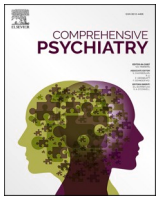
Comprehensive Psychiatry 130 (2024) 152449

Contents lists available at ScienceDirect

Comprehensive Psychiatry

journal homepage: www.elsevier.com/locate/comppsych



Impulsivity across psychiatric disorders in young adults

Zharia C. Crisp [a], Jon E. Grant [b,*]

[a] Pritzker School of Medicine, University of Chicago, Chicago, IL, USA
[b] Department of Psychiatry & Behavioral Neuroscience, University of Chicago, Chicago, IL, USA

ARTICLE INFO

Keywords:
impulsivity
transdiagnostic
young adults
cognition

ABSTRACT

Purpose: Impulsivity is a common cognitive issue across several psychiatric illnesses but is most frequently associated with the *DSM-5* Disruptive, Impulse Control and Conduct Disorders, ADHD, and addictive disorders. We hypothesized that a wide range of psychiatric disorders would be associated with elevated impulsivity, not just those commonly linked to impulsiveness. This study aimed to explore the relationship between impulsivity and various psychiatric disorders in young adults.

Procedures: 700 non-treatment seeking participants (aged 18–29 years) were enrolled from the general community, provided demographic information, and underwent a psychiatric evaluation to screen for various psychiatric disorders. Each participant then completed the Barratt Impulsiveness Scale (BIS), a self-report measure of impulsivity, followed by the Stop Signal Task (SST), a computerized stop-attention task that measures impulse control. Impulsivity levels across psychiatric disorders were examined by analyzing z-scores relative to controls.

Main findings: Patients with bulimia nervosa, comorbid panic disorder with agoraphobia, and borderline personality disorder showed the highest levels of attentional, motor, and non-planning impulsivity, respectively. The effect size of the difference in total BIS impulsivity was large ($d > 0.8$) for several conditions including eating, personality, addictive, and mood disorders. The effect size of the difference in impulsivity was not large for any of the measures of ADHD. As compared to other psychiatric disorders analyzed, trichotillomania showed the greatest levels of impulsivity as measured by SST.

Principal conclusions: This data indicates that a wide range of psychiatric disorders exhibit heightened impulsivity with findings differing across various cognitive domains. Comorbidity resulted in unique findings of elevated impulsivity. This may suggest utility in viewing impulsivity as a transdiagnostic factor for a broad range of psychiatric disorders. Future studies should analyze comorbidities and whether patient psychiatric medication impacts these findings.

1. Introduction

Lack of impulse control is a common cognitive issue across several psychiatric illnesses. Impulsivity is a cognitive domain that involves failure to resist urges, delay gratification, or adhere to long-term goals [1]. This is a complex domain that involves higher order cognitive processes, motor function, and impairments to neurocircuitry in executive brain function in regard to motivation [2]. Motivation neurocircuitry describes how motivational drives impact behavior through parallel cortical-striatal-thalamic-cortical loops [3]. This has been supported through neuroimaging studies that have found certain subcortical and striatal regions to be associated with decision-making. These pathways encode information regarding affect, memory, sensation, and homeostasis that influence motivational drive. This generates firing patterns that impact motor output through the thalamus and cortex. Deficits in these brain systems may lead to impulsivity, lack of goal-directed behavior, and addiction due to excess dopaminergic activity, abnormal inhibitory input, or other deficiencies in these pathways [3]. Impulsive actions are often premature or unplanned and related to reward seeking and feelings of gratification without regard for potential risk or consequences [1]. Impulsivity is of particular importance in adolescents and young adults, who often exhibit poor impulse control due to delays in executive function and top-down processing as they develop their prefrontal cortex and amygdala. During this maturation process, adolescents experience elevated dopaminergic activity and limited inhibitory ability that impacts motivational drive and may result in impulsive behavior [3].

In extreme cases, lack of impulse control can manifest itself as

* Corresponding author.
E-mail address: jongrant@uchicago.edu (J.E. Grant).

https://doi.org/10.1016/j.comppsych.2023.152449

Available online 4 January 2024

psychiatric illness.

The *DSM-5* groups several disorders together as Disruptive, Impulse Control and Conduct Disorders including oppositional defiant disorder, intermittent explosive disorder, conduct disorder, kleptomania, pyromania, and "impulse-control disorders not elsewhere classified" [4]. This update from the *DSM-IV* moved disorders including attention deficit hyperactivity disorder (ADHD), binge eating disorder, trichotillomania, and pathologic gambling to various other categories, such as Neurodevelopmental Disorders and Substance-Related and Addictive Disorders [4]. Impulsivity is commonly associated with ADHD and addictive disorders, including substance abuse disorder and pathological gambling [1,5]. Thus, most studies examining impulsivity focus on its relationship with a small subset of disorders. However, eating disorders, personality disorders, sexual behavior disorders, and suicidal behaviors have been associated with elevated impulsivity and poor behavioral inhibition [6–11]. Although some research has analyzed comorbidity of prior impulse-related disorders with other psychiatric conditions, such as substance use disorder and borderline personality disorder, there haven't been any exploratory studies looking at impulsivity as a cognitive domain across a wide range of psychiatric illnesses [12]. This may result in patients with high levels of impulsivity being misdiagnosed or underdiagnosed with specific behavioral disorders.

In recent years, there has been a push to move beyond traditional diagnostic tools, such as the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)* and *International Statistical Classification of Diseases and Related Health Problems (ICD-10)*, which are frequently used in clinical practice. Critics of these resources state that their categorizations are too rigid and fail to consider overlapping symptoms across disorders, psychopathology as a spectrum, or individual differences in clinical presentation [13]. Transdiagnostic tools have been established that cut across traditional diagnostic categories and incorporate other dimensions into clinical reasoning. The Research Domain Criteria (RDoC) incorporates self-report and behavioral measurements to the diagnostic process to provide more robust and valid frameworks for diagnosis [14]. This includes neurobiological and cognitive measures, such as the Barratt Impulsiveness Scale, which aims to provide a more systematic approach to classification. The Hierarchical Taxonomy of Psychopathology (HiTOP) is another emerging transdiagnostic tool designed to use a broader classification of psychopathology in a more generalized, hierarchical framework [13]. This hierarchy combines basic signs and symptoms into traits, which point to a generalized group of related disorders. These disorders are then grouped into overarching spectra, which are increasingly broader moving up the taxonomy. This aims to account for heterogeneity within disorders, comorbidities, and the overlapping nature of psychopathologies. A transdiagnostic symptomatologic approach such as HiTOP or RDoC could be a powerful tool used in conjunction with current *DSM* or *ICD*-based clinical guidelines to allow for more nuance and flexibility in practice.

