



Co-occurrence, Assessment and Treatment of Obsessive Compulsive Disorder in Children and Adults With Autism Spectrum Disorder

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Abstract

Purpose of Review This review aims to give an update on research in the past 5 years regarding the co-occurrence, assessment and treatment of obsessive compulsive disorder (OCD) in individuals with autism spectrum disorder (ASD).

Recent Findings Recent findings affirm not only a high prevalence of OCD amongst individuals with ASD (and vice versa) but also notable variability in assessment methods and results. There remain limited validated measures with which to assess OCD in those with ASD, which are often difficult to differentiate. Adapted and function-based CBT programs specifically designed for ASD demonstrate promising results, but additional randomised controlled trials are needed.

Summary Though some exciting progress has been made in the area of treatment of OCD in ASD, progress remains hampered by inconsistent measurement of OCD in ASD. Future priorities include development of brief, valid assessment tools and determining the efficacy and effectiveness of newly developed and adapted treatment programs.

Keywords Obsessive compulsive disorder · Autism spectrum disorder · Comorbidity · Assessment · Treatment · Differentiation

Introduction

The link between obsessive-compulsive disorder (OCD) and autism spectrum disorder (ASD) has long been recognised and debated; whereas some have argued that these disorders are distinct but frequently comorbid [1], others have argued that ASD is on an OC spectrum [2], and still others argue a middle ground [3]. Despite this long-recognised link, and evidence that those with ASD and comorbid OCD have greater functional impairment and may require specialised treatment [4, 5], research on the assessment and treatment of co-occurring OCD in ASD has been relatively under-developed compared with research on co-occurring anxiety disorders in ASD. With the removal of OCD from the anxiety disorders in the DSM 5 [6], more studies are focusing on OCD specifically, resulting in notable advances. Here, we briefly summarise the knowledge

regarding the prevalence, presentation, assessment and treatment of OCD and ASD circa 2015, and then provide a more in depth review of advances in the research since that time.

Summary of Past Research

Research prior to 2015 suggests an increased prevalence of OCD in those with ASD; however, estimates have been variable (2.6–37.2% [7, 8]). The precision of prevalence rates is likely reduced by similarities between the symptoms of the two disorders; specifically, distinguishing between restricted, repetitive interests in ASD and obsessions in OCD, and between repetitive or self-stimulatory behaviours in ASD and compulsions in OCD is challenging. However, previous work suggests that the symptoms of the two disorders are distinct, and has identified key distinctions which can aid in guiding diagnostic decisions. First, the obsessions and compulsions of OCD are typically associated with significant anxiety and distress [9], whereas in ASD, repetitive interests and behaviours tend to be associated with intense interest and pleasure [10]. The function or purpose of repetitive behaviours, and the link between obsessions and compulsions, is also important: in OCD, compulsions have a clear purpose, usually linked to an obsession, and serve to neutralise the anxiety associated

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with the obsession, thus reinforcing these behaviours [9, 11]. In ASD, the purpose of repetitive behaviours is often unclear. They typically provide reinforcement or self-stimulation and can also be soothing or modulate anxiety [12]; however, they are not linked to a specific purpose or thought as in OCD [13]. Further complicating this clinical picture is evidence that OCD symptoms may present differently in individuals with ASD. Prior to 2015, very little work had examined this altered presentation, though differences such as less severe obsessions in adults [14] and less checking, washing and repeating compulsions [15] in youth have been reported. A lack of a standard approach and validated assessments to differentiate and diagnose OCD in autistic individuals has been a consistent challenge. Past research has relied on measures designed for the assessment of repetitive behaviours in ASD or standard OCD measures that may not be valid in ASD populations.

