Concentrated exposure and response prevention for adolescents with obsessive-compulsive disorder: An effectiveness study

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ABSTRACT

This study evaluated the effectiveness of a concentrated exposure and response prevention (ERP) treatment for adolescents with obsessive-compulsive disorder (OCD). Twenty-two adolescents with OCD (range 11–17 years) received therapist-assisted ERP during four consecutive days, followed by a three week period of self-administered ERP. Treatment was delivered to 2–3 patients and their parents simultaneously at an outpatient clinic for child and adolescent psychiatry as part of standard health care. OCD-symptoms were assessed at pre-treatment, post-treatment, 3- and 6-month follow-up. The results demonstrated that patients had significant reduction in OCD-symptoms from pre- to post-treatment and the gains were maintained at follow-up. 91% (n=20) were classified as responders at post-treatment, and 77% (n=17) at six-month follow-up. Remission rates were 73% (n=16) at post-treatment and 68% (n=15) at six-month follow-up. OCD-related impairment and symptoms of anxiety and depression were significantly reduced at post-treatment and follow-up. The results suggest that concentrated ERP is a promising treatment for adolescents with OCD.

1. Introduction

Obsessive-compulsive disorder (OCD) affects 1–2% of children and adolescents (Canals, Hernández-Martínez, Cosi, & Voltas, 2012; Zohar, 1999) and about 75% have comorbid conditions (Geller et al., 2000; Geller et al., 2001). It causes functional impairments in the family, at school and socially (Piacentini, Bergman, Keller, & McCracken, 2003). Cognitive-behavioral therapy (CBT) involving exposure and response prevention (ERP) is empirically supported in several RCTs and about 70% of patients respond to treatment (McGuire et al., 2015; Öst, Riise, Wergeland, Hansen, & Kvale, 2016). It is recognized as first line treatment for OCD in children and adolescents (Geller & March, 2012). Individual CBT is the most common treatment format for pediatric OCD and is typically delivered over 10–14 weeks, with weekly sessions ranging from 45–90 min (Öst et al., 2016). The empirical basis for the standard format is well-documented (Skarphedinsson et al., 2014). Still, symptom remission is seen in only 50–60% of patients

(McGuire et al., 2015; Öst et al., 2016) and the need for improving recovery rates calls for alternative approaches of delivering CBT.

For patients without local access to qualified CBT-therapists, attending weekly sessions for 10–14 weeks might be both costly and time consuming. Even for patients and parents living close to the clinic, weekly sessions might be inconvenient, as it often leads to recurrent absence from school and work. A reduced number of clinic visits might be a possible solution to these practical challenges. A brief CBT format for pediatric OCD with only 5 sessions over 12 weeks has been found to be as effective as standard CBT (Bolton et al., 2011), however the findings are not consistent. In POTS II, a brief version of CBT was investigated, and the results demonstrated that the combination of SRIs and brief CBT was less effective than SRIs combined with full CBT. The symptom severity at baseline in POTS II was higher than what was reported by Bolton et al. (2011), suggesting that brief CBT might not be a satisfactory approach in more severe cases (Mataix-Cols & Marks, 2006). One possible explanation might be the reduced number of therapy sessions in brief CBT and the dependence on self- administered ERP, which has been found to be less effective than therapist-assisted ERP (Abramowitz, 1996; Rosa-Alcázar, Sánchez-Meca, Gómez-Conesa, & Marín-Martínez, 2008).

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CBT delivered more intensively has the benefit of reducing the duration of treatment while retaining the amount of therapist-assisted ERP. Intensive approaches have been successfully delivered to adolescents with OCD lasting from five days (Whiteside & Jacobsen, 2010) to three weeks (Lewin et al., 2005). Storch et al. (2007) demonstrated that a three-week treatment with 14 daily sessions (90 min) was as effective as weekly CBT. The treatment produced large effect sizes even in samples of partial or non-responders to SRI's (Storch et al., 2010). However, attending daily sessions for three weeks might still be challenging to organize within busy family schedules. Whiteside and Jacobsen (2010) reduced the time span of the treatment further and reported promising results from a five-day intensive treatment, which was delivered to children and adolescents in 50-min sessions twice daily (Whiteside & Jacobsen, 2010; Whiteside et al., 2014). They found large effect sizes at post-treatment with continued reduction in symptoms from post-treatment to follow-up. Their findings demonstrated that even in samples with severe OCD, treatment can be successfully delivered over only five days. This is especially encouraging in the treatment of pediatric OCD, as longer duration of symptoms is associated with higher OCD-persistence (Stewart et al., 2004) and increased levels of comorbid disorders (Diniz et al., 2004). If OCD patients can return to normal functioning after only five days of treatment, this might have important long-term implications for the adolescents.