Impulsivity is often measured using the Barratt Impulsiveness Scale (BIS), a validated 30-question self-report measure used in clinical research [15]. Inhibition can also be measured objectively using the CANTAB Stop Signal Task (SST), a computerized stop-attention task that measures motor inhibition and impulse control [16]. Thus, this study aimed to explore the relationship between impulsivity and various psychiatric disorders in young adults using both subjective (i.e., BIS) and objective (i.e., SST) measures. We hypothesized that a range of psychiatric disorders would be associated with elevated impulsivity levels, not just those commonly linked to impulsiveness such as ADHD and addiction disorders.

2. Material and methods

2.1. Participants

A total of 700 participants were recruited and enrolled through media advertisements that were posted throughout the Chicago and Minneapolis metropolitan areas. Participant criteria included being a non-treatment seeking young adult (aged 18–29 years) from the general community who endorsed gambling at least five times in the past year. Additionally, participants had to be able to perform the required cognitive task and participate in an in-person interview. Exclusion criteria included hearing or vision difficulties that interfered with completion of the cognitive testing or inability to consent to the study. Participants received a $50 gift card as compensation for their study participation. This study and consent statement were approved by the Institutional Review Board of the University of Chicago.

2.2. Assessments

Demographic information was collected for participants including age, gender identity, and highest level of education completed. Participants were given a psychiatric evaluation by psychiatrists at The University of Chicago Medicine using the Mini International Neuropsychiatric Inventory (MINI) [17], the Minnesota Impulsive Disorders Interview (MIDI) [18,19], the ADHD WHO Screening Tool Part A (ASRS v1.1) [20], and the Structured Clinical Interview for Gambling Disorder [21]. Criteria for diagnosis of attention deficit hyperactivity disorder using the ASRS v1.1 was participants endorsing at least four of the six ADHD symptoms; this aligned with standard diagnostic recommendations [20]. These clinical evaluations screened for various psychiatric disorders including major depressive disorder, panic disorder, agoraphobia, social phobia, obsessive compulsive disorder (OCD), posttraumatic stress disorder (PTSD), alcohol use disorder, substance use disorder, bulimia nervosa, generalized anxiety disorder (GAD), antisocial personality disorder, attention deficit hyperactivity disorder (ADHD), trichotillomania, intermittent explosive disorder, pathological gambling, compulsive sexual behavior disorder, compulsive buying disorder, binge eating disorder, and borderline personality disorder.

Following diagnostic procedures, participants completed the Barratt Impulsiveness Scale (BIS) under the supervision of trained lab members, a validated 30-question self-report measure of impulsiveness commonly used throughout clinical research. The Barratt Impulsiveness Scale was scored as both a composite score ($\alpha = 0.844$) and several subsections; these look at different domains of impulsivity including attentional (making quick cognitive decisions) ($\alpha = 0.720$), motor (acting without thinking) ($\alpha = 0.691$), and non-planning (lack of future planning) ($\alpha = 0.718$) impulsivity. Participants then completed computerized testing using the Stop Signal Task (SST) from CANTAB software [16]. Trained lab members conducted five blocks of 64 trials each per participant. The paradigm asked participants to rapidly respond to a stimulus by pressing a button in response to a left- or right-facing arrow on the screen. In the second part of the paradigm, participants were asked to withhold from the task if an auditory signal was present; this auditory tone was randomly presented during 25% of the trials. A tracking algorithm varied the amount of time between stimulus presentation and onset of the auditory stop-signal. Their ability to successfully stop completing the task was recorded as stop-signal reaction time (SSRT); longer SSRT indicates greater impulsivity and reduced motor inhibition.

2.3. Data analysis

Psychiatric disorders were only included for analysis if endorsed by at least 1% of the subjects. The control group consisted of all participants who were not diagnosed with any of the screened psychiatric disorders in the MINI, MIDI, ASRS v1.1 or Structured Clinical Interview for Gambling Disorder. Impulsivity was quantified by calculating z-scores for each psychiatric disorder. To calculate z-scores, we took mean of patient group and calculated z relative to distribution of controls (their mean and SD). In this way we are asking what is the z-score deficit for a typical (average) person with the condition (i.e. their mean score) versus the distribution for people who did not have the condition. There are of course other ways to analyze these data (e.g., calculating cohens Ds for

group comparisons but this likely would not change anything from an interpretation point of view as it mean using the SD information for both groups per comparison rather than only the reference group),

but we chose this method as it is convenient, easy for readers to understand, and consistent with prior work.

3. Results

The sample analyzed consisted of 692 participants. Eight participants were excluded due to inability to complete the psychiatric evaluation or stop signal task. This sample was composed of 286 women (41.3%), 398 men (57.5%) and 8 participants identifying as "Other" (1.2%). The control group consisted of 335 participants, with all 335 completing the BIS and 328 completing the SST. In total, 20 psychiatric disorders were included in the analysis. Several psychiatric disorders were excluded from analysis due to small sample size including psychotic disorder, anorexia, bipolar disorder, kleptomania, and pyromania, which were each endorsed by <1% of the participants. Table 1 shows the z-scores for all of the studied psychiatric disorders across each of the impulsivity measures. Table 2 provides the control group mean scores and corresponding standard deviations as well as the mean scores and 95% confidence intervals for each psychiatric disorder.

Figs. 1–4 illustrate the psychiatric disorders that were associated with attentional, motor, non-planning, and total impulsivity as measured by the Barratt Impulsiveness Scale. Findings differed when looking across specific BIS domains, such that varying psychiatric disorders had high impulsivity measures. Patients with bulimia nervosa (z = 1.50), comorbid panic disorder with agoraphobia (z = 1.82), and borderline personality disorder (z = 1.34) showed the highest levels of attentional, motor, and non-planning impulsivity, respectively (Figs. 1–3). Notably, several psychiatric disorders exhibited lower levels of motor impulsivity than controls, with borderline personality disorder exhibiting the least motor impulsivity (z = −0.79, Fig. 2). Except for trichotillomania and panic disorder, all of the psychiatric disorders exhibited greater attentional, non-planning, composite BIS, and SSRT impulsivity than controls, illustrating that deficits in impulse control are common across many psychopathologies.

