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Adapted cognitive behavior therapy for obsessive compulsive disorder with co-occurring autism
spectrum disorder: A clinical effectiveness study

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Abstract

Obsessive-compulsive disorder (OCD) and autism spectrum disorder (ASD) commonly co-occur. Adapted CBT for OCD in adults with ASD has not previously been evaluated outside the United Kingdom. In this study, 19 adults with OCD and ASD were treated using an adapted CBT protocol that consisted of 20 sessions focused on exposure with response prevention. The primary outcome was the clinician-rated Yale-Brown Obsessive-Compulsive Scale (YBOCS). Participants were assessed up to 3 months after treatment. There were significant reductions on the YBOCS at post-treatment ($d=1.5$), and improvements were sustained at follow-up ($d=1.2$). Self-rated OCD symptoms and depressive symptoms showed statistically significant reductions. Improvements in general functioning and quality of life were statistically non-significant. Three participants (16%) were responders at post-treatment and four (21%) were in remission from OCD. At follow-up, three participants (16%) were responders and one (5%) was in full remission. Adapted CBT for OCD in adults with co-occurring ASD is associated with reductions in obsessive-compulsive symptoms and depressive symptoms. However, outcomes are modest; few patients were completely symptom free, and treatment engagement was low with few completed exposures and low adherence to homework assignments. We identify and discuss the need for further treatment refinement for this vulnerable group.

Keywords: cognitive behavior therapy, obsessive compulsive disorder, autism spectrum disorder

Word count: 3843

Adapted cognitive behavior therapy for obsessive compulsive disorder with co-occurring autism spectrum disorder: A clinical effectiveness study

Introduction

Autism spectrum disorder (ASD) is characterized by difficulties in social interaction and communication, as well as restricted and repetitive interests (American Psychiatric Association, 2000). Obsessive-compulsive disorder (OCD) is characterized by intrusive thoughts, images or impulses (obsessions), and ritualized behaviors (compulsions) (American Psychiatric Association, 2000). OCD is one of the most common co-occurring psychiatric conditions in individuals with ASD (Buck et al., 2014; Hollocks, Lerh, Magiati, Meiser-Stedman, & Brugha, 2018; Russell, Mataix-Cols, Anson, & Murphy, 2005). Repetitive behaviors are seen in both disorders, and they may be difficult to disentangle. One key difference is that the function of compulsions is to reduce anxiety triggered by obsessions, which is typically not observed in repetitive behaviors seen in ASD (Jiujiias, Kelley, & Hall, 2017; Ruzzano, Borsboom, & Geurts, 2015). The median prevalence of OCD in individuals with ASD was 10% in a recent overview, but estimates vary between studies (range 1.5% - 37.2%), likely due to differences in diagnostic procedures (Neil & Sturmey, 2014). Individuals diagnosed with ASD also have increased odds of being diagnosed with OCD later in life (Meier et al., 2015).

Several studies suggest that patients with ASD may benefit less from cognitive behavior therapy (CBT) than patients without ASD. One meta-analysis of 24 studies by Weston, Hodgekins, and Langdon (2016) showed that children, adolescents, and adults with ASD receiving standard CBT for anxiety disorders had worse outcomes than patients without ASD. For example, one case-controlled study by Murray, Jassi, Mataix-Cols, Barrow, and Krebs (2015)

compared treatment outcomes of CBT for 44 pediatric OCD patients with or without co-occurring ASD. Results showed that only 9% of the patients with ASD were in remission from their OCD at post-treatment, compared to 46% in patients without ASD. Core difficulties in ASD may in part explain this lower response pattern of CBT. For example, individuals with ASD often have impaired skills communicating emotions (de Schipper et al., 2015; Hill, Berthoz, & Frith, 2004) and this may become a problem in CBT for OCD where one crucial part of exposure exercises is to recognize and communicate changes in emotional states to the therapist (Foa, Yadin, & Lichner, 2012). It is our clinical experience that the frequency of compulsions increase if the individual is homebound to a high degree, since individuals with ASD may struggle to identify alternative goal-directed behaviors instead of doing compulsions (Anderson & Morris, 2006). In addition, therapists may be less confident in their skills to deliver psychological treatments to individuals with ASD (Cooper, Loades, & Russell, 2018), pointing to the need of CBT protocols that are adapted to the specific needs of individuals with ASD.