Intensive ERP treatment is a promising approach for children and adolescents, and might offer an attractive treatment alternative for many patients as impairing symptoms may be treated in a short period of time. Another potential advantage of delivering the treatment over a few days is that the amount of distracting elements (e.g. school, social life) are reduced and ERP can be the patients' primary focus during treatment. Previous trials of intensive treatment adhere to sessions of 90 min duration daily (e.g. Storch et al., 2007) or 50 min sessions delivered twice daily (e.g. Whiteside et al., 2014). The time limits of the standard sessions may potentially impede flexibility when conducting therapist-assisted ERP. Conducting exposures in multiple contexts, with variability (Craske, Treanor, Conway, Zbozinek, & Vervliet, 2014) and under supervision of a therapist (Abramowitz, 1996; Rosa-Alcázar et al., 2008) have been underscored as important features to improve the effect of treatment. Prolonged sessions permit greater flexibility and facilitate the application of such elements. It allows for numerous variations of therapist-assisted ERP and makes exposures across contexts (i.e. home, school, public places) more feasible. Prolonged exposure sessions has been successfully applied for other anxiety disorders in children and adolescents such as specific phobia (Davis, Ollendick, & Öst, 2012; Ollendick et al., 2009), social phobia (Donovan, Cobham, Waters, & Occhipinti, 2015), separation anxiety (Santucci & Ehrenreich-May, 2012), and panic disorder with agoraphobia (Gallo, Chan, Buzzella, Whitton, & Pincus, 2012). To our knowledge, the use of prolonged sessions in the treatment of adolescents with OCD has not previously been investigated.

CBT delivered to groups of adolescents with OCD has also shown promising results (Asbahr et al., 2005; Barrett, Healy-Farrell, & March, 2004). Group treatment provides the possibility to share and get feedback on own efforts in ERP tasks and it has been argued that the group setting increases the patient's treatment adherence, motivation and effort (e.g. Farrell, Waters, Milliner, & Ollendick, 2012). Barrett et al. (2004) found that adolescents receiving group CBT had larger reductions in other anxiety symptoms as compared to individual CBT. Their findings suggest that there might be additional benefits of group treatment, a possible explanation being the effect of peer normalization and support. Nevertheless, group treatment provides less one-to-one therapist contact than individual treatment and makes it more challenging

to individually tailor treatment and to conduct therapist-assisted ERP. Considering the benefits of both individual and group treatment, it is possible that treatment delivered in a group combined with one-to-one contact between patient and therapist during ERP, would increase the efficacy of treatment. This allows for greater flexibility when tailoring and carrying out ERP, while the therapeutic benefits of group treatment are preserved.

Our research group has demonstrated that a concentrated Exposure Treatment (cET) format [developed by the second and last author (GK and BH)] delivered in a group-setting yields promising results (Havnen, Hansen, Öst, & Kvale, 2014).[1] The treatment is delivered over four consecutive days with individually tailored and therapist-assisted ERP. After a thorough psychoeducation on Day 1, ERP is delivered Day 2 and 3 in prolonged sessions lasting a whole work day, with continued self-administered ERP tasks in the evening. On the last treatment day patients are taught strategies for maintaining the change and further self-administered ERP tasks for the next three weeks are planned. The treatment has demonstrated promising results in the treatment of adult OCD (Havnen et al., 2014; Havnen, Hansen, Öst, & Kvale, 2016). In the adult version, the treatment is delivered to groups of 5–6 patients with a patient-therapist ratio of 1:1. The treatment for adolescents has the same patient-therapist ratio, but includes parents, and is delivered to 2–3 patients simultaneously. Further, the psychoeducation is customized to adolescents and both a parent and a family session is conducted. The aim of the current paper is to evaluate the treatment effect of cET delivered to adolescents. We believe that the current study adds to the literature of pediatric OCD treatment both in terms of delivering therapy in an concentrated all-day format, and by the unique approach of delivering individual treatment to patients and parents (with a one-to-one contact between patient and therapist) in a group-setting.

2. Method

2.1. Participants

The treatment in the current study was part of standard clinical outpatient care at the OCD treatment unit, Haukeland University Hospital, Bergen, Norway, which is part of the general national health services. The unit serves OCD-patients younger than 18 years of age, and all OCD-patients in a catchment area of approximately 420,000 inhabitants are referred to this unit from local psychiatric clinics for children and adolescents. All patients fulfilling the DSM-IV/DSM-5 diagnosis (American Psychiatric Association, 1994) of OCD were offered treatment, except for patients who were suicidal, psychotic or in active substance abuse. Diagnoses were based on the administration of K-SADS-PL (Kaufman et al., 1997). Patients under 11 years of age, patients who were hospitalized and patients with comorbid mental retardation or pervasive developmental disorder were not offered cET, but standard weekly ERP (March & Mulle, 1998).

A total of 65 patients were referred. Of these, 22 were offered cET, 19 did not have OCD, and 12 had OCD but were offered individual treatment [outside age range (n=7), did not want group treatment (n=2), mental retardation (n=1), autism (n=1), hospitalized (n=1)]. 12 patients did not receive any treatment due to the following reasons: recovered (n=6), declined treatment (n=4), treatment postponed by patient (n=1), psychosis (n=1). The sample consisted of 15 males (68%) and 7 females (32%) in the age range 11–17 (M=13.3, SD=1.6). Seven of the patients had divorced parents and lived with one of their parents part-time or full time,

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[1] The cET manual is currently under translation to english.

and 15 of the adolescents lived with both their parents. All the treated patients were Caucasian (mother or father Scandinavian). At pre-treatment, the mean CY-BOCS score was 28.0 (SD=4.06). Two patients (9.1%) were classified with moderate OCD (16–23), 14 patients (63.6%) with severe OCD (24–31), and 6 patients (27.3%) with extreme OCD (32–40). Mean duration of OCD symptoms, as reported by patients and parents, was 2.2 years (SD=1.6) and 13 patients (59.1%) had previously received psychological treatment. Of these 9 (69%) reported having received ERP, and 4 (31%) had undergone other forms of psychotherapy.

