Journal of Affective Disorders 394 (2026) 120498

Contents lists available at ScienceDirect

Journal of Affective Disorders

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

Review article

Impulsivity in obsessive-compulsive disorder: A systematic review and meta-analysis

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ARTICLE INFO

Keywords:
Behavioral impulsivity
Attention impulsivity
OCD
Disinhibition
Compulsivity

ABSTRACT

Background: There is an ongoing debate regarding the role of impulsivity in obsessive-compulsive disorder (OCD). Impulsivity is a complex multidimensional construct, generally defined as the tendency to act without forethought. OCD, in contrast, is associated with preoccupation with the consequences of one's actions, harm and risk avoidance, and was posited to lie on the opposite end of a proposed impulsive-compulsive continuum. The aim of the present study was to conduct a systematic review and meta-analysis of studies comparing OCD and non-clinical controls on self-report measures of impulsivity.

Methods: Twenty-seven studies were subjected to analyses (N_{OCD} = 1547). Separate meta-analyses were conducted on the total scores and the subscale scores of the impulsivity measures used in these studies, primarily the Barratt Impulsivity Scale (BIS).

Results: Results from the meta-analyses showed large effect sizes for the BIS Attention subscale (g = 0.83; 95 % CI = 0.61–1.06), medium effect size for the Nonplanning subscale (g = 0.41; 95 % CI = 0.29–0.53), and very small effect sizes for the Motor subscale (g = 0.17; 95 % CI = 0.02–0.32). These results were complemented by a systematic review, where most studies found significantly elevated attention impulsivity in OCD compared to controls, whereas only a minority of studies reported significantly elevated motor impulsivity.

Conclusion: OCD is not associated with elevated trait-level impulsivity. Inflated total BIS scores frequently result from high Attentional Impulsivity scores on this measure. In addition, individuals with OCD tend to inflate self-reported impulsivity. A pathway toward resolution of the controversy surrounding impulsivity in OCD would be to differentiate between trait and state impulsivity.

1. Introduction

Impulsivity is a complex and multidimensional psychological construct that is commonly defined as "*a predisposition toward rapid, unplanned reactions to internal or external stimuli without regard to the negative consequences of these reactions to the impulsive individuals or to others*" (Moeller et al., 2001, p. 1784). Impulsivity is associated with constructs such as risk-taking, sensation seeking, and non-planning. Behavioral impulsivity, more specifically, is generally defined as a tendency toward actions without forethought that result in undesired negative outcomes. Elevated impulsivity is common in the general population and has been linked to a host of maladaptive behaviors, including excessive cellphone usage (Billieux et al., 2008), procrastination (Youzhi and Jing, 2009) and overeating (Loxton, 2018), as well as behaviors that harbor increased risk for negative outcomes such as cigarette smoking and drug use (Bloom et al., 2014; Moeller and Dougherty, 2002), reckless driving (Bıçaksız and Özkan, 2016), risky sexual behaviors (Dir et al., 2014) and gambling (Ioannidis et al., 2019).

In terms of its conceptualization, impulsivity was historically thought to be a unidimensional personality trait that was essentially equivalent to extraversion (Sharma et al., 2014). Later conceptualizations of impulsivity viewed it as a more complex, multifactorial construct, which has led to the development of several measures of impulsivity, primarily the Barret Impulsiveness Scale (BIS; Barratt, 1965). The BIS reflected the new multifaceted conceptualization by including three main factors: Motor Impulsivity, Nonplanning

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https://doi.org/10.1016/j.jad.2025.120498
Received 20 March 2025; Received in revised form 12 October 2025; Accepted 14 October 2025
Available online 15 October 2025

Impulsivity, and Attention Impulsivity. The BIS quickly became the most widely accepted self-report measure of impulsivity, to the extent that it has been said to have "*shaped the current conceptualization of impulsivity*" (Stanford et al., 2009, p. 392). Quite early on, however, the BIS was subjected to significant criticism. Prominent scholars such as Eysenck and Eysenck (1977), for example, faulted the BIS and other contemporary measures of impulsivity for including arbitrary items, "*some of which have only marginal relationships with acting on impulse*" (p. 58). More recently, several systematic reviews indicated that most BIS factor analytic studies did not support the construct validity of the BIS, and specifically, that the Attention Impulsivity subscale is the BIS's most unstable factor, with many of its items loading on different factors (Sharma et al., 2014; Vasconcelos et al., 2012).

A notable shift in the conceptualization of impulsivity followed from the work of Whiteside and Lynam (2001). Their model was inspired by the 'Big-5' model of personality and resulted in four factors that the authors termed Urgency, (lack of) Premeditation, (lack of) Perseverance, and Sensation Seeking. This conceptualization led to the development of the Urgency-Premeditation-Perseverance-Sensation Seeking Scale (UPPS) Impulsive Behavior Scale (Whiteside and Lynam, 2001), but to this day, the BIS is overwhelmingly more commonly used than the UPPS or any other self-report measure of impulsivity (Stanford et al., 2009).

Importantly, the vast majority of research on impulsivity assesses *trait impulsivity* - an enduring and relatively stable personality characteristic (Huang et al., 2024). However, as with other underlying personality traits, global trait impulsivity may not be a reliable predictor of a person's behavior in specific situations, as it assesses a person's *typical* behaviors (Halvorson et al., 2021). Because of that, *state impulsivity*, defined as "*variable, momentary responses to contextual intrinsic and extrinsic triggers*" (Nguyen et al., 2018, p. 67), is an essential complementary construct. Unfortunately, there is a relative dearth of research on state impulsivity, particularly in the context of psychopathology, partly perhaps due to methodological challenges (Nguyen et al., 2018). Reflecting this bias in the field, we use the term "impulsivity" in this work to refer to trait impulsivity.

As noted above, elevated impulsivity is associated with symptoms of psychopathology and is known to play a major role in several personality disorders (Mungo et al., 2020; Turner et al., 2017), impulse control disorders (Sharma et al., 2014), attention deficit/hyperactivity and conduct-related disorders (Moeller et al., 2001), substance use disorders (Bornovalova et al., 2005), and bipolar and other affective disorders (Fields et al., 2021). However, the association between impulsivity and anxiety disorders is less clear, relatively understudied, and is subject to controversy (Del Carlo et al., 2012). Overall, research does not reveal elevated impulsivity in anxiety disorders (e.g., Kotov et al., 2010; Summerfeldt et al., 2004), and only a few studies found direct evidence for elevated impulsivity among individuals diagnosed with a primary anxiety disorder (e.g., Kashdan et al., 2009). Indeed, Barratt and colleagues, who developed the BIS (Barratt, 1965), considered anxiety orthogonal to impulsivity. As opposed to impulsive behavior, anxiety disorders are associated with risk and harm avoidance, behavioral inhibition, and need for safety (Zinbarg and Barlow, 1996).

In contrast to the limited research on anxiety disorders, impulsivity in obsessive-compulsive disorder (OCD) has been a subject of extensive research and controversy (Abramovitch and McKay, 2016). OCD is a relatively prevalent disorder (~1–1.5 %; Fawcett et al., 2020) that is characterized by intrusive unwanted thoughts (obsessions) that cause significant distress, and performance of behavioral or mental compulsive rituals that are aimed at alleviating the distress caused by obsessions (American Psychiatric Association, 2022). Individuals diagnosed with OCD are also characterized by harm and risk avoidance, behavioral inhibition, overthinking about the consequences of their actions, 'pathological doubt', intolerance to ambiguity, and fear of causing accidental harm (Abramowitz et al., 2009). Therefore, OCD can be characterized as a disorder of 'pathological forethought' and avoidance of behaviors that may accidentally result in negative consequences, which stands in direct contrast to the lack of forethought that characterizes impulsivity.

Despite this apparent phenomenological contrast, it has been proposed that OCD should be conceptualized as a condition characterized by impulsivity. This may have originally stemmed from the perception that individuals with OCD are unable to inhibit an impulsive urge to perform a compulsion. Furthermore, although impulsivity and compulsivity differ in terms of distinct neurobiological correlates (Hollander and Rosen, 2000), more recent research suggests that impulsive and compulsive brain circuits are interconnected and that some behaviors result from an interplay between the two (Fineberg et al., 2014). Based on this hypothesis, it has been posited that instead of lying on opposite ends of an impulsive-compulsive continuum (Hollander and Wong, 1995), OCD should be conceptualized as a disorder of compulsivity *and* impulsivity (Clarke et al., 2024). Notably, these hypotheses focus largely on evidence from neuropsychological task performance (i.e., response inhibition/response cancellation) in OCD, rather than on evidence of behavioral impulsivity (for a critical review, see Abramovitch and Cooperman, 2015).

The research literature that does imply behavioral impulsivity in OCD is inconsistent and controversial (Abramovitch and McKay, 2016; Frydman et al., 2020). Most studies find comparable or even reduced behavioral impulsivity in OCD compared to controls (e.g., Benatti et al., 2014; Kim and Grant, 2001; Lyoo et al., 1998; Martin et al., 2021; O'Connor et al., 2014; Sahmelikoglu Onur et al., 2016; Shoval et al., 2006; Tavares and Gentil, 2007; Wu et al., 2006), and only a minority of studies find elevated self-reported behavioral impulsivity in OCD (e.g., Boisseau et al., 2012; Ettelt et al., 2007; Grassi et al., 2015; Sohn et al., 2014; Tumkaya et al., 2021). A major issue at the core of this discrepancy pertains to the measurement of self-reported impulsivity. Most studies measure impulsivity using the BIS (Barratt, 1965; Patton et al., 1995), which, as mentioned above, assesses three major domains of impulsivity, namely Motor Impulsivity, Nonplanning Impulsivity, and Attention Impulsivity. Whereas Motor Impulsivity refers to *acting* without forethought, and Nonplanning Impulsivity to orientation toward the present rather than the future, Attention Impulsivity gauges cognitive processes and control over one's thoughts, and not directly impulsive *behavior* (Vasconcelos et al., 2012). Indeed, attention impulsivity is defined as the ability to control one's attention and thoughts (Stanford et al., 2009).

As OCD is associated with frequent distressing intrusive obsessive thoughts, it stands to reason that individuals with OCD would score significantly higher than controls on this domain, irrespective of being behaviorally impulsive or temperamentally inhibited. This issue has been raised by several researchers who have pointed out that in most studies that report elevated impulsivity in OCD, the elevated total BIS scores stem from a significant difference in Attention Impulsivity between OCD and control participants, but largely comparable scores on Motor and Nonplanning Impulsivity (Abramovitch and McKay, 2016; Frydman et al., 2020; Summerfeldt et al., 2004).

To address this controversy, the aim of the present systematic review and meta-analysis is to examine behavioral impulsivity in OCD as compared to non-clinical control samples, as well as the differences between these populations on the three domains of the BIS, namely Nonplanning, Motor, and Attention. Specifically, we aimed to examine whether OCD is associated with a substantial elevation in self-reported behavioral impulsivity (i.e., acting upon an urge without forethought) compared to controls, or whether this elevation, particularly as measured by the BIS, stems primarily from higher 'Attention Impulsivity' scores.

2. Methods

2.1. Search strategy

This report complies with the latest PRISMA guidelines (Page et al., 2021), which are reported in the study and abstract checklists (*see*

Tables S1 and S2 under Supplementary Materials). The studies were identified by a systematic search of publications through October 2024. Our search included PubMed, PsycNet, and ISI Web of Science and the following search strategies were employed across all databases. All relevant subject headings and free text terms related to OCD and behavioral impulsivity were adopted, using the following search terms (the asterisk denotes truncation to capture grammatical variability): "obsessiv*, compulsiv*" with "impul*", "behavioral impulsivity", "urgency", "positive urgency", "premeditation", and "sensation seeking". Further studies were identified using the Similar Articles function of PubMed and the ISI Web of Science cited reference search. We also examined the references of the included studies for further relevant publications.