Total impulsivity was measured using both the subjective composite BIS score and the objective SSRT. Stop Signal Reaction Time was not analyzed for participants with borderline personality disorder as these participants did not complete the Stop Signal Task. The composite BIS measure showed that a wide variety of conditions had elevated total impulsivity, including eating disorders, personality disorders, addictive disorders, and several mood disorders (Fig. 4). Similarly, the effect size of the difference in impulsivity as measured by SSRT was large (d > 0.8) for many psychopathologies, including PTSD, comorbid panic disorder and agoraphobia, compulsive buying disorder, trichotillomania, compulsive sexual behavior disorder, and binge eating disorder (Fig. 5). Interestingly, participants with panic disorder were the only psychiatric group that showed lower total impulsivity when compared to control as measured by the SSRT (z = −0.54). Although there was some overlap in total impulsivity findings, the measures generally differed when looking at the objective SSRT and subjective BIS. When measured by SSRT, trichotillomania (z = 1.45) and comorbid panic disorder with agoraphobia (z = 1.19) had the highest total impulsivity scores, whereas when measured by BIS, comorbid panic disorder with agoraphobia (z = 1.53) and compulsive buying disorder (z = 1.27) exhibited the highest total impulsivity. Beyond differences in total impulsivity measures, there was also varying overlap across different BIS domains and the SSRT. Conditions including depression, PTSD, anxiety disorders, eating disorders, personality disorders, and addictive disorders showed large effect sizes for various domains (Table 1). None of the psychiatric disorders exhibited large effect sizes across all three domains of the BIS and SSRT concurrently.

4. Discussion

According to these findings, impulsivity is a common feature across many psychiatric disorders as opposed to a narrow category of impulsive disorders. As such, impulsivity seems to be a symptom that cuts across various psychopathologies and could be indicative of a broad range of diagnoses when using a transdiagnostic approach. For example, patients with depression showed large effect sizes for attentional and non-planning impulsivity. Although depression is not commonly viewed as an impulse control disorder, difficulty maintaining cognitive focus and planning for the future are common features of this condition. This illustrates how impulsivity is not specific to a subset of disorders and may be seen across conditions that are not traditionally associated with poor impulse control.

Broadening the approach to impulse control symptomatology may

Table 1
Z-Scores across psychiatric disorders as compared to controls. Greater z-scores indicate more impulsivity as compared to controls.

Psychiatric Disorder	Z-Score						
	Barratt Impulsiveness Score (BIS)					Stop Signal Reaction Time (SSRT)	
	N	*Attentional*	*Motor*	*Non-Planning*	*Total*	*N*	*Total*
Control	335	0.00	0.00	0.00	0.00	328	0.00
Depression	47	0.96	−0.36	0.82	0.61	12	0.18
Generalized Anxiety Disorder	59	1.08	−0.14	0.79	0.73	24	0.13
Obsessive Compulsive Disorder	21	0.76	0.00	0.52	0.53	21	0.54
Post-Traumatic Stress Disorder	26	1.48	−0.29	0.82	0.82	6	0.96
Binge Eating Disorder	7	0.95	1.00	0.69	1.09	7	1.14
Bulimia Nervosa	29	1.50	−0.19	1.16	1.04	10	0.41
Panic Disorder	29	1.20	−0.39	0.32	0.44	9	−0.54
Agoraphobia	34	1.29	−0.08	0.94	0.90	14	0.33
Panic Disorder with Agoraphobia	5	0.56	1.82	1.22	1.53	5	1.19
Social Phobia	26	1.29	0.35	0.67	0.94	29	0.31
Antisocial Personality Disorder	43	0.82	0.49	0.94	0.96	31	0.61
Borderline Personality Disorder	65	1.37	−0.80	1.34	0.84	0	–
ADHD	199	0.45	0.50	0.37	0.55	194	0.32
Trichotillomania	55	0.57	−0.34	−0.03	0.06	1	1.45
Alcohol Use Disorder	128	0.59	0.86	0.66	0.89	128	0.38
Substance Use Disorder	67	0.95	0.34	0.96	0.93	47	0.60
Compulsive Buying Disorder	16	0.61	1.43	0.97	1.27	16	1.10
Compulsive Sex Behavior Disorder	10	0.43	0.95	0.46	0.76	10	0.85
Pathological Gambling	78	0.55	0.92	0.58	0.85	78	0.51
Intermittent Explosive Disorder	9	0.83	1.28	0.32	0.97	9	0.24

Table 2
Group mean scores and corresponding standard deviations for the control group and each psychiatric disorder.

