

Review Article

## Relationship between impulsivity and Obsessive-Compulsive Disorder (OCD) in forensic sciences

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### Abstract

Obsessive-compulsive disorder (OCD) is a neuropsychiatric disorder characterized by repeated unwanted thoughts, repetitive behaviours and rituals to reduce these thoughts. OCD is often seen together with other psychiatric disorders such as anxiety and depression. Although it may seem similar, often the urge to perform certain behaviours or act in certain ways is sometimes confused with impulse control disorder. Impulsivity is a trait associated with low impulse control, impaired cognitive functioning, and risky behaviour. Impulse control disorders include disorders that affect the ability to control behaviour and can lead to behavioural addictions, such as gambling addiction. It is argued that impulsivity is associated with neurotransmitters, genetic factors and brain structure and that impulsive behaviours have neurological bases. Neurotransmitters such as dopamine and serotonin have been associated with impulsivity. Candidate genes associated with impulsivity and aggression have been shown to alter the function of neurotransmitters. The relationship between psychiatric illnesses and criminality has been the subject of intense debate and investigation by many researchers in recently. Although there is no direct connection between OCD and criminal behaviour, there are some behaviours that can be considered "behavioural addiction" in the "Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition"(DSM-5), such as gambling addiction and compulsive stealing. It is an undeniable fact that individuals with impulse control disorders are prone to criminal acts. The relationship between OCD and impulse control disorder has therefore attracted the attention of forensic sciences and has been examined multidisciplinary.

**Keywords:** Obsessive-compulsive disorder, psychiatric genetics, impulsivity, behavioural genetics

### INTRODUCTION

The relationship between psychiatric illnesses and criminality has been the subject of intense debate and investigation by many researchers in the recent past. Although the renewed focus on the importance of mental health and media attention following tragedies such as grand thefts and murders is a positive development, the relationship between mental illness and criminality has been a matter of curiosity. Popular belief is that people with mental illness are more likely to commit acts of violence and aggression. The perception of psychiatric patients as dangerous individuals often stems from the media portrayal of criminals as "crazy" individuals [1,2].

Obsessive-compulsive disorder (OCD) is a neuropsychiatric

disorder characterized by recurring intrusive disturbing thoughts and repeating behaviours or rituals performed to calm anxiousness. It often accompanies other psychiatric disorders, especially anxiety and depression [1]. Obsessions are recurring thoughts, images, and urges that people perceive as intrusive and unwanted. Compulsions are repeated actions, behaviourally and cognitively, in response to obsessions [2]. OCD has the potential to have a negative impact on life quality in general, especially education, employment, career development and relationships.

Patients with obsessive-compulsive disorder often feel shame and guilt about their condition. Especially when compulsions attract public attention, patients with insight may feel ashamed of their behaviour and fear being labelled. Since it takes a long time for individuals with OCD to start treatment, the disease usually

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follows a chronic course. A major reason for this delay is the fear of embarrassment, judgment and stigma that comes with the symptoms [2,3].

OCD can be characterized by repeated unwanted ideas, urges, and images. It often progresses with some comorbid psychiatric disorders. Studies have shown that OCD is frequently seen together with mood and anxiety disorders among Axis I disorders [4].

### **Impulsivity and OCD**

The inclination to respond quickly and impulsively, regardless of the potential consequences, to internal or external stimuli is known as impulsivity. The behaviours of people who struggle with impulse control, defined as the ability to manage one's behaviour in response to a disturbing emotion or situation, often display similar characteristics to individuals with OCD. Both OCD and impulse control disorder involve the unable to resist the urge to perform certain behaviours or act in certain ways [5]. Although compulsiveness and impulsivity are seemingly conceptualized as mutually opposite, the relationship appears to be more complex than that. Compulsiveness and impulsivity can occur simultaneously in the same disorder, or they can occur separately at different times. People with both disorders may find it difficult to ignore their compulsions and may be driven by intrusive thoughts or obsessions. People with OCD may have thoughts that they feel the need to check before leaving the house, such as making sure all the doors are locked several times, the stove is off, and the iron is not working. People with OCD often interpret the meaning of their compulsions differently than people who suffer from impulse control problems. For example, someone with OCD may believe that performing a particular compulsive action, will prevent something terrible from happening, such as hurting a loved one. On the other hand, a person with impulse control problems may engage in an activity because it gives them pleasure or relief, whether it does.

Impulsive behaviour can be dangerous and lead to serious consequences. People with impulse control problems may engage in activities such as gambling, excessive shopping, or drug use. Compulsive behaviours, on the other hand, are often done to relieve anxiety or distress.