2.2. Search selection process

Titles and abstracts were independently screened by a reviewer (DFB) and the principal investigator (AA), following the inclusion and exclusion criteria outlined below. All initially selected studies were then examined independently by both. In case of disagreement, specific cases were discussed between the two researchers, and a consensus meeting was held to decide on study inclusion. The study selection process and reasons for exclusions are described in Fig. 1. A study was included if: (1) OCD was assessed using a valid and accepted instrument; (2) OCD participants were compared to a non-clinical control group; (3) the study assessed explicit self-reported impulsivity; (4) the study included adult participants (age > 18); and (5) the study was published in English. Studies were excluded on the following grounds: (1) they were a review article, case study, or book chapter; (2) no valid instrument was used to diagnose OCD; (3) the OCD group was not specifically identified; (4) lack of a non-OCD control group; (5) "analogue" samples (i.e., non-clinical participants with high vs. low scorers on OCD symptoms); (6) behavioral impulsivity was assessed only indirectly (e.g., through the performance on neuropsychological tasks measuring inhibitory function), with no explicit reporting of behavioral impulsivity.

2.3. Data extraction

Data extraction was performed by two reviewers (DFB and RD) and supervised by the principal investigator (AA) for errors. Data extracted from the included reviewed studies were: (1) publication year; (2) sample size; (3) age of OCD group; (4) age of healthy control group; (5) gender ratio; (6) years of education in both groups; (7) years of illness in OCD group; (8) age of OCD onset in OCD group; (9) comorbidities in OCD group; (10) pharmacologic treatment in OCD group; (11) the occurrence of anxiety or depressive symptoms in both groups; (12) the severity of OCD symptoms in OCD group; (13) the occurrence of OC symptoms in the healthy control group; (14) self-reported measures of behavioral impulsivity in both groups; (15) paradigm/task used to assess inhibitory functions in both groups. Table 1 lists the basic characteristics of the studies included in our analysis.

2.4. Data analysis

We analyzed the data using Comprehensive Meta-Analysis, Version 4 (CMA; Borenstein et al., 2022). Hedges' g was used as the effect size measure. We calculated several main effects (differences between OCD and control participants). First, we calculated a global effect of self-reported impulsivity comprising all the self-report scales used in the studies, including the BIS, the UPPS (Whiteside and Lynam, 2001), the Impulsivity-Venturesomeness-Empathy Scale (IVE; Eysenck and Eysenck, 1978), Frontal Lobe Personality Scale (FLPS; Grace et al., 1999), and Tridimensional Personality Questionnaire (TPQ; Cloninger et al., 1991). In addition, we calculated the effects separately for each subscale of the BIS, which was the most commonly used measure in the studies included in our review. All these effects were calculated using a random effect model, as recommended by Borenstein and his colleagues (Borenstein, 2019; Borenstein et al., 2009). In addition, we tested the statistical significance of the pair-wise differences between the effects associated with these three subscales, using a mixed-effect model. As these effects are correlated, and the size of these correlations affects the calculation of the differences between their corresponding effects, we estimated the intercorrelations between the three subscales based on three two large-scale studies (Reise et al., 2013; Stanford et al., 2009) and one medium-scale study (Kam et al., 2012) that reported those coefficients (combined $N = 2353$). Based on these correlation coefficients, we calculated the SE of the differences, which were used for computing the *Z*-statistics for two dependent effect sizes (see Dunlap et al., 1996).

Finally, we followed the basic analysis with meta-regression predicting the effects of each BIS subscale using OCD severity on the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) as a predictor. Unfortunately, the number of studies that reported Y-BOCS scores together with the subscales scores was too small ($K = 11$) to constitute a robust analysis, making any findings of this analysis tentative (Jenkins and Quintana-Ascencio, 2020). Other potential moderators were reported in even fewer studies, which hindered our ability to examine the potential sources of heterogeneity in effect sizes. Publication bias (Sterne et al., 2001) was examined using funnel plots with the one-tailed Egger tests (Egger et al., 1997). The potential impact of such a bias on the results of the analysis was estimated using the Duval and Tweedie Trim and Fill method (Duval and Tweedie, 2000).

3. Results

3.1. Systematic review

Of the 28[1] studies included in this review, 23 studies (86 %) utilized the BIS, and 5 studies (18 %) utilized the UPPS Impulsive Behavior Scale ($k = 2$; Whiteside and Lynam, 2001), the Eysenck Impulsivity scale IVE ($k = 1$; Abramovitch et al., 2012), FLPS ($k = 1$), or the Tridimensional Personality Questionnaire (TPQ; $k = 1$; Cloninger et al., 1991). Analysis of these five studies indicated that only two sub-scores of these outcome measures, from two studies, were significantly higher in the OCD sample as compared to controls. One study found a significantly higher score on the FLPS Impulsivity score (Aycicegi et al., 2003). A second study using the UPPS subscale scores found that OCD participants scored higher than controls only on the Urgency subscale, but no differences were found on the Perseverance and Premeditation subscales (Parkes et al., 2019). In addition, no difference was found on any of the scales' total scores.

A summary of the results of the systematic review for the studies comparing OCD and controls on the BIS ($k = 23$) is presented in Table 2. As can be seen, there were some clear differences between the results pertaining to the three BIS subscales. While of the studies examining BIS-Attention ($k = 18$), 89 % reported significantly higher scores in OCD samples compared to controls, significant differences on the BIS-Motor ($k = 17$) were found only in 12 % of studies, and on the BIS-Nonplanning in 41 % of the studies ($k = 17$). In terms of the total BIS score ($k = 19$), significantly elevated scores in the OCD samples were reported in 63 % of the studies ($k = 12$). A similar picture emerged in considering only the studies that analyzed and reported both the BIS total and its subscale scores ($k = 14$). Of those, 86 % reported significantly elevated total BIS scores in OCD compared to controls. However, a breakdown of the BIS subscale indicated that 93 % found significantly elevated scores on the BIS-Attention, 50 % on the BIS-Nonplanning, and 14 % on the BIS-Motor subscale. In addition, among those studies ($k = 14$), 43 % found significantly elevated scores in OCD compared to

[1] Although 28 studies were included in the systematic review, only 27 were available for meta-analysis. One study reported significant differences between BIS subscale scores, but the data required for meta-analysis were not provided in the manuscript and could not be obtained from the study authors.

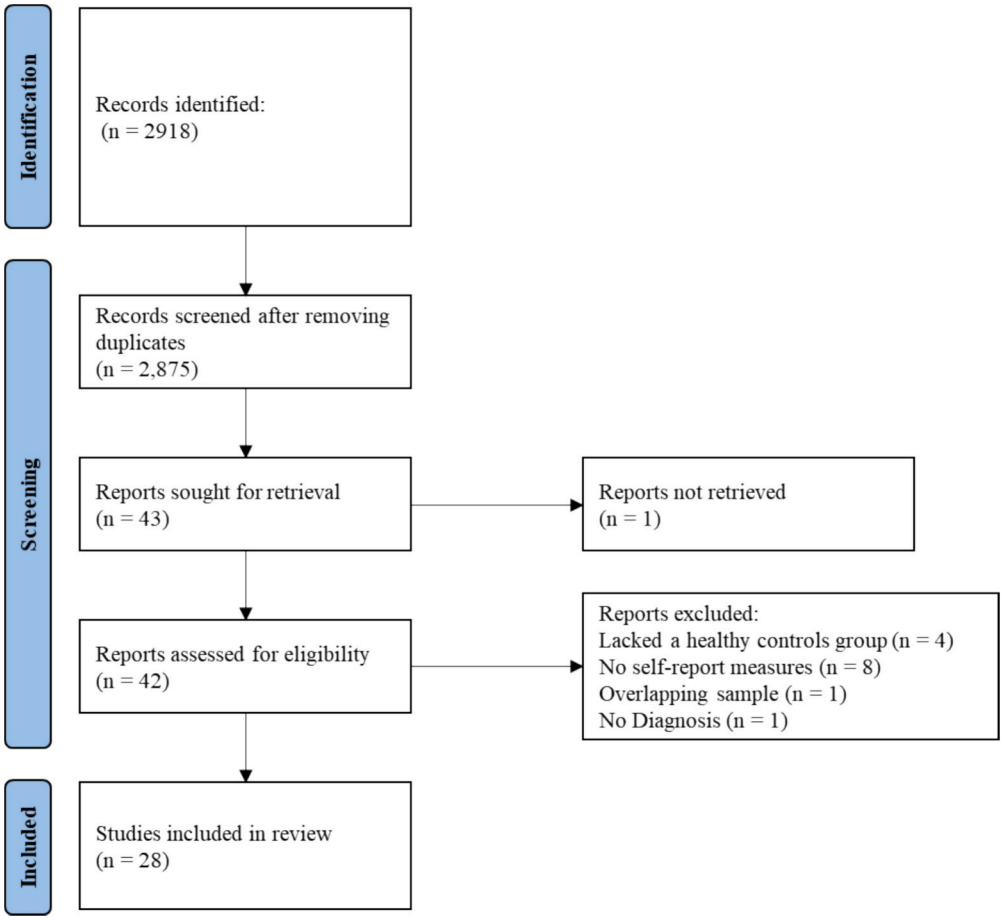

Fig. 1. PRISMA flow diagram.

controls in only one of three subscales, and 57 % on two subscales. No study found significantly elevated scores in OCD compared to controls on all three BIS subscales. Taken together, these results suggest that the difference between OCD and controls in the BIS total score is largely driven by the difference on the BIS-Attention subscale. Importantly, the conclusions drawn from this systematic review should be interpreted with caution, given that many of the studies reviewed are underpowered. The meta-analysis that follows complements this descriptive review and provides a more comprehensive picture of the state of the field in terms of true effect sizes.

3.2. Meta analysis

3.2.1. Publication bias

We examined publication bias in the full dataset of studies that reported subjective impulsivity on any of the measures. An examination of the funnel plot (Fig. S1) did not suggest a small study effect (i.e., smaller studies reporting larger effects). Consistent with this impression, the Begg and Mazumdar rank correlation test (Begg and Mazumdar, 1994) was not statistically significant, with a Kendall's tau correlation coefficient of 0.007 between sample size and effect size, $p_{1\text{-tailed}} = 0.481$. Similarly, Egger's regression was also non-significant, $t(23) = 0.347$, $p_{1\text{-tailed}} = 0.366$. In addition to this global analysis, we also examined the funnel plots for each of the BIS subscales. In contrast to the global analysis, the funnel plot for the Attention subscale (Fig. S2) was asymmetric in a way that strongly suggests a small study effect, with small-sample studies (with larger SEs) reporting larger effects than large-sample studies. This impression was supported by a significant Begg and Mazumdar rank correlation test, with a Kendall's tau correlation coefficient of 0.451 between studies' SEs and their effect size, $p_{1\text{-tailed}} = 0.009$. Similarly, Egger's regression was significant, $t(16) = 4.36$, $p_{1\text{-tailed}} < 0.001$. The funnel plot for the Motor subscale (Fig. S3) did not suggest a small study effect (Kendall's tau = 0.206, $p_{1\text{-tailed}} = 0.249$; Egger's regression $t(16) = 1.948$, $p_{1\text{-tailed}} = 0.071$), and the same was the case for the Non-planning subscale (Fig. S4; Kendall's tau = 0.118, $p_{1\text{-tailed}} = 0.510$; Egger's regression $t(15) = 0.291$, $p_{1\text{-tailed}} = 0.775$).