With regard to treatment, cognitive behavioural therapy (CBT) with exposure-response prevention (ERP), with or without pharmacological treatment (e.g. selective serotonin reuptake inhibitors (SSRIs)), has been identified as first-line treatment options for OCD in both children and adults in the general population [16, 17]. However, until recently, few treatment studies had evaluated the efficacy of these first-line interventions in those with OCD and ASD. While the evidence base of psychosocial treatments for anxiety disorders in those with ASD surged, studies focused exclusively on OCD were fewer. Several case studies of adapted CBT programs demonstrated significant reductions in OCD symptoms per parent report and clinical assessment (e.g. Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS); Anxiety Disorders Interview Schedule (ADIS)) [18–20]. The first manualised adapted CBT protocol for OCD in ASD also demonstrated promising treatment outcomes compared with both treatment as usual (TAU) and a control treatment without active CBT elements, across two randomised controlled trials (RCTs) involving autistic adults without intellectual disability (verbal IQ > 70) [21, 22]. However, prior to 2015, no studies had empirically investigated the efficacy of standard (unadapted) CBT programs for OCD in individuals with ASD; thus, the efficacy of adapted CBT programs compared with these standard treatments remained unclear. Evidence regarding the efficacy of SSRIs for treating OCD in ASD was also mixed [23, 24].

Recent Advances

Prevalence of Co-occurring OCD and ASD

In recent years, an increase in studies examining the overlap of ASD and OCD has added to the existing, but notably inconsistent literature regarding the prevalence of this co-occurrence. One review examined rates of OCD in autistic children

and adults across 17 studies, including only studies using diagnostic interviews, and found rates of OCD of 4.9–37.2% in children and adolescents and 7–24% in adults with ASD [25], compared with 1–2% in the general population [26, 27]. Another meta-analysis including a larger number of studies that used diagnostic interviews, questionnaires or clinical diagnosis reported an average prevalence rate of 24% in adults with ASD, with a range of 7–71% (though most studies were between 7 and 46%) [28]. Studies using clinical interviews reported lower and less variable prevalence rates compared with studies using questionnaires (estimated pooled prevalence 19% vs. 43%; range 8–46% vs. 17–71%) [28]. Other recent studies of autistic individuals recruited from clinical settings have reported rates of 5–8% in youths and 18–48% in adults [29–32]. These rates are similar to prior estimates (range 2–37% [3, 7, 8]); however, variability amongst studies remains high, and studies of clinical samples, which may not reflect the broader population, continue to predominate.

To this end, a large Danish population study of over 3 million individuals found a prevalence rate of comorbid OCD of 4% amongst autistic individuals [33]. Individuals with OCD had a 13 times higher risk of ASD relative to the general population (6.6% vs. 0.5%, respectively). In a longitudinal analysis of this sample, individuals first diagnosed with ASD had a two times higher chance of being subsequently diagnosed with OCD, and individuals with OCD had a four times higher risk of a subsequent ASD diagnosis. Other recent studies have reported a co-occurring diagnosis of ASD amongst 21–25% of youth [31, 34], and 29% of adults [35], in clinical samples of individuals with OCD. Importantly, there is evidence that ASD in those with OCD may be under-recognised; for example, in Wikramanayake et al. [35], 29% of the sample of adults with OCD were identified as having a comorbid ASD diagnosis, which had previously gone undetected. Thus, routine screening for ASD in those with OCD may be important, though not necessarily straightforward.

Presentation and Assessment of OCD and ASD Symptoms

In keeping with prior work, recent research supports the distinctiveness of ASD and OCD despite some symptom similarities. For example, two recent studies assessed all repetitive and compulsive behaviours together and demonstrated differences in types of repetitive behaviours by diagnosis. Scahill and Challa [36] observed that common OCD behaviours such as checking, cleaning and repetitive behaviours to protect against harm were uncommon in a large sample of children with ASD (aged 4–17). In a study involving cognitively able (IQ > 80) children diagnosed with ASD, OCD and/or other neurodevelopmental disorders (aged 5–14), Ruzzano et al. [37] conducted a network analysis of repetitive behaviours

based on both clinician perceptions and symptom data from autism and OCD measures. Two separate clusters representing ASD and OCD symptoms were reported, with little relationship between the two clusters, supporting the notion that repetitive behaviours in ASD and OCD are distinct. Though autistic children present with compulsions and ritualistic behaviours (e.g. continual counting and repeating), these appeared to be distinct from typical OCD compulsions (e.g. washing and checking). Obsessions were least connected to ASD symptoms in the autism network, supporting previous findings that obsessions are uncommon in ASD [38].

