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Imagery rescripting as an adjunct clinical intervention for obsessive compulsive disorder

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ABSTRACT

Novel adjunct psychological techniques are needed for the large number of patients with OCD who remain symptomatic despite the effective implementation of standard evidence-based treatments. The aim of this study was to examine the efficacy of imagery rescripting (ImRs), an established technique for the treatment of traumatic stress, as a treatment for OCD symptoms that were not responsive to standard exposure and response prevention (ERP). Thirteen patients completed a baseline assessment followed by a control intervention that involved discussion of an aversive memory linked with the onset of OCD symptoms. Treatment then involved provision of 1–6 ImRs sessions; ImRs continued until patients achieved a 35% reduction in symptoms, as measured using the Y-BOCS one week after each treatment. Patients were followed up one and three months after the treatment completion. Twelve out of thirteen patients achieved ≥35% improvement in Y-BOCS. Of these patients, six required only a single ImRs session, while the remaining six patients required 2–5 ImRs sessions to achieve a clinically significant change. Lower baseline Y-BOCS predicted improvement after a single treatment session. ImRs may be a useful adjunct for treatment-resistant OCD associated with past aversive experiences, especially when symptomatology remains within the mild-moderate range after standard ERP.

1. Introduction

Obsessive Compulsive Disorder (OCD) is a severe and often debilitating condition (Markarian et al., 2010). The World Health Organization (WHO, 1996) has ranked OCD as one of the ten leading causes of diminished quality of life in the world for individuals aged between 15–44 years. Fortunately, the understanding of OCD has improved substantially over the past few decades, leading to the development of effective treatments that lead to symptom relief and associated improvements in functioning for many sufferers. Exposure and Response Prevention (ERP), a specific type of cognitive-behavioral therapy (CBT), is now widely considered to be a first-line treatment option for OCD; its efficacy is supported by multiple studies and by meta-analysis (e.g. Eddy, Dutra, Bradley, & Westen, 2004). ERP is commonly combined with medication; between 50–60% of sufferers can manage their symptoms effectively with single or combined treatment (Abramowitz, 2006). However, despite the effective implementation of evidence-based treatments, approximately half of OCD sufferers continue to experience significant symptoms. Novel adjunct treatments are desperately needed for these treatment-resistant patients.

There has been a surge in recent research into innovative methods of engaging emotions to achieve a deeper level of therapeutic change, such as the incorporation of imagery techniques into existing cognitive behavior therapy approaches (Thoma & McKay, 2015). However, there has been a relative paucity of such work in the treatment of OCD. While OCD is not typically thought of as tightly linked to past trauma in the way that, for example, post-traumatic stress disorder (PTSD) is, there is increasing evidence that past aversive events can play an important role in symptom development, maintenance, or phenomenology. Several studies have described intrusive imagery in OCD that develops following aversive events (e.g. Veale, Page, Woodward, & Salkovskis, 2015; Speckens, Hackman, Ehlers, & Cuthbert, 2007; Coles, Pietrefesa, Schofield, & Cook, 2008). In one of the few studies that systematically investigated obsessive images in OCD, 81% of patients reported intrusive mental images (Speckens et al., 2007); of these, 79% were either memories of an aversive event or were associated with such memories. These findings highlight the possible role of aversive experiences in the development or maintenance of OCD. This in turn raises the possibility that augmentation of standard ERP with psychological treatments that target aversive event-associated imagery may enhance outcomes in some individuals with treatment resistant OCD (e.g. Lipton, Brewin, Linke, & Halperin, 2010).