Adapted CBT for individuals with ASD and OCD has been developed and evaluated in two trials in the United Kingdom by Russell and colleagues (Russell et al., 2013; Russell, Mataix-Cols, Anson, & Murphy, 2009). In a first pilot study, 24 individuals received an adapted CBT protocol for OCD, which contained extra sessions on psychoeducation and anxiety ratings. This protocol was subsequently tested in a randomized trial (Russell et al., 2013) where 46 adolescents and adults with OCD and ASD were allocated to adapted CBT for OCD or anxiety management (an active control intervention that excluded exposure and ritual prevention). The groups did not differ significantly in Y-BOCS symptom severity at post-treatment, although more patients responded to adapted CBT (45%) than anxiety management (20%). In this trial, response was defined as at least 25% reduction on the Y-BOCS. While this trial was likely underpowered

to detect modest effect sizes, it showed that a meaningful proportion of complex patients, previously deemed untreatable, can benefit from an adapted evidence-based intervention. While these results are a promising first step, replications in different settings are warranted. Our aim was therefore to replicate results of initial trials and further refine the protocol developed by Russell et al. (2009) in a consecutive sample of patients referred to a specialist outpatient OCD clinic in Stockholm, Sweden.

Methods

Trial design

This was an open, non-randomized, clinical effectiveness study. The study was approved by the regional ethics review board in Stockholm (no. 2011/1809-31/1) and all participants gave written informed consent prior to inclusion.

Participants

To be included, participants had to be at least 18 years old, live in Stockholm, and fulfil diagnostic criteria for OCD and Asperger syndrome according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association (2000)). Reasons for exclusion were that the participant had a primary diagnosis other than OCD, ongoing substance or alcohol abuse, a history of psychosis, a personality disorder that would interfere with treatment, a high risk of suicide, was receiving concomitant psychological treatment for OCD elsewhere, or had severe somatic problems requiring acute medical attention that would interfere with treatment. As shown in Table 1, the majority of the participants were either on sick-leave, unemployed or on social welfare support.

Measures

The diagnosis of OCD and of other co-occurring psychiatric conditions were established at baseline using the Mini-International Neuropsychiatric Interview (MINI; Sheehan et al. (1998)). The Ritvo Autism Asperger Diagnostic Scale - Revised (RAADS-R; Ritvo et al. (2011)) was used to assess autistic symptoms. The RAADS-R has excellent accuracy (98.5%) in distinguishing ASD from non-ASD subjects (Ritvo et al., 2011). All participants had been diagnosed with Asperger syndrome (DSM-IV criteria) in specialist neuropsychiatric assessment clinics prior to being referred to our clinic and participating in the study. By definition the participants did not have general delay in language or cognitive development. Psychiatrists also reviewed medical records to assess previous diagnoses, but did not assess diagnostic criteria of Asperger syndrome using a standardized interview. Clinician-rated outcome measures were assessed at baseline, mid-treatment (after 10 weeks), post-treatment, and 3-month follow-up. Participants also completed self-rated measures at these assessment points.

The clinician-rated Y-BOCS (Goodman et al., 1989) was the primary outcome measure and was administered by psychiatrists, not otherwise involved in the treatment. The Y-BOCS yields a total score of 0-40, where a higher score indicated more severe symptoms. Due to its high inter-rater reliability ($r = .98$) and good internal consistency ($\alpha = .89$), the Y-BOCS is regarded as the gold standard in assessing the severity of OCD symptoms (Goodman et al., 1989). The same psychiatrists also administered the Clinical Global Impression Scale for severity and improvement (CGI-S and CGI-I; Guy (1976)), and the Global Assessment of Functioning (GAF; American Psychiatric Association (2000)).

Participants self-rated their OCD symptoms using the Obsessive Compulsive Inventory - Revised (OCI-R), which has good psychometric properties (internal consistency $\alpha = .81$, test-

retest reliability $r = .82$) (Foa et al., 2002) and sensitivity and specificity in use with autistic adults (Cadman et al., 2015). Depressive symptoms were assessed using the Montgomery Åsberg Depression Rating Scale - Self report (MADRS-S; Svanborg and Åsberg (1994)). The MADRS-S has a high correlation with the Beck Depression Inventory ($r = .87$) (Svanborg & Åsberg, 2001) and high internal consistency [$\alpha = .82 - .90$] when administered over the internet (Carlbring et al., 2007). Participants rated quality of life on the EuroQol 5-dimensions (EQ-5D; Rabin and Charro (2001)), an internationally validated measure of health status that can be used for clinical and health economic evaluation.

Therapists documented the number of therapist-led exposure exercises, cancelled appointments and adherence to homework assignments (good, adequate or poor). Therapists also noted the dates of the first and last sessions, respectively, since participants were not always able to come for sessions each week.

