addiction (Brown and Schuckit, 1988). Comorbidity caused by substance abuse may be due to exposing high-risk individuals to situations that bring about latent depression susceptibility allowing a depressive propensity to manifest (American Psychiatric Association, 2013). Comorbidity rates between depression and SUD are a function of both pathways (Schuckit, 2006). Ultimately, the covariance of SUD and depression can be explained by the possibility of common predisposing variables, such as biological, social or environmental type factors (Rappeneau, V.,et al., 2017)

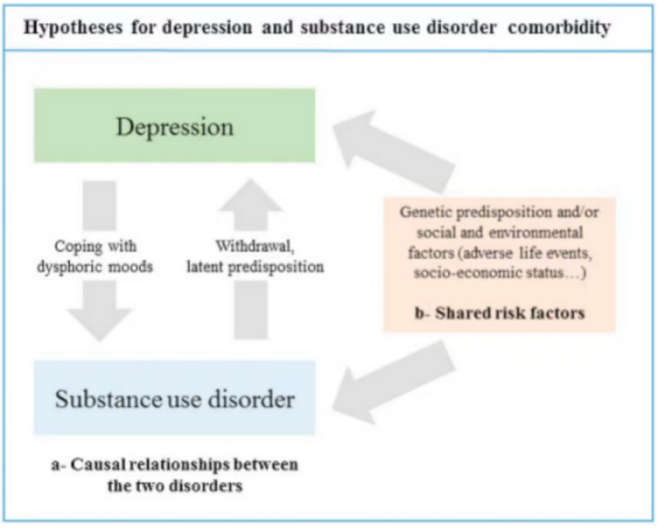


**Figure 1**

There are similar mechanisms that underlie depression and SUD. The commonalities between substance abuse problems and depression include similarities in neurotransmitter abnormalities, as both involve alterations

in the neurotransmitter systems that regulate the levels of dopamine and serotonin experienced. The impact of these neurotransmitter abnormalities on mood regulation, reward response, and self-regulation, affects the onset and severity of both depression and SUD. An example of a common substance abuse problem is alcohol use disorder (AUD), and there is little research on whether AUD and depressive disorders might have shared pathophysiology, although co-occurrence is a growing focus of research. Evidence of shared susceptibility as indicated by studies of genetic liability has been found for AUD and depressive disorders (Zhou et al., ). Individuals with ADHD frequently tend to be distracted from study and work. Furthermore, recent studies have revealed that ADHD share common pathological mechanisms with SUD.

### 2.3 The Comorbidity Between ADHD and Depression

In their longitudinal analyses, (Lucy et al 2021) stated that ADHD in early age of a person was a contributing factor to first-episode repeated episodes of depression in early adulthood (OR 1.35, 95% CI 1.05-1.73). The MR analyses indicated that genetic predisposition to ADHD causes major depression (OR 1.21, 95% CI 1.12-1.31). The MR results based on a wider definition of depression indicated a weak association between ADHD and depression (OR 1.07%, 95% CI 1.02-1.13) (Riglin et al., 2021).

In a study of 148 mid-life women from a UK-based longitudinal study of adults with recurrent depression, an examination was conducted on the prevalence of ADHD as well as the association of ADHD with symptoms of depression. Overall, they found that 12.8% of women with recurrent depression exhibited high levels of ADHD symptoms, and 3.4% met DSM-5 diagnostic criteria for ADHD. None of the women had received an ADHD diagnosis from a healthcare provider. ADHD symptoms were associated with increased risk of hospitalisation and receipt of non-first-line antidepressant medication (Powell et al, 2021). Higher ADHD symptoms appear to indicate a more severe presentation of depression.

## 3. DISCUSSION

Neurobiologically, the three conditions seem to be related, with dysregulation in the same brain regions and neurotransmitter systems afflicted in depression, ADHD and drug or alcohol abuse. Depression is related dysfunction in pathways utilising the neurotransmitters serotonin, norepinephrine, and dopamine, all of which are also critically involved in ADHD and substance abuse. Dopamine signalling dysfunction in ADHD, involved in the neural mechanisms of reward processing and motivation, can underlie the risk of developing substance abuse problems. Once a person becomes addicted, their brain chemistry and brain structure changes in response to the drug, reinforcing addictive behaviour and possibly even making depressive and ADHD symptoms worse.