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Imagery rescripting (ImRs) is a psychotherapeutic technique that targets clearly identified memories of past aversive or traumatic experiences that are related to present problems, by imagining that the sequence of events is modified in a more desired direction that better matches an individual's emotional needs (Arntz & Weeterman, 1999; Arntz, 2011). The mechanisms by which ImRs contributes to therapeutic change are still being investigated. One leading hypothesis is that it produces a change in the meaning associated with an emotional memory and associated images, thereby modifying the emotions associated with the related problems. This relates to the concept from learning theory of "unconditioned stimulus (US) revaluation" (Arntz, 2015). It is proposed that new information is incorporated into the representation of an inherently emotionally charged memory, the US, which in this case is the traumatic/aversive event itself. This new information may change the dysfunctional meanings associated with the trauma/aversive memory. If this memory rescripting is successful, then on future occasions when the aversive memory is triggered, it will no longer produce the same dysfunctional responses, such as negative affect or expectations of a reoccurrence of previous trauma.

ImRs has been investigated across a wide range of psychological disorders over the past decade. In a recent meta-analysis of 19 trials of ImRs across a range of conditions, Morina, Lancee, and Arntz (2017)) concluded that ImRs was largely effective in decreasing psychological symptoms associated with aversive memories from pre-post treatment, and at follow-up. These trials used between 1–16 ImRs sessions, with a mean of 4.5 sessions. ImRs has been found to be effective as either a stand alone treatment or an adjunctive technique for social phobia (e.g. Nilsson, Lundh, & Viborg, 2012; Wild, Hackman, & Clark, 2008); simple phobia (Hunt & Fenton, 2007); depression (e.g. Brewin et al., 2009; Wheatley et al., 2007); personality disorders (e.g. Arntz & Van Genderen, 2009; Giesen-Bloo et al., 2006; Arntz, 2011); PTSD (e.g. Ehlers, Clark, Hackmann, McManus, & Fenell, 2005; Grunert, Weis, Smucker, & Christianson, 2007; Raabe, Ehring, Marquenie, Olff, & Kindt, 2015); bulimia nervosa (e.g. Cooper, Todd, & Tunrer, 2007); body dysmorphic disorder (Ritter & Stangier, 2016; Willson, Veale, & Freeston, 2016) and nightmares (e.g. Davis & Wright, 2005; Krakow et al., 2001).

Despite this growing research base demonstrating the efficacy of ImRs in a variety of psychological disorders, we are aware of only one published study that has investigated the use of ImRs in the treatment of OCD (Veale et al., 2015). Veale and colleagues described a case series of 12 individuals diagnosed with OCD who remained symptomatic despite at least one previous trial of ERP. In these patients, Veale et al. identified an aversive OCD-related image that was associated with a past aversive experience. They first administered a control intervention that entailed talking about the image, but no rescripting. They then monitored OCD symptoms before and after a single session of ImRs, and over a three-month follow-up period. 7 out of 12 participants showed clinically significant change, as measured by the Yale-Brown Obsessive Compulsive Scale (Y-BOCS), after this single ImRs session. This change was maintained at the three-month follow-up. Two of these clients also achieved such a marked reduction in OCD symptoms that they achieved asymptomatic criterion for OCD.

These promising initial findings call out for replication and extension. Veale et al. (2015) achieved remarkable success with a single ImRs session; but Morina et al. (2017) note in their meta-analysis across disorders that effect size is associated with the number of ImRs sessions, suggesting that even better results might be achieved with more sessions.

The present study aims to further the research into the use of ImRs as an adjunct treatment for treatment resistant OCD. We used a similar methodology to that successfully employed in Veale et al. (2015), so that our results would be comparable to their initial work. However, whereas this previous work used a single session of ImRs, we allowed the option of using several ImRs sessions, when OCD symptoms persisted after the first. This allowed us to explore the potential application of repeated ImRs in a clinical setting. We hypothesized that the use of ImRs as an adjunct to ERP would result in a decrease in OCD symptoms reported on the Y-BOCS, and that the number of ImRs sessions required would vary based on individual therapeutic needs. Therefore, each patient was offered between 1–6 ImRs sessions; treatment continued until a clinically significant change was reported or clients became asymptomatic, as determined by post-treatment reductions in Y-BOCS scores.