Procedure

Psychiatrists assessed twenty-four individuals, consecutively seen at a specialist outpatient clinic that offers specialized multimodal treatment for OCD and related disorders (OCD-programmet, Huddinge, Sweden), for inclusion in the study between February 22nd 2012 and May 28th 2014. In one to three appointments they administered the MINI diagnostic interview (Sheehan et al., 1998), Y-BOCS (Goodman et al., 1989) and RAADS-R (Ritvo et al., 2011) to establish a diagnosis of OCD and confirm a previously established diagnosis of autism spectrum disorder. The psychiatrists also rated CGI-S, CGI-I (Guy, 1976) and GAF (American Psychiatric Association, 2000) as baseline measures. After this initial assessment, three individuals chose not to participate, one was deemed as not having OCD, and one as having another primary axis I disorder. Eligible and interested individuals subsequently gave written informed consent and

completed an online test battery including the Y-BOCS symptom checklist (Goodman et al., 1989), OCI-R (Foa et al., 2002), AUDIT (Saunders, Aasland, Babor, Fuente, & Grant, 1993), DUDIT (Berman, Berman, Bergman, Palmstierna, & Schlyter, 2004), MADRS-S (Svanborg & Åsberg, 1994), and EQ-5D (Rabin & Charro, 2001). During treatment, after treatment, and at follow-up, psychiatrists re-assessed the patients (Y-BOCS, CGI, and GAF) and collected self-rated measures (OCI-R, MADRS-S, and EQ-5D) from study participants.

Treatment

Participants received a 20 session adapted CBT treatment protocol originally developed by Russell et al. (2009) at King's College London. The main intervention in this protocol is exposure with response prevention (Foa et al., 2012). In order to meet the needs of individuals with autism spectrum disorder, the protocol has extra sessions devoted to psychoeducation and skills training in anxiety identification and communication. The protocol also uses several adaptations such as visual guidance, concrete examples such as a traffic light to communicate anxiety levels, including an individual's special interests to improve adherence and communication, and minimizing the use of abstract language. Therapists were instructed to involve, educate and coach family members, teachers, and other important people around participants to provide optimal conditions for exposure exercises. Sessions 1-2 consisted of behavioral assessments, work to establish an alliance, and goal setting of the treatment. Sessions 3-5 consisted of psychoeducation of OCD and exposure exercises and skill training on how to do anxiety ratings. The majority of subsequent sessions (6-18) consisted of EX/RP exercises, for example gradually approaching items at the clinic that are perceived as contaminated, while resisting washing compulsions. The last two sessions (19-20) were used to summarize the treatment and elaborate on strategies to sustain progress and prevent relapses.

In this study, clinicians also made further case-by-case adaptations based on individual formulation. These adaptations were therefore not made for all patients. For some patients, an in-depth assessment of daily habits (e.g. sleep, food intake, physical exercise and other daily routines) in the beginning of treatment ensured that treatment gains would not be compromised by a lack of sleep or food intake prior to EX/RP exercises. Our clinical experience is that disrupted daily routines often interfere with the patient's ability to sustain attention towards the feared stimuli and ability to refrain from compulsive behavior and choose other goal-directed behaviors. Psychologists asked about daily activities in the first session, and dedicated time in upcoming sessions to schedule and follow up on activity scheduling. ERP and other activities were scheduled in tandem. In some cases, response prevention was scheduled and initiated using external cues such as timers, reminders, and calendars. This was done in order to overcome executive dysfunctions in planning and response initiation which are often seen in ASD (Demetriou et al., 2018; Johnston, Madden, Bramham, & Russell, 2011). Third, we used the patients' special interests as reward-based behavior (Lindley, Marks, Philpott, & Snowden, 1977; Premack, 1959) when doing EX/RP. For example, a patient with compulsive checking who was particularly interested in spiders was instructed to leave the home daily without any checking behaviors and immediately go to the natural science history museum as a reward-based behavior. Fourth, when participants struggled to report experiences during and after exposure exercises, therapists carefully reviewed thoughts, emotions and physical reactions to help the patient identify OCD-relevant thoughts and emotions, and asking questions about specific reactions like heightened pulse rather than open-ended questions. Patients were assigned the same exposure exercise as homework as he or she had practiced during the therapist-led session.

There were 11 therapists involved in the study. All the therapists were licensed clinical psychologists with prior experience working with adults with ASD. Throughout the study period, the therapists met to discuss treatment strategies and difficult cases.