Psychiatric Disorder	Mean						
	Barratt Impulsiveness Score (BIS)					Stop Signal Reaction Time (SSRT)	
	N	*Attentional*	*Motor*	*Non-Planning*	*Total*	*N*	*Total*
Control	335	16.03 (3.86)	22.50 (4.23)	23.15 (5.14)	61.67 (5.14)	328	172.91 (51.97)
Depression	47	19.72 [18.62, 20.82]	20.98 [19.77, 22.19]	27.38 [25.91, 28.85]	68.09 [65.08, 71.10]	12	182.28 [152.87, 211.69]
Generalized Anxiety Disorder	59	20.20 [19.22, 21.18]	21.90 [20.82, 22.98]	27.22 [25.91, 28.53]	69.32 [66.63, 72.01]	24	179.83 [159.04, 200.63]
Obsessive Compulsive Disorder	21	18.95 [17.30, 20.60]	22.52 [20.71, 24.33]	25.81 [23.61, 28.01]	67.29 [62.78, 71.80]	21	200.88 [178.65, 223.11]
Post-Traumatic Stress Disorder	26	21.73 [20.25, 23.21]	21.27 [19.65, 22.89]	27.35 [25.37, 29.33]	70.35 [66.30, 74.40]	6	222.95 [181.36, 264.54]
Binge Eating Disorder	7	19.71 [16.85, 22.57]	26.71 [23.58, 29.84]	26.71 [22.90, 30.52]	73.14 [65.33, 80.95]	7	232.40 [193.90, 270.91[
Bulimia Nervosa	29	21.83 [20.43, 23.23]	21.69 [20.15, 23.23]	29.10 [27.23, 30.97]	72.62 [68.78, 76.46]	10	194.23 [162.02, 226.45]
Panic Disorder	29	20.66 [19.26, 22.06]	20.86 [19.32, 22.40]	24.79 [22.92, 26.66]	66.31 [62.47, 70.15]	9	144.78 [110.82, 178.73]
Agoraphobia	34	21.00 [19.70, 22.30]	22.15 [20.73, 23.57]	27.97 [26.24, 29.70]	71.12 [67.58, 74.66]	14	190.20 [162.97, 217.42]
Panic Disorder with Agoraphobia	5	18.20 [14.82, 21.58]	30.20 [26.50, 33.90]	29.40 [24.89, 33.91]	77.80 [68.56, 87.04]	5	235.00 [189.44, 280.56]
Social Phobia	26	21.02 [19.54, 22.50]	24.00 [22.38, 25. 84]	26.59 [24.61, 28.57]	71.61 [67.56, 75.66]	29	188.77 [169.86, 207.69]
Antisocial Personality Disorder	43	19.19 [18.04, 20.34]	24.58 [23.32, 25.84]	27.98 [26.44, 29.52]	71.74 [68.59, 74.89]	31	204.74 [186.44, 223.03]
Borderline Personality Disorder	65	21.31 [20.37, 22.25]	19.14 [18.11, 20.17]	30.06 [28.81, 31.31]	70.51 [67.95, 73.07]	0	–
ADHD	199	17.75 [17.21, 18.29]	24.62 [24.03, 25.21]	25.04 [24.33, 25.75]	67.42 [65.96, 68.88]	194	189.63 [182.31, 196.94]
Trichotillomania	55	18.24 [17.22, 19.26]	21.07 [19.95, 22.19]	22.98 [21.62, 24.34]	62.29 [59.50, 65.08]	1	248.08 [146.20, 349.95]
Alcohol Use Disorder	128	18.32 [17.65, 18.99]	26.15 [25.42, 26.88]	26.55 [25.66, 27.44]	71.02 [69.19, 72.85]	128	192.54 [183.53, 201.54]
Substance Use Disorder	67	19.69 [18.77, 20.61]	23.93 [22.92, 24.94]	28.07 [26. 84, 29.30]	71.50 [68.98, 74.02]	47	203.90 [189.04, 218.76]
Compulsive Buying Disorder	16	18.37 [16.48, 20.26]	28.56 [26.49, 30.63]	28.13 [25.61, 30.65]	75.06 [69.89, 80.23]	16	229.96 [204.49, 255.42]
Compulsive Sex Behavior Disorder	10	17.70 [15.31, 20.09]	26.50 [23.88, 29.12]	25.50 [22.31, 28.69]	69.70 [63.17, 76.23]	10	217.11 [184.90, 249.33]
Pathological Gambling	78	18.14 [17.28, 19.00]	26.40 [25.46, 27.34]	26.14 [25.00, 27.28]	70.68 [68.34, 73.02]	78	199.47 [187.93, 211.00]
Intermittent Explosive Disorder	9	19.22 [16.70, 21.74]	27.89 [25.13, 30.65]	24.78 [21.42, 28.14]	71.89 [65.00, 78.78]	9	185.62 [151.66, 219.58]

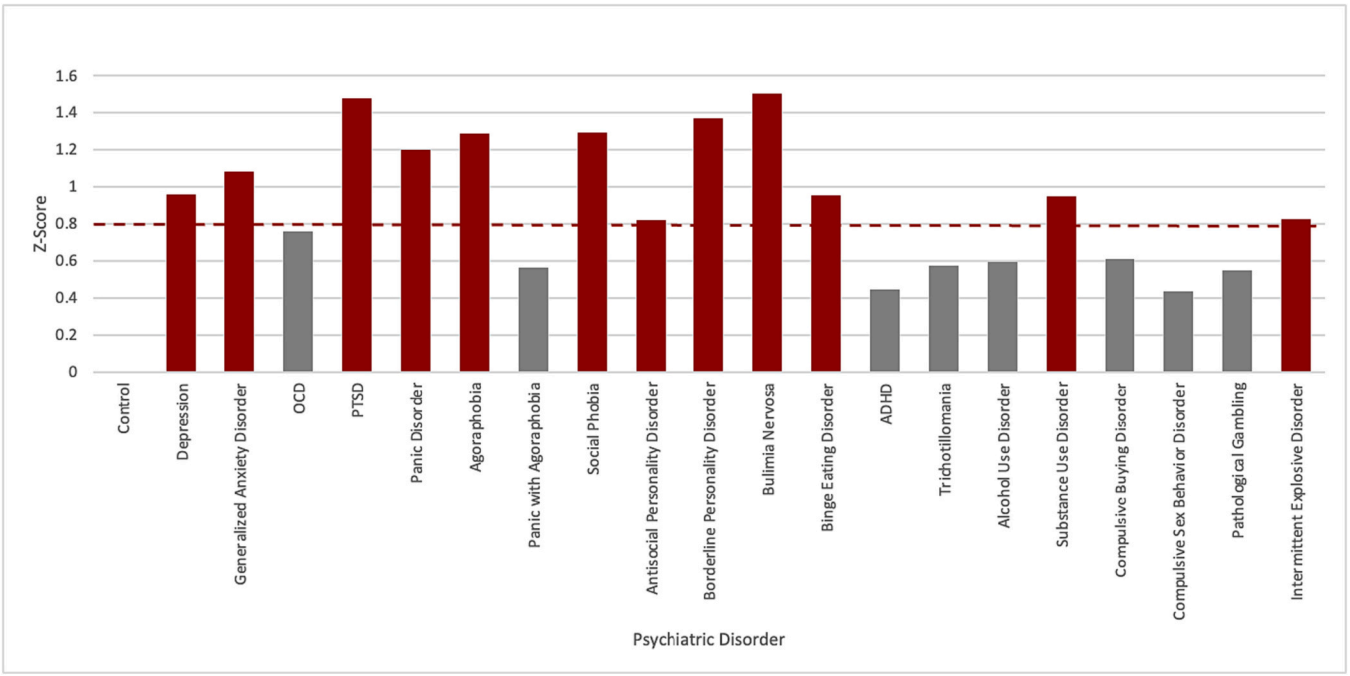


Fig. 1. Range of subjective attentional impulsivity measures across psychiatric disorders, as measured by Barratt Impulsiveness Scale. Higher z-scores indicate greater impulsivity in participant groups as compared to controls. The dotted line represents the threshold for large effect size ($d > 0.8$).

