

Understanding the Differences Between Impulsivity and Compulsivity

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Impulsivity and compulsivity are natural behaviors controlled by brain mechanisms that are essential for survival in all species. Understanding these brain mechanisms may lead to targeted treatment strategies for these symptom domains when impulsivity and compulsivity become dysfunctional. Pathological impulsivity and compulsivity characterize a broad range of mental disorders and are the core and most debilitating symptoms, at least phenotypically, in some of the disorders in which these behaviors occur. These illnesses, some of which are highly heritable, are currently classified across several *DSM-IV-TR* diagnostic categories. Obsessive-compulsive spectrum disorders include obsessive-compulsive disorder (OCD), body dysmorphic disorder, trichotillomania, Tourette syndrome, and hypochondriasis. Disorders that involve deficits in impulse control include pathological gambling, externalizing disorders such as attention-deficit/hyperactivity disorder (ADHD), personality disorders such as borderline personality disorder, and substance and behavioral addictions.

Impulsivity versus compulsivity

The concept of impulsivity has many different aspects and definitions, but in general it covers a wide range of “actions that are poorly conceived, prematurely expressed, unduly risky, or inappropriate to the situation and that often result in undesirable outcomes,” or more simply put, a tendency to act prematurely and without foresight.¹ Moeller and colleagues² defined impulsivity as “a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions to the

impulsive individual or to others.” However, impulsivity is not always unplanned; for example, some pathological gamblers plan in advance to pursue their impulsive behavior. Impulsive behaviors can be conceptualized as the core symptoms of a broad range of psychiatric disorders that are often comorbid with one another, including cluster B personality disorders, impulse control disorders, and bipolar disorder (**Figure 1 restricted. Please see print version for content.**).

In contrast, compulsivity refers to repetitive behaviors that are performed according to certain rules or in a stereotypical fashion.³ Compulsivity is a tendency to repeat the same, often purposeless acts, which are sometimes associated with undesirable consequences. Impulsivity and compulsivity may be viewed as diametrically opposed, or alternatively, as similar, in that each implies a dysfunction of impulse control.⁴ Each involves alterations within a wide range of neural processes including, for example, attention, perception, and coordination of a motor or cognitive response. Objective neurocognitive tests hold potential for elucidating the mechanisms by which pharmacological agents exert their beneficial clinical effects and for predicting clinical outcomes.^{5,6} Using sensitive and domain-specific neurocognitive tasks, we may also be able to divide impulsivity and compulsivity into separate and quantifiable neurobiologically specific domains.⁷

Disorders characterized by impulsivity include impulse control disorders in *DSM-IV-TR*, representing a failure to resist aggressive impulses (as in intermittent explosive disorder) and urges to steal (kleptomania), set fires (pyromania), gamble (pathological gambling), and pull one’s hair (trichotillomania). However, behaviors characteristic of these disorders may also manifest as symptoms of another mental disorder. A number of other disorders are not included as a distinct category but are categorized as impulse control disorders not otherwise specified in *DSM-IV-TR*. These include sexual compulsions, compulsive shopping, skin picking, and Internet addiction. Impulse control disorders share the feature of the irresistible urge to act in a given way and may be considered as a subset of the obsessive-compulsive spectrum of disorders.

The obsessive-compulsive spectrum is a dimensional model of risk avoidance in which impulsivity and compulsivity represent polar oppo-

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EDUCATIONAL OBJECTIVES

After reading this article, you should be familiar with:

- Differences and similarities between impulsivity and compulsivity.
- Characteristics of impulsivity and compulsivity.
- Factors that contribute to impulsivity and those that contribute to compulsivity.
- Treatment approaches for impulsivity and compulsivity.

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site psychiatric spectrum complexes that can be viewed along a continuum of compulsive and impulsive disorders. Patients on the compulsive end of the spectrum tend to have an exaggerated sense of threat from the outside world and engage in rituals/routines, such as obsessive-compulsive behaviors, to neutralize the threat or reduce the harm. This end point marks compulsive or risk-averse behaviors characterized by overestimation of the probability of future harm, as exemplified by OCD. However, some compulsive patients pursue unrewarding rituals for short-term gains (relief of tension) despite negative long-term consequences. Generally, however, OCD rituals are not pleasurable activities engaged in for their own sake but are neutral or often irritating and unpleasant behaviors that are performed to reduce anxiety.

Patients on the impulsive end of the spectrum

tend to underestimate the harm that is associated with behaviors such as aggression, excessive gambling, or self-injury. This end point designates impulsive action generally characterized by a lack of consideration of the negative results of such behavior and is exemplified by borderline and antisocial personality disorders.⁸ Some impulsive patients do recognize and assess the harm associated with the impulsive behavior but nonetheless engage in it because they find that the thrill or arousal they experience in response to the behavior outweighs the negative consequences.