3.2.2. Global analysis across self-report measures of impulsivity

As explained above, we first analyzed the differences between OCD and control participants by combining all the measures' total scale scores (BIS, UPPS, IVE, TPQ, and FLPS) used in the 25 studies included in the meta-analysis that reported a total scale score. As noted above, we used the random effects model with Hedges' g as the effect size index. Overall, OCD participants had higher scores on this composite effect than control participants, $g = 0.412$, $Z = 6.203$, $p < .001$, 95 % CI: [0.282–0.542]. The Q-value was 63.348 with 24 degrees of freedom and $p < .001$, indicating a statistically significant heterogeneity of the true effect size across the 25 studies included in this analysis (See Fig. 2). Tau, the standard deviation of true effect sizes, was 0.247 in g units. The I^2 statistic was 62 %, indicating that 62 % of the variance in observed effects reflects variance in true effects rather than sampling error.[2] Assuming a normal distribution of the g statistic, the prediction interval (which estimates where the true effect falls in 95 % of all comparable populations; Higgins and Thompson, 2002) was [−0.117–0.940].

[2] Note that I^2 is often wrongly interpreted as a measure of heterogeneity, but its correct interpretation is the proportion of observed variance that reflects true effect variance (Borenstein, 2019).

Table 1
Characteristics of included studies.

				OCD					
Study	Country	OCD (n)	NCC (n)	Age, M (SD)	Sex, % female	YBOCS total score, M (SD)	% medicated	% with comorbidity	Impulsivity measure
Koenn et al. (2023)	Germany	16	28	36.31 (13.65)	37.5 %	–	–	–	BIS (S)
Namli et al. (2022)	Turkey	88	90	30.50	65.6 %	21.90 (6.90)	100.0 %	0.0 %	BIS (S)
Shan et al. (2022)	China	89	42	30.99 (10.32)	42.9 %	26.73 (4.81)	0.0 %	–	BIS (T + S)
Demartini et al. (2021)	Italy	18	18	40.72 (15.78)	50.0 %	15.94 (10.51)	100.0 %	22.2 %	BIS (T)
Martin et al. (2021)	France	25	24	30.52 (9.84)	29.2 %	27.64 (7.37)	100.0 %	–	UPPS (T + S)
Tumkaya et al. (2021)	Turkey	136	94	33.01 (11.34)	64.9 %	20.83 (9.49)	89.0 %	–	BIS (T + S)
Xu et al. (2021)	China	36	50	29.14 (7.66)	46.0 %	28.28 (4.43)	0.0 %	0.0 %	BIS (T + S)
Frydman et al. (2020)	Brazil	17	17	35.88 (13.13)	17.7 %	24.05 (5.43)	100.0 %	–	BIS (T + S)
Grassi et al. (2020)	Italy	44	40	34.68	20.0 %	24.00	93.2 %	27.3 %	BIS (T + S)
Tan and Koroglu (2020)	Turkey	314	319	31.60 (9.61)	41.0 %	–	–	–	BIS (T + S)
Parkes et al. (2019)	Australia	34	39	32.34 (9.26)	50.7 %	–	59.0 %	0.0 %	UPPS (T)
Martoni et al. (2018)	Italy	68	68	34.70 (10.80)	48.5 %	–	86.8 %	14.7 %	BIS (T + S)
Kim et al. (2017)	South Korea	24	26	25.00 (5.70)	30.8 %	22.40 (6.90)	29.2 %	–	BIS (T)
Sahmelikoglu Onur et al. (2016)	Turkey	146	80	37.85 (10.97)	47.5 %	–	83.0 %	96.0 %	BIS (T + S)
Grassi et al. (2015)	Italy	38	39	36.29 (12.73)	51.3 %	21.79 (6.48)	84.2 %	18.4 %	BIS (T + S)
Benatti et al. (2014)	Italy	75	70	41.62 (10.78)	64.3 %	–	100.0 %	64.0 %	BIS (T + S)
O'Connor et al. (2014)	Canada	82	38	38.24 (12.78)	50.7 %	25.38 (7.08)	–	–	BIS (T)
Sohn et al. (2014)	South Korea	80	76	27.80 (8.10)	34.2 %	21.70 (6.90)	97.5 %	–	BIS (T + S)
Abramovitch et al. (2012)	Israel	30	30	31.95 (7.86)	0.0 %	–	56.6 %	80.0 %	IVE (T)
Boisseau et al. (2012)	USA	19	21	22.32 (4.24)	–	22.53 (3.92)	26.3 %	36.8 %	BIS (T + S)
Hwang et al. (2012)	South Korea	18	33	25.20 (6.00)	–	24.70 (5.20)	–	–	BIS (S)
Chamberlain et al. (2007)	UK	20	20	35.30 (14.07)	–	20.40 (4.07)	80.0 %	–	BIS (T)
Ettelt et al. (2007)	India	70	70	37.10 (11.80)	61.0 %	–	–	–	BIS (T + S)
Tavares and Gentil (2007)	Brazil	40	40	–	–	–	–	–	BIS (T)
Summerfeldt et al. (2004)	Canada	40	49	33.55 (10.52)	–	24.32 (6.05)	–	–	BIS (T + S)
Aycicegi et al. (2003)	Turkey	16	15	34.30 (11.10)	73.4 %	–	62.5 %	–	FLPS (S)
Kim & Grant (2001)	USA	41	40	41.80 (14.20)	27.5 %	–	–	–	TPQ (S)
Stein et al. (1994)	South Africa	431	151	–	–	–	–	–	BIS (S)

Note. OCD = obsessive-compulsive disorder; NCC = non-clinical controls; BIS = Barratt Impulsiveness Scale; UPPS = Impulsive Behavior Scale; IVE = Eysenck Impulsiveness Venturesomeness Empathy scale; TPQ = Tridimensional Personality Questionnaire; FLPS = Frontal Lobe Personality Scale; T = Total Score, S = Subscale Scores.

3.2.3. Analysis of BIS subscales

3.2.3.1. Attentional subscale. This analysis was based on 18 studies. Overall, OCD participants had higher scores on the Attentional subscale of the BIS than did control participants ($g = 0.833$, $Z = 7.308$, $p < .001$, 95 % CI: [0.610–1.056]). As can be seen in Fig. 3, OCD participants had higher scores than control participants on this subscale in all the studies included in our analysis. The Q-statistic's value was 126.491 with 17 degrees of freedom and $p < .001$, indicating a statistically significant heterogeneity of the true effect size across the 18 studies, and I^2 was 86.56 %. Tau, the standard deviation of true effect sizes, was 0.431 in g units. Finally, assuming a normal distribution of the g statistic, the prediction interval for this subscale was [−0.133–1.779].

3.2.3.2. Motor subscale. This analysis was based on 17 studies. OCD participants scored significantly higher than control participants on this subscale (Fig. 4; $g = 0.169$, $Z = 2.221$, $p = .026$, 95 % CI: [0.020–0.318]). The Q-statistic was 53.758 with 16 degrees of freedom and $p < .001$, indicating a statistically significant heterogeneity of the true effect size across the 17 studies, and I^2 was 70.237 %. Tau was 0.248 in g units, and the prediction interval was [−0.385–0.723].

3.2.3.3. BIS Nonplanning subscale. This analysis was based on 17 studies. OCD participants had higher scores on the Nonplanning

Table 2
Significance found between OCD and controls on BIS total impulsivity and subscores by study (Koenn et al., 2023; Namli et al., 2022; Shan et al., 2022; Demartini et al., 2021; Tumkaya et al., 2021; Xu et al., 2021; Frydman et al., 2020; Grassi et al., 2020; Tan and Koroglu, 2020; Martoni et al., 2018; Kim et al., 2017; Sahmelikoglu Onur et al., 2016; Grassi et al., 2015; Benatti et al., 2014; O'Connor et al., 2014; Sohn et al., 2014; Boisseauet al., 2012; Hwang et al., 2012; Chamberlain et al., 2007; Tavares and Gentil, 2007; Summerfeldt et al., 2004; Stein et al., 1994).

Study	Total	Nonplanning	Attention	Motor
Koenn (2023)	--	--	SIG	--
Namli (2023)	--	SIG	SIG	NS
Shan (2022)	NS	SIG	SIG	NS
Demartini (2021)	NS	--	--	--
Tumkaya (2021)	SIG	NS	SIG	SIG
Xu (2021)	SIG	SIG	SIG	NS
Frydman (2020)	SIG	NS	SIG	NS
Grassi (2020)	SIG	NS	SIG	NS
Tan (2020)	SIG	SIG	SIG	NS
Martoni (2018)	SIG	SIG	NS	NS
Kim (2017)	SIG	--	--	--
Sahmelikoglu (2016)	NS	NS	SIG	NS
Grassi (2015)	SIG	SIG	SIG	NS
Benatti (2014)	SIG	NS	SIG	NS
O'Connor (2014)	NS	--	--	--
Sohn (2014)	SIG	NS	SIG	SIG
Boisseau (2012)	SIG	SIG	SIG	NS
Hwang (2012)	--	NS	SIG	NS
Chamberlain (2007)	NS	--	--	--
Ettelt (2007)	NS	NS	SIG	NS
Tavares & Gentil (2007)	NS	--	--	--
Summerfeldt (2004)	SIG	NS	SIG	NS
Stein (1994)	--	NS	NS	NS
Total *k*	19	17	18	17
Percent Significant	**63.2%**	**41.2%**	**88.9%**	**11.8%**

Note: Significant results (denoted with SIG) indicates that OCD sample had elevated scores compared to non-clinical controls; Non-significant = NS; Not Assessed = (--).

subscale than did control participants, as depicted in Fig. 5 ($g = 0.410$, $Z = 6.506$, $p < .001$, 95 %, CI: [0.287, 0.534]). The Q-statistic was 35.922 with 16 degrees of freedom and $p = .003$, again indicating a statistically significant heterogeneity of the true effect size across the 17 studies, and I^2 was 55.459 %. Tau was 0.182 in g units, and the prediction interval was [0.0–0.82].

3.2.3.4. BIS total score. This analysis was based on 19 studies that reported the total BIS score means across groups. As seen in Fig. 6, OCD participants averaged overall higher mean scores compared to non-clinical controls ($g = 0.448$, $Z = 5.502$, $p < .001$, 95 % CI: [0.288–0.607]). The Q-value was 60.628 with 18 degrees of freedom and $p < .001$, suggesting a statistically significant heterogeneity of the true effect size across the 20 studies, and I^2 was 70 %. Tau was 0.282 in g units, with the prediction interval being [−0.172–1.068].

3.2.4. Comparing the effects of the BIS subscales

As explained above, we tested the pair-wise differences between the effect sizes associated with the three BIS subscales while accounting for their intercorrelations, which we pooled from three large studies. As seen in Table 3, the results of all these pairwise comparisons were statistically significant.

3.2.5. Moderator analyses

Finally, we conducted a meta-regression analysis predicting the effect size associated with each subscale from the Y-BOCS scores in the 11 studies that reported these scores. No significant moderation effect was found for Y-BOCS scores across the BIS subscale and total score (all *p*-values > .4). As noted above, considering the small K and N and the relative homogeneity of the OCD sample, the interpretation of these findings should be considered tentative.