Another theme in recent work is the challenges posed to OCD assessment by low verbal and/or intellectual abilities in some individuals with ASD. Studies often rely on parent inference to assess the motivation or purpose associated with repetitive behaviours in children with low verbal ability; however, these behaviours may be misinterpreted [39]. For example, a recent study demonstrated that for cognitively able (IQ > 70) youth with ASD (aged 7–17), self-reported, but not parent-reported, OCD symptoms were associated with clinician rated restricted and repetitive behaviours. This suggests that autistic children may experience more distress associated with restricted and repetitive behaviours, and that restricted and repetitive behaviours may be more similar to OCD-like compulsions than is apparent to parents [40].

Recent studies also suggest differences in the presentation of OCD in autistic individuals, including potentially more severe as well as ambiguous OCD symptoms, and greater functional impairment. Greater OCD symptom severity has been reported in adults with ASD and comorbid OCD compared with those with OCD alone [41]. Conversely, a study of treatment-seeking children with OCD with and without ASD did not find a difference in symptom severity; however, youth with ASD and OCD had increased functional impairment and more comorbid diagnoses [34]. Autistic youth with OCD have also been shown to have poorer psychosocial functioning, use clinical services for longer, be prescribed medication more often and make smaller treatment gains [31•], as well as maintain less gains 6 months after treatment [34], relative to youth with OCD only. In two separate samples, Kerns et al. [11, 42•] described the presence of OCD-like symptoms that are associated with negative affect but the exact function of which is unclear in children with ASD. Thus, while some studies suggest that OCD and ASD are distinct constructs with different symptoms, others point to ambiguous features that are touched upon in both ASD and OCD measures and are difficult to parse out due to limited understanding of the function or mental state behind the behaviour. Recent studies in clinical samples that carefully characterised ASD and OCD symptoms indicate that youth and adults with comorbid ASD and OCD exhibit higher levels of hoarding and ordering behaviours and less magical obsessions relative to those with OCD only [34, 41, 43], though no differences in checking, washing,

neutralising or obsessing behaviours were observed. Ambiguous symptoms may reflect a distinct manifestation of OCD in ASD, as has previously been suggested for anxiety disorders [3]. Finally, recent work has demonstrated that even in verbal adults, ASD traits [35] and diagnosis [32] are associated with poorer insight into OCD symptoms, presenting another challenge to differential diagnosis.

With regard to measurement, there have been some recent attempts to address the lack of validated OCD tools for use in ASD populations. The Autism Spectrum Addendum to the Anxiety Disorders Interview Schedule (ADIS/ASA; Kerns et al. [11, 42•]) is an addendum to the original gold-standard ADIS-Parent Interview (ADIS-P [44]). The ASA was designed specifically to help guide differential diagnosis between ASD and anxiety disorders, and includes items to assess potentially ambiguous or distinct symptoms of OCD. Initial studies of the ADIS/ASA [11, 42•] suggest favourable psychometric properties overall, with excellent interrater reliability in particular for the OCD module (intraclass correlation coefficient = 0.98; Kappa = 1.00). Cadman et al. [41] also reported favourable psychometric properties and good ability to differentiate between ASD and OCD for the Obsessive-Compulsive Inventory-Revised (OCI-R [45]), a common, brief self-report measure of OCD symptoms, in verbal adults with ASD and/or OCD. Finally, some treatment trials of OCD in individuals on the spectrum ([46, 47•]; more detail below), are beginning to use function-based behavioural assessment to identify OCD behaviours and guide appropriate treatment. Nonetheless, there remains a dearth of specialised tools for differentiating between OCD and ASD.

