Understanding the Differences Between Impulsivity and Compulsivity

by Heather A. Berlin, PhD, MPH and Eric Hollander, MD

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 and are neutral or often irritating and unpleasant behaviors engaged in for their own sake but undesirable consequences. Impulsivity and compulsivity may be viewed as diametrically opposed, or alternatively, as similar, in that each implies a dysfunction of impulse control. 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. Using sensitive and domain-specific neurocognitive tests, we may also be able to divide impulsivity and compulsivity into separate and quantifiable neurobiologically specific domains.

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 opposites. Obsessive-compulsive 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 un rewarding 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. 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 impulsivity 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. 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. 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.

Impulsive and compulsive features may present at the same time or at different times during the same illness. 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 disorders 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. 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 distortions may respond to neuroleptics, while a patient with depressed mood may respond best to antidepressants. Some symptom dimensions (e.g., 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.

There may be several unique developmental trajectories to impulsivity and compulsivity (e.g., 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.

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. These circuits, first identified in nonhuman primates, have also been identified in human lesion and imaging studies of patients who have OCD.

**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 nonpharmacological 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. 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.

**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. Thus, mood stabilizers such as lithium or valproate...
Impulsivity and Compulsivity

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.\textsuperscript{37,38} A number of investigations of the use of antidepressants with specific inhibition of serotonin reuptake (ie, fluoxetine and clomipramine) have yielded mixed results.\textsuperscript{39,40} Naltrexone, an opioid antagonist, has been found to be superior to placebo in reducing trichotillomania symptoms.\textsuperscript{41} Also, augmentation of SSRIs with atypical neuroleptics may be beneficial, and olanzapine may be effective as a mono-therapy for trichotillomania, as well as CBT.\textsuperscript{42-44}

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.\textsuperscript{45} There is some evidence for familial aggregation and genetic links with OCD.\textsuperscript{46} Although body dysmorphic disorder is still difficult to treat, success has been demonstrated for serotonin reuptake inhibitors and CBT.\textsuperscript{31} A clear role for the serotonin system is evidenced by the specificity of therapeutic response to serotonin antagonists.\textsuperscript{47}

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.\textsuperscript{48-50}

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 Featured in This Article

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

References

20. Lawrence AD, Sahakian BJ, Robbins TW. Cognitive functions and heritability, and co-variety in the underlying pathology.\textsuperscript{47} Accordingly, there are many disorders known as obsessive-compulsive spectrum disorders that share features with OCD, including trichotillomania and body dysmorphic disorder.\textsuperscript{46,47}

The apparent association between altered serotonergic function and OCD has guided attention toward the possible role of serotoninergic function in the underlying cause of trichotillomania.\textsuperscript{48-50}


Evidence-Based References


In order to receive AMA PRA Category 1 Credits™, posttests and activity evaluations must be completed online at <www.PsychiatricTimes.com/cme>.

To earn credit, read the article and complete the activity evaluation and posttest online at www.psychiatrictimes.com/cme. A score of 70% or more must be achieved in order to receive credit. A fee of $15.00 will be charged.

CME LLC designates this educational activity for a maximum of 1.5 AMA PRA Category 1 Credits™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

Category 1 Posttest

1. Which of the following is not a disorder involving a deficit in impulse control?
   A. Attention-deficit/hyperactivity disorder
   B. Borderline personality disorder
   C. Body dysmorphic disorder
   D. Addiction disorder

2. Which of the following is one of the compulsive spectrum disorders?
   A. Trichotillomania
   B. Tourette syndrome
   C. Hypochondriasis
   D. All of the above
   E. None of the above

3. Compulsivity is the tendency to act prematurely and without foresight.
   A. True
   B. False

4. Decreased frontal lobe activity may characterize the compulsive disorders.
   A. True
   B. False

5. Lesion, functional neuroimaging, and neuropsychological studies have suggested that the neurobiological basis of obsessive-compulsive disorder (OCD) involves structural and functional dysfunction of the:
   A. Cortico-striato-thalamocortical circuitry
   B. Orbitofrontal cortex
   C. Limbic/affective circuitry
   D. All of the above
   E. A and C

6. Which is considered the first-line pharmacological treatment for OCD?
   A. Antipsychotics
   B. Anticonvulsants
   C. SSRIs
   D. Lithium

7. The impulse control disorders may be conceptualized in all the following models except the:
   A. Addictive
   B. Affect-driven
   C. Compulsive
   D. Dissociative

8. Which of the following may be used to treat impulsive disorders?
   A. SSRIs
   B. Lithium
   C. Anticonvulsants
   D. All of the above
   E. None of the above

9. Which of the following may be considered for patients refractory to all standard treatments for OCD?
   A. Mood stabilizers
   B. Aversion therapy
   C. Deep brain stimulation
   D. Acupuncture

10. Clinicians should target and treat core symptoms of impulsivity and compulsivity based on the underlying neurobiology of these behaviors.
    A. True
    B. False