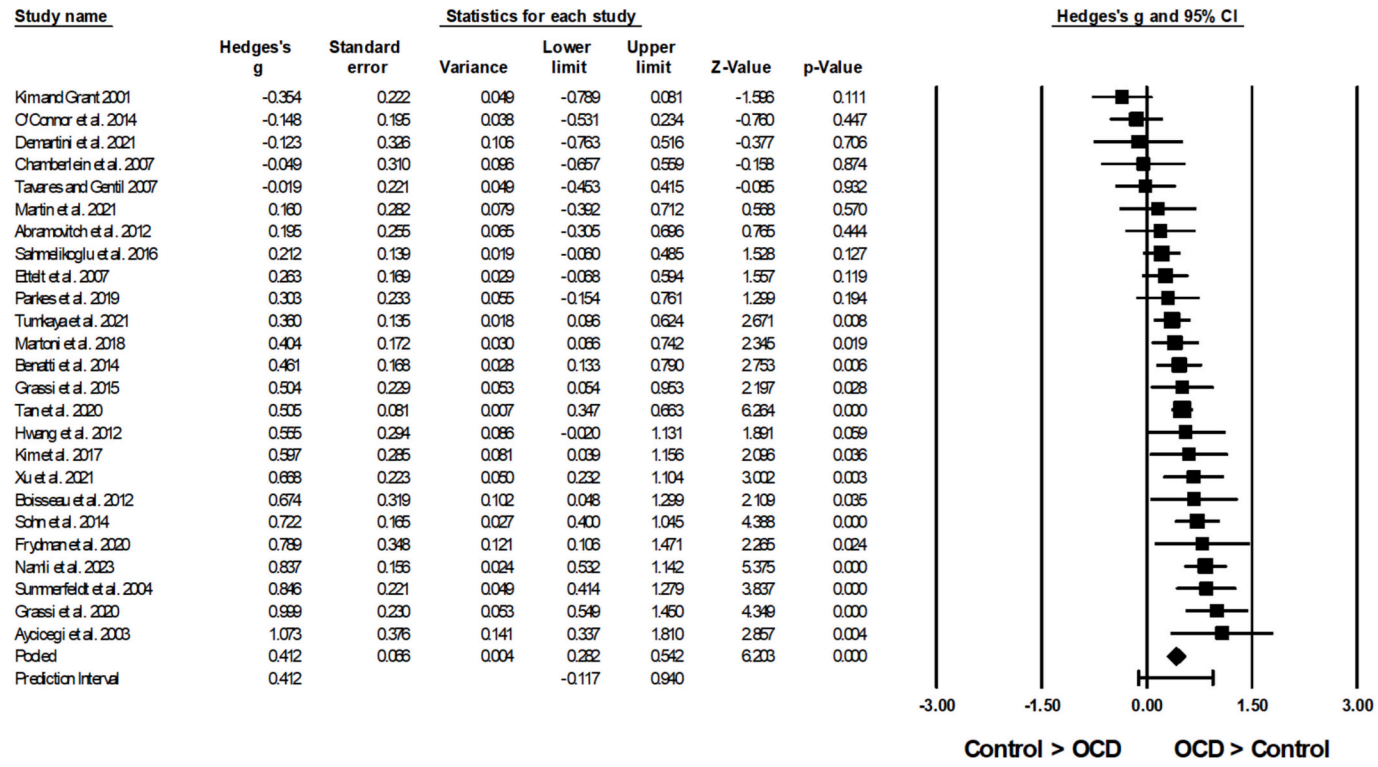

Fig. 2. Forest plot of all included studies providing total scale scores.

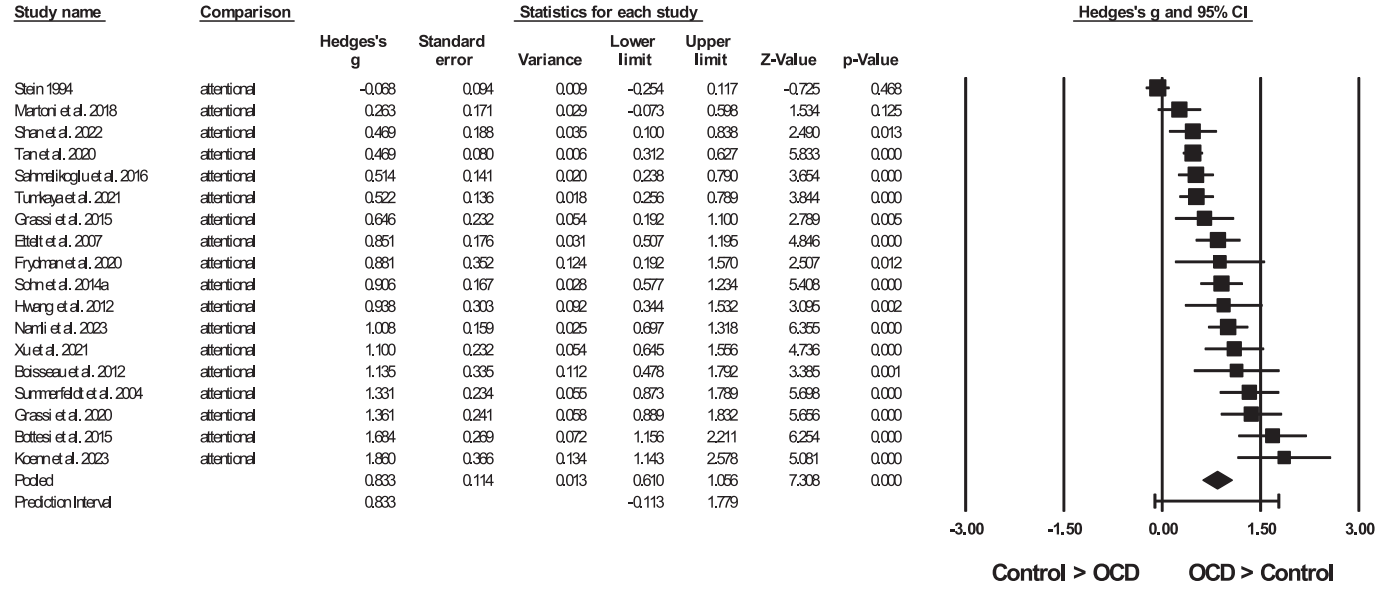

Fig. 3. Forest plot of BIS-attentional subscale.

4. Discussion

The present investigation aimed to conduct a systematic review and meta-analysis of impulsivity in OCD compared to non-psychiatric controls. Results of the systematic review indicated that most studies did not report significantly elevated scores on behavioral aspects of impulsivity in OCD compared to controls, whereas a large majority of studies examining 'Attention Impulsivity' did find significantly elevated scores in OCD, which in many cases led to significant differences between the groups on the BIS total scores as well. Notably, although many of the studies reviewed were underpowered, which requires caution in interpreting these data, results of the meta-analysis both corresponded with, and complemented, these findings. Across studies and measures, the overall effect size for impulsivity in OCD versus non-clinical controls was statistically significant but small in magnitude ($g = 0.41$). Among the studies utilizing the BIS, the effect size for the total BIS score was significant and medium in magnitude ($g = 0.45$). A meta-analysis of each of the BIS subscale scores (i.e., Motor Impulsivity, Nonplanning Impulsivity, and Attention Impulsivity) shed light on the source of the overall effect size. Motor Impulsivity, reflecting behavioral impulsivity (actions without forethought), was associated with a very small, albeit statistically significant, effect size ($g = 0.18$). A somewhat larger but still

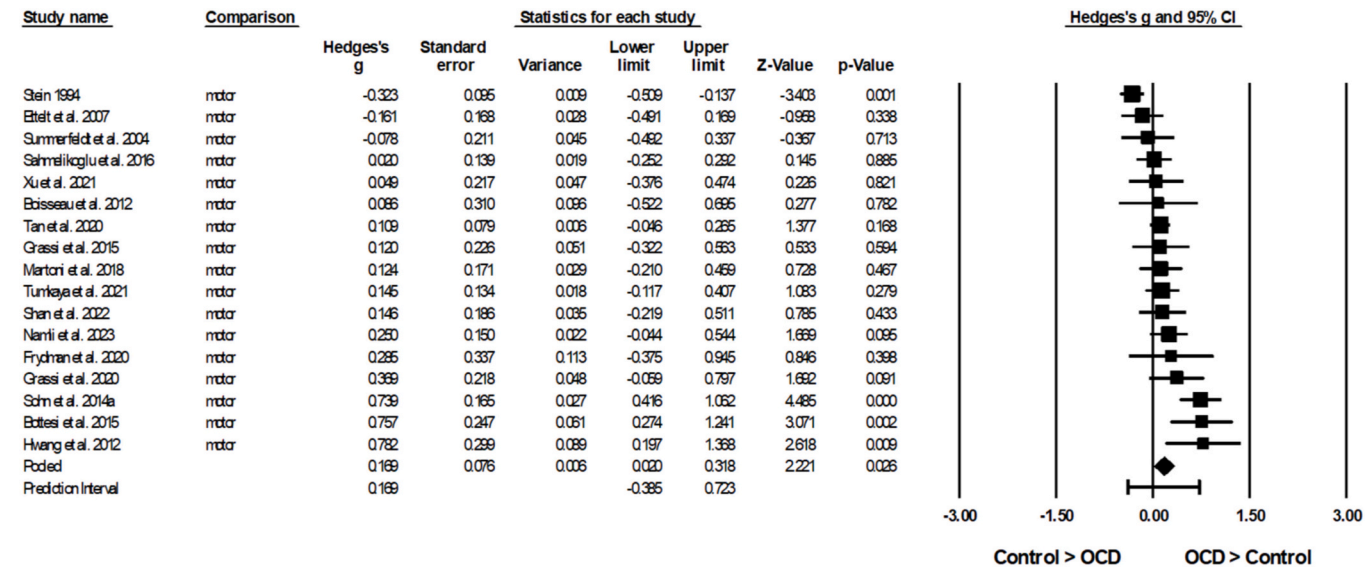

Fig. 4. Forest plot of BIS-motor subscale.

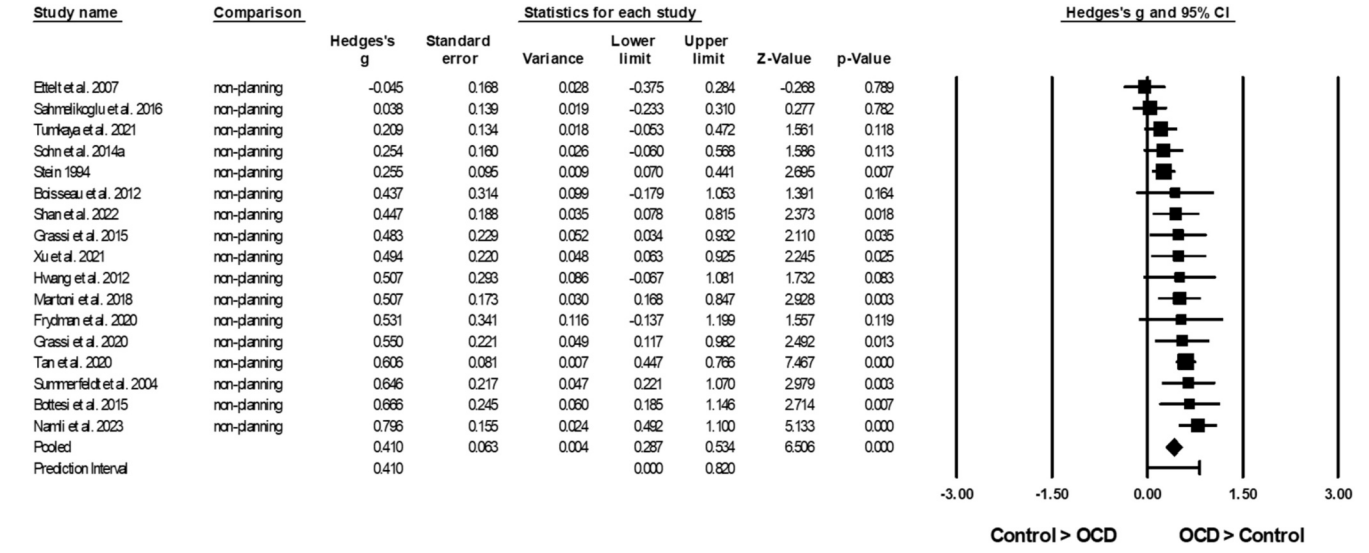

Fig. 5. Forest plot of BIS-nonplanning subscale.

objectively small effect (according to Cohen, 1988) size was found for the Nonplanning subscale (i.e., preference for orientation toward the present rather than the future; $g = 0.42$). In contrast, a much different picture emerged in differentiating non-clinical controls and OCD samples on the BIS Attention Impulsivity subscale (i.e., control over one's thoughts), which was associated with a large effect size ($g = 0.80$).