2. Method

2.1. Design

We investigated the efficacy of 1–6 ImRs sessions in adults with OCD who experienced intrusive distressing images and continued to be symptomatic despite an adequate course of ERP. We employed A-B-C-D single case experimental design with one and three-month follow-up. Following initial assessment (A), subjects underwent a control intervention with randomized timing (detailed below; B), followed by 1–6 ImRs sessions (C). The precise timing of the ImRs sessions was variable, depending on appointment waiting times at the clinic. The primary measure of symptom severity was the Y-BOCS (Goodman et al., 1989), which was collected at baseline, after the control session, after each ImRs session, within one week of the final ImRs session, and at 1- and 3-month follow-up. No additional treatment was provided between the end of ImRs and the 3-month follow-up time point.

We additionally collected a number of secondary and process measures for exploratory analysis, at baseline, post-control, post-ImRs, and at 1- and 3-month follow-up. At baseline, patients were asked to identify a past aversive experience that they associated with a core intrusive OCD image or thought (detailed below). At each time point, they rated on a scale from 0 to 100% their belief in the meaning they ascribed to this aversive event, the vividness and distress associated with the image of the aversive event, and the frequency with which the image occurred in the preceding week. Additional secondary outcome measures, detailed below, were collected at the same time points. In a subset of patients, (8 of 13), all secondary outcomes were collected after each ImRs session.

All procedures were reviewed and approved by the Institutional Review Board (IRB) of Yale University. All patients provided informed consent and reviewed and signed an IRB-approved informed consent before any study procedures were initiated.

2.2. Participants

Thirteen patients seeking psychotherapy for OCD at the Perth OCD Clinic, a private practice in Western Australia, were identified during initial assessment or after ERP treatment as having aversive intrusive images associated with their OCD. Patient demographics and treatment history are outlined in Table 1. Patients were invited to participate in the study if they had completed at least one previous ERP trial (defined as a minimum of 13–20 ERP and CBT sessions, but not formally assessed for quality) at this clinic or elsewhere and remained symptomatic, as defined by a Y-BOCS score of $\geq$16. This number of sessions delivered weekly or twice weekly is typically considered to provide an adequate duration of an ERP trial (Gershkovich, Wheaton, & Simpson, 2017). Primary and comorbid diagnoses were confirmed using the MINI (Sheehan et al., 1998). A semi-structured interview developed by Speckens et al. (2007) was used to identify aversive memories and intrusive images that were considered by both the therapist and patient to be emotionally linked to memories of past aversive events. The interview enquires about the features of the intrusive images, the context in which they occur, the associated emotion that the images arouse, the associated degree of distress, the meaning the patient attached to the images, and any associated memories.

Inclusion and exclusion criteria were: (1) A primary diagnosis of

Table 1
Patient demographics and clinical characteristics.

Patient	Age	Gender	Co-morbidity	Current medication	Previous ERP trials	Age at OCD onset	Primary OCD symptoms
1	61	M	MDE	–	1	6	Perfectionism, checking for mistakes, re-reading
2	62	F	BDD	citalopram 20 mg; clonazepam 1 mg,	2	9	Perfectionism, mental and physical checking of no harm caused to others; checking some parts of body
3	41	F	Dysthymia	–	1	8	Repeating routine activities; checking no harm happened to others
4	55	M	GAD	escitalopram 20 mg	2	7	Perfectionism; relationship obsessions
5	48	F	Dysthymia	venlafaxine 300 mg; clonazepam 0.25 mg	2	5	Perfectionism, postnatal obsessions
6	23	M	–	escitalopram 10 mg	2	5	Contamination
7	38	M	–	fluvoxamine 100 mg	2	23	Sexual obsessions that involve children; forbidden sexual thoughts about infidelity
8	29	M	Dysthymia	sertraline 150 mg	1	36	Unwanted sexual thoughts
9	64	F	MDE	fluvoxamine 200 mg	2	10	Fear of violent images
10	22	F	–	duloxetine 60 mg	1	16	Relationship obsessions
11	34	M	–	–	3	17	Fear of harming others because of not being careful enough
12	24	F	Dysthymia	citalopram 20 mg	1	18	Perfectionism, checking that did not make mistakes
13	24	F	GAD	–	1	13	Contamination; Fear of contaminating others.