Statistical analysis

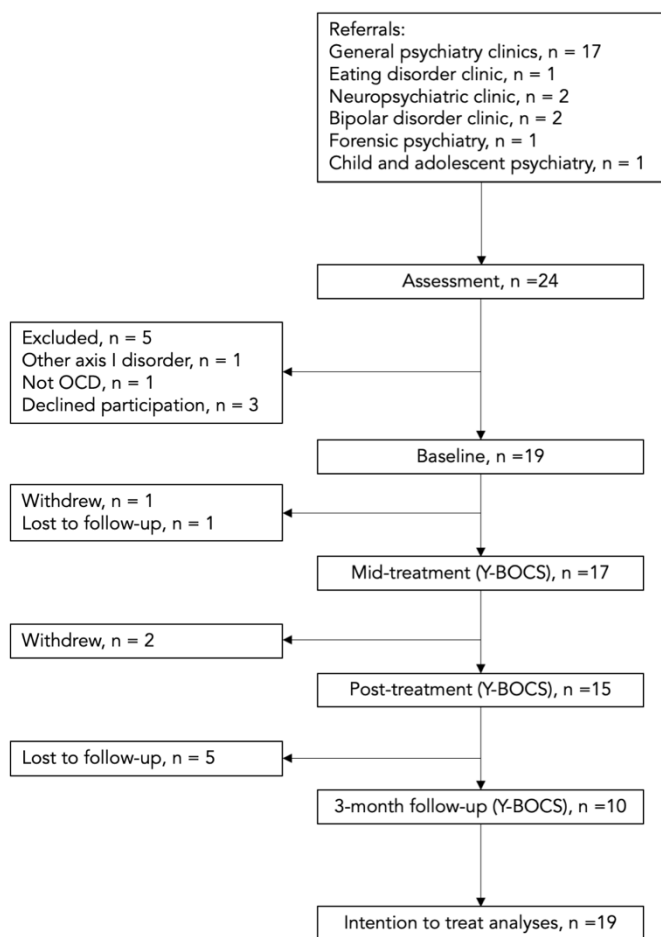
We used linear mixed-effects models to analyze continuous outcomes, which enabled us to use all available data for each participant. Each model included a random intercept for participants and a fixed effect of time (Bates, Mächler, Bolker, & Walker, 2015). Ordinal outcomes on the CGI-S were analyzed using ordinal logistic regression, where we present proportional odds ratios that show the log odds ratio of having a lower versus a higher score. To calculate within-individual effect sizes, we divided the estimated mean difference between two time-points with the standard deviation at baseline. We used expert consensus criteria to define treatment responders (35% or more reduction in Y-BOCS score and CGI-I of 1 or 2) and remitters (12 points or less on the Y-BOCS) (Mataix-Cols et al., 2016). Missing data was considered in the models by using maximum likelihood estimations for each outcome variable. We used R version 3.5.1 (R Core Team, 2018) for our analyses. Scripts for statistical analyses are uploaded to the Open Science Framework (<https://osf.io/gj87z/>).

Results

Between February 22nd 2012 and May 28th 2014, we recruited 19 adults with OCD and co-occurring ASD. See Figure 1 for participant flow through the study.

Treatment activity and acceptability

Participants completed on average 7.87 (SD = 3.02, range 3-13) therapist-led exposure exercises and 15.93 (SD = 2.79, range 10-19) sessions. Treatment lasted for on average 33 weeks (SD = 9.47, range 22-56) with 4 (SD = 2.79, range 1-10) missed or cancelled sessions on average. Homework compliance was rated as good (53%), adequate (12%) or poor (35%) by the therapists.