As elaborated upon in the introduction, there is a longstanding controversy regarding the role of impulsivity in OCD. One view conceptualizes impulsivity and compulsivity as lying on opposite ends of an impulsive-compulsive continuum (Hollander, 2005). This conceptualization underlines several major differences between the constructs. First, compulsive behaviors are largely ego-dystonic, are performed in order to reduce anxiety, counteract perceived risk or avoid/prevent harm. In contrast, impulsive behaviors are ego-syntonic, associated with underestimation of the probability of harm, and result in an experience of pleasure, arousal, or immediate gratification (Hollander and Allen, 2000; Stein et al., 1991). Second, there is ample evidence that compulsivity and impulsivity are associated with different neurobiological and neurochemical processes (Abramovitch et al., 2012; Hollander and Rosen, 2000). Third, research provides theoretical and empirical support for a lack of association between behavioral impulsivity and anxiety (Gray, 1982). Indeed, as noted above, Barrett himself suggested that anxiety and impulsivity are orthogonal (Stanford et al., 2009). As opposed to impulsivity, which is associated with risk-taking and disinhibition, anxiety and anxiety disorders are associated with harm avoidance, safety seeking, behavioral inhibition, and overall inhibited temperament (Zinbarg and Barlow, 1996). In fact, in the context of personality research, a large-scale meta-analysis found that disinhibition is not associated with anxiety disorders or with OCD (Kotov et al., 2010). This is further supported by findings that obsessive-compulsive symptoms in the general population are not associated with behavioral impulsivity (Abramovitch et al., 2015; Hudiburgh et al., 2021), or with underperformance on inhibitory function tasks (Chamberlain et al., 2016). Finally, converging evidence from psychological, neurobiological, neurocognitive, and genetic studies demonstrate a clear distinction between impulse control disorders and OCD (for a review, see Potenza et al., 2009).

Notwithstanding the above arguments, it has been suggested that

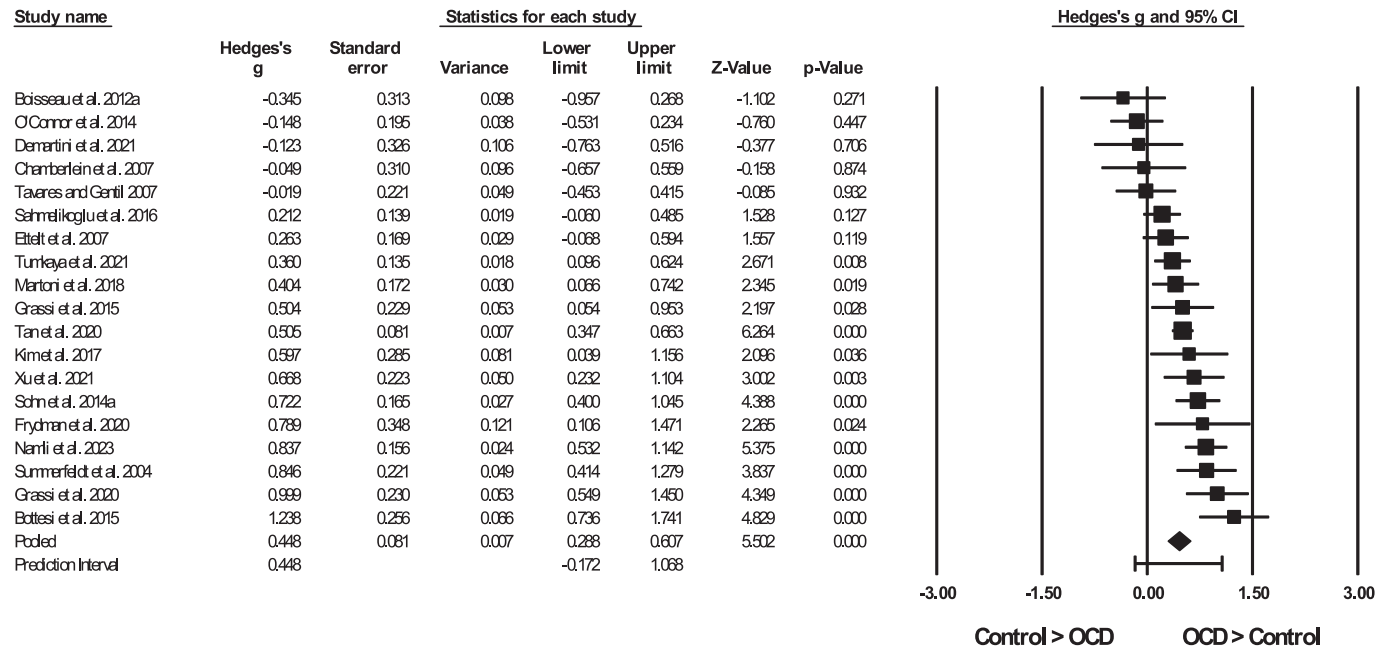

Fig. 6. Forest plot of BIS-total scores.

Table 3
Comparing effects of BIS subscales.

Comparison	*Z*	*p*
Attentional vs. Motor	6.288	< 0.001
Attentional vs. Nonplanning	4.257	< 0.001
Motor vs. Nonplanning	2.668	0.008

Note: The effects sizes (Hedges' g) associated with each subscale are 0.802 for Attentional, 0.176 for Motor, and 0.420 for Nonplanning.

OCD is a disorder of both impulsivity and compulsivity (Clarke et al., 2024; Fineberg et al., 2014; Robbins et al., 2012). This body of research relies on the premise that OCD is associated with deficient inhibitory control because individuals with OCD experience repeated failures to inhibit engaging in compulsions (Chamberlain et al., 2005; Dalley et al., 2011). In addition, the assertion of elevated impulsivity in OCD relies predominantly on findings of deficient performance in OCD, compared to non-clinical controls, on tasks of inhibitory functions (Chamberlain et al., 2005). Notably, a decade later, the same authors published another study designed to address the question of whether OCD is a disorder of impulsivity or compulsivity. Utilizing both neuropsychological and psychological measures, they concluded that OCD is indeed a disorder of compulsivity and not impulsivity (Chamberlain et al., 2016).

Indeed, the hypothesis regarding OCD as a disorder or both impulsivity and compulsivity encounters several difficulties. First, as echoed by our findings, in most studies that find overall elevated self-reported impulsivity on the BIS, the difference is largely driven by elevated scores on Attention Impulsivity (e.g., Frydman et al., 2020; Koenn et al., 2023; Summerfeldt et al., 2004), which measures control over thoughts (for a review, see Stanford et al., 2009). Relatedly, the BIS-Attention Impulsivity subscale has been repeatedly criticized for its poor psychometric properties, including its conceptual and empirical association with behavioral impulsivity (Vasconcelos et al., 2012). Second, the phenomenology of compulsive rituals appears to be in direct opposition to the dynamics of impulsive behavior—generally defined as actions without forethought with negative consequences. In contrast, compulsive rituals are often very deliberate, controlled, carefully executed, subject to specific rules, and performed in order to reduce the anxiety or distress that emanates from obsessions (Boyer and Liénard, 2006). In fact, rather than succumbing to impulsive urges, individuals with OCD can often postpone compulsive rituals (Likierman and Rachman, 1980; Rachman et al., 1976). Third, although individuals with OCD tend to underperform non-clinical controls on neurocognitive tasks of inhibitory functions, deficient performance on such tasks is not specific to OCD; it is found across most DSM disorders and considered transdiagnostic, as part of the proposed C Factor (Abramovitch et al., 2021). Finally, the ecological validity of neurocognitive tests, and specifically as it relates to inhibitory function, in predicting real-life behavioral impulsivity is poor across populations (Chaytor and Schmitter-Edgecombe, 2003; Hedge et al., 2020), as well as specifically in OCD (Sohn et al., 2014).

An additional point may aid in disentangling this controversy. It appears that this body of literature overlooks an important theoretical distinction between state and trait impulsivity (Summerfeldt et al., 2004). Impulsiveness is thought to be a stable and pervasive trait-level cross-situational tendency (DeYoung and Reuter, 2016; Huang et al., 2024). However, as noted by Summerfeldt et al. (2004), impulsivity can be regarded also as a state phenomenon (Halvorson et al., 2021), where "…*'impulsive' is used also to describe a phenomenological state, reflecting the subjective experience of involuntariness, perhaps even reflexivity, associated with a specific act*" (Summerfeldt et al., 2004, p. 549). It is plausible that OCD may be associated with some impulsive states (Lopez-Ibor, 1990), but not with trait impulsiveness. Unfortunately, as noted above, research into state-level (non-neurocognitive) impulsivity in OCD is currently lacking.

In this context, it is worthwhile to address the interplay between neurocognitive and self-reported impulsivity, particularly in the context of the state-trait distinction. Originally, neuropsychological tasks of inhibitory function were developed under the assumption that these tasks objectively assess an underlying personality trait by 'bypassing' subjective report, and that neurocognitive tests of inhibition are therefore indicative of trait impulsivity (Cyders and Coskunpinar, 2011; Odum, 2011). Indeed, this has also been recently hypothesized in the context of OCD (Clarke et al., 2024). Results from a large-scale meta-analytic review of theoretical conceptualizations of impulsivity, however, concluded that, unlike self-reported impulsivity measures, neurocognitive tasks of impulsivity may indicate *state*, rather than trait impulsivity (Sharma et al., 2014). Indeed, Sharma et al. (2014) found weak correlations between self-reported and neurocognitive measures of impulsivity. The authors offered two interpretations of these findings. First, they may confirm the hypothesis that the two types of assessment

differentially gauge state and trait impulsivity. Second, given the consensus that impulsivity is a complex multidimensional construct, the all-too-common use of single tasks that assess only one aspect of neurocognitive impulsivity is problematic. The authors compared this practice to utilizing only one subscale score from a self-report measure and ignoring the others. They also highlight the fact that whereas self-report measures are subject to rigorous psychometric evaluation, neurocognitive tests are not subject to the same level of scrutiny. For example, test-retest reliability is seldom rigorously assessed in neurocognitive tasks, and a study that did assess the test-retest reliability of 13 neurocognitive tasks of impulsivity found it to be very low (Kindlon et al., 1995), lending further support to the notion that neurocognitive tasks of impulsivity/inhibition are largely state indicators. Sharma et al. (2014) concluded that a combination of several neurocognitive tasks together with self-report measures of impulsivity would provide a fuller picture of one's state and trait impulsivity.

Finally, assessment of impulsivity predominantly relies on self-report measures that are inherently susceptible to biases. As OCD is associated with an inflated sense of responsibility for harm, researchers have introduced the concept of 'perceived impulsivity,' referring to the tendency of individuals with OCD to overestimate their experienced and self-reported impulsivity (Abramovitch et al., 2012; Boisseau et al., 2012; Cottraux and Gerard, 1998). This idea has been supported by research suggesting that individuals with OCD tend to describe themselves as impulsive without objective justification (Frydman et al., 2020). In the same vein, Abramovitch et al. (2012) found no difference on a self-report scale assessing behavioral impulsivity (IVE) between OCD and controls, but did find significantly elevated rates of responding positively to a questionnaire item "*Are you an impulsive person?*" among OCD (50 %) compared to controls (17 %). These findings suggest that among individuals with OCD, the threshold for feeling impulsive or 'out of control' may be relatively low, a possibility that should be directly addressed in future studies of self-reported impulsivity in OCD.