OCD, defined by DSM-V (American Psychiatric Association, 2013) established by a doctoral level Clinical Psychologist at interview and confirmed by the MINI (Sheehan et al., 1998); (2) a Y-BOCS (Goodman et al., 1989) score of at least 16 at baseline assessment; (3) aged 18–70; (4) medication free or no changes in medication in the preceding two months before and throughout the study; (5) intrusive imagery associated with OCD and considered by the patient to be linked to memories of aversive events; (6) no evidence of any physical or medical conditions underlying anxiety; (7) no evidence of psychotic or organic illness; (8) no active substance use or alcohol abuse; (9), no active suicidality; and (10) no concurrent additional psychotherapy.

2.3. Measures

Yale-Brown Obsessive-Compulsive Scale (Y-BOCS; Goodman et al., 1989). The Y-BOCS is a semi-structured, clinician-administered interview designed to rate the severity of OCD symptoms and the response to treatment. The scale is composed of 10 items, each rated on a 5-point scale, ranging from 0 (not at all) to 4 (extremely), yielding a total score range from 0-40. The Y-BOCS is widely considered to be the 'gold standard' in OCD treatment outcome research and has high internal consistency ($\alpha = 0.91$) and sound psychometric properties (Taylor, 1995).

Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). The BDI is a 21-item scale used to assess a patient's current depressive symptomology. Each item is scored on a 4-point scale, from 0 (indicating least intensity) to 3 (indicating highest intensity), with a maximum possible score of 63. The BDI has high internal consistency ($\alpha = 0.89$, Beck, Steer, Ball, & Ranieri, 1996) and validity (Beck et al., 1988).

Beck Anxiety Inventory (BAI; Beck & Steer, 1993). The BAI is a 21-item self-report measure used to assess anxiety symptoms in the past week. Items are scored from 0 (not at all) to 3 (severely), providing a score range of 0-63. The BAI has high internal consistency ($\alpha = 0.94$; Fydrich, Dowdall, & Chambless, 1992) as well as good test-retest reliability and concurrent validity (Beck, Brown, Epstein, & Steer, 1988)

Obsessive Compulsive Inventory – (OCI; Foa, Kozak, Salkovskis, Coles, & Amir, 1998). The OCI is a self-report scale for OCD symptoms, composed of 42 items. Items are scored on a 5-point scale, ranging from 0 (not at all) to 4 (extremely). The distress-only version of the OCI was used in the present study and consists of seven subscales including washing, ordering, obsessions, hoarding, checking, doubting and neutralizing. The subscale scores add up to a range between 0 and 168. The OCI has been found to possess high internal reliability ($\alpha = 0.92$; Foa et al.)

Responsibility Interpretations Questionnaire (RIQ; Salkovskis et al., 2000). The RIQ was designed to assess the way patients interpret intrusive thoughts about potential harm. Patients are asked to specify up to 5 intrusions experienced in the past two weeks to provide ratings on. The current study used the belief in negative/high responsibility interpretations only version of the RIQ, which is composed of 16 items rated for degree of belief ranging from 0 (not at all) to 100 (completely convinced) to determine an average rating. High internal consistency of $\alpha = 0.92$ has been reported for this subscale (Salkovskis et al., 2000).