Impulsive behaviors generally have an element of pleasure, at least initially, although they may lose their pleasurable quality over time. Some patients with impulse control disorders may engage in the behavior to increase arousal, but there may be a compulsive component to their behavior in which they continue to engage in the behavior to decrease dysphoria. So, in general, while compulsivity may be driven by an attempt to alleviate anxiety or discomfort, impulsivity may be driven by the desire to obtain pleasure, arousal, or gratification. Both types of behaviors share the inability to inhibit or delay repetitive behaviors.⁹ Over time, impulsive behaviors may become compulsive (driven behaviors without arousal) and compulsive behaviors may become impulsive (reinforced habits).

Contributing factors

There are many contributing factors to impulsivity and compulsivity, such as genes, gender, environment, psychiatric disorders, and substance abuse. The neurobiology of impulsivity and compulsivity may involve inhibitory neurotransmitters such as serotonin and γ -aminobutyric acid (GABA); excitatory neurotransmitters such as glutamate, norepinephrine, and dopamine; and prefrontal cortex and/or limbic dysfunction. Convergent evidence suggests that a failure in top-down cortical control mechanisms that leads to striatal overdrive may constitute a unifying pathophysiological model underpinning an “impulsive-compulsive spectrum” of mental disorders.⁷ Increased frontal lobe activity may characterize the compulsive disorders, such as OCD. In contrast, decreased frontal lobe activity may characterize the impulsive disorders, such as pathological gambling and borderline personality disorder.⁹

Impulsive and compulsive features may present at the same time or at different times during the same illness.¹⁰ Although both compulsive and impulsive disorders may be related to prefrontal cortex dysfunction, compulsive disorders would be related to hyperactivity and impulsive disorders to hypoactivity of the prefrontal cortex. Compulsiveness appears to be associated with increased frontal lobe activity, while impulsiveness may be associated with reduced frontal lobe activity.

Treatment targets

The impulse control disorders can be conceptualized in addictive, affect-driven, and compulsive models (Figure 2). Targeted treatments of impulsivity in impulse control disorders can influence the motivational circuitry, or work via addictive, affect-driven, and compulsive systems. Treatments should also target comorbid bipolar spectrum, ADHD, and compulsive and addictive dis-

orders for maximal anti-impulsive effects (Figure 3). There is some evidence that different symptom dimensions within the impulse control disorders are particularly responsive to different medication classes.^{11,12} It is therefore important to individualize treatment decisions based on the limited evidence base and the patient’s presenting problems, history, and comorbid conditions.

For example, a patient with borderline personality disorder with prominent cognitive/perceptual distortion may respond to neuroleptics, while a patient with depressed mood may respond best to antidepressants. Some symptom dimensions (eg, antisocial traits) may be less responsive to medication, and some classes of medication, including the benzodiazepines, do not appear particularly effective for the treatment of impulse control disorders and should generally be avoided.¹³

There may be several unique developmental trajectories to impulsivity and compulsivity (eg, ADHD, bipolar spectrum, trait impulsivity, obsessive-compulsive personality disorder) and various routes to altering motivational circuitry, such as modulators of cortico-striatal-limbic circuits. We suggest that core symptoms within disorders should be treated and appropriate outcome measures should be used to determine targeted treatment response. Interventions should be directed at the brain circuitry that modulates core symptoms, which may be shared across disorders rather than *DSM* diagnoses.¹⁴

Although the neurobiological basis of OCD (symptoms and related cognitive impairments) is unclear, lesion, functional neuroimaging, and neuropsychological studies have suggested that structural and functional dysfunction of limbic or affective cortico-striato-thalamocortical circuitry, which includes the orbitofrontal cortex, plays a key role.¹⁵⁻¹⁸ These circuits, first identified in non-human primates, have also been identified in human lesion and imaging studies of patients who have OCD.¹⁹⁻²³

Treatment approaches

Intervention can occur at the symptom, syndrome, or behavioral level. Effective treatment of impulsivity and compulsivity depends on determining the cause(s) of these behaviors and selecting treatments accordingly. Pharmacological and non-pharmacological treatment, such as behavioral strategies aimed at reducing impulsive and compulsive behavior, may be most effective for the long-term treatment of the underlying chronic or recurrent illness.