The present systematic review and meta-analysis has several strengths, including being the first quantitative systematic review of self-reported behavioral impulsivity in OCD, and the integration of a systematic review and meta-analysis that facilitates disentangling a standing controversy. At the same time, this study is not without limitations. First, the systematic review of the literature is descriptive, and the associated 'vote count' of significant results does not take into consideration that some studies were underpowered. This limitation notwithstanding, the difference between Motor and Attention Impulsivity identified is substantial, and the results were substantiated by the meta-analysis. Second, some effect sizes were found to have significant heterogeneity. As mentioned in the Methods section, however, only 11 studies included data permitting moderator analysis for symptom severity. The results of this analysis indicated no significant moderation effects, but due to the small K and N, these results should be considered tentative. Third, it is important to reiterate the inherent problem in relying on data derived from self-report measures, especially given that individuals with OCD tend to inflate self-reported behavioral impulsivity. At the same time, reliance solely on more objective neurobiological and neurocognitive data to extrapolate to real-life behavioral impulsivity is at least as problematic in terms of ecological validity. To address this limitation, future studies should incorporate multidisciplinary and multimodal examination of impulsivity in OCD. Another point concerns the interdependence between the BIS subscales. As described in the Analysis section, in comparing the effects between the BIS subscales, we estimated their interdependence based on the corresponding correlations reported in three large studies. An alternative way for dealing with the subscale interdependence, which was suggested by one of the reviewers of this manuscript, would be to use a multilevel meta-analysis. However, several sources suggest that such analysis may lead to biased estimates and larger Type I errors when the number of studies is small (Assink and Wibbelink, 2016; Van den Noortgate et al., 2013; Van Den Noortgate and Onghena, 2003). Specifically, multi-level analyses are believed to require a minimum of 30 units (in the case of meta-analysis, studies; Kreft and De Leeuw, 1998; Van den Noortgate et al., 2013). Our review comprises only 17 studies that included all three subscales, which falls short of this requirement. As a final limitation, it should be acknowledged that the present study was not preregistered.

5. Conclusion

Taken together, the results of this systematic review and meta-analysis do not support the notion that OCD is characterized by elevated behavioral impulsivity compared with non-clinical controls. The notion that OCD is associated with trait impulsivity appears to stem from studies utilizing the BIS total scores, which tend to be higher in individuals with OCD. In the vast majority of cases, this elevation stems from highly elevated scores on the BIS Attentional Impulsivity subscale, which assesses the experience of deficient control over thoughts. Very little empirical evidence has supported significantly elevated trait-level *behavioral* impulsivity in OCD as compared to non-clinical controls, and the present study found that this construct was associated with a very small effect size. Future studies on impulsivity in OCD should focus on the difference between state and trait impulsivity, and the tendency of individuals with OCD to inflate self-reported impulsivity. Researchers should also steer clear of concluding about real-life behaviors from models based exclusively on neurocognitive test performance and brain activity, as both of these are not disorder-specific and have been found to have very poor ecological validity in predicting real-life behavioral impulsivity. Finally, in terms of the present study's clinical implications, we suggest that as psychological interventions for behavioral impulsivity are remarkably different from first-line psychotherapy for OCD, caution should be exercised by clinicians in assessing impulsivity in their OCD clients.

CRediT authorship contribution statement

Amitai Abramovitch: Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Investigation, Conceptualization. **Davide Fausto Borrelli:** Writing – review & editing, Investigation, Data curation. **Cristian Curran:** Writing – review & editing, Investigation. **Reuven Dar:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Investigation, Conceptualization.

Funding sources

None.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jad.2025.120498.

References

Abramovitch, A., Cooperman, A., 2015. The cognitive neuropsychology of obsessive-compulsive disorder: a critical review. J. Obsessive Compuls. Relat. Disord. 5, 24–36. https://doi.org/10.1016/j.jocrd.2015.01.002.

Abramovitch, A., McKay, D., 2016. Behavioral impulsivity in obsessive-compulsive disorder. J. Behav. Addict. 5 (3), 395–397. https://doi.org/10.1556/2006.5.2016.029.

Abramovitch, A., Dar, R., Hermesh, H., Schweiger, A., 2012. Comparative neuropsychology of adult obsessive-compulsive disorder and attention deficit/hyperactivity disorder: implications for a novel executive overload model of OCD. J. Neuropsychol. 6 (2), 161–191. https://doi.org/10.1111/j.1748-6653.2011.02021.x.

Abramovitch, A., Shaham, N., Levin, L., Bar-Hen, M., Schweiger, A., 2015. Response inhibition in a subclinical obsessive-compulsive sample. J. Behav. Ther. Exp. Psychiatry 46, 66–71. https://doi.org/10.1016/j.jbtep.2014.09.001.

Abramovitch, A., Short, T., Schweiger, A., 2021. The C factor: cognitive dysfunction as a transdiagnostic dimension in psychopathology. Clin. Psychol. Rev. 86, 102007. https://doi.org/10.1016/j.cpr.2021.102007.

Abramowitz, J.S., Taylor, S., McKay, D., 2009. Obsessive-compulsive disorder. Lancet 374 (9688), 491–499. https://doi.org/10.1016/S0140-6736(09)60240-3.

American Psychiatric Association, 2022. *Diagnostic and statistical manual of mental disorders* (DSM-5-TR). American Psychiatric Association Publishing. https://doi.org/10.1176/appi.books.9780890425787.

Assink, M., Wibbelink, C.J.M., 2016. Fitting three-level meta-analytic models in R: a step-by-step tutorial. Quant. Methods Psychol. 12 (3), 154–174. https://doi.org/10.20982/tqmp.12.3.p154.

Aycicegi, A., Dinn, W.M., Harris, C.L., Erkmen, H., 2003. Neuropsychological function in obsessive-compulsive disorder: effects of comorbid conditions on task performance. Eur. Psychiatry 18 (5), 241–248. https://doi.org/10.1016/S0924-9338(03)00065-8.

Barratt, E.S., 1965. Factor analysis of some psychometric measures of impulsiveness and anxiety. Psychol. Rep. 16 (2), 547–554. https://doi.org/10.2466/pr0.1965.16.2.547.

Begg, C.B., Mazumdar, M., 1994. Operating characteristics of a rank correlation test for publication Bias. Biometrics 50 (4), 1088. https://doi.org/10.2307/2533446.

Benatti, B., Dell'Osso, B., Arici, C., Hollander, E., Altamura, A.C., 2014. Characterizing impulsivity profile in patients with obsessive–compulsive disorder. Int. J. Psychiatry Clin. Pract. 18 (3), 156–160. https://doi.org/10.3109/13651501.2013.855792.

Bıçaksız, P., Özkan, T., 2016. Impulsivity and driver behaviors, offences and accident involvement: a systematic review. Transport. Res. F: Traffic Psychol. Behav. 38, 194–223. https://doi.org/10.1016/j.trf.2015.06.001.

Billieux, J., Van Der Linden, M., Rochat, L., 2008. The role of impulsivity in actual and problematic use of the mobile phone. Appl. Cogn. Psychol. 22 (9), 1195–1210. https://doi.org/10.1002/acp.1429.

Bloom, E.L., Matsko, S.V., Cimino, C.R., 2014. The relationship between cigarette smoking and impulsivity: a review of personality, behavioral, and neurobiological assessment. Addict. Res. Theory 22 (5), 386–397. https://doi.org/10.3109/16066359.2013.867432.

Boisseau, C.L., Thompson-Brenner, H., Caldwell-Harris, C., Pratt, E., Farchione, T., Harrison Barlow, D., 2012. Behavioral and cognitive impulsivity in obsessive–compulsive disorder and eating disorders. Psychiatry Res. 200 (2–3), 1062–1066. https://doi.org/10.1016/j.psychres.2012.06.010.

Borenstein, M., 2019. Common Mistakes in meta-Analysis and how to Avoid them. Biostat, Inc.

Borenstein, M., Hedges, L.V., Higgins, J.P.T., Rothstein, H.R., 2009. Introduction to Meta-analysis, 1st ed. Wiley. https://doi.org/10.1002/9780470743386.

Borenstein, M., Hedges, L., Higgins, J., Rothstein, H., 2022. Comprehensive Meta-Analysis Version 4. Biostat, Englewood, NJ.

Bornovalova, M.A., Lejuez, C.W., Daughters, S.B., Zachary Rosenthal, M., Lynch, T.R., 2005. Impulsivity as a common process across borderline personality and substance use disorders. Clin. Psychol. Rev. 25 (6), 790–812. https://doi.org/10.1016/j.cpr.2005.05.005.

Boyer, P., Liénard, P., 2006. Why ritualized behavior? Precaution systems and action parsing in developmental, pathological and cultural rituals. Behav. Brain Sci. 29 (6), 595–613. https://doi.org/10.1017/S0140525X06009332.

Chamberlain, S.R., Blackwell, A.D., Fineberg, N.A., Robbins, T.W., Sahakian, B.J., 2005. The neuropsychology of obsessive compulsive disorder: the importance of failures in cognitive and behavioural inhibition as candidate endophenotypic markers. Neurosci. Biobehav. Rev. 29 (3), 399–419. https://doi.org/10.1016/j.neubiorev.2004.11.006.

Chamberlain, S.R., Fineberg, N.A., Blackwell, A.D., Clark, L., Robbins, T.W., Sahakian, B. J., 2007. A neuropsychological comparison of obsessive–compulsive disorder and trichotillomania. Neuropsychologia 45 (4), 654–662. https://doi.org/10.1016/j.neuropsychologia.2006.07.016.

Chamberlain, S.R., Leppink, E.W., Redden, S.A., Grant, J.E., 2016. Are obsessive–compulsive symptoms impulsive, compulsive or both? Compr. Psychiatry 68, 111–118. https://doi.org/10.1016/j.comppsych.2016.04.010.

Chaytor, N., Schmitter-Edgecombe, M., 2003. The ecological validity of neuropsychological tests: a review of the literature on everyday cognitive skills. Neuropsychol. Rev. 13 (4), 181–197. https://doi.org/10.1023/b:nerv.0000009483.91468.fb.

Clarke, A.T., Fineberg, N.A., Pellegrini, L., Laws, K.R., 2024. The relationship between cognitive phenotypes of compulsivity and impulsivity and clinical variables in obsessive-compulsive disorder: a systematic review and Meta-analysis. Compr. Psychiatry 133, 152491. https://doi.org/10.1016/j.comppsych.2024.152491.

Cloninger, C.R., Przybeck, T.R., Svrakic, D.M., 1991. The tridimensional personality questionnaire: U.S. normative data. Psychol. Rep. 69 (3), 1047–1057. https://doi.org/10.2466/pr0.1991.69.3.1047.

Cohen, J., 1988. Statistical Power analysis for the behavioral sciences. Routledge. https://doi.org/10.4324/9780203771587.

Cottraux, J., Gerard, D., 1998. Neuroimaging and neuroanatomical issues in obsessive-compulsive disorder. Toward an integrated model—Perceived impulsivity. In: Obsessive-Compulsive Disorder: Theory, Research, and Treatment. Guilford Press, pp. 154–180.

Cyders, M.A., Coskunpinar, A., 2011. Measurement of constructs using self-report and behavioral lab tasks: is there overlap in nomothetic span and construct representation for impulsivity? Clin. Psychol. Rev. 31 (6), 965–982. https://doi.org/10.1016/j.cpr.2011.06.001.