Nine patients (40.9%) had comorbid disorders. Six patients (27.3%) had one comorbid diagnosis and three patients (13.6%) had two or more comorbid diagnoses. Comorbidity included depression (n=4) specific phobia (n=3), social phobia (n=2), adjustment disorder (n=1), Tourette's syndrome (n=1), and agoraphobia (n=1). Three patients (13.6%) currently received pharmacological treatment. Two of them were on SSRI medication and one was on a low dose antipsychotic medication due to tics.

2.2. Measures

Schedule for Affective Disorders and Schizophrenia for School-Age Children – Present and Lifetime Version (K-SADS-PL) (Kaufman et al., 1997). The K-SADS-PL is a clinician-administered, semi-structured diagnostic interview for DSM-IV diagnoses. It has good psychometric properties (Kaufman et al., 1997; Lauth et al., 2010) with 98% inter-rater reliability and test-retest reliability for anxiety disorders with a kappa coefficient of 0.80. The interview assesses current and lifetime psychopathology in children and adolescents, and was administered to determine principal and comorbid diagnoses. The interview was performed by one of the therapists at the OCD-unit and was administered to youth and parents separately.

Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS) (Scahill et al., 1997). The clinician-administered version of the CY-BOCS was used to assess obsessive-compulsive symptom severity. The interview yields severity scores for obsessions and compulsions based on five dimensions (time occupied by symptoms, interference, distress, resistance and degree of control over symptoms). The CY-BOCS is a widely used instrument with good internal consistency (Cronbach's α=0.90), test-retest reliability (intra class correlation=0.79) (Storch et al., 2004), and inter-rater reliability (intra class correlation=0.84) (Scahill et al., 1997). The internal consistency in the current sample was good (Cronbach's α=0.90).

Children's Depression Inventory (CDI) was used to assess depressive symptoms. The questionnaire has a total of 27 items each consisting of three statements in which the patient indicates which one best describes their own thoughts or feelings (e.g. "I am sometimes sad/I am often sad/I am always sad"). The statements correspond to a score of 0–2 which add up to a total severity score ranging from 0 to 54, where higher scores indicate more depression. The questionnaire is widely used in clinical and experimental research and has demonstrated strong psychometric properties (Kovacs, 1992). A high level of internal consistency was found for the CDI in the current sample (Cronbach's α=0.91).

The generalized anxiety disorder scale (GAD-7) (Spitzer, Kroenke, Williams, & Löwe, 2006) is a 7-item questionnaire developed to screen for generalized anxiety disorder. It has also been validated as a measure of anxiety in clinical samples as well as in the general population, and it performs well as a screening tool for other anxiety disorders such as social phobia or panic disorder (Kroenke, Spitzer, Williams, Monahan, & Löwe, 2007; Lowe et al., 2008). The seven items (e.g. "How often have you been bothered by feeling nervous, anxious, or on edge") are rated from 0 (not at all) to 3 (nearly every day) giving a total score range from 0 to 21.

Higher scores indicate more anxiety symptoms. The GAD-7 is a valid and reliable measure of anxiety for adults and adolescents (Lowe et al., 2008; Spitzer et al., 2006). Cronbach's α was 0.88 in the current sample.

Child OCD Impact Scale – Revised (COIS-R) (Piacentini, Peris, Bergman, Chang, & Jaffer, 2007) assesses OCD-specific functional impairment of children and adolescents at home, school, and socially. There are separate child and parent questionnaires each consisting of 33 items, in which higher scores indicate more severe functional impairment. Parents and patients are asked to rate how much the OCD has caused problems in various tasks (e.g. "leaving the house", "concentrating on his / her work"). The questions are scored on a 4-point Likert scale from 0 (not at all) to 3 (very much). The parent version has four subscales measuring impairment in four different areas; socially, school, daily living skills, and family / activities and the child version is divided into three subscales: socially, school, and family. Both the child- and parent forms have demonstrated good psychometric properties (Piacentini et al., 2007). The parent version in the current paper was rated by both parents, but due to a large amount of missing data (48%) in the fathers' ratings, analyses were performed on the mothers' ratings only. Both the mother and adolescent rating had good internal consistency (Cronbach's α=0.93; 0.91).

2.3. Procedure

2.3.1. Assessment

All 65 referred patients and their parents, met with a clinician for an initial screening session. In this session, an unstructured clinical interview aimed at assessing the presence of obsessions and / or compulsions was performed, a short psychoeducation about the mechanisms maintaining OCD-symptoms was provided, and motivation for treatment was addressed. If OCD symptoms were reported, pre-treatment assessment sessions were scheduled and self-report questionnaires (GAD-7, CDI, COIS) handed out, asking patients to return them at the next session. Assessment was carried out in 1–3 sessions. Information about the developmental history of the adolescent was collected and K-SADS-PL was administered to determine whether the patient fulfilled criteria for OCD and comorbid disorders. OCD severity was assessed through the clinician-administered interview CY-BOCS. The assessment was performed as part of routine clinical practice by therapists at the unit, with substantial experience in the use of the applied instruments. During the assessment, time was also spent on providing brief information about the principles of ERP. Post-treatment, and at three and six months follow-up the CY-BOCS interview was administered by an independent rater. This clinician was aware of the patients having received treatment, but had not been involved in the pre-treatment assessment or the treatment. Self-report questionnaires were handed out the last day of treatment, and collected at the post-treatment assessment occasion. At six months follow-up, questionnaires were sent and returned by mail.