Psychosocial Treatment for OCD in ASD

Standard vs. Adapted CBT Since 2015, a number of treatment studies have both extended prior work and pioneered novel treatment strategies for OCD in autistic individuals (see Table 1 for a summary of studies and results). Though individuals with ASD and co-occurring OCD may have greater treatment needs [31•], a recent and novel finding is that standard CBT programs for OCD have reduced efficacy in individuals with ASD compared with those with OCD alone. Significantly smaller decreases in OCD symptoms at post-treatment in individuals with versus without ASD were demonstrated in a recent case-controlled trial in adolescents ($d = -0.75$ [4•]), as well as a non-randomised trial of cognitively able (IQ > 80) adults ($g = 1.05$ [5]). Both studies also demonstrated lower remission rates in the ASD group (9% vs. 46% [4•] and 13.33% vs. 54.54% [5]). Additionally, autistic individuals may not experience treatment gains as early in treatment as individuals with OCD alone: Tsuchiyagaito et al. [5] reported that though adults without ASD demonstrated significant reductions in OCD symptoms by mid-treatment, adults

Table 1 CBT for OCD in ASD: review of sample characteristics, assessment procedures, treatment details and outcomes

Sample	Study design	CBT program	Assessment of OCD at baseline	Outcome measures	Outcomes
Treatment protocols pre-2015					
Unadapted CBT					
Murray et al. (2015)	Case-controlled study of individual CBT for OCD (OCD+ASD vs. OCD only sample) in a specialist OCD clinic in the UK	Fourteen 1-h sessions of individual CBT. Additional sessions offered if clinical need identified	CY-BOCS	Clinician-Rated: CY-BOCS	Percentage decrease in symptoms at post-treatment significantly lower in ASD+OCD group compared with OCD only group. Fewer treatment responders (CY-BOCS score reduction of $\geq 35\%$ at post) (46% vs. 73%) and lower remission rates (CY-BOCS score ≤ 12 at post) (9% vs. 46%) in OCD+ASD group vs. OCD only group. Effect size not reported
Tsuchiyagaito et al. (2017)	Open trial (not randomised) of individual CBT for OCD; OCD+ASD vs. OCD only sample in an OCD outpatient clinic in Japan	Up to 20 50-min weekly sessions of individual CBT (completed sessions: 11–20)	Y-BOCS	Clinician-Rated: Y-BOCS; Self-Report: PHQ-9, GAD-7, Sheehan Disability Scale	Significantly lower reduction in Y-BOCS total post-treatment in OCD+ASD group than OCD only group ($d = 1.05$) and lower remission rates (OCD+ASD: 13.33% vs. OCD only: 54.54%). ASD group did not demonstrate significant reduction in Y-BOCS scores until post-treatment, whereas OCD only group demonstrated significant improvement by mid-treatment. No change in depression, anxiety or perceived disability at post in ASD group
Adapted CBT					
Russell et al. (2009)	Non-randomised, non-blind controlled trial of adapted individual CBT for OCD vs. TAU in a specialist ASD clinic in the UK	Non-manualised individual CBT based on standard CBT for OCD (Foa and Goldstein, 1978) with adaptations for ASD. Participants received 10–50 sessions ($M = 27.5$)	Modification to the Y-BOCS interview—Clearly defining obsessions vs. repetitive behaviours; use of visual tools to guide ratings of anxiety/discomfort. To classify as OCD symptom, require evidence that obsessions are ego-dystonic, unwanted and	Clinician-Rated: Y-BOCS	Significantly greater reduction in Y-BOCS total severity scores post-treatment ($\eta^2 = 0.165$) in CBT vs. TAU, and more treatment responders ($> 25\%$ reduction in Y-BOCS total) (58% vs. 18%)

Table 1 (continued)