Obsessive Beliefs Questionnaire (OBQ; Obsessive Compulsive Cognitions Working Group, 2005). The OBQ is a 44-item self-report questionnaire that assesses beliefs associated with OCD. Each item is scored on a 7-point scale, ranging from 1 (disagree very much) to 7 (agree very much), with higher scores denoting a greater degree of acceptance of dysfunctional beliefs associated with OCD. The OBQ-44 consists of three subscales derived from a factor analytic review from the original OBQ-87. These subscales include: responsibility and threat estimation, perfectionism and intolerance for uncertainty, and importance and control of thoughts. High internal consistency of $\alpha = 0.89$-0.95 and convergent validity has been reported for the scale (OCCWG, 2005).

2.4. Procedure

Patients who had previously completed at least one previous trial of ERP and continued to report a Y-BOCS score of at least 16, indicating at least moderate persisting symptomatology, were invited to participate in the current study. At study baseline (A), OCD diagnosis was confirmed using the MINI, and the presence of intrusive imagery was identified through use of the semi-structured interview developed by Speckens et al. (2007). Patients were first underwent a control intervention (B), randomized to a commencement point of either 4, 7, 11 or 14 days. Y-BOCS and other ratings were collected immediately before the control intervention. During the control intervention, the aversive memory identified was discussed in a single session. Patients were asked to describe the aversive memory with their eyes closed in a detailed frame-by-frame account with no attempt to modify the context or change the meaning associated with the memory.

Following the control intervention, patients entered the ImRs phase (C). The first ImRs intervention session was scheduled based on appointment waiting times and corresponding patient availability from 5 to 21 days after the control intervention. Y-BOCS and other ratings were collected immediately prior to each ImRs intervention session. All patients received a first ImRs session. For subsequent sessions, if the Y-BOCS indicated that a clinically significant change had not occurred (defined as a reduction in the Y-BOCS score of at least 35%, e.g. Gershkovich et al., 2017) and the score remained higher than 7, further

Table 2
Summary of clinical measures and subjective ratings for 13 patients.

Patient	Baseline clinical measures								Characteristics of aversive memory			
	Y-BOCS	OCI (distress)	BAI	BDI	OBQ total	OBQ RT	OBQ PC	OBQ ICT	True?	Distress	Vividness	Frequency
1	27	46	10	14	186	72	87	27	100	80	80	0
2	27	61	10	5	206	68	87	51	75	70	80	10
3	26	84	19	29	179	76	66	37	70	40	30	20
4	22	39	24	4	157	61	60	36	20	75	70	0
5	23	60	14	22	238	84	100	54	90	90	90	100
6	22	27	4	7	101	49	27	25	90	40	80	10
7	36	101	13	15	239	89	81	69	80	90	80	80
8	22	45	18	7	214	73	76	65	100	100	20	90
9	17	75	24	5	96	43	22	31	70	50	50	20
10	28	19	16	1	92	29	34	29	80	50	70	50
11	29	34	10	20	98	42	29	27	60	60	100	60
12	23	61	15	25	217	74	99	44	60	60	90	25
13	28	54	37	14	222	83	103	36	80	70	100	70
Average	25 ± 1.3	54 ± 6.4	16 ± 2.3	13 ± 2.5	172 ± 16	64 ± 5.2	67 ± 8.3	41 ± 4	75 ± 5.8	67 ± 5.4	72 ± 6.9	41 ± 9.8

ImRs sessions (up to a total of 6) were offered at weekly intervals and focused on the same aversive memory each time. All outcome measures were again administered one week following the last ImRs session delivered and at one- and three-month follow-up intervals (D). Patients were also encouraged to complete homework in the form of listening to their ImRs transcript on two occasions between any subsequent ImRs sessions delivered.

Three clinical psychologists who work at the Perth OCD Clinic provided the ImRs intervention and associated outcome measures to different patients in the current study, to reduce the possibility of a therapist bias. Each clinician had between 16–20 years of clinical experience as a registered Clinical Psychologist and had previously treated a minimum of 75 supervised OCD cases. The first author had completed accredited OCD training by the International OCD Foundation and provided supervision to the other two Clinical Psychologists. Furthermore, two of the treating Clinical Psychologists had completed ImRs training directly by Arnoud Arntz, who developed the ImRs technique. ImRs sessions were audio-recorded, and co-supervision was provided between the three co-authors who administered the ImRs intervention for consistency.