2.4. Treatment

Treatment was delivered over four consecutive days and followed the cET program, developed by the Bergen OCD-team (see Havnen et al. (2014) and Havnen, Hansen, Haug, Prescott, and Kvale (2013)). According to this treatment format there is a therapist patient ratio of 1:1 and it can be delivered as both group and individual treatment. Since the treatment was developed for adults, certain modifications were made to customize it to adolescents. First, parents participated in the treatment so the groups had a total of 6–9 participants (2–3 patients and 4–6 parents). At least one parent had to be present all four days of treatment, but the participation of both parents was encouraged. Parents were

present during all parts of the treatment. However, in cases where the absence of parents augmented the effect of the ERP tasks, parents were given some "time off". Second, the language of the psychoeducation was adjusted to the cognitive level of the adolescents. Third, the treatment program for adolescents also included a parent session and a family session the first day.

2.4.1. Day 1

Patients and parents met with the therapists for three hours. Rules regarding confidentiality between members of the group were established and patients were encouraged to be supportive and to help each other. The aim of day 1 was to provide psychoeducation for patients and parents and to plan the ERP tasks for the following days.

The first hour was spent on psychoeducation in the group. Anxiety was explained as the body's alarm reaction; an adequate response when facing actual danger. In order to protect us, the threshold for eliciting the alarm is low and false alarms are frequently elicited. If we get scared of the alarm itself, and engage in anxiety reducing behavior we will signal to the brain that the alarm was appropriate, rather than false. As a consequence, the alarm will be elicited at a lower threshold in similar situations, and a vicious circle of sensitization and repetitive anxiety reduction will maintain and worsen OCD-symptoms. It was further explained that in order to break the vicious circle, we must actively behave in a way that is inconsistent with this pattern, through performing anxiety-provoking exposure tasks without carrying out rituals or other anxiety-reducing behavior.

It was underscored that the best strategy to get rid of their OCD was to seek out tasks that "the OCD disliked the most". Such tasks were considered efficient as they would exclude the necessity for training in a lot of different situations. It was emphasized that attempts of reducing anxiety during ERP would send ambiguous signals to the brain and the tasks would be less powerful. Instead the patients were encouraged to fully engage in ERP tasks without holding back and to consider anxiety and discomfort valuable remedies that should be treasured during treatment. Rather than "putting the brake on", they were encouraged to pretend to like the tasks. A demonstration of ERP performed while holding back in contrast to leaning in was carried out in front of the group. The patients were also informed that they would not be forced to do anything, but that the therapists would suggest useful ERP tasks and encourage them to carry these out. During the psychoeducation it was explained that whether they had previously fought the OCD on their own, or with the help of a therapist, it was important not to repeat previously committed mistakes. It was also explained that the therapists would help them to plan and carry out a winning strategy by individually tailoring their treatment and assisting them during ERP.

After the psychoeducation parents were given an individual session with one of the therapists. The main focus of the parent session was to externalize OCD by separating their child from the symptoms, and encouraging parents to help their child, and not his/her OCD. Parents were also encouraged to stop all forms of family accommodation such as participating in rituals or adjusting family routines to OCD symptoms. While parents had individual sessions the adolescents had a small-group session with one of the therapists and formulation of the treatment plan was initiated. The treatment plan was completed in the following family session, allowing for parents to comment on the tasks in case the adolescent had forgotten or avoided certain areas. The adolescents were also informed that in order to support them in the treatment process all previous family accommodation to OCD would have to cease. At the end of the first day the group met again for a summary and each patient presented their treatment plan to the other participants in the group.

2.4.2. Day 2

The second day the patients and parents met with the therapists for six hours. Before the therapist-assisted ERP started, patients and parents met in the group for a brief repetition of the psychoeducation. ERP lasted for 5 h interrupted by an hour long lunch break. ERP was carried out in various locations of relevance (home, school etc.) and there was emphasis on applying the exposures to all possible situations and locations. No hierarchies were created, rather patients were encouraged to start out with the most efficient exposure tasks while they applied full response prevention and refrained from any anxiety reducing behavior. During the therapist-assisted ERP, therapists constantly asked the patients about the degree to which they were holding back, they commented on any anxiety reducing behavior, such as bodily posture or facial expressions, and demonstrated how to perform the task without holding back. Patients were instructed to not merely refrain from ritualizing, but to actively choose to do the opposite of what the OCD wanted them to do whenever they were tempted to start ritualizing or avoid. During the last 30 min of day 2 patients and parents met in the group to summarize. The patients reported to the group what tasks they had performed and were asked how satisfied they were with their own effort. The other patients and the parents gave feedback to the participants in front of the group. Self-administered ERP tasks continued in the evening, and a detailed plan for these tasks, covering every hour, was prepared. Therapists were available for both adolescents and parents on the phone in the evening, and patients were instructed to send a text message to one of the therapists before going to bed, evaluating their own efforts. Maximum effort was defined as doing all ERP tasks without holding back.

2.4.3. Day 3

The third day the patients met for six hours. Patients and parents met in the group to summarize homework. The patients were asked to give a summary of their self-administered ERP tasks from the evening before and to evaluate their own effort, and feedback was provided by both therapists and participants. After a short repetition of the psychoeducation ERP continued. ERP lasted for five hours including an hour long lunch break. During the day, the adolescents were given increased responsibility of what tasks to perform. At the end of the day patients met again to summarize and parents were given an opportunity to give feedback to their adolescents in front of the group. A detailed plan for self-administered ERP tasks for the evening was prepared, and participants were instructed to evaluate their own effort in a text message to one of the therapists before going to bed.