Depression is frequently found to co-occur with addiction problems. In fact, gaming addiction and substance abuse problems are among the most common presenting problems. The relationship between depression and addiction is complicated and well-studied within both psychological and medical research domains. Depression can lead to addictive behaviours as people attempt to self-medicate out of desperation to feel better, and chronic addiction can make depressive symptoms worse due to changes in brain chemistry and social functioning. Shared risk factors within the family and in the surrounding environment likely contribute to their co-occurrence. The correlation between ADHD and addiction issues is notable. Patients suffering from attention deficit disorder can be easily addicted to video games, alcohol and other addictive substances. Studies suggest that untreated ADHD patients up the risk of developing addiction issues as a means to cope with symptoms, or to self-medicate. The same underlying neurological mechanisms are involved in both disorders, where dopamine pathways in the brain impact reward processing and decision-making. Timely intervention in ADHD patients can reduce the risk of addiction, which underlines the imperative of treatment of ADHD that tackles its symptomatology in an integrated manner.

The most common treatments for depression are psychotherapy and medication. Psychotherapy, also frequently referred to as talk therapy, or cognitive behaviour therapy (CBT). CBT is effective for some patients. Moreover, it has been found that medicine therapy is not sufficient for some people (Chandler, 2013) and that additional treatment is needed to compensate for interpersonal, emotional, academic and occupational dysfunction that is often associated with conditions such as AU-TDA/H. CBT seems to be a particularly reliable therapy among the psychological models that show promise in treating adult ADHD (Knouse & Safren, 2010). This therapy was actually invented to treat depression first, and it's also helpful in treating many different types of mental illness (Ramsay & Rastin, 2003). Conventional cognitive behavioural therapy (CCT) is based on cognitive psychopathology, which has the foundational assumption that an individual's maladaptive thoughts and beliefs are a fundamental cause of the appearance or perpetuation of clinical symptomatology. The aim of the therapy is to transform the way in which the problem is thought about in order to change the feelings and behaviours to which it is associated (Auclair et al., 2016). The advantage of this type of therapy is that

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the treatment can also help to slow down the addictive behaviour initiated by depression.

After the conclusion of the randomised-controlled study, the efficacy of CBT, at least in the short term, has been proven for most of these diseases. Some studies conducted a year after the end of the session have shown that CBT has significant and sustained effects on the behavioural features of certain psychological disorders, such as the obsessive-compulsive disorder (Cludius et al., 2020). Future studies should further investigate the longevity of the positive effects brought about by CBT, and determine the appropriate level of treatment, including the number of sessions. This can be augmented in future studies focused on the comorbidity of these three mental disorders by refining our neurobiological understanding of the interaction among depression, ADHD and addiction. Conducting longitudinal studies that cover a greater time period to elucidate developmental trajectories and associations among the three disorders, as well as examining genetic and environmental effects and then tailoring the appropriate treatment, are also worthwhile objectives for studying the co-occurrence of ADHD, depression and addiction.

## 4. Conclusion

This study was able to demonstrate that individual pairs among depression, ADHD and SUD were demonstrated to be related. During the assessment process, shared symptoms can cause confusion and misdiagnosis to one illness, when in fact two were present. The Neurotransmitter effects tend to interact with the brain functions, causing people with ADHD to have a greater chance of developing depression. It was also shown that people with depression have a greater chance to suffer from a substance abuse disorder. Individuals with ADHD are more likely to suffer from substance abuse disorder due to poor social skills and environmental factors. Due to the similarity in pathology, the three mental disorders have an evident relationship. ADHD can easily bring about the development of SUD and depression, for which CBT can be beneficial in this situation. It should be acknowledged that in terms of limitations, the results of this study merely examine data that span a period of 10 years, and considerations for cultural and policy influences were not integrated. This study referred to many different articles and research samples but did not have access to specific details of every patient, leading to the possibility that other mental disorders or factors were not appropriately considered.

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