Dalley, J.W., Everitt, B.J., Robbins, T.W., 2011. Impulsivity, compulsivity, and top-down cognitive control. Neuron 69 (4), 680–694. https://doi.org/10.1016/j.neuron.2011.01.020.

Del Carlo, A., Benvenuti, M., Fornaro, M., Toni, C., Rizzato, S., Swann, A.C., Dell'Osso, L., Perugi, G., 2012. Different measures of impulsivity in patients with anxiety disorders: a case control study. Psychiatry Res. 197 (3), 231–236. https://doi.org/10.1016/j.psychres.2011.09.020.

Demartini, B., Nisticò, V., Ranieri, R., Scattolini, C., Fior, G., Priori, A., Gambini, O., Ricciardi, L., 2021. Reduced interoceptive accuracy in patients with obsessive–compulsive disorder: a case-control study. J. Clin. Neurosci. 90, 152–154. https://doi.org/10.1016/j.jocn.2021.05.067.

DeYoung, C., Reuter, A.R., 2016. Impulsivity as a personality trait. In: Handbook of Self-Regulation: Research, Theory, and Applications, 3rd ed. Guilford Press, pp. 345–363.

Dir, A.L., Coskunpinar, A., Cyders, M.A., 2014. A meta-analytic review of the relationship between adolescent risky sexual behavior and impulsivity across gender, age, and race. Clin. Psychol. Rev. 34 (7), 551–562. https://doi.org/10.1016/j.cpr.2014.08.004.

Dunlap, W.P., Cortina, J.M., Vaslow, J.B., Burke, M.J., 1996. Meta-analysis of experiments with matched groups or repeated measures designs. Psychol. Methods 1 (2), 170–177. https://doi.org/10.1037/1082-989X.1.2.170.

Duval, S., Tweedie, R., 2000. Trim and fill: a simple funnel-plot–based method of testing and adjusting for publication Bias in Meta-analysis. Biometrics 56 (2), 455–463. https://doi.org/10.1111/j.0006-341X.2000.00455.x.

Egger, M., Smith, G.D., Schneider, M., Minder, C., 1997. Bias in meta-analysis detected by a simple, graphical test. BMJ 315 (7109), 629–634. https://doi.org/10.1136/bmj.315.7109.629.

Ettelt, S., Ruhrmann, S., Barnow, S., Buthz, F., Hochrein, A., Meyer, K., Kraft, S., Reck, C., Pukrop, R., Klosterkötter, J., Falkai, P., Maier, W., Wagner, M., Freyberger, H.J., Grabe, H.J., 2007. Impulsiveness in obsessive–compulsive disorder: results from a family study. Acta Psychiatr. Scand. 115 (1), 41–47. https://doi.org/10.1111/j.1600-0447.2006.00835.x.

Eysenck, S.B.G., Eysenck, H.J., 1977. The place of impulsiveness in a dimensional system of personality description. Br. J. Soc. Clin. Psychol. 16 (1), 57–68. https://doi.org/10.1111/j.2044-8260.1977.tb01003.x.

Eysenck, S.B.G., Eysenck, H.J., 1978. Impulsiveness and Venturesomeness: their position in a dimensional system of personality description. Psychol. Rep. 43 (3_suppl), 1247–1255. https://doi.org/10.2466/pr0.1978.43.3f.1247.

Fawcett, E.J., Power, H., Fawcett, J.M., 2020. Women are at greater risk of OCD than men: a Meta-analytic review of OCD prevalence worldwide. J. Clin. Psychiatry 81 (4). https://doi.org/10.4088/JCP.19r13085.

Fields, S.A., Schueler, J., Arthur, K.M., Harris, B., 2021. The role of impulsivity in major depression: a systematic review. Curr. Behav. Neurosci. Rep. 8 (2), 38–50. https://doi.org/10.1007/s40473-021-00231-y.

Fineberg, N.A., Chamberlain, S.R., Goudriaan, A.E., Stein, D.J., Vanderschuren, L.J.M.J., Gillan, C.M., Shekar, S., Gorwood, P.A.P.M., Voon, V., Morein-Zamir, S., Denys, D., Sahakian, B.J., Moeller, F.G., Robbins, T.W., Potenza, M.N., 2014. New developments in human neurocognition: clinical, genetic, and brain imaging correlates of impulsivity and compulsivity. CNS Spectr. 19 (1), 69–89. https://doi.org/10.1017/S1092852913000801.

Frydman, I., Mattos, P., De Oliveira-Souza, R., Yücel, M., Chamberlain, S.R., Moll, J., Fontenelle, L.F., 2020. Self-reported and neurocognitive impulsivity in obsessive-compulsive disorder. Compr. Psychiatry 97, 152155. https://doi.org/10.1016/j.comppsych.2019.152155.

Grace, J., Stout, J.C., Malloy, P.F., 1999. Assessing frontal lobe behavioral syndromes with the frontal lobe personality scale. Assessment 6 (3), 269–284. https://doi.org/10.1177/107319119900600307.

Grassi, G., Pallanti, S., Righi, L., Figee, M., Mantione, M., Denys, D., Piccagliani, D., Rossi, A., Stratta, P., 2015. Think twice: impulsivity and decision making in obsessive–compulsive disorder. J. Behav. Addict. 4 (4), 263–272. https://doi.org/10.1556/2006.4.2015.039.

Grassi, G., Makris, N., Pallanti, S., 2020. Addicted to compulsion: assessing three core dimensions of addiction across obsessive-compulsive disorder and gambling disorder. CNS Spectr. 25 (3), 392–401. https://doi.org/10.1017/S1092852919000993.

Gray, J.A., 1982. Précis of *the neuropsychology of anxiety: an enquiry into the functions of the septo-hippocampal system*. Behav. Brain Sci. 5 (3), 469–484. https://doi.org/10.1017/S0140525X00013066.

Halvorson, M.A., Pedersen, S.L., Feil, M.C., Lengua, L.J., Molina, B.S.G., King, K.M., 2021. Impulsive states and impulsive traits: a study of the multilevel structure and validity of a multifaceted measure of impulsive states. Assessment 28 (3), 796–812. https://doi.org/10.1177/1073191120939161.

Hedge, C., Powell, G., Bompas, A., Sumner, P., 2020. Self-reported impulsivity does not predict response caution. Personal. Individ. Differ. 167, 110257. https://doi.org/10.1016/j.paid.2020.110257.

Higgins, J.P., Thompson, SG., 2002. Quantifying heterogeneity in a meta-analysis. Stat. Med. 21 (11), 1539–1558. https://doi.org/10.1002/sim.1186. PMID: 12111919.

Hollander, E., 2005. Obsessive–compulsive disorder and spectrum across the life span. Int. J. Psychiatry Clin. Pract. 9 (2), 79–86. https://doi.org/10.1080/13651500510018347.

Hollander, E., Allen, Andrea, 2000. PREFACE. Psychiatr. Clin. N. Am. 23 (3), xv–xvi. https://doi.org/10.1016/S0193-953X(05)70174-X.