They may also have rules to follow to make them feel good, such as counting items a certain way before going to bed. When these compulsions are not acted upon, the person may experience extreme anxiety or distress.

Individuals with OCD may resort to violence in some situations. There may be several reasons for this situation. For example, if someone else unintentionally or intentionally disrupts the obsessive thoughts of the person with OCD, tries to prevent them, or breaks the rules without justification, this may cause the individual with OCD to turn to crime and violence.

Although OCD does not definitively cause criminal behaviour, some research suggests that individuals with OCD may have

higher rates of criminal behaviour than the general population. obsessive-compulsive personality disorder (OCPD) subtype is associated with rigid perfectionism, rigidity, and a strong need for control. These characteristics can lead to an increased risk of criminal behaviour if they are directed towards illegal activities.

OCD significantly affects daily life and social interactions and is not usually associated with criminal behaviour. However, some research suggests that individuals with OCD may be more prone to impulsivity, which can potentially lead to criminal acts. While there is no direct link between OCD and criminal behaviour, there are some behaviours that can be considered "behavioural addiction" (gambling disorder-GD and compulsive stealing) in the DSM-5. As a result of the studies, it has been revealed that individuals with behavioural addictions may be more likely to engage in criminal behaviour due to their impulsivity and inability to control their actions [6].

When it comes to their negative outcomes, phenomenology, and natural history, behavioural addictions are very similar. Phenomenologically, individuals with behavioural addiction often display dysfunctional impairment (disregard for other facets of life and narrowing of interests), impaired control (desires and fruitless attempts to restrict behaviour), and risky use (ignorance of detrimental psychological effects). They exhibit the behaviour of persisting in the behaviour despite the situation.

Impulsivity, which expresses the tendency to act without forethought, has received intense attention in the field of psychiatric research. Research has demonstrated a strong correlation between this behavioural trait and a number of psychiatric conditions, such as Attention-Deficit / Hyperactivity Disorder (ADHD), addiction, bipolar disorder (BP) and personality disorders like Antisocial Personality Disorder (ASPD) and Borderline Personality Disorder (BPD). According to DSM-4, it includes a category of psychiatric disorders called impulse control disorders not elsewhere classified, including kleptomania, Intermittent explosive disorder (IED), pathological gambling, pyromania and trichotillomania. Beyond this classification, impulsive tendencies exhibit a link to crime, with suicidal behaviours, aggression, and self-harming tendencies.

When they first start a behaviour, many persons with behavioural addictions describe feeling tense or aroused, and when they finish the behaviour, they often report feeling relieved or satisfied. This disordered behaviours can progressively change over time from an impulsive, reward-seeking habit to an ego-dystonic, obsessive one. For instance, if you have a gambling disorder, your gaming may become less pleasurable and you may feel pressured to play more to ease your tension or anxiety. Relapses are common in behavioral addictions, despite the fact that many individuals with these diseases recover without seeking professional help. These impulsive behaviors can have negative effects on one's quality of life, seriously affect one's ability to operate in social and professional contexts, and result in new financial and legal obligations [6].

Gambling addiction (GD) is considered by determined and recurring patterns of maladaptive gambling behaviour. Some gambling addicts have psychopathic personality traits. However, most of them are perfectionists, detail-oriented, controlling, overly responsible and ambitious people, which is often seen in OCD patients. Before they became addicted to gambling, they appeared to be extremely respectable, fulfilling their responsibilities, and ideal spouses and parents. Clinical characteristics of gambling addiction are similar to those of substance use disorders: tolerance, withdrawal, and other unfavorable psychosocial effects; additionally, there are recurrent unsuccessful attempts to quit gaming. Gambling addiction is also marked by cognitive biases that support unfavorable decision-making. These cognitive errors include superstitious beliefs such as performing gambling tasks in a certain order, the gambler's fallacy, and the conviction that an independent event, such as the outcome of a fair coin toss, is more or less likely. It is common to see gamblers chase losses, continue to bet despite repeated losses, and have a sense of control over the outcome. They may also misinterpret reward and loss (for example, non-winning "near-miss" outcomes, which tend to boost their urge to gamble). For those with a gambling addiction, there are numerous gamblers with an addiction can quickly elicit a wide range of intense feelings, including anger, exhilaration, hope, and disgust. Given their diminished capacity for reason or lack of control, it makes sense that some problem gamblers who also have legal issues would look for mitigating circumstances in their sentencing [7].

Kleptomania has been classified as an "obsessive-compulsive spectrum disorder" and an impulse control disorder due to similarities in symptom presentation and response to therapy [8]. It is appropriate to recognize that impulsive behaviour does not always manifest as maladjustment; rather, it may provide advantages in contexts that require rapid reactions and take advantage of unexpected expectations [9].