2.4.4. Day 4

The fourth day the patients met for three hours in the group. Patients summarized their self-administered ERP from the evening before and evaluated their own effort in front of the group. The therapists and the other participants gave feedback. Psychoeducation focusing on relapse prevention was provided and daily self-administered ERP tasks for the next three weeks were planned. Participants were instructed to continue to send reports as text messages to the therapists for the next three weeks. The treatment achievements were summarized and the adolescents received a diploma for showing courage.

2.4.5. Post-treatment session

One week after treatment, patients and parents met with their therapist again for an individual session at the OCD-treatment unit. The aim of the session was to discuss current status of OCD-symptoms and ensure that patients continued to work on their ERP tasks. No ERP was conducted in this session. Post-treatment questionnaires were collected. The post-treatment CY-BOCS

interview was not performed in this session, but was performed by an independent rater during a separate appointment.

2.5. Therapists

A total of four therapists were involved in the treatment. All the therapists had hands-on training by the developers of the cET format (BH and GK) in addition to a comprehensive training as part of the Norwegian national OCD-implementation. Two licensed clinical psychologists with substantial ERP experience were in charge of the group sessions. One of them had participated in the intensive group treatment for adults with OCD (Havnen et al., 2014). The third therapist was an experienced clinical social worker with a master's degree in Child and Adolescent mental health and with several years of experience with CBT treatment for pediatric OCD and other anxiety disorders. The fourth therapists had basic training in CBT and substantial practice in ERP treatment.

2.6. Statistical analyses

All statistical analyses were performed with SPSS 22.0. The effect of the cET program on CY-BOCS, CDI and GAD-7 was analyzed using a linear mixed-effects model (LMM) for repeated measures. We used an unstructured covariance matrix with patient as random intercept and time as fixed effect (pre-treatment, post-treatment, 3- month follow-up and 6- month follow-up). To investigate whether previous treatment and number of additional sessions affected the overall results, previous treatment and the (time × previous treatment) interaction were also included as fixed effects in the model, and number of additional sessions was included as a covariate. Bonferroni corrections for multiple comparisons were used for comparisons of assessment points. Within-group effect sizes were calculated as $(M_{pre} - M_{post})/SD_{pre}$ (as recommended by Morris & DeShon, 2002).

All analyzes were carried out on an intention-to-treat basis. The linear mixed-effects model allows for patients with missing data to be included in the analyses. The procedure deals with missing data within the model and provides analyses based on available information through maximum likelihood estimation. Mixed models have shown to perform better than alternative methods of handling missing data (Siddiqui, 2011; Siddiqui, Hung, & O'Neill, 2009) and is recommended in studies with missing data where the aim is to make inferences of treatment effect (Burzykowski et al., 2010).

3. Results

3.1. Attrition

Two patients discontinued treatment. One patient was not motivated to start ERP, and he and his parents were offered individual sessions to work on his motivation. An independent CY-BOCS interview was performed one week after the scheduled treatment and his score was included in the intention-to-treat analyses. Another patient reported psychotic symptoms on day 2 and it was decided that further assessment and treatment of psychotic symptoms should be prioritized over OCD-treatment. Post-treatment and follow-up measures were not collected for this patient. CY-BOCS scores were obtained for 21 patients at post-treatment and 19 patients at three- and six-months follow-up.

3.2. Primary outcome measure

Table 1 displays estimated means and standard deviations for

Table 1
Estimated means, standard deviations and effect sizes (Cohen's d) for CY-BOCS (intention-to-treat).

	M	(SD)	ES
Pre-treatment	28.00	(4.06)	
Post-treatment	9.04	(4.98)	4.67[a]
3-month follow-up	7.80	(5.84)	4.98[b]
6-month follow-up	6.87	(6.72)	5.20[c]

[a] Effect size from pre- to post-treatment.
[b] Effect size from pre-treatment to 3-month follow-up.
[c] Effect size from pre-treatment to 6-month follow-up.

CY-BOCS as well as within-group effect sizes. The linear mixed model revealed a significant effect of time; $F(3,19.7) = 91.54$, $p < 0.001$. Pairwise comparisons showed a significant reduction on CY-BOCS scores from pre- to post-treatment ($p < 0.001$) and from pre-treatment to 3- and 6-month follow-up ($p < 0.001$), and there were large effect sizes at all assessment points after treatment. There were no significant differences in CY-BOCS scores between post-treatment and 3- or 6-month follow-up ($p = 1$; $p = .96$), and there were no significant changes between 3- and 6-month follow-up ($p = 1$). There was no significant difference between patients who had previously received ERP and patients who had not; neither at pre-treatment ($M = 26.78$, $SD = 4.38$; $M = 28.85$, $SD = 3.76$; $t(20) = 1.19$, $p = 0.25$), nor at post-treatment ($M = 7.67$, $SD = 4.18$; $M = 10.08$, $SD = 5.65$; $t(20) = 1.09$, $p = 0.29$). Further, the time × previous treatment interaction was not significant: $F(3, 19.0) = 2.13$, $p = 0.13$. However, patients who had previously gone through ERP had significantly lower scores than patients with no such experience; both at 3-month follow-up ($M = 4.44$, $SD = 2.79$; $M = 10.72$, $SD = 6.74$; $t(20) = 2.63$, $p = 0.02$) and at 6-month follow-up ($M = 2.56$, $SD = 2.51$; $M = 10.62$, $SD = 7.55$; $t(20) = 3.07$, $p = 0.01$).