Sample	Study design	CBT program	Assessment of OCD at baseline	Outcome measures	Outcomes
Russell et al. (2013)	$N = 46$, 14–65 years, 76% male, $IQ > 70$ RCT of adapted individual CBT for OCD vs. anxiety management (AM) (plausible control treatment without active CBT elements) in specialist ASD and OCD clinics and mental health centers in the UK	Up to 20 1-h sessions of manualised individual CBT with adaptations for ASD based on a case note from pilot (Russell et al., 2009), expert recommendations and literature on cognitive and neuropsychological function in ASD. Participants received $M = 17.43$ sessions (average of 10 ERP homework tasks)	Modification to the Y-BOCS interview—Clearly defining obsessions vs. repetitive behaviours; use of visual tools to guide ratings of anxiety/discomfort. To classify as OCD symptom, require evidence that obsessions are ego-dystonic, unwanted and resisted or recognised as excessive	Clinician-Rated: Y-BOCS, CGI, Self-Report: OCI-R, BDI, BAI, LSAS, WSAS, SCAS	Significant reduction in Y-BOCS total severity score in CBT group post-treatment ($d = 1.15$); gains maintained at 1-, 3- and 6-month follow-up. More treatment responders ($> 25\%$ reduction in Y-BOCS total) in CBT vs. AM (45% vs. 20%), though not statistically significant, and similar rates of remission (CY-BOCS score ≤ 12 at post) (20% vs. 15%). No significant change in self-reported depression, anxiety, functional impairment at post-treatment
Nakagawa et al. (2017)	$N = 18$ (OCD only) and 12 (OCD+ASD), 18–60 years, 58% male (in ASD group), $IQ \geq 80$ Naturalistic long-term follow-up study of adapted individual CBT in a psychiatric clinic in Japan	Standard CBT for OCD with adaptations for ASD (length and duration of sessions not reported)	Behavioural analysis of OCD symptoms and ASD symptoms (e.g. verbal and non-verbal communication, reactions to change) to differentiate compulsions and repetitive behaviours and identify individual clinical needs. Findings used to inform treatment planning	Clinician-Rated: Y-BOCS, Yale-Brown Symptom Checklist; Self-Report: BDI-II	Significant reduction in Y-BOCS total severity score at 4–11-year follow-up; significantly higher Y-BOCS score in OCD+ASD group vs. OCD only group at follow-up. No significant change in self-reported depressive symptoms at follow-up
Flygare et al. (2019)	$N = 19$, 18+ years ($M_{Age} = 23.84$), 73% male, no “general delay in language or cognitive development” (cognitive ability not reported) Open, non-randomised clinical effectiveness study of adapted individual CBT (Russell et al. 2009 protocol) in a specialist OCD outpatient clinic in Sweden	Up to 20 1-h sessions of manualised individual CBT with adaptations for ASD (Russell et al., 2009). Participants received $M = 15.93$ treatment sessions ($M = 7.87$ exposure exercises)	MINI	Clinician-Rated: Y-BOCS, CGI-S, CGI-I, GAF; Self-Report: OCI-R, MADRS-S, EQ-5D	Significant reduction in Y-BOCS total severity score at post-treatment ($d = -1.48$) and OCI-R; gains maintained at 3-month follow-up. Significant reduction in depressive symptoms at post-treatment, but not at follow-up
Novel treatment protocols (post-2015) Functional-behavioural CBT Vause et al., 2017	$N = 14$, 8–12 years, 64.3% male, $IQ \geq 70$ Preliminary RCT for Fb-CBT for OCD vs. TAU in a research clinic in Canada	Manualised individual modified CBT program for OCD in ASD based on	Functional behaviour analysis of antecedents and consequences of OCBs in	Clinician-Rated: CY-BOCS, RBS-R;	Significantly greater reduction in CY-BOCS Compulsion scale score ($\eta^2 = .51$) and

Table 1 (continued)