There is no standardized treatment for complex disorders involving impulsivity, although a range of different medication classes have been investigated.¹³ Pharmacological treatments may reduce impulsivity and normalize arousal by decreasing dopaminergic activity, enhancing serotonergic activity, shifting the balance of amino acid neurotransmitter from excitatory (glutamatergic) toward inhibitory (GABAergic) transmission, lowering glutamatergic conduction, and/or reducing or stabilizing nonadrenergic effects. Medications used to treat disorders involving impulsivity, including impulse control disorders and cluster B personality disorders, which have been shown to be effective in some clinical trials, include SSRIs, lithium, and anticonvulsants.^{14,24-31} Cognitive-behavioral

therapy (CBT) and psychodynamically informed psychotherapy have a useful role in the management of a number of impulse control disorders. More specific details of the pharmacotherapeutic and psychotherapeutic approaches to each of the individual impulse control disorders can be found elsewhere.³²

With regard to compulsive behavior, the most common treatment approaches for OCD are pharmacological and psychological. CBT was the first psychological treatment for which empirical support was obtained. A recent review compared psychological treatments with treatment as usual and found that psychological treatments derived from cognitive-behavioral models are effective for adults with OCD.³³

On the basis of the hypothesized underlying neurobiology of OCD and observed treatment effects, SSRIs are considered first-line treatment for OCD. However, SSRIs are often associated with delayed onset of therapeutic effect (8 to 12 weeks), only partial symptom reduction, and response failure or intolerability in 40% to 60% of patients. Pharmacological options for SSRI-refractory cases include increasing drug dosage, changing to another SSRI or clomipramine, combining SSRIs, or changing the mode of drug delivery. Augmentation with second-generation antipsychotics appears promising, as well as augmentation or monotherapy with some of the anticonvulsants.³⁴⁻³⁶

Alternative interventions

Some patients with OCD remain refractory to all standard pharmacological and psychological treatments. Several alternative medical interventions have been considered for these severe cases, including ablative neurosurgery and brain stimulation techniques such as electroconvulsive therapy, transcranial magnetic stimulation (TMS), and deep brain stimulation (DBS—the nonablative neurosurgical procedure). Studies that explore these techniques for OCD treatment are limited by small sample sizes and scarcity of double-blind trials, and none of these alternative interventions are FDA-approved for treatment of OCD. However, given the promising efficacy findings thus far, reversibility, noninvasiveness or minimal invasiveness, tolerability, and possibility of double-blind trials, additional research should be conducted with TMS and DBS to refine these techniques, better establish their efficacy, and offer more options to patients who have exhausted all other available treatments.³⁷

Patients with comorbid disorders

Clinicians should also identify comorbid conditions and associated symptoms related to brain systems, because these can also influence treatment choice and response. For example, mood stabilizers, traditionally used to treat bipolar disorder, can be effective for other disorders, including impulse control disorders.

When treating patients at risk for bipolar disorder, SSRI-induced manic behaviors could emerge in pathological gamblers who have a history of, or are at risk for, mania or hypomania.²⁴ Thus, mood stabilizers such as lithium or valpro-

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ate may be better treatment options for patients with comorbid impulse control disorder and bipolar disorder. Personality disorders with aggressive behavior and emotionally unstable character disorder with a disturbance of mood swings respond to lithium. A variety of personality factors and comorbid conditions such as premenstrual syndrome, bulimia, agoraphobia, major affective disorder (eg, bipolar II), and hypersomnia, which are overrepresented in patients with borderline personality disorder, often complicate the clinical picture. Depending on a mix of these factors, certain drugs may need to be avoided, nonstandard drug combinations may be needed, or safer but less effective drugs may need to replace more effective drugs whose abuse by suicidal patients may have more dangerous consequences.³⁸

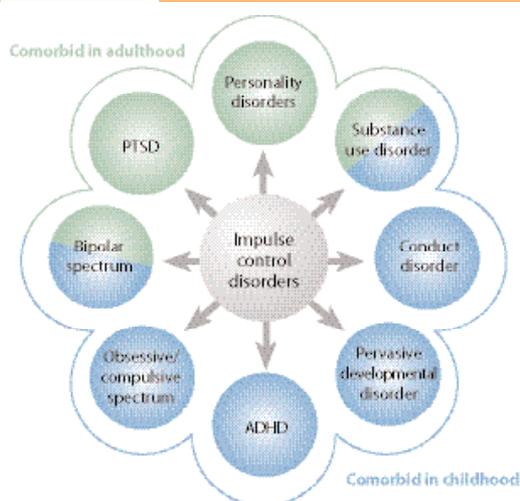
OCD is heterogeneous in terms of types of obsessions and compulsions, heritability, and comorbid conditions, which probably reflect heterogeneity in the underlying pathology.¹⁸ Accordingly, there are many disorders known as obsessive-compulsive spectrum disorders that share features with OCD, including trichotillomania and body dysmorphic disorder.^{39,40}

The apparent association between altered serotonergic function and OCD has guided attention toward the possible role of serotonergic function in the underlying cause of trichotillomania.⁴¹

Figure 2 Models of impulsivity



Figure 3 Comorbidities of impulse control disorders



ADHD, attention-deficit/hyperactivity disorder; PTSD, posttraumatic stress disorder.