3.3. Response and remission

CY-BOCS scores were used to determine response and remission. According to Jacobson and Truax (1991) clinically significant change is achieved if a patient has a reliable change in scores (response) and the post scores are within the non-dysfunctional range (remission). We followed international consensus criteria from Mataix-Cols et al. (2016). Accordingly, response was defined as a reduction of at least 35% on the CY-BOCS, and remission as a score of 12 or below. In the current sample, 91% (n=20) were responders post-treatment and 77% (n=17) both at 3- and 6-month follow-up. Remission rates were 72.7% (n=16) at post and 3-month follow-up and 68% (n=15) at 6-month follow-up. Patients who achieved both response and remission were classified as recovered and patients who achieved response, but had a total score on the CY-BOCS above 12 were classified as improved. If patients had a decrease of less than 35% on CY-BOCS, they were classified as unchanged.

Table 2 presents recovery rates at post-treatment and follow-up for the individual patients. At post-treatment 16 patients (73%) were recovered, 4 (18%) improved, and 2 (9%) unchanged. The corresponding results at follow-up were 15 (68%), 2 (9%), and 5 (23%), respectively. Of the 16 patients that were recovered at post-treatment, 12 (75%) were still recovered at follow-up, whereas 4 (25%) deteriorated (1 to improved and 3 to unchanged). One of the patients that changed status from recovered to no change was unavailable for CY-BOCS interview at follow-up and was therefore categorized as unchanged. Of the 4 patients who were improved post-treatment, 1 (25%) remained improved at follow-up, whereas 3 (75%) continued to improve and were recovered at follow-up. The two (9%) patients who were unchanged post-treatment were still classified as unchanged at follow-up. These two patients did

Table 2
Number of patients recovered, improved and unchanged and comparison of improvement status at post-treatment and 6-month follow-up (intention-to-treat).

Post-treatment	6-month follow-up			Total
	Recovered[a]	Improved[b]	Unchanged[c]	
Recovered[a]	12	1	3	16
Improved[b]	3	1	0	4
Unchanged[c]	0	0	2	2
Total	15	2	5	22

[a] Recovered: Patients with $\geq$ 35% reduction on CY-BOCS and total score $\leq$ 12.
[b] Improved: Patients with > 35% reduction on CY-BOCS and a total score > 12.
[c] Unchanged: Patients with < 35% reduction on CY-BOCS.

not complete treatment and follow-up data were not collected.

3.4. Additional sessions

In addition to the post-treatment session, three patients received additional sessions. One of the patients received five additional 60 min sessions within three months after treatment; ERP was conducted in three of the sessions and psychoeducation and counseling regarding OCD-symptoms was provided in the remaining two sessions. Two patients received two additional sessions within six months after treatment. The content of the sessions were psychoeducation and motivational work for further self-administered ERP tasks. The number of additional sessions was included as a covariate in the LMM analyses, and no significant effect was found: $F(3, 19)=1.52$, $p=0.24$. To further investigate whether additional sessions affected the overall CY-BOCS scores, we did separate LMM analyses on the CY-BOCS for patients not receiving additional sessions (n=19). The effect of time was $F(3, 16.1)=94.77$, $p < 0.001$, which was very similar to that found in the ITT analyses, and the estimated means and standard deviations at three ($M=6.75$, $SD=5.18$) and six-month follow-up ($M=5.62$, $SD=5.55$) did not differ significantly from the corresponding time points of the ITT analyses (Table 1) ($t(39)=0.60$, $p=0.55$; $t(39)=0.64$, $p=0.52$).

3.5. Secondary outcomes

Estimated means and standard deviations for GAD-7 and CDI are presented in Table 3. LMM analyses on GAD-7 scores yielded a significant effect of time, $F(2, 11.7)=6.59$, $p=.01$. Pairwise comparisons showed a significant reduction from pre-treatment to post-treatment ($p=.05$) and from pre-treatment to six-month follow-up ($p=.02$). There was a significant effect of time on CDI-scores, $F(2,11.7)=7.42$, $p=.01$), and pairwise comparisons showed a significant reduction from pre to post-treatment ($p=.01$) and from pre to 6 month follow-up ($p=0.02$). There were no significant differences on either GAD-7 ($p=.90$) or CDI ($p=.59$) between post-treatment and six month follow-up.

3.6. Functional impairment

COIS-R (Table 3) was analyzed by linear mixed models which yielded a significant effect of time on the total score of both the parent ($F(2, 12.4)=10.31$, $p=.002$) and child rating ($F(2, 13.8)=8.75$, $p=.004$). Pairwise comparisons showed that there was a significant reduction from pre-treatment to post-treatment ($p=.004$) and from pre-treatment to 6-month follow-up ($p=.001$) on the parent rated COIS-R total score. On the child rated total score, the reduction from pre- to post-treatment was not significant ($p=.09$); however, from pre-treatment to six-month

Table 3
Estimated means, standard deviations and effect sizes (Cohen's d) on GAD-7, CDI and COIS-R (parent- and child-rated): intention-to-treat.