improve diagnosis and treatment. The update from the *DSM-IV* to *DSM-5* that redefined Impulse Control Disorders now excludes several of the psychopathologies that exhibited large effect sizes, such as binge eating disorder, trichotillomania, and pathologic gambling [4]. In accordance with the *DSM-5* Disruptive, Impulse Control and Conduct Disorders, intermittent explosive disorder showed elevated levels of attentional, motor, and total BIS impulsivity. Additionally, ADHD didn't exhibit large effect sizes across any of the measures. However, this study suggests that a wider range of psychiatric disorders exhibit elevated impulsivity than those explicitly categorized as impulse disorders. In clinical practice, psychiatrists and psychologists may benefit from incorporating a broader transdiagnostic system with traditional clinical tools, such as the *DSM-5*. Viewing impulsivity as a transdiagnostic factor accounts for its heterogeneity and the lack of clear boundaries between different disorders that share this nonspecific trait. This may allow for more comprehensive screening and a nuanced approach to diagnosis. However, more research must be conducted regarding how impulsivity would fit in a transdiagnostic framework and how it could be integrated into clinical practice according to empirical data. Moving towards this framework would address some of the concerns regarding the *DSM-5*, but more data is needed to determine whether impulsivity can be used as a transdiagnostic factor or if it is simply too common of a trait to be a

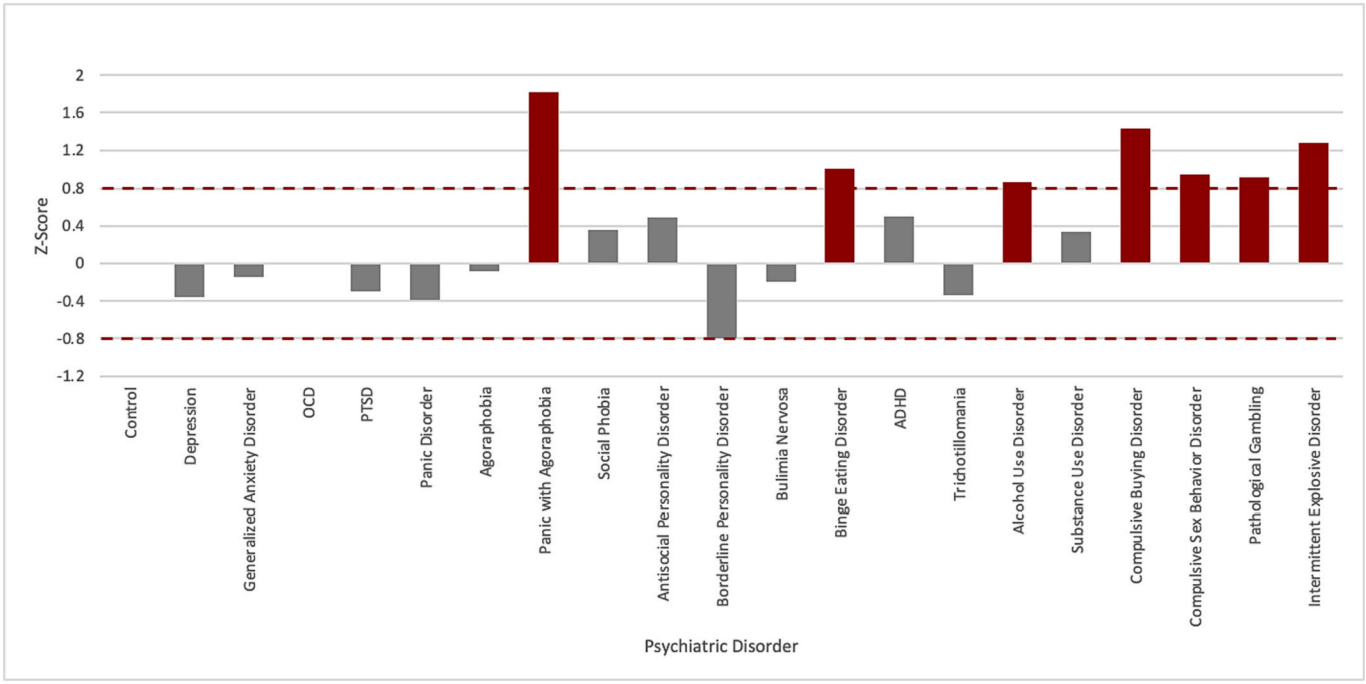


Fig. 2. Range of subjective motor impulsivity measures across psychiatric disorders, as measured by Barratt Impulsiveness Scale. Higher z-scores indicate greater impulsivity in participant groups as compared to controls. The dotted lines represent the threshold for large effect size ($d > 0.8$ or $d < -0.8$).