The ImRs intervention consisted of the three-phase procedure developed by Arntz and Weeterman (1999). In the first stage, the patient was encouraged to re-experience the aversive memory identified from the perspective of a child at the age at which the memory occurred. The associated affective experiences and meaning was explored, as were any unmet emotional needs that the patient associated with the memory. Second, the patient was encouraged to re-experience the same memory; however this time the perspective was changed to that of a healthy adult observing the event and intervening when necessary in the desired direction of change. Third, the patient was asked to re-experience the memory and from the child's perspective that was observing how the healthy adult intervened to change the event and the associated new meaning in the desired direction and provide for opportunities to ask for further unmet emotional needs to be provided by the healthy adult.

2.4.1. Analysis

Statistical analysis was performed using SPSS v22 (IBM). Symptom severity (Y-BOCS) and other clinical measures after the control intervention, at the end of ImRs, and at 1 and 3 months post-treatment was compared with baseline using a 2-tailed paired t-test. 'Response' was defined as a reduction in Y-BOCS of greater than 35%, which is a standard threshold for a clinically meaningful response in the field (e.g. Gershkovich et al., 2017). Clinical wellness was defined as achieving a Y-BOCS of ≤ 12, following Farris et al (2013).

We also report the 'Reliable Change' measure of Jacobson, Follette, and Revenstorf (1986, 1991), calculated for each subject as RC_t = ($YBOCS_t$ – $YBOCS_{baseline}$) / standard error of measurement ($YBOCS_t$ – $YBOCS_{baseline}$). To compute the standard error of measurement of the difference between YBOCS at baseline and time *t*, rather than rely on published values for the reliability of the Y-BOCS, we use the method of Christensen and Mendoza (1986): standard error of measurement = sqrt [$SD_{baseline}$ + SD_t + ($SD_{baseline}$ * SD_t * correlation(baseline,*t*)].

3. Results

3.1. Subject characteristics

We recruited 13 adults with persistent OCD despite at least one previous trial of ERP, who had intrusive images associated with their OCD that they identified with a past trauma or aversive experience. Patient demographic and clinical characteristics are presented in Table 1. Ages ranged from 23 to 64; age of onset ranged from 6 to 36, and most patients described having symptoms for well over a decade. Primary obsessions and compulsions were predominantly in the domain of intrusive disturbing thoughts or fear-of-harm, with checking compulsions, though 2 of the 13 had primary contamination obsessions (Bloch, Landeros-Weisenberger, Rosario, Pittenger, & Leckman, 2008). Nine of the 13 patients were on stable doses of antidepressant medication; the others were medication free: this may be worthy of highlighting as a preference of the referring psychiatrists to this clinic and may represent a difference to other OCD treatment refractory cases who have sometimes been prescribed polypharmic regimens of medication. All patients had undergone at least one previous trial of ERP, in accord with our inclusion criteria, although the quality of past ERP was not formally assessed. Baseline ratings of OCD and comorbid symptomatology are presented in Table 2. As a group, these subjects had moderately severe OCD (Y-BOCS = 25 ± 1.3; all values are mean ± SEM) and mild comorbid anxiety and depressive symptoms (BAI = 16 ± 2.3; BDI = 13 ± 2.5).

3.2. OCD-associated aversive memories

Aversive memories were identified using the semi-structured interview developed by Speckens et al. (2007) and are presented in Table 3. These memories covered a range of scenarios, mostly from childhood; they included such themes as bullying, criticism by authority figures, perfectionist anxiety, and sexually inappropriate thoughts.

We asked all participants to rate several aspects of these aversive memories on a visual analog scale from 0 to 100. Table 2 presents baseline ratings of subjects' conviction that their memories and their

Table 3
Aversive OCD-related memories in the 13 patients included in this study, together with their identified meaning to the subject and the rescripted meaning after ImRs.