Sample	Study design	CBT program	Assessment of OCD at baseline	Outcome measures	Outcomes
Vause et al., 2018 <i>N</i> = 37, 7–13 years, 73% male, <i>IQ</i> ≥ 70	RCT for Fb-CBT for OCD vs. TAU in a research clinic in Canada	principles of behavioural analysis and research on efficacious adapted treatment for anxiety disorders in ASD	natural environment (home visit, in session); supplemented by parent report on QABF	Parent-Rated: Parent OCB Rating Scale, QABF	RSB-R ($\eta^2 = .58$) in CBT group vs. TAU at post-treatment; maintained at 5-month follow-up. Significant reduction in number of parent-reported OCBs ($\eta^2 = .74$) in Fb-CBT group
		Manualised individual modified CBT program for OCD in ASD based on principles of behavioural analysis and research on efficacious adapted treatment for anxiety disorders in ASD	Functional behaviour analysis of antecedents and consequences of OCBs in natural environment (home visit, in session); supplemented by parent report on QABF	Clinician-Rated: CY-BOCS, RBS-R; Parent-Rated: COIS-RP, Parent OCB Rating Scale, QABF	Significantly greater reduction in CY-BOCS Compulsion scale score ($g = 1.15$) and RSB-R ($g = 1.00$) in CBT group vs. TAU; maintained at 6-month follow-up. Significant reduction in parent-reported OCD-related impairment at post-treatment and follow-up in the Fb-CBT group ($g = 0.77$)
Intensive CBT Iniesta-Sepúlveda et al., 2017 <i>N</i> = 9, 11–17 years, 88.9% male, cognitive ability not reported	Case controlled study (not randomised) of intensive CBT for OCD; specialised OCD treatment program	Modified CBT for OCD via either intensive outpatient program (3 h a day of ERP, 5 days a week) or partial hospitalization program (6.5 h of treatment per day (4–5 h of ERP per day), 5 days a week) (range 24–60 days, <i>M</i> = 46.5)	CY-BOCS	Clinician-Rated: CY-BOCS, CGI-- S; Parent-Report: CIS-C/P, SCARED; Self-Report: CIS-C/P, PQ-LES-Q, SCARED, PROMIS	Significant reduction in CY-BOCS total ($d = 1.86$), obsession ($d = 1.35$) and compulsion scores ($d = 2.50$), as well as CGI-S ($d = 2.58$). Significant re- duction in functional impairment, anxiety and de- pressive symptoms, and im- provement in quality of life

with ASD did not demonstrate reductions in OCD symptoms until post-treatment [5].

By contrast, recent work has extended prior findings suggesting that adapted CBT programs for ASD and OCD, including a manualised protocol by Russell et al. [21, 22•] developed prior to 2015, result in large effect sizes, more closely matching those reported in trials of CBT for OCD in the general population (adapted CBT for ASD: $d = 1.01$ – 1.48 [48•, 49]; standard CBT for TD: $g = 1.31$ – 1.53 [17, 50]). In a recent follow-up to Russell et al.'s [21, 22•] work, which demonstrated large treatment effects ($d = 1.08$ – 1.22) of adapted CBT across two RCTs, a non-randomised clinical effectiveness study in autistic adults demonstrated significant reductions in OCD symptoms at post-treatment ($d = -1.48$), as well as at 3-month follow-up ($d = -1.2$) [48•]. Treatment gains following completion of an adapted CBT program for OCD may also persist as long as 4–11 years post-treatment, as demonstrated by a naturalistic follow-up study involving cognitively able ($IQ > 80$) autistic adults in Japan [49]. Nonetheless, a direct comparison of standard versus adapted CBT for ASD and OCD has yet to be conducted.

Another promising new direction is the development of intensive CBT for treatment-resistant OCD, which appears more common in ASD compared with the general population [51]. In a recent case-controlled study, Iniasta-Sepúlveda and colleagues [52•] evaluated an adapted CBT program that involves treatment delivery via either partial hospitalization (6.5 h per day) or an intensive outpatient program (3 h per day), and emphasises behavioural components (i.e. ERP), emotional literacy and self-care (e.g. personal and sleep hygiene, organization) to create optimal conditions for exposure and help adolescents better cope with anxiety. After completing this program, verbally fluent adolescents with ASD and severe OCD (aged 11–17 years) demonstrated significant reductions in overall OCD symptom severity ($d = 1.86$), obsessions ($d = 1.35$) and compulsions ($d = 2.50$). Notably, significant improvements were also seen in child- and parent-reported functional impairment ($d = 1.69$ and $d = 0.94$, respectively) and child-reported quality of life ($d = 0.82$), perhaps reflecting the focus on self-care in this protocol. Two recent case studies of a novel, adapted ERP-based CBT program for OCD (including one home-based implementation) [53] have also demonstrated significant improvements in OCD symptoms and global functioning in two adolescents with ASD and severe, treatment-resistant OCD and average to above average IQ [54, 55].