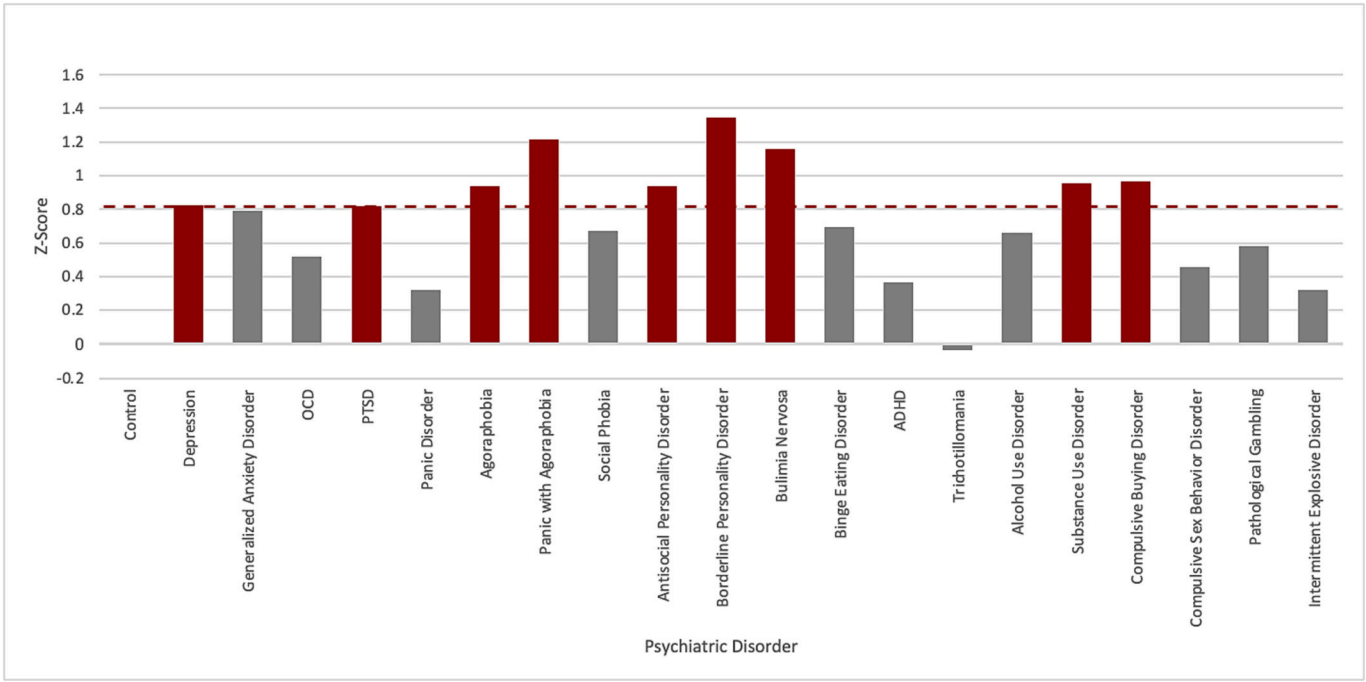


Fig. 3. Range of subjective non-planning impulsivity measures across psychiatric disorders, as measured by Barratt Impulsiveness Scale. Higher z-scores indicate greater impulsivity in participant groups as compared to controls. The dotted line represents the threshold for large effect size ($d > 0.8$).

strong indicator of a specific psychopathology.

Additionally, emphasizing the prevalence of high impulsivity across various disorders can provide clinical benefits by reducing underdiagnosis or misdiagnosis due to overlapping symptoms and comorbidity. Surprisingly, panic disorder with agoraphobia showed particularly high impulsivity for motor BIS, total BIS, and SSRT measures despite individual panic disorder and agoraphobia having considerably lower scores. Panic disorder with agoraphobia was the only comorbidity that was screened for and may indicate that the presence of multiple psychopathologies results in a somewhat synergistic effect on impulsivity. Future studies should further explore whether there is a pattern of comorbidity in which there are consistent elevations in impulsivity for patients with multiple conditions.

This study may also provide implications for future research and measurement of impulsivity. The Barratt Impulsiveness Scale is a frequently used measure of impulsivity that requires self-reporting.

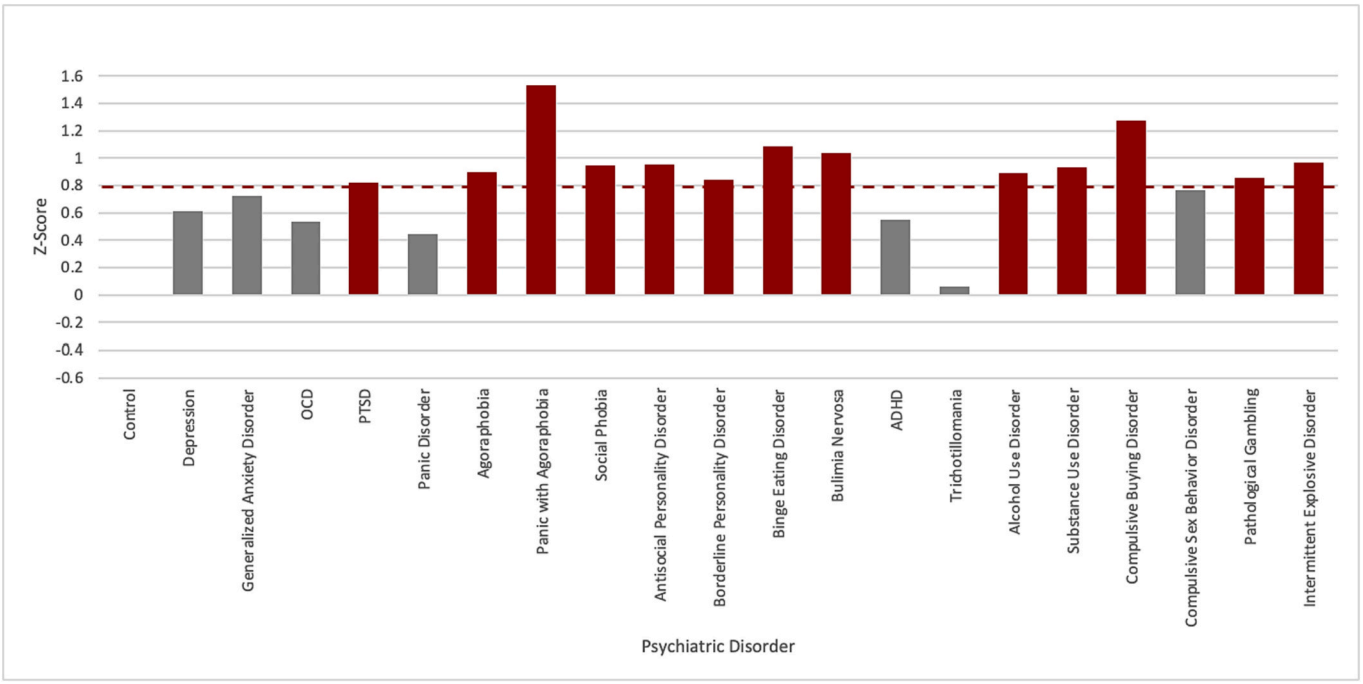


Fig. 4. Range of total subjective impulsivity scores across psychiatric disorders, which consist of composite attentional, motor, and non-planning Barratt Impulsiveness Scale scores. Higher z-scores indicate greater impulsivity in participant groups as compared to controls. The dotted line represents the threshold for large effect size ($d > 0.8$).