		M	(SD)	ES
GAD-7				
	Pretreatment	10.46	(4.81)	
	Posttreatment	6.59	(5.39)	0.76[a]
	6-month FU	4.70	(4.44)	1.24[b]
CDI				
	Pretreatment	14.96	(9.65)	
	Posttreatment	10.10	(9.04)	0.52[a]
	6-month FU	7.47	(7.39)	0.87[b]
COIS-R parent-rated				
	Pretreatment	32.70	(19.16)	
	Posttreatment	12.25	(9.73)	1.35[a]
	6-month FU	10.07	(12.18)	1.41[b]
COIS-R child-rated				
	Pretreatment	21.52	(11.26)	
	Posttreatment	12.44	(12.80)	0.75[a]
	6-month FU	7.93	(10.38)	1.25[b]

Abbreviations: GAD-7=The generalized anxiety disorder scale; CDI=Children's Depression Inventory; COIS-R: Child Obsessive-Compulsive Impairment Scale Revised.
[a] Effect size from pre- to post-treatment.
[b] Effect size from pre-treatment to 6-months follow-up.

follow up, the reduction was statistically significant ($p = 0.002$). Parents rated OCD-related impairment more severe than did the children pre-treatment ($t(42)=2.36$, $p=.02$), but at post-treatment and six-month follow-up, there were no significant differences between parent- and child ratings ($t(42)=0.06$. $p=0.96$; $t(42)=0.63$, $p=0.53$). Linear mixed model analyses on the subscales on the COIS-R showed that there was a significant effect of time on all four subscales on the parent version (school: $F(2, 16.3)=6.07$, $p=.01$; social: $F(2, 11.6)=10.55$, $p=.002$), daily living skills: $F(2, 14.16)=6.38$, $p=.011$, family / activities: $F(2, 11.9)=10.45$, $p=.002$), whereas on the child version there was a significant reduction on the subscales school ($F(2, 13.2)=4.47$, $p=.033$) and activities ($F(2, 14.7)=6.53$, $p=.009$) but no significant change on the subscale social impairment($F(2, 9.9)=2.97$, $p=.097$).

4. Discussion

The present article describes an effectiveness study on concentrated ERP treatment delivered over four consecutive days to adolescents with OCD. Previous research has demonstrated that OCD treatment for adolescents can be successfully delivered within only five days (Whiteside & Jacobsen, 2010; Whiteside et al., 2014), and the current study adds further support to the efficacy of intensive treatments of adolescents with OCD. An important strength of the current study is the fact that the treatment was delivered in an ordinary outpatient clinical setting to a representative sample of treatment-seeking adolescents with OCD. The high ecological validity enhances the clinical relevance and generalizability of our findings. Another strength is that 41% of the patients had gone through ERP previously without experiencing clinically significant improvement. They improved after cET to the same extent as the patients who never had obtained any behavioral treatment, and had significantly less OCD symptoms at follow-up.

As for adults (Havnen et al., 2014; Havnen et al., 2016), the results demonstrate that concentrated Exposure Therapy (cET) is a promising treatment approach also for adolescents. In fact, 91% of the patients were responders, and 73% experienced a remission of symptoms after treatment. The results are encouraging considering the fact that approximately 70% of OCD patients respond to

Table 4
Means, standard deviations and effect sizes (Cohens *d*) on CY-BOCS from studies on brief and intensive CBT for OCD.

Study	M (SD)						ES	
	Pre-treatment		Post-treatment		Follow-up		Post-treatment	Follow-up
Storch et al. (2007)	25.9	(5.6)	9.5	(6.9)	10.2	(8.7)	2.93	2.80
Merlo et al. (2010)	27.4	(11.8)	12.4	(7.9)	–		1.27	–
Bolton et al. (2011)	22.0	(6.9)	13.0	(9.6)	11.0	(9.1)	1.30	1.59
Storch et al. (2010)	26.9	(4.7)	12.4	(7.3)	12.4	(7.9)	3.09	3.09
Whiteside and Jacobsen (2010)	28.4	(4.6)	17.4	(5.9)	11.5	(7.3)	2.39	3.67
Whiteside et al. (2014)	25.0	(5.6)	15.7	(5.2)	10.1	(4.8)	1.66	2.66
Present study	28.0	(4.1)	9.0	(5.0)	6.9	(6.7)	4.67	5.20

Note: Effect sizes were calculated from pre-treatment to post-treatment and from pre-treatment to follow-up using the following formula: (Mpre–Mpost)/SD pre (as recommended by Morris and DeShon (2002)).

CBT and only about half of patients achieves remission (Öst et al., 2016). OCD-symptoms were substantially reduced after four days (ES =4.67), and the improvements were maintained at both three- and six month follow-up, with effect sizes of 4.98 and 5.20, respectively. Patients also demonstrated substantial improvement in OCD-related impairment and in symptoms of anxiety and depression at post-treatment and at follow-up. A comparison with previous studies of brief and intensive treatments (Table 4) indicates that this treatment produced larger effect sizes in OCD-symptoms as compared to treatments delivered over three weeks (Merlo et al., 2010; Storch et al., 2007; Storch et al., 2010) and treatments with a similar time span (Whiteside & Jacobsen, 2010; Whiteside et al., 2014). At pre-treatment the patients had high levels of symptom severity compared to the average severity in OCD-trials (24.6) (Öst et al., 2016). Still, the low scores on the CY-BOCS at post-treatment and follow-up, as compared to similar studies (Table 4), indicates that cET may be effective even for patients with severe OCD.