Finally, two recent case studies found that an empirically supported, adapted, modular CBT program for anxiety disorders (BIACA [56]) may also lead to significant reductions in OCD symptoms in autistic children and adolescents [57, 58]. BIACA has demonstrated more favourable treatment gains compared with standard CBT for children with ASD and anxiety (including OCD) ($d = 0.60$), though studies have not

reported specifically on OCD outcomes beyond the two case studies reported here. Given that OCD is distinct from other anxiety disorders in the current diagnostic framework, research is needed to determine whether tailored treatment approaches that specifically address OCD-related concerns are necessary or if CBT programs for anxiety that can be flexibly administered may be sufficient.

Function-Based CBT Another notable advancement in the treatment literature is the development of function-based CBT (Fb-CBT), a novel treatment approach combining CBT principles and applied behavioural analysis (ABA) to identify the function of OCD behaviours and reinforce alternative, adaptive patterns of behaviour. Fb-CBT expands on March and Mulle's [59] well-established CBT protocol for pediatric OCD by incorporating ABA principles, such as function-based behavioural assessment (i.e. analyzing antecedents, consequences and functions of behaviours) and reinforcement of goal-related behaviours [60]. In doing so, therapists can understand the purpose of OCD behaviours and promote adaptive responses to obsessions through immediate reinforcement and a token economy system. Uniquely, Fb-CBT targets compulsions as well as restricted and repetitive behaviours, in an effort to address the common co-occurrence of these behaviours. Fb-CBT also includes traditional cognitive techniques (e.g. thought challenging) and extensive family involvement (i.e. 30 min of caregiver coaching per 2-h session). Notably, Fb-CBT is the first adapted treatment program developed for younger children with ASD and OCD.

Two RCTs have evaluated the efficacy of Fb-CBT for children with ASD and OCD (aged 7–13 years; $IQ > 70$) [46, 47•]. In both studies, Fb-CBT demonstrated significantly greater reductions in restricted and repetitive behaviours ($g = 1.00$, $\eta^2 = 0.58$) and severity of compulsions ($g = 1.15$, $\eta^2 = 0.51$) compared with TAU [46, 47•]. Treatment gains were maintained at 5-month [47•] and 6-month [46] follow-up. Additionally, in a case study of an 11-year-old male, a 9-week intervention of Fb-CBT also led to a reduction in parent-rated OCD-related functional impairment [61]. Overall, studies suggest that Fb-CBT may be a promising alternative to standard and adapted CBT for OCD in autistic children.

Psychopharmacological Treatment for OCD in ASD

Recent findings have extended prior work by preliminarily evaluating the efficacy of SSRIs amongst children and adolescents with ASD and a confirmed diagnosis of OCD. Two case studies and one RCT conducted over the past 5 years have indicated that the SSRI fluoxetine may show promise as a pharmacological treatment for OCD in children and youth with ASD [62, 63•]. For example, in a RCT comparing fluoxetine with placebo, children with ASD and OCD (aged 7.5–

18 years) receiving fluoxetine demonstrated significantly greater reductions in OCD symptoms and repetitive behaviours after a 16-week trial [63•]. However, no recent studies have investigated the efficacy of other SSRIs such as risperidone or fluvoxamine in the treatment of OCD symptoms in autistic children and adults; further randomised and controlled tests of SSRIs are thus needed.

Summary and Future Directions

Notable progress has been made in recent years to improve our understanding of the co-occurrence of OCD and ASD, yet there remains significant work to be done. Recent research has confirmed high prevalence rates of OCD in individuals with ASD, and vice versa; however, rates have predominantly come from clinical samples and results remain variable, likely impacted by inconsistent assessment of OCD in ASD. Future work should include community samples, as well as more accurate and consistent assessment and diagnosis of OCD in autistic individuals. For example, semi-structured interviews, tailored questionnaires designed specifically for those with ASD and function-based assessments of behaviour are likely to support more precise differential diagnosis of OCD and ASD; however, further research is needed to validate these approaches and expand the repertoire of available tools.