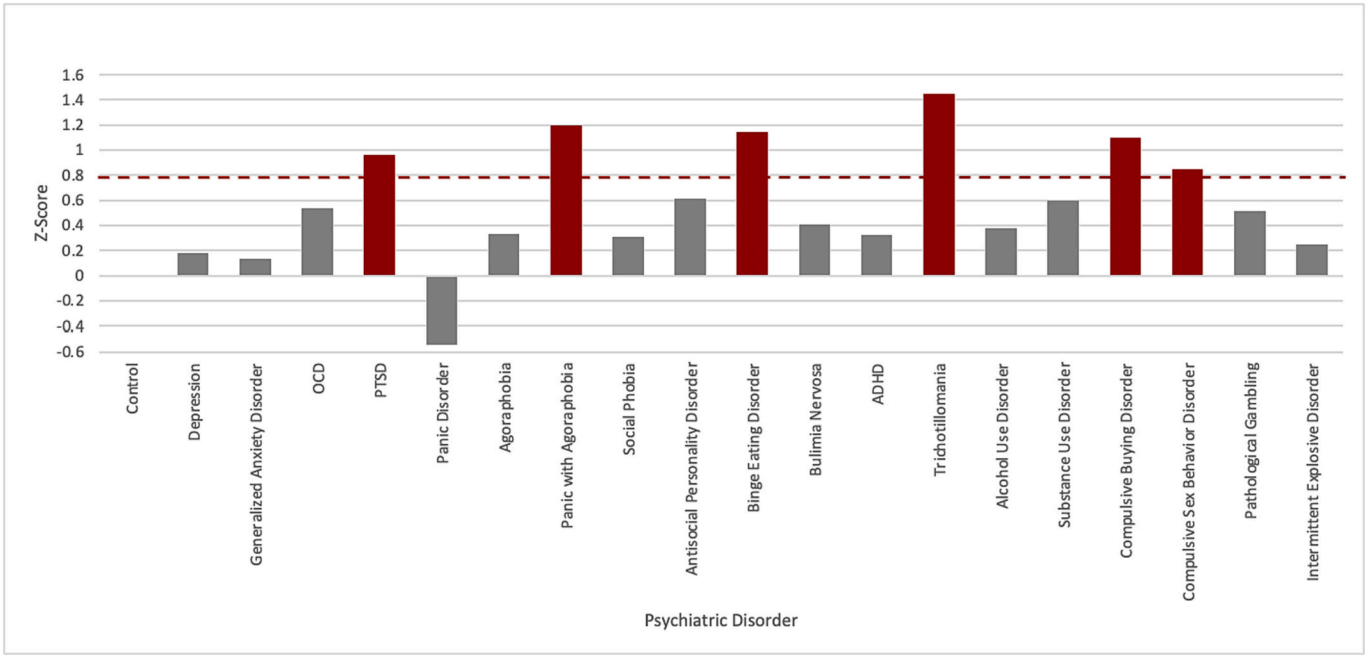


Fig. 5. Range of objective impulsivity scores across psychiatric disorders measured by stop signal reaction time. Higher z-scores indicate greater impulsivity in participant groups as compared to controls. The dotted line represents the threshold for large effect size ($d > 0.8$).

Since the results of this study differed depending on type of impulsivity (i.e., attentional, motor, non-planning, and composite), future research may focus on specific cognitive domains depending on the disorder being examined. Notably, patients with borderline personality disorder exhibited amongst the highest attentional and non-planning impulsivity, despite having the lowest levels of motor impulsivity, as compared to controls. This may indicate that the BIS has greater utility when looking at specific subscales rather than the total composite score. It may also suggest that clinicians could benefit from asking more nuanced questions on impulsivity to gain additional diagnostic information regarding what impulse control looks like for each individual.

Furthermore, it is notable that the measure of subjective impulsivity was less specific than the objective measure, such that a broader range of diagnoses were associated with impulsivity when measured

subjectively. The composite BIS showed many psychiatric disorders with elevated total impulsivity, whereas the objective stop signal task had much fewer disorders that exhibited large effect sizes. Subjective self-report measures may overestimate impulsivity due to patients confounding other psychiatric symptoms with impulsivity. This is a common phenomenon across psychopathologies, which often have overlapping symptoms or symptoms that patients struggle to define, here resulting in misattribution of their experiences to poor impulse control. This could explain the discrepancy between each of the measures and why the objective stop signal task may be a useful corollary to self-report.

This is the first study that explores impulsivity across a wide range of psychiatric disorders as opposed to analyzing conditions individually. Current subjective and objective measures of impulse control lack a clear correlation, and objective measures alone demonstrate that impulsivity is not a singular domain [5]. Thus, a strength of this paper is the use of both subjective and objective measures of impulsivity, which provide a deeper understanding of impulse control. Another strength is the large sample size, which allows for analysis of an age group that is generally higher in impulsivity. This provides greater utility across young adult populations and may help elucidate differences between age-related elevations in impulsivity and pathological impulse control in clinical populations. However, a limitation to consider is that some disorders (e.g., panic with agoraphobia and intermittent explosive disorder) had smaller sample sizes. Thus, continuing this study in the future with larger samples will make the findings more robust and generalizable. Another limitation is that this study is unable to determine causality due to the cross-sectional nature of the study or analyze borderline personality disorder objectively as there was a lack of SSRT data on these participants. Additionally, patients were not asked about their medications, so this study does not account for differences in impulsivity that may be due to ongoing treatments. Furthermore, future studies should analyze various comorbidities, which may have resulted in unique findings regarding the nature of impulsivity for patients with multiple diagnoses; this should include analysis between impulse disorders and non-impulse related psychiatric conditions.

5. Conclusion

Impulsivity is a multidimensional cognitive domain that is a common feature across a wide range of psychiatric disorders, not just those commonly associated with impulsivity. This includes eating, personality, addictive, and mood disorders, which all exhibited elevated impulsivity across varying dimensions of the Barratt Impulsiveness Scale and Stop Signal Task. The use of subjective self-reports and objective behavioral tasks resulted in different findings, which suggests that patients may confound psychiatric symptoms when reporting poor impulse control. In accordance with these findings, it is important for clinicians to be aware that poor impulse control is a common feature across several psychiatric disorders and to be cautious about only associating impulsivity with a narrow range of psychopathologies. This may indicate clinical utility in using impulsivity as a transdiagnostic factor in conjunction with traditional diagnostic tools, such as the *DSM-5*. Future research should explore how impulsivity can be incorporated into a transdiagnostic framework, which may improve diagnosis of psychopathologies with overlapping symptoms and common comorbidities.