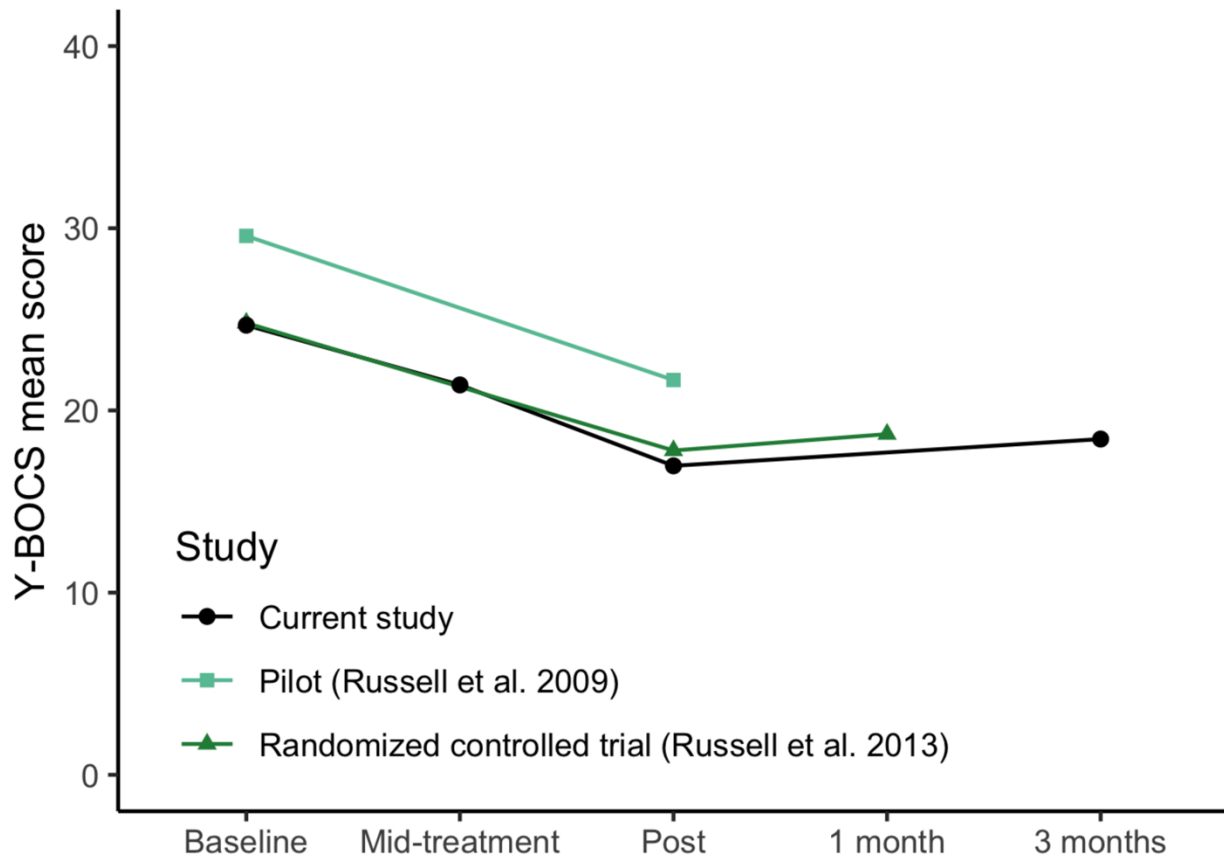


Variable			
Gender, n (%)	Women	11	(57.9)
	Men	8	(42.1)
Age, mean (SD)		23.84	(5.90)

Occupational status, n (%)	Working	2	(10.5)
	Sick leave	4	(21.1)
	Unemployed	2	(10.5)
	Social welfare support	6	(31.6)
	Student	5	(26.3)
RAADS-R, mean (SD)		104.41	(51.53)
Obsessions, n (%)	Harm	11	(57.9)
	Contamination	10	(52.6)
	Symmetry	6	(31.6)
	Unacceptable thoughts	2	(10.5)
Compulsions, n (%)	Checking	10	(52.6)
	Washing/cleaning	8	(42.1)
	Symmetry/ordering	5	(26.3)
	Mental	6	(31.6)
Insight, n (%)	Good	8	(42.1)
	Poor	7	(36.8)
	Unknown	4	(21.1)
Age of OCD onset, mean (SD)		13.76	(5.67)
Comorbidity, n (%)	Major depressive disorder	5	(26.3)
	Generalized anxiety disorder	3	(15.8)
	Attention-deficit hyperactivity disorder	5	(26.3)
	Tic disorder	5	(26.3)
	Panic disorder	2	(10.5)
	Social anxiety disorder	2	(10.5)
	Post-traumatic stress disorder	1	(5.3)
	Substance dependence	1	(5.3)
	Bulimia nervosa	1	(5.3)
Previous psychological treatment for OCD, n (%)		8	(42.1)

Abbreviations: RAADS-R, Ritvo Autism Asperger Diagnostic Scale – Revised; OCD, obsessive compulsive disorder.