The promising findings suggest that the treatment may have beneficial novel aspects as compared to previously described intensive treatments. The study was not designed to investigate the contribution of the treatment variables on outcome, and assertions about the relative importance of different treatment features cannot be made. Nevertheless, the mode of delivering ERP distinguishes cET from both standard and intensive ERP manuals in various aspects, and the combination of the distinct features may have contributed to the beneficial outcome. For instance, one of the key concepts of cET is extended therapist-assisted ERP sessions which makes multiple exposures in a number of relevant natural settings more feasible. It allows for ERP in the patients' home, school, or other relevant contexts, and various ERP tasks can be conducted in a day. Another possible advantage of cET and other short-term formats (Whiteside & Jacobsen, 2010; Whiteside et al., 2014) is that when initiating treatment at the first day, patients are aware that major changes can be obtained during the next days, and this may increase motivation for starting ERP. Another motivating factor may lie in the fact that they rapidly conquer the most anxiety provoking ERP tasks. The participants' engagement when performing ERP may also be enhanced in the concentrated format, as the treatment becomes the primary focus for four whole days, with planned exposure tasks covering all time slots. The emphasized focus in cET on how to perform ERP might also be an important factor which facilitates change. During ERP therapists constantly assessed the patients' effort to actively increase anxiety ("do the opposite of what OCD wants") without precautions ("pretend to like it"/"not put the brake on") and not merely refrain from rituals. This principle is applied throughout the treatment and patients are trained to recognize when anxiety arises, and to value any bursts of anxiety as an opportunity to practice. Rather than focusing on enduring discomfort until it decreases, there is emphasized focus on the patients' active choice and effort to increase anxiety whenever the opportunity occurs. The fact that the patients evaluate their own effort in front of the group, may enhance the motivation for increased effort during ERP.

Finally, the numerous sequential hours spent with the adolescent and his or her parents might enhance the working alliance and provides a unique opportunity for the therapist to observe and intervene regarding any accommodating or reassuring behavior of parents. Finally, the treatment was delivered to 2–3 patients simultaneously and 4–6 parents participated in the treatment. Although the number of patients in the group was small, the patients possibly experienced peer normalization and support from both the participants and the parents in the group, which may have enhanced treatment motivation.

It is encouraging that the gains achieved in treatment were maintained at six- month follow-up. The emphasized focus on applying ERP to all relevant settings may have had a positive effect in this respect. Another possible contributor to the maintenance of treatment gains is the three week period of continued self-administered ERP, aimed at integrating the treatment principles to everyday life. Further, the fact that the psychoeducation was also delivered to the parents, the focus on stopping family accommodation to OCD, and the presence of the parents during the therapist-assisted prolonged sessions may have enhanced the parents' integration of the treatment rationale and facilitated maintenance of the treatment gains at home.

The participants also had a significant decrease in OCD-related impairment at post-treatment and at six-month follow-up as reported by parents. At pre-treatment, parents reported more severe functional impairment than their children, and the lower adolescent pre-treatment scores may explain why the adolescent-reported decrease from pre- to post-treatment did not reach significance. However, the adolescents reported a significant decrease in OCD-related impairment from pre-treatment to follow-up. Although there was a discrepancy between parent- and child reports at pre-treatment, both adolescents and parents reported equally low levels of impairment at post-treatment and follow-up. The findings are encouraging as it may be expected that improvements in functional impairment at school, socially, in the family and in the adolescents' daily living skills would require treatment over time. However, the RCT conducted by Storch et al. (2007) indicated that intensive treatment may produce larger reductions in OCD-related impairment compared to weekly CBT. The current study supports the findings of Storch et al. (2007), as our results demonstrated a significant decrease in OCD-related functional impairment after the concentrated treatment.

The current study has limitations. Methodological limitations include the lack of a comparison condition, the small sample size and the fact that the assessment of secondary measures used self-report questionnaires only. Furthermore, the generalizability of our findings to more ethnically diverse cultures is uncertain, as the

current sample consisted of Caucasian (Norwegian) patients only. Also, the fact that nine of the patients had previous experience with ERP, may have affected their outcome, and we did find lower CY-BOCS scores at follow-up for these patients. Still, it should be underscored that our results did not reveal a significant interaction effect between patients with and without previous treatment experience, suggesting that previous treatment experience did not affect the overall results significantly. Another possible limitation in the current study is the additional sessions delivered to three of the patients. The deviation from the standardized protocol was considered necessary in order to provide the patients sound treatment. Nevertheless, it may have biased the follow-up results, as the extra sessions might have prevented a potential relapse. The problem is somewhat attenuated by the fact that only one of the patients conducted ERP in the additional session. Further, our statistical analyses demonstrated that when removing the three patients with additional sessions from the analyses, it did not have a significant impact on the overall result. A last limitation that should be pointed out is the feasibility for therapists and families to organize and participate in an all-day treatment during four consecutive days. The standard procedure in outpatient clinics is to deliver treatment in weekly sessions. The cET applies an all-day format and requires willingness and effort from both clinical leadership and therapists in order to organize and prioritize the treatment. Consequently, the implementation of cET depends upon highly motivated therapists with a flexible attitude towards time schedules. For patients and parents the all-day presence might be difficult to organize within school, work and family schedules. However, the families in our study communicated high satisfaction with the all-day format, and expressed that they preferred to take four days off and fully concentrate on the treatment, rather than attending weekly sessions for a larger period of time. Despite the limitations, the findings are promising, and calls for a systematic replication to further elaborate on the feasibility and effectiveness of cET delivered to adolescents. Future studies should also include a control condition in randomized designs in order to further examine the effect of the concentrated treatment.

The current study is the first to evaluate the effectiveness of cET delivered to adolescents, and the findings from this open trial on a highly relevant sample are promising.

It is encouraging that after only four days of concentrated treatment a significant reduction of OCD-symptoms was observed. The treatment gains probably had an immediate positive impact on the adolescents' lives. The quick reduction of symptoms may even have had long-term implications for the patients, as enduring OCD-symptoms and impairments potentially could impede a normal developmental trajectory of adolescence.

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