Some investigators have postulated that patients with trichotillomania who engage primarily in hair pulling, where their attention is focused on the hair pulling, are more phenomenologically similar to individuals with compulsions in OCD than those with automatic hair pulling that occurs outside conscious awareness, and thus they may be more responsive to pharmacological interventions found to be effective for OCD.^{42,43} A number of investigations of the use of antidepressants with specific inhibition of serotonin reuptake (ie, fluoxetine and clomipramine) have yielded mixed results.⁴⁴⁻⁴⁸ Naltrexone, an opioid antagonist, has been found to be superior to placebo in reducing trichotillomania symptoms.⁴⁹ Also, augmentation of SSRIs with atypical neuroleptics may be beneficial, and olanzapine may be effective as a monotherapy for trichotillomania, as well as CBT.^{50,55}

Body dysmorphic disorder is a relatively common and often disabling somatoform disorder that may be an obsessive-compulsive spectrum disorder because of its similarity to OCD.⁴⁰ There is some evidence for familial aggregation and genetic links with OCD.⁵⁶ Although body dysmorphic disorder is still difficult to treat, success has been demonstrated for serotonin reuptake inhibitors and CBT.⁵⁷ A clear role for the serotonin system is evidenced by the specificity of therapeutic response to serotonergic antidepressants.⁵⁸ Higher doses of SSRIs and longer treatment trials than those used for many other psychiatric disorders, including depression, may be needed to effectively treat body dysmorphic disorder. CBT, using techniques such as cognitive restructuring, behavioral experiments, response (ritual) prevention, and exposure, also appears beneficial and is currently considered the psychotherapy of choice for body dysmorphic disorder.⁵⁹

Conclusion

In general, evidence suggests that mood stabilizers appear to be effective for treating the symptom domains of impulsivity and compulsivity across a wide range of psychiatric disorders and for impulse control and cluster B personality disorders in particular. We suggest that clinicians target and treat core symptoms of impulsivity and compulsivity based on the underlying neurobiology of these behaviors instead of the overall diagnosis, while taking into account comorbid disorders, associated symptoms, developmental trajectory, and family history.

Drugs Mentioned in This Article

Clomipramine (Anafranil)
Fluoxetine (Prozac, Sarafem)
Lithium (Eskalith, Lithane, Lithobid)
Naltrexone (Depade, ReVia)
Olanzapine (Zyprexa)
Valproate/valproic acid (Depakote, others)

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Category 1 Posttest

- Which of the following is not a disorder involving a deficit in impulse control?
 - Attention-deficit/hyperactivity disorder
 - Borderline personality disorder
 - Body dysmorphic disorder
 - Addiction disorder
- Which of the following is one of the compulsive spectrum disorders?
 - Trichotillomania
 - Tourette syndrome
 - Hypochondriasis
 - All of the above
 - None of the above
- Compulsivity is the tendency to act prematurely and without foresight.
 - True
 - False
- Decreased frontal lobe activity may characterize the compulsive disorders.
 - True
 - False
- Lesion, functional neuroimaging, and neuropsychological studies have suggested that the neurobiological basis of obsessive-compulsive disorder (OCD) involves structural and functional dysfunction of the:
 - Cortico-striato-thalamocortical circuitry
 - Orbitofrontal cortex
 - Limbic/affective circuitry
 - All of the above
 - A and C
- Which is considered the first-line pharmacological treatment for OCD?
 - Antipsychotics
 - Anticonvulsants
 - SSRIs
 - Lithium
- The impulse control disorders may be conceptualized in all the following models except the:
 - Addictive
 - Affect-driven
 - Compulsive
 - Dissociative
- Which of the following may be used to treat impulsive disorders?
 - SSRIs
 - Lithium
 - Anticonvulsants
 - All of the above
 - None of the above
- Which of the following may be considered for patients refractory to all standard treatments for OCD?
 - Mood stabilizers
 - Aversion therapy
 - Deep brain stimulation
 - Acupuncture
- Clinicians should target and treat core symptoms of impulsivity and compulsivity based on the underlying neurobiology of these behaviors.
 - True
 - False