Funding

This research was supported in part by the University of Chicago Bucksbaum Institute for Clinical Excellence.

CRediT authorship contribution statement

Zharia C. Crisp: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Jon E. Grant:** Writing – review & editing, Project administration, Methodology, Investigation, Funding acquisition, Data curation, Conceptualization.

Declaration of competing interest

J.E.G. has received research grants from Otsuka and Biohaven Pharmaceuticals. He receives yearly compensation from Springer Publishing for acting as Editor-in-Chief of the Journal of Gambling Studies and has received royalties from Oxford University Press, American Psychiatric Publishing, Inc., Norton Press, and McGraw Hill. Ms. Crisp reports no conflicts of interest.

Acknowledgements

The University of Chicago Pritzker School of Medicine.

The University of Chicago Bucksbaum Institute for Clinical Excellence.

References

[1] Berlin GS, Hollander E. Compulsivity, impulsivity, and the DSM-5 process. CNS Spectr 2014;19(1):62–8. https://doi.org/10.1017/S1092852913000722.
[2] Lau JH, Jeyagurunathan A, Shafie S, et al. The factor structure of the Barratt impulsiveness scale (BIS-11) and correlates of impulsivity among outpatients with schizophrenia and other psychotic disorders in Singapore. BMC Psychiatry 2022;22(1). https://doi.org/10.1186/s12888-022-03870-x.
[3] Chambers RA, Taylor JR, Potenza MN. Developmental neurocircuitry of motivation in adolescence: a critical period of addiction vulnerability. Am J Psychiatry 2003;160(6):1041–52. https://doi.org/10.1176/appi.ajp.160.6.1041.
[4] Fariba KA, Gokarakonda SB. Impulse control disorders. In: StatPearls. Treasure Island (FL): StatPearls Publishing; August 22, 2022.
[5] Dalley JW, Everitt BJ, Robbins TW. Impulsivity, compulsivity, and top-down cognitive control. Neuron. 2011;69(4):680–94. https://doi.org/10.1016/j.neuron.2011.01.020.
[6] Carr MM, Wiedemann AA, Macdonald-Gagnon G, Potenza MN. Impulsivity and compulsivity in binge eating disorder: a systematic review of behavioral studies. Prog Neuro-Psychoph 2021;110:110318. https://doi.org/10.1016/j.pnpbp.2021.110318.
[7] Schaumberg K, Wonderlich S, Crosby R, et al. Impulsivity and anxiety-related dimensions in adults with bulimic-spectrum disorders differentially relate to eating disordered behaviors. Eat Behav 2020;37:101382. https://doi.org/10.1016/j.eatbeh.2020.101382.
[8] Fahy T, Eisler I. Impulsivity and eating disorders. BJPsych. 1993;162(2):193–7. https://doi.org/10.1192/bjp.162.2.193.
[9] McHugh C, Balaratnasingam S. Impulsivity in personality disorders. Curr Opin Psychiatry 2018;31(1):63–8. https://doi.org/10.1097/yco.0000000000000383.
[10] Savard J, Hirvikoski T, Görts Öberg K, Dhejne C, Rahm C, Jokinen J. Impulsivity in compulsive sexual behavior disorder and pedophilic disorder. J Behav Addict 2021;10(3):839–47. https://doi.org/10.1556/2006.2021.00044.
[11] Gvion Y, Apter A. Aggression, impulsivity, and suicide behavior: a review of the literature. Arch Suicide Res 2011;15(2):93–112. https://doi.org/10.1080/13811118.2011.565265.
[12] Bornovalova MA, Lejuez CW, Daughters SB, Rosenthal MZ, Lynch TR. Impulsivity as a common process across borderline personality and substance use disorders. Clin Psychol Rev 2005;25(6):790–812. https://doi.org/10.1016/j.cpr.2005.05.005.
[13] Ruggero CJ, Kotov R, Hopwood CJ, et al. Integrating the hierarchical taxonomy of psychopathology (HiTOP) into clinical practice. J Consult Clin Psychol 2019;87(12):1069–84. https://doi.org/10.1037/ccp0000452.
[14] Förstner BR, Tschorn M, Reinoso-Schiller N, et al. Mapping research domain criteria using a transdiagnostic mini-RDoC assessment in mental disorders: a confirmatory factor analysis. Eur Arch Psychiatry Clin Neurosci 2023;273(3):527–39. https://doi.org/10.1007/s00406-022-01440-6.
[15] Patton JH, Stanford MS, Barratt ES. Factor structure of the barratt impulsiveness scale. J Clin Psychol 1995;51(6):768–74. https://doi.org/10.1002/1097-4679(199511)51:6<768::aid-jclp2270510607>3.0.co;2-1.
[16] Stop Signal Task (SST). Cambridge Cognition. Accessed June 8, https://cambridgecognition.com/stop-signal-task-sst/; 2023.
[17] Sheehan DV, Lecrubier Y, Sheehan KH, et al. The mini-international neuropsychiatric interview (M.I.N.I.): the development and validation of a

structured diagnostic psychiatric interview for DSM-IV and ICD-10. J Clin Psychiatry 1998;59(Suppl. 20):22–33.
[18] Grant JE. Impulse control disorders: A Clinician's guide to understanding and treating behavioral addictions. New York: WW Norton and Company; 2008.
[19] Chamberlain SR, Grant JE. Minnesota impulse disorders interview (MIDI): validation of a structured diagnostic clinical interview for impulse control disorders in an enriched community sample. Psychiatry Res 2018;265:279–83. https://doi.org/10.1016/j.psychres.2018.05.006.
[20] Kessler RC, Adler L, Ames M, et al. The world health organization adult ADHD self-report scale (ASRS): a short screening scale for use in the general population. Psychol Med 2005;35(2):245–56. https://doi.org/10.1017/s0033291704002892.
[21] Grant JE, Steinberg MA, Kim SW, Rounsaville BJ, Potenza MN. Preliminary validity and reliability testing of a structured clinical interview for pathological gambling. Psychiatry Res 2004;128(1):79–88. https://doi.org/10.1016/j.psychres.2004.05.006.