Primary and secondary outcomes



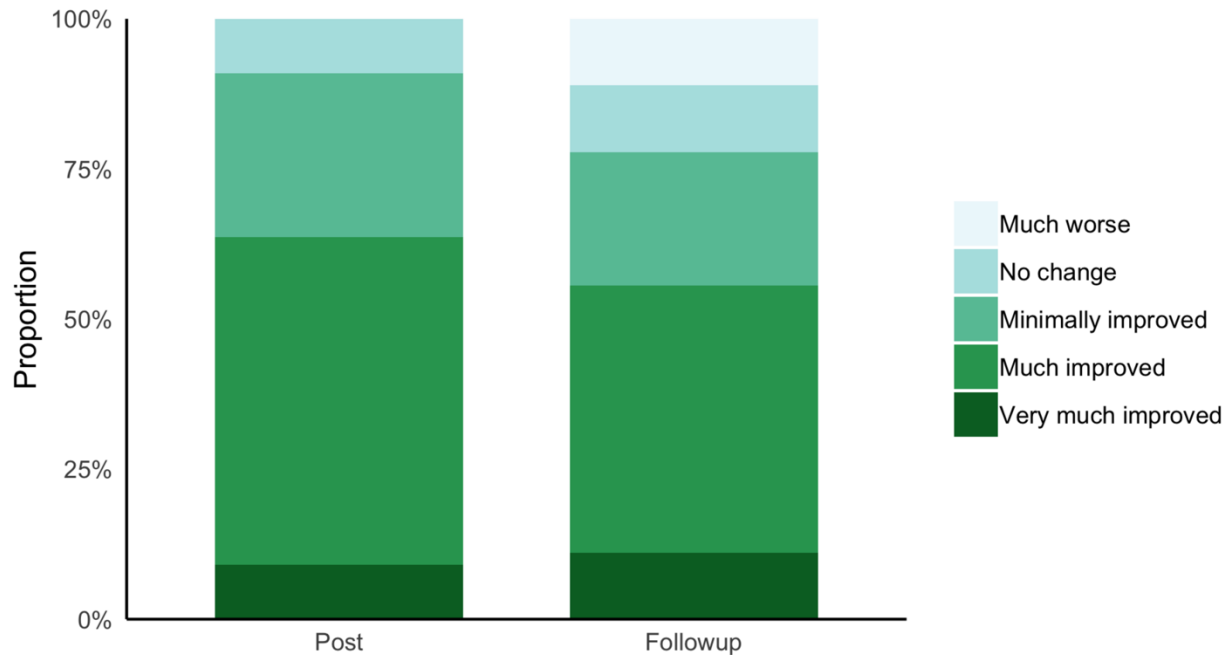
There was a statistically significant effect of time on the Y-BOCS ($F [3, 42.06] = 13.57, p < .001$). The mean difference in Y-BOCS score between baseline and post-treatment was -7.72 points ($d = -1.48 [95\% \text{ CI } -2.30 \text{ to } -0.64]$), and from baseline to follow-up the difference was -6.25 points ($d = -1.2 [95\% \text{ CI } -2.05 \text{ to } -0.33]$). As shown in Figure 2, these results were similar to those of the Russell et al. (2009) and Russell et al. (2013) trials. The difference between post-treatment and follow-up was not statistically significant ($F [1, 11.61] = 0.80, p = .389$), indicating that the gains were maintained at follow-up. Self-rated obsessive-compulsive symptoms on the OCI-R also showed statistically significant reductions over time ($F [3, 45.17] = 10.02, p < .001$), which were maintained from post-treatment to follow-up ($F [1, 9.81] = 1.53, p = .245$). The

reduction of depressive symptoms was statistically significant at post treatment (Mean difference between baseline and post-treatment = -3.63, $p = .03$), but not at mid-treatment or follow-up ($F [3, 46.1] = 2.17, p = .105$). General functioning ($F [2, 24.97] = 1.36, p = .275$) and quality of life ($F [3, 45.89] = 0.29, p = .832$) did not show any statistically significant improvements. Estimated means using maximum likelihood estimation are shown in Table 2.

Table 2. Estimated means and mean differences over time						
Outcome	Estimated mean (SE)	Range	Mean difference (95% CI)	d	n	p
Y-BOCS						
Baseline	24.68 (1.21)	13-36			19	
Mid	21.4 (1.22)	13-31	-3.29 (-5.68 to -0.9)	0.63	17	0.01
Post	16.96 (1.28)	8-25	-7.72 (-10.23 to -5.22)	1.48	15	< 0.001
Follow-up	18.43 (1.48)	10-31	-6.25 (-9.15 to -3.36)	1.2	10	< 0.001
OCI-R						
Baseline	38.3 (2.73)	16-59			18	
Mid	31.77 (2.65)	14-56	-6.53 (-11.73 to -1.34)	0.51	17	0.018
Post	26.3 (2.65)	11-51	-12 (-17.2 to -6.8)	0.94	17	< 0.001
Follow-up	23.94 (3.06)	9-37	-14.36 (-20.35 to -8.37)	1.13	11	< 0.001
MADRS-S						
Baseline	21.84 (1.99)	10-34			19	
Mid	20.64 (1.63)	8-39	-1.2 (-4.4 to 2)	0.17	17	0.467
Post	18.22 (1.64)	6-32	-3.63 (-6.83 to -0.42)	0.5	17	0.032
Follow-up	18.22 (1.91)	4-37	-3.63 (-7.37 to 0.11)	0.5	11	0.064
GAF						
Baseline	53.97 (1.39)	39-61			16	
Post	56.61 (1.61)	50-62	2.65 (-0.5 to 5.79)	0.48	13	0.112
Follow-up	55.17 (1.84)	45-65	1.2 (-2.4 to 4.81)	0.22	9	0.52
EQ-5D						