Impulsivity is a complex behavioural construct, much like many others. The range of impulsive expressions expands to include aggression. This rich diversity of expression styles shows that impulsivity is not a unitary structure. Identifying different forms of impulsivity may advance understanding of the neurobiological basis of diseases of which impulsivity is a component [10].

Impulsivity in humans can be assessed with self-report questionnaires such as the Barratt Impulsivity Scale (BIS-11) [11], UPPS-P Impulsive Behaviour Scale (IBS) [12] and The Impulsivity Rating Scale (IRS). These scales reflect more of the individual's subjective view of his or person's behaviour; However, some progress has been made in correlating such measurements with differences in brain function. Correlating different impulsivity measurements with brain activations has also been a pioneer in genetic studies.

### **Impulsivity and Genetic**

Aggression evaluated behaviourally has demonstrated a good correlation with biomarkers for gene discovery and candidate

gene investigations. Aggression can be reactive or impulsive, and it can be instrumental, purposeful and goal-directed. Disorders that share a genetic predisposition to impulsive aggression include ASPD, BP and IED [13]. The Brown-Goodwin Lifetime History of Aggression (BGLHA) scale is an 11-item questionnaire that assesses aggressive behaviour over the lifetime by counting the number of times each type of aggressive behaviour occurs [14]. Events measured include temper tantrums and violent behaviour against self, property, and others (including authority) in a variety of social contexts; family, work and school. According to BGLHA, aggression is predicted to be associated with testosterone, which is higher in men and is also associated with functional variation of the MAO-A (Monoamine oxidase A) gene. The MAO-A gene has been observed to interact with testosterone levels to predict aggressive behaviour as measured by BGLHA, and FKBP5 (FK506 binding protein5), which encodes a protein involved in the cortisol response, has been observed to interact with stress exposure to predict BGLHA scores [15].

Numerous neurotransmitters and different genes have a role and connected with impulsivity may affect the behavioural responses of these neurotransmitters, according to pharmacobehavioral studies.

Dopaminergic and serotonergic pathways are particularly prominent in the brain areas that control impulses. Neuropharmacological studies using gene knockout and genetic association methods have demonstrated that impulsivity is related to the dysregulated activity of monoamine neurotransmitters. The genes under discussion have been linked to impulsivity and violence, may modify the activity of monoamine neurotransmitters, and have occasionally been investigated for relationships to human reactions to impulsivity [10].

The neurotransmitter most frequently linked to impulsivity is serotonin, especially when it comes to impulsive aggressiveness and suicide. Human and animal models of neurochemical and neurobehavioral research have linked serotonin to impulsivity and violence. Examination of serotonergic biomarkers in violent criminals and alcoholics has revealed that cerebrospinal fluid (CSF) 5-hydroxyindoleacetic acid (5-HIAA) is reduced only in individuals who are impulsive rather than in those who pre-plan aggressive behaviour and violence [16]. In a study conducted in rodents, it was observed that manipulations that reduce 5-HT (5-hydroxytryptamine/serotonin) signaling increased impulsivity and aggression. Aggressive behavior in rodents is decreased as 5-HT activity is increased using 5-HT precursors, 5-HT reuptake inhibitors, or 5-HT<sub>1A</sub> and 5-HT<sub>1B</sub> receptor agonists. [17].

A tryptophan hydroxylase 2 (TPH2) haplotype is associated with reduced levels of the serotonin metabolite 5-HIAA in the cerebrospinal fluid (CCSF) and a higher risk of suicide attempt. The TPH2 gene encodes the enzyme that catalyzes the rate-limiting step for serotonin production in the brain [18]. It has been demonstrated that the MAO-A gene, which genes for the enzyme monoamine-oxidase A, which metabolizes monoamine

neurotransmitters, is involved in regulating aggression [19].

Individual variations in the binding of the serotonin 1A receptor have been linked to violence throughout one's life [20]. A functional HTR1A single nucleotide polymorphism (SNP, rs6295) was associated with both BIS-11 and Eysenck Personality Inventory (EPQ) scores in a population sample [21]. Numerous pharmacological investigations using agonists and antagonists of serotonin 2A, 2B, and 2C have demonstrated the involvement of these receptors in impulsive behavior. [22].

Serotonin-transporter-related promoter region, or 5-HTTLPR, is situated on chromosome 17q11.1–q12, upstream of the serotonin transporter gene (SLC6A4) and has a common polymorphism. The neurotransmitter serotonin is transported from the synaptic region to presynaptic neurons by an essential membrane protein that is encoded by this gene. An allele (S) with 14 repeats reduces transcriptional efficiency compared to the allele (L) with 16 repeats or the L allele containing a G substitution [23]. Stress-modified associations between this polymorphism and suicidality have also been reported, and HTTLPR has been associated with trait impulsivity as measured by BIS-11 [24-25].