Patient	Aversive memory identified	Age in aversive memory	Original meaning associated with aversive memory	New meaning associated with memory following ImRs
1	Being shamed/reprimanded by authority figures for making mistakes	8	I'm not loved and no matter how hard I try my best is never good enough	I am loveable, but my Father clearly suffered from OCD
2	Being shamed/reprimanded by authority figures for checking behavior after imagining face was disfigured	9	There is something physically wrong with me. I always need to be perfect to be accepted and worthwhile	That was a once off and never happened again – I try to do things right, but I no longer need to be perfect to be worthwhile"
3	Fear of being kidnapped as a child while parents too intoxicated to help	8	I'm responsible for other's safety and I must check to stop bad things from happening	I'm safe now and I don't need to be scared anymore
4	Becoming distressed when unable to sleep at a friend's house	10	I'm weak and not worthwhile if I can't do the normal things that others can do	It was just a one off experience that doesn't mean anything about me
5	Perfectionistic images of needing her childhood bedroom to be 'just right'	9	Everything needs to be just right and then my life will be ok, if not something bad will happen	It's OK that this image happens, there is a reason that it does. The anxiety goes, it just takes a while.
6	Injured in school playground requiring hospital stay	5	If I'm not careful bad things can happen	I don't need to be constantly worried about harm
7	Viewing a website image of a woman who looked young and thought of a child	23	I'm bad for thinking this and now my images are contaminated	These images don't mean anything about me
8	Having a thought of sexually assaulting a child	36	I must be a dreadful person; a pedophile	This was just a thought, my mind created a false memory
9	Having a thought about wanting her Mother dead	10	I must be a bad person if I want my Mother dead	My thoughts do not mean that I want something to happen
10	Having a thought about a colleague when in a relationship with fiancé	16	If I'm having a thought about another man this must mean I don't love my partner	Having thoughts about other people is normal and does not mean anything about my relationship
11	Physical bullying by neighborhood boys	9	I have no control, I'm weak	I now have options
12	Bullying by friends in school	9	I am inadequate	I am good enough
13	Being criticized by Father and feeling useless after she had been mean to her sister because she felt jealous	7	I'm useless	I am OK as I am

interpretation of them was accurate; the distress caused by the aversive memories; the vividness of the memories; and the frequency with which they occurred. These characteristics of the intrusive memories were monitored over the course of ImRs and follow-up. Interestingly, the distress associated with these aversive memories was positively correlated with the OBQ ($r = 0.699$, $p = 0.008$) and all of its subscales.

As a first 'control intervention' phase to treatment, to examine any effects attributable to simple habituation from recounting these aversive memories, subjects were asked to describe their aversive memories in detail. No rescripting was performed during these sessions. The Y-BOCS was measured 1 week later (immediately prior to the first ImRs session). As shown in Table 4 and Fig. 1, Y-BOCS scores were largely stable after this session; only a single subject showed more than a 15% reduction in Y-BOCS. Overall, Y-BOCS changed from 25.4 ± 1.3 at baseline to 24.3 ± 1.5 after the control session, a non-significant change (paired *t*-test: $p = 0.4$; $d = 0.2$).

3.3. Clinical response to imagery rescripting

These 13 subjects, all of whom remained symptomatic despite having undergone at least one course of ERP for their OCD, were next treated with 1–6 sessions of ImRs at approximately 1-week intervals, as described in the Methods. The Y-BOCS was administered before each ImRs session and was interpreted as reflecting the response to the previous session; treatment was continued until a Y-BOCS decrease of ≥35% was observed, up to 6 total weekly treatments. Y-BOCS scores over the course of treatment and at follow-up are shown in Table 4; the percent improvement, relative to baseline, is indicated for the last session for each subject, after which ImRs was ended.