Baseline	0.63 (0.04)	0.352-0.848			18	
Mid	0.66 (0.05)	0.077-0.848	0.03 (-0.07 to 0.13)	0.19	16	0.559
Post	0.68 (0.05)	0.151-0.883	0.04 (-0.05 to 0.14)	0.29	17	0.373
Follow-up	0.66 (0.05)	0.378-0.883	0.03 (-0.07 to 0.14)	0.21	12	0.558
Abbreviations: Y-BOCS, Yale-Brown Obsessive-Compulsive Scale; OCI-R, Obsessive-Compulsive Inventory - Revised; MADRS-S, Montgomery-Åsberg Depression Rating Scale - Self-Rated; GAF, Global Assessment of Functioning; EQ-5D, Euroqol; SE, Standard Error; CI, Confidence Interval; d, within-individual Cohen's d; p, p-value for mean difference.						

Participants had statistically significant improvements on the CGI-S at post (proportional Odds Ratio (pOR) with 95% confidence interval = 0.09 [.01 - .43], standard error (se) = .84, p = .005) and at follow-up (pOR = 0.15 [.02 - .87], se = .93, p = .041). Results on the CGI-I are shown in Figure 3. Using stricter international consensus definitions (Mataix-Cols et al., 2016), three participants (16%) were classified as responders at both post-treatment and follow-up. At post-treatment, 4 individuals (21%) were in remission, whereas only one participant (5%) remained in remission at follow-up.



Adverse events and protocol deviations

One patient was admitted to a psychiatric ward due to a worsening of depressive symptoms during the last weeks of treatment but completed follow-up assessment, one patient did not want to perform exposure exercises and dropped out from treatment at session 8, and one patient was unable to come to the clinic for assessments after baseline. They did not differ systematically from other participants in terms of OCD-severity, ASD-severity or co-morbid conditions. Eight participants changed therapist during the course of treatment due to various reasons, such as a therapist going on parental leave.

Discussion

The aim of this study was to replicate and extend previous results of an adapted CBT protocol for patients with OCD and ASD. We recruited 19 consecutively referred patients at a specialist clinic and found that the adapted CBT protocol was associated with significant

reductions in OCD symptoms from baseline to post-treatment with sustained gains at 3-month follow-up. The mean drop on the Y-BOCS in the current study was 7.7 points, which is in line with the two previous studies conducted in the UK (Russell et al., 2013, 2009) and thus indicates that adapted CBT can effectively improve OCD symptoms in individuals with OCD and ASD.

Our findings point to the need for further development and refinement of psychological treatments for patients with OCD and ASD. For example, the 7.7 point reduction on the Y-BOCS and responder rates (16%) were low compared to previous trials of CBT for OCD without co-occurring ASD where the mean Y-BOCS reduction is 11.6 points and 65% of patients respond to treatment (Öst, Havnen, Hansen, & Kvale, 2015). While the definitions of treatment response may differ somewhat across trials, this is still likely to represent a substantial difference in outcomes. Homework compliance, shown to predict outcomes in CBT for OCD (Simpson et al., 2011), was low with less than half of the homework assignments rated as being complied with. Treatment was also spread out (33 weeks on average) and it was thus difficult for the patients to attend sessions regularly. Further, the number of completed exposures (7.87 on average) were low compared to the number of sessions. Taken together, these findings suggest that the traditional delivery format of 1 session per week may not be well suited to this vulnerable patient group. Below, we provide suggestions on approaches to improve treatment outcomes for patients with OCD and co-occurring ASD. It is important to stress that these are suggestions and should not be regarded as an exhaustive list of potential treatment refinements. We are also aware that these recommendations may not be feasible in non-specialist settings where teams may have fewer resources at their disposal.