Hollander, E., Rosen, J., 2000. Obsessive-compulsive Spectrum disorders: A review. In: Maj, M., Sartorius, N., Okasha, A., Zohar, J. (Eds.), Obsessive-Compulsive Disorder, 1st ed. Wiley, pp. 203–252. https://doi.org/10.1002/0470846496.ch5.
Hollander, E., Wong, C.M., 1995. Obsessive-compulsive spectrum disorders. J. Clin. Psychiatry 56 (Suppl. 4), 3–6 discussion 53-55.
Huang, Y., Luan, S., Wu, B., Li, Y., Wu, J., Chen, W., Hertwig, R., 2024. Impulsivity is a stable, measurable, and predictive psychological trait. Proc. Natl. Acad. Sci. 121 (24), e2321758121. https://doi.org/10.1073/pnas.2321758121.
Hudiburgh, S.E., Reese, H.E., Carver, C.S., Çek, D., Timpano, K.R., 2021. A multi-method examination of the link between obsessive-compulsive symptomatology and emotion-related impulsivity. Br. J. Clin. Psychol. 60 (3), 293–311. https://doi.org/10.1111/bjc.12290.
Hwang, J.Y., Shin, Y.-C., Lim, S.-W., Park, H.Y., Shin, N.Y., Jang, J.H., Park, H.-Y., Kwon, J.S., 2012. Multidimensional comparison of personality characteristics of the big five model, impulsiveness, and affect in pathological gambling and obsessive–compulsive disorder. J. Gambl. Stud. 28 (3), 351–362. https://doi.org/10.1007/s10899-011-9269-6.
Ioannidis, K., Hook, R., Wickham, K., Grant, J.E., Chamberlain, S.R., 2019. Impulsivity in gambling disorder and problem gambling: a meta-analysis. Neuropsychopharmacology 44 (8), 1354–1361. https://doi.org/10.1038/s41386-019-0393-9.
Jenkins, D.G., Quintana-Ascencio, P.F., 2020. A solution to minimum sample size for regressions. PLoS One 15 (2), e0229345. https://doi.org/10.1371/journal.pone.0229345.
Kam, J.W., Dominelli, R., Carlson, SR., 2012. Differential relationships between sub-traits of BIS-11 impulsivity and executive processes: an ERP study. Int. J. Psychophysiol. 85 (2), 174–187. https://doi.org/10.1016/j.ijpsycho.2012.05.006. Epub 2012 May 29. PMID: 22659220.
Kashdan, T.B., McKnight, P.E., Richey, J.A., Hofmann, S.G., 2009. When social anxiety disorder co-exists with risk-prone, approach behavior: investigating a neglected, meaningful subset of people in the National Comorbidity Survey-Replication. Behav. Res. Ther. 47 (7), 559–568. https://doi.org/10.1016/j.brat.2009.03.010.
Kim, S.W., Grant, J.E., 2001. Personality dimensions in pathological gambling disorder and obsessive–compulsive disorder. Psychiatry Res. 104 (3), 205–212. https://doi.org/10.1016/S0165-1781(01)00327-4.
Kim, M., Lee, T.H., Choi, J.-S., Kwak, Y.B., Hwang, W.J., Kim, T., Lee, J.Y., Lim, J.-A., Park, M., Kim, Y.J., Kim, S.N., Kim, D.J., Kwon, J.S., 2017. Neurophysiological correlates of altered response inhibition in internet gaming disorder and obsessive-compulsive disorder: perspectives from impulsivity and compulsivity. Sci. Rep. 7 (1), 41742. https://doi.org/10.1038/srep41742.
Kindlon, D., Mezzacappa, E., Earls, F., 1995. Psychometric properties of impulsivity measures: temporal stability, validity and factor structure. J. Child Psychol. Psychiatry 36 (4), 645–661. https://doi.org/10.1111/j.1469-7610.1995.tb02319.x.
Koenn, L.G., Kohl, S., Schleyken, S., Kuhn, J., 2023. Impulsivity and attention in obsessive compulsive and tic disorders: mismatch in self-report and Behavioural data. J. Clin. Med. 12 (6), 2277. https://doi.org/10.3390/jcm12062277.
Kotov, R., Gamez, W., Schmidt, F., Watson, D., 2010. Linking "big" personality traits to anxiety, depressive, and substance use disorders: a meta-analysis. Psychol. Bull. 136 (5), 768–821. https://doi.org/10.1037/a0020327.
Kreft, I., De Leeuw, J., 1998. Introducing multilevel modeling. SAGE Publications, Ltd. https://doi.org/10.4135/9781849209366.
Likierman, H., Rachman, S.J., 1980. Spontaneous decay of compulsive urges: cumulative effects. Behav. Res. Ther. 18 (5), 387–394. https://doi.org/10.1016/0005-7967(80)90003-0.
Lopez-Ibor, J.J., 1990. Impulse control in obsessive-compulsive disorder: a biopsychopathological approach. Prog. Neuro-Psychopharmacol. Biol. Psychiatry 14 (5), 709–718. https://doi.org/10.1016/0278-5846(90)90041-E.
Loxton, N.J., 2018. The role of reward sensitivity and impulsivity in overeating and food addiction. Curr. Addict. Rep. 5 (2), 212–222. https://doi.org/10.1007/s40429-018-0206-y.
Lyoo, I.K., Gunderson, J.G., Phillips, K.A., 1998. Personality dimensions associated with depressive personality disorder. J. Personal. Disord. 12 (1), 46–55. https://doi.org/10.1521/pedi.1998.12.1.46.
Martin, S., Graziani, P., Del-Monte, J., 2021. Comparing impulsivity in borderline personality, schizophrenia and obsessional-compulsive disorders: who is ahead? J. Clin. Psychol. 77 (7), 1732–1744. https://doi.org/10.1002/jclp.23129.
Martoni, R.M., De Filippis, R., Cammino, S., Giuliani, M., Risso, G., Cavallini, M.C., Bellodi, L., 2018. Planning functioning and impulsiveness in obsessive–compulsive disorder. Eur. Arch. Psychiatry Clin. Neurosci. 268 (5), 471–481. https://doi.org/10.1007/s00406-017-0803-0.
Moeller, F.G., Dougherty, D.M., 2002. Impulsivity and substance abuse: what is the connection? Addict. Disord. Their Treat. 1 (1). https://journals.lww.com/addictiondisorders/fulltext/2002/05000/impulsivity_and_substance_abuse__what_is_the.2.aspx.
Moeller, F.G., Barratt, E.S., Dougherty, D.M., Schmitz, J.M., Swann, A.C., 2001. Psychiatric aspects of impulsivity. Am. J. Psychiatry 158 (11), 1783–1793. https://doi.org/10.1176/appi.ajp.158.11.1783.
Mungo, A., Hein, M., Hubain, P., Loas, G., Fontaine, P., 2020. Impulsivity and its therapeutic Management in Borderline Personality Disorder: a systematic review. Psychiatry Q. 91 (4), 1333–1362. https://doi.org/10.1007/s11126-020-09845-z.
Namli, Z., Tamam, L., Demirkol, M.E., Karaytuğ, M.O., Sun, T., 2022. The relationship among autistic traits, impulsivity, and functionality in patients with obsessive-compulsive disorder. J. Nerv. Ment. Dis. https://doi.org/10.1097/NMD.0000000000001601.
Nguyen, R., Brooks, M., Bruno, R., Peacock, A., 2018. Behavioral measures of state impulsivity and their psychometric properties: a systematic review. Personal. Individ. Differ. 135, 67–79. https://doi.org/10.1016/j.paid.2018.06.040.
O'Connor, K., St-Pierre-Delorme, M.-È., Leclerc, J., Lavoie, M., Blais, M.T., 2014. Meta-cognitions in Tourette syndrome, tic disorders, and body-focused repetitive disorder. Can. J. Psychiatr. 59 (8), 417–425. https://doi.org/10.1177/070674371405900804.
Odum, A.L., 2011. Delay discounting: trait variable? Behav. Process. 87 (1), 1–9. https://doi.org/10.1016/j.beproc.2011.02.007.
Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., Shamseer, L., Tetzlaff, J.M., Akl, E.A., Brennan, S.E., Chou, R., Glanville, J., Grimshaw, J.M., Hróbjartsson, A., Lalu, M.M., Li, T., Loder, E.W., Mayo-Wilson, E., McDonald, S., Moher, D., 2021. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ, n71. https://doi.org/10.1136/bmj.n71.
Parkes, L., Tiego, J., Aquino, K., Braganza, L., Chamberlain, S.R., Fontenelle, L.F., Harrison, B.J., Lorenzetti, V., Paton, B., Razi, A., Fornito, A., Yücel, M., 2019. Transdiagnostic variations in impulsivity and compulsivity in obsessive-compulsive disorder and gambling disorder correlate with effective connectivity in cortical-striatal-thalamic-cortical circuits. NeuroImage 202, 116070. https://doi.org/10.1016/j.neuroimage.2019.116070.
Patton, J.H., Stanford, M.S., Barratt, E.S., 1995. Factor structure of the Barratt impulsiveness scale. J. Clin. Psychol. 51 (6), 768–774. https://doi.org/10.1002/1097-4679(199511)51:6<768::aid-jclp2270510607>3.0.co;2-1.
Potenza, M.N., Koran, L.M., Pallanti, S., 2009. The relationship between impulse-control disorders and obsessive–compulsive disorder: a current understanding and future research directions. Psychiatry Res. 170 (1), 22–31. https://doi.org/10.1016/j.psychres.2008.06.036.
Rachman, S., De Silva, P., Röper, G., 1976. The spontaneous decay of compulsive urges. Behav. Res. Ther. 14 (6), 445–453. https://doi.org/10.1016/0005-7967(76)90091-7.
Reise, S.P., Moore, T.M., Sabb, F.W., Brown, A.K., London, E.D., 2013. The Barratt Impulsiveness Scale-11: reassessment of its structure in a community sample. Psycho.l Assess. 25 (2), 631–642. https://doi.org/10.1037/a0032161. Epub 2013 Apr 1. PMID: 23544402; PMCID: PMC3805371.
Robbins, T.W., Gillan, C.M., Smith, D.G., De Wit, S., Ersche, K.D., 2012. Neurocognitive endophenotypes of impulsivity and compulsivity: towards dimensional psychiatry. Trends Cogn. Sci. 16 (1), 81–91. https://doi.org/10.1016/j.tics.2011.11.009.
Sahmelikoglu Onur, O., Tabo, A., Aydin, E., Tuna, O., Maner, A.F., Yildirim, E.A., Çarpar, E., 2016. Relationship between impulsivity and obsession types in obsessive-compulsive disorder. Int. J. Psychiatry Clin. Pract. 20 (4), 218–223. https://doi.org/10.1080/13651501.2016.1220580.
Shan, H., Liu, Y., Zhao, Q., Wang, Y., Wang, Y., Cheung, E.F., Chan, R.C., Wang, Z., 2022. Distinct clinical manifestations of obsessive-compulsive disorder are associated with cortical thickness alteration. Aust. N. Z. J. Psychiatry 56 (2), 186–196. https://doi.org/10.1177/00048674211009623.
Sharma, L., Markon, K.E., Clark, L.A., 2014. Toward a theory of distinct types of "impulsive" behaviors: a meta-analysis of self-report and behavioral measures. Psychol. Bull. 140 (2), 374–408. https://doi.org/10.1037/a0034418.
Shoval, G., Zalsman, G., Sher, L., Apter, A., Weizman, A., 2006. Clinical characteristics of inpatient adolescents with severe obsessive–compulsive disorder. Depress. Anxiety 23 (2), 62–70. https://doi.org/10.1002/da.20135.
Sohn, S.Y., Kang, J.I., Namkoong, K., Kim, S.J., 2014. Multidimensional measures of impulsivity in obsessive-compulsive disorder: cannot wait and stop. PLoS One 9 (11), e111739. https://doi.org/10.1371/journal.pone.0111739.
Stanford, M.S., Mathias, C.W., Dougherty, D.M., Lake, S.L., Anderson, N.E., Patton, J.H., 2009. Fifty years of the Barratt impulsiveness scale: an update and review. Personal. Individ. Differ. 47 (5), 385–395. https://doi.org/10.1016/j.paid.2009.04.008.
Stein, D.J., Hollander, E., DeCaria, C., Trungold, S., 1991. OCD: a disorder with anxiety, aggression, impulsivity, and depressed mood. Psychiatry Res. 36 (2), 237–239. https://doi.org/10.1016/0165-1781(91)90135-C.
Stein, D.J., Hollander, E., Simeon, D., Cohen, L., 1994. Impulsivity scores in patients with obsessive-compulsive disorder. J. Nerv. Ment. Dis. 182 (4), 240–241. https://doi.org/10.1097/00005053-199404000-00009. PMID: 10678323.
Sterne, J.A.C., Egger, M., Smith, G.D., 2001. Systematic reviews in health care: investigating and dealing with publication and other biases in meta-analysis. BMJ 323 (7304), 101–105. https://doi.org/10.1136/bmj.323.7304.101.
Summerfeldt, L.J., Hood, K., Antony, M.M., Richter, M.A., Swinson, R.P., 2004. Impulsivity in obsessive-compulsive disorder: comparisons with other anxiety disorders and within tic-related subgroups. Personal. Individ. Differ. 36 (3), 539–553. https://doi.org/10.1016/S0191-8869(03)00113-2.
Tan, O., Koroglu, Ayce.F., 2020. Smoking prevalence, nicotine dependence, and impulsivity in obsessive-compulsive disorder. Int. J. Ment. Heal. Addict. 18 (1), 125–137. https://doi.org/10.1007/s11469-018-9949-x.
Tavares, H., Gentil, V., 2007. Pathological gambling and obsessive-compulsive disorder: towards a spectrum of disorders of volition. Rev. Bras. Psiquiatr. 29 (2), 107–117. https://doi.org/10.1590/S1516-44462007000200005.
Tumkaya, S., Yucens, B., Mart, M., Tezcan, D., Kashyap, H., 2021. Multifaceted impulsivity in obsessive-compulsive disorder with hoarding symptoms. Nord. J. Psychiatry 75 (3), 207–213. https://doi.org/10.1080/08039488.2020.1838605.
Turner, D., Sebastian, A., Tüscher, O., 2017. Impulsivity and cluster B personality disorders. Curr. Psychiatry Rep. 19 (3), 15. https://doi.org/10.1007/s11920-017-0768-8.
Van Den Noortgate, W., Onghena, P., 2003. Multilevel Meta-analysis: a comparison with traditional Meta-analytical procedures. Educ. Psychol. Meas. 63 (5), 765–790. https://doi.org/10.1177/0013164402251027.

Van Den Noortgate, W., López-López, J.A., Marín-Martínez, F., Sánchez-Meca, J., 2013. Three-level meta-analysis of dependent effect sizes. Behav. Res. Methods 45 (2), 576–594. https://doi.org/10.3758/s13428-012-0261-6.

Vasconcelos, A.G., Malloy-Diniz, L., Correa, H., 2012. Systematic review of psychometric proprieties of Barratt impulsiveness scale version 11 (BIS-11). Clin. Neuropsychiat.: J. Treat. Eval. 9 (2), 61–74.

Whiteside, S.P., Lynam, D.R., 2001. The five factor model and impulsivity: using a structural model of personality to understand impulsivity. Personal. Individ. Differ. 30 (4), 669–689. https://doi.org/10.1016/S0191-8869(00)00064-7.

Wu, K.D., Clark, L.A., Watson, D., 2006. Relations between obsessive–compulsive disorder and personality: beyond axis I–axis II comorbidity. J. Anxiety Disord. 20 (6), 695–717. https://doi.org/10.1016/j.janxdis.2005.11.001.

Xu, T., Gu, Q., Zhao, Q., Wang, P., Liu, Q., Fan, Q., Chen, J., Wang, Z., 2021. Impaired cortico-striatal functional connectivity is related to trait impulsivity in unmedicated patients with obsessive-compulsive disorder. J. Affect. Disord. 281, 899–907. https://doi.org/10.1016/j.jad.2020.11.037.

Youzhi, W., Jing, L., 2009. A research on impulsivity and delay discounting differences between high and low procrastinators. Psychol. Sci. (China) 32 (2), 371–374.

Zinbarg, R.E., Barlow, D.H., 1996. Structure of anxiety and the anxiety disorders: a hierarchical model. J. Abnorm. Psychol. 105 (2), 181–193. https://doi.org/10.1037/0021-843X.105.2.181.