Though recent findings indicate that the symptoms of OCD and ASD are distinct [36•, 37], a number of recent studies highlight further complications to differential diagnosis due to altered and ambiguous presentations of OCD symptoms in those with ASD (see [11, 31•, 34]). Relatedly, further work to develop measures specifically designed to assess OCD in those with ASD is needed. In particular, though several diagnostic measures tailored to ASD and including OCD modules (e.g. ADIS/ASA [11, 42•]; ACI-PL [7]) show promise, these interviews are typically lengthy and training-intensive. The OCI-R is a brief self-report; however, it has only been validated for use in adults on the spectrum [41]. We still lack a brief, valid measure of OCD symptoms for children with ASD, and thus most studies rely on measures of repetitive behaviour that may not discriminate between the two disorders. Careful and accurate assessment is necessary to clarify remaining questions regarding the clinical presentation of comorbid OCD and ASD, and in turn, to evaluate the specific needs of affected individuals, guide treatment and assess treatment gains and outcomes.

Perhaps the most significant recent gains in research have been made in the area of treatment, with many exciting advances in the past few years. Treatment trials have demonstrated that standard CBT for OCD is less effective for individuals on the spectrum than those with OCD only. By comparison, function-based [46, 47•] and adapted CBT treatments [48•, 49] for OCD in ASD populations have shown promising results in children and adults, respectively. Such treatments

are more tailored to the individual needs of clients on the spectrum and have yielded larger effect sizes for treatment outcomes than trials of standard CBT for OCD in this population. Intensive formats of CBT have also shown early signs of promise across varied settings. Finally, the first psychopharmacological study to include ASD samples with clinical OCD provides preliminary support for the efficacy of the SSRI fluoxetine for OCD in autistic children and adolescents.

There are a number of important next steps to be taken to build on these treatment advances. First, further research on adapted treatments for children and adolescents specifically with ASD and OCD is needed, as the majority of treatment studies, even in recent years, have focused on adults. The high prevalence of OCD in children and youth with ASD, the high frequency and duration of service use and the significant functional impairment associated with this comorbidity suggest that earlier detection and treatment of OCD are warranted and could potentially reduce or prevent the negative consequences of OCD later in life. Second, there is a need for replication of RCTs evaluating adapted CBT and Fb-CBT by independent research teams to confirm their efficacy, illuminate which specific modifications improve outcomes and examine the effectiveness of these approaches in real-world settings. Furthermore, examination of OCD remission rates across the many already completed RCTs evaluating adapted CBT for anxiety disorders in children with ASD [64–67] could be a cost-effective way to evaluate whether these programs may also benefit children with OCD or if OCD-specific treatments are needed. Third, further RCTs are needed to evaluate the efficacy of SSRIs relative to adapted CBT and consider whether combined treatment (SSRI+CBT) may result in optimal outcomes, as has been suggested in children (particularly those with treatment-resistant OCD) and adults without ASD [68–71]. Fourth, future treatment trials should be sufficiently large to identify moderators and mediators of change, which are notably absent from this literature, but essential to developing best practice guidelines.

Finally, future research on OCD in those with ASD should include samples that are recruited from and more representative of the community, including both individuals with varied sociodemographic characteristics and a wider range of intellectual and verbal abilities. OCD may be particularly difficult to assess in those with limited language. Alternate methods, like the functional assessment of behaviour employed in Fb-CBT, may represent a promising approach in such cases, though this requires evaluation, and more extensive modifications may be needed.

Conclusions

Prevalence estimates of OCD amongst autistic individuals remain highly varied, largely due to heterogeneity of methods

and inconsistent assessment procedures. Increasing evidence suggests that OCD and ASD symptoms are distinct but may present differently when co-occurring. Differential diagnosis also remains hampered by a lack of reliable measures for assessment and differentiation of symptoms. Prioritising the development of appropriate tools will help to clarify the clinical presentation of OCD and ASD, which will, in turn, inform all other research on OCD in ASD.

Some exciting developments have been made in the area of treatment; however, no well-established treatments for OCD in ASD have yet been identified. Larger RCTs will be needed to determine best practices and identify what factors relate to maximal treatment gains in this population. Future research should also focus on evaluating the effectiveness of treatments in community settings and on the treatment of OCD in those with ASD and verbal or intellectual disabilities. Such research is essential to ensure that we develop accessible, evidence-based practices to support the full range of individuals with ASD and OCD in the near future.

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