Dopamine controls reward response, cognitive function, and attention—all of which are components of impulsivity. The nucleus acumens are located on the border of the corpus striatum and is present in both hemispheres of the brain. This nucleus is characterized by the presence of many dopamine receptors that play an important role in the functioning of various cognitive processes. In rats, spontaneous impulsivity is predicted by lower levels of dopamine D2 receptors in the nucleus acumens [26]. It has been demonstrated that variations in the dopamine transporter gene reduce the likelihood of ADHD, a condition marked by impulsivity and hyperactivity. Additionally, there is proof that variations in the dopamine D4 receptor gene are linked to an increased risk of ADHD [27].

An endophenotype approach to gene discovery can be employed to identify impulsivity, an inherited trait related with disease. But as was previously mentioned, impulsivity is not a monolithic concept, and several methods and metrics are employed to evaluate its various facets. Furthermore, it is accurate that no gene can be classified as "impulsivity gene" because most genes have pleiotropic effects, meaning they affect multiple phenotypic traits.

Current study has shown that variations in the structure and function of people's brains are related to impulsivity. People also differ in their capacity to restrain their impulses. A person's brain and nerves are involved in the flow of tasks when they feel, know, believe, recall, are conscious of reasons, designs, wills, or exercise determination. However, these studies of psychiatric genetics and neuroscience do not conclude that they can inform us as to whether defendants' acts were ethically or legally justified. Responsibility, though informed by empirical knowledge, is a normative standard. However, research indicates that certain individuals may find it nearly impossible to stop their

behavior, even when they are aware that it is bad, in particular circumstances. Given this situation, it raises the question of how fair or effective it is to punish such people.

### **Crime and OCD**

Crime is behavior that creates legal harm, undermines personal or social security, disrupts public order and has consequences that may hinder the development of societies and must be punished. The phenomenon of crime should be approached at an individual level as well as a legal event. The relationship between crime and mental disorders has attracted the attention of researchers and scientists working in this field, and many studies have been conducted on this subject. Based on the idea that people with serious mental illnesses may engage in violent behaviors, studies have found that physical violent behaviors is also associated with psychiatric disorders.

If mental illnesses and psychiatric disorders that reduce and/or eliminate a person's ability to control their behaviors and therefore their ability to commit crimes are experienced at the time of the crime, the criminal liability of the person is reduced or eliminated. A person who cannot perceive the legal meaning and consequences of the act he committed due to mental illness and whose ability to direct his behaviors in relation to this act is significantly reduced is not punished, but security measures are imposed on these people.

The relationship between mental illness and crime is a situation that needs to be seriously investigated and preventive initiatives should be taken due to the social, economic, and medical problems it causes. Studies have been curiously examined which mental disorders are related to the type of crime. It is claimed that with the increase in violent behaviors in society, violent behaviors in psychiatric cases are also increasing. Many studies have been conducted on the frequency of aggressive behaviors in people with psychiatric disorders. All studies on the subject show that schizophrenia, alcohol and/or substance addiction, antisocial personality disorder and obsessive-compulsive disorder are associated with a high criminal history.

If we consider OCD from the perspective of crime and forensic science, it includes obsessions that the diagnosed person may harm himself or someone else, intentionally, or unintentionally, in a community or social environment, may say humiliating, obscene or offensive words, and may engage in aggressive, disproportionate actions. OCD sufferers can occasionally act violently and criminally. There might be several causes. One is due to the distress experienced when someone else unintentionally or purposely tries to stop an obsession or is thought to be breaking the law without cause. To prevent the possibility of these behaviors from occurring, the person may show compulsions such as restricting behavior towards himself and his environment, and constantly apologizing even if the action does not occur. Furthermore, when an OCD sufferer believes that someone else has been harmed, they may become furious and upset and may even resort to improper physical force

to defend the individual, which could lead to charges of violent crimes. There is a dearth of research on the legal implications of OCD, specifically on their significance for determining criminal guilt as well as criminal accountability [1,6].

Examining the typical effects of mental illnesses is necessary, particularly when making decisions that outline the legal environment during the sentencing phase of criminal proceedings. Thanks to a few sample cases in courts in the UK, Ireland, Canada, Australia, New Zealand, and India, it is hoped to increase awareness of OCD and OCPD globally [1].

#### Conflict of interests

*The authors declare that there is no conflict of interest in the study.*

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#### Ethical Approval

*That review with no research intervention do not need ethics committee approval*

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