First, add in-home support by a multidisciplinary team to increase adherence to homework. It is reasonable to assume that the modest treatment effects in this study can in part be

explained by low compliance rates to homework assignments, which are an integral part of CBT treatments (Kazantzis, Whittington, & Dattilio, 2010; Kazantzis et al., 2016). One way to overcome this problem could therefore be to increase the level of support for self-directed exposure exercises. For example, occupational therapists could assist patients to do exposure exercises as planned and help to establish daily routines regarding food intake, exercise, and sleep.

Second, concentrate treatment delivery. One way to overcome many of the difficulties seen in patients with ASD would be to deliver the CBT treatment over a few days instead of, as in this study, on average 33 weeks. For example, an intensive 4-day CBT treatment for OCD-patients without ASD has shown large reductions on the Y-BOCS from baseline to post-treatment (14.92 to 20.14 points) (Hansen, Kvale, Hagen, Havnen, & Öst, 2018; Havnen, Hansen, Öst, & Kvale, 2014, 2017). In this intensive treatment, patients receive treatment in groups of 5-6 with a 1:1 patient-therapist ratio. Treatment is delivered over four consecutive days, with days 2-4 dedicated to exposure exercises. Patients are then instructed to continue doing exposure exercises for three weeks and receive a booster session three months after treatment (Havnen et al., 2014). The studies to date have not included patients with co-occurring ASD, but by using an intensive treatment format, it might be possible to circumvent several of the difficulties seen in ASD: low compliance with homework assignments, the need for extra time during exposure exercises, and need for therapist-led exposure exercises throughout treatment. It is also possible, however, that a more intensive treatment format with accelerated change may not suit this patient group.

Quality of life and general functioning did not improve significantly with treatment. Another area that may help increase overall function in this vulnerable group would be to

incorporate additional strategies that go beyond the goal of OCD symptom reduction. Both OCD and ASD are associated with markedly poor educational and occupational outcomes (Cederlund, Hagberg, Billstedt, Gillberg, & Gillberg, 2008; Howlin & Moss, 2012; Pérez-Vigil et al., 2018; Pérez-Vigil, Mittendorfer-Rutz, Helgesson, Cruz, & Mataix-Cols, 2018; Rydén & Bejerot, 2008; Taylor & Mailick, 2014). Psychological interventions targeting work functioning has received empirical support in reducing the amount of work-loss days in depressed patients (Schene, Koeter, Kikkert, Swinkels, & McCrone, 2007) and in patients with depression, anxiety, or adjustment disorder (Lagerveld, Blonk, Brenninkmeijer, Wijngaards-de Meij, & Schaufeli, 2012). Work-focused psychological interventions apply techniques from CBT (e.g., gradual exposure to the workplace setting, changing the appraisal of work stressors, behavioral activation) to the context of work, as an adjunct treatment to regular CBT (Schene et al., 2007) or as a stand-alone treatment (Lagerveld et al., 2012). While such interventions are promising, to our knowledge they have not been systematically evaluated in individuals with OCD and ASD. Such work-focused interventions could motivate patients to challenge their OCD symptoms and do exposure exercises in order to reach their long-term goals, which often include studies or work.

It is worth noting that previous research, including the present study, has been conducted with minimal input from the affected individuals themselves. An important consideration in future development will be to consult participants in the early phases of treatment development to improve the content and mode of delivery of interventions (Brett et al., 2014; Fletcher-Watson et al., 2018).

Our results should be viewed in light of several limitations. First, because the trial was uncontrolled, we cannot rule out that the observed effects were due to other factors than the

treatment itself. We believe this is unlikely as OCD-symptoms rarely remit spontaneously. Second, more than half of the participants were female, which is not representative of the larger population of individuals with ASD who may have different needs (Kim et al., 2011). However, the gender distribution is mirrored in patients seen at our specialist clinic in the past year, where 60% of patients with OCD and ASD were female. Treatment seeking for mental health problems is higher among females, which could contribute to the gender distribution seen in this study (Kovess-Masfety et al., 2014; Wang et al., 2007). Third, although psychiatrists evaluating the main outcomes were not directly involved in delivering the CBT, they were still part of the same team and thus not entirely blind to the patient's clinical progress. Fourth, we did not measure therapist fidelity to the treatment procedures, and it is unclear whether there was a negative effect on treatment outcomes from changing therapist for the eight participants who did so.

In conclusion, we found that adapted CBT can be a partially effective treatment for patients with both OCD and autism spectrum disorder but given the modest effects, novel innovations are needed in order to improve current treatments for this patient population.

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