Six of the 13 subjects (46%) achieved ≥ 35% improvement after a single ImRs session. Overall, Y-BOCS scores improved from 24.3 ± 1.5 at the post-control point to 15.4 + 2.0 after the first ImRs session, a highly significant 37% improvement (paired t-test: $p < 5 \times 10^{-5}$). We expressed each subject's improvement in terms of the Reliable Change (RC) index (Jacobson et al., 1986, 1991; Christensen & Mendoza, 1986); RC after the first ImRs ranged from 0 to 10.6, with an average of 4.6 ± 0.9. 9 of 13 subjects exhibited RC > 1.96, indicative of significant change beyond expected measurement error, at this time point. 5 of 13 subjects achieved a Y-BOCS score of ≤ 12, identified by Farris, McLean, Van Meter, Simpson, and Foa (2013) as corresponding to clinical wellness, after a single ImRs session.

A further three subjects responded after a second ImRs session. Two further subjects achieved ≥35% improvement after 4 sessions, and one more after 5 sessions. A single subject achieved only 27% improvement after six sessions, which we determined *a priori* to be the maximum allowed. Overall, 12 of 13 subjects (92%) achieved a ≥35% improvement in Y-BOCS with ImRs treatment. Average Y-BOCS after 1 week after the last ImRs session was 11.8 ± 0.9, a 52% improvement from after the control session; this difference was highly significant (paired t-test: $p < 5 \times 10^{-7}$; $d = 3.34$). RC at post-treatment ranged from 3.0 to 11.5, with an average of 6.7 ± 0.7. 13 of 13 subjects exhibited RC > 1.96 at post-treatment. 8 of 13 subjects achieved a Y-BOCS of ≤ 12 (i.e. clinical wellness; Farris et al., 2013) at post-treatment. We note that in several cases ImRs was stopped because of the *a priori* criterion that Y-BOCS had improved by ≥35%; subjects with baseline Y-BOCS > 18 could improve by 35%, and thus stop ImRs sessions, but still have a final Y-BOCS of > 12. It is possible that further ImRs sessions in these subjects would have produced a higher level of clinical wellness.

Subjects were re-evaluated 1 and 3 months following the final ImRs session, to characterize the persistence of clinical benefit. There was no further active intervention during this follow-up period. Data were not available for one subject at 3-months (subject #5), as this subject required new initiation of supportive therapy due to an acute psychosocial stressor. Average Y-BOCS was 11.7 ± 1.1 at 1 month and 12.2 ± 1.4 at 3-month follow-up; these effects were highly significant, relative to measurements after the control session (paired *t*-test:

Table 4
Y-BOCS baseline and improvement across ImRs sessions.

Patient	Therapist	Baseline Y-BOCS	Post-control	Post ImRs1	Post ImRs2	Post ImRs3	Post ImRs4	Post ImRs5	Post ImRs6	1 month FU	3 month FU
001	GM	27	25	16	12 (55.6%)	–	–	–	–	9	10
002	GM	27	23	11 (59.3%)	–	–	–	–	–	10	9
003	GM	26	28	22	20	17	14 (46.1%)	–	–	10	14
004	GM	22	19	12 (45.5%)	–	–	–	–	–	10	9
005	GM	23	25	16	14 (39.1%)	–	–	–	–	15	–
006	SR	22	22	18	16	23	16	17	16 (27.2%)	15	18
007	SR	36	36	34	28	31	24	17 (52.7%)		22	24
008	SR	22	22	15	9 (59%)	–	–	–	–	9	11
009	SR	17	20	17	22	19	11 (35.2%)	–	–	11	14
010	SR	28	14	5(82.1%)	–	–				5	5
011	GK	29	29	15 (48.2%)	–	–	–	–	–	12	10
012	GK	23	23	9 (60.8%)	–	–	–	–	–	12	12
013	GK	28	30	10 (64.3%)	–	–	–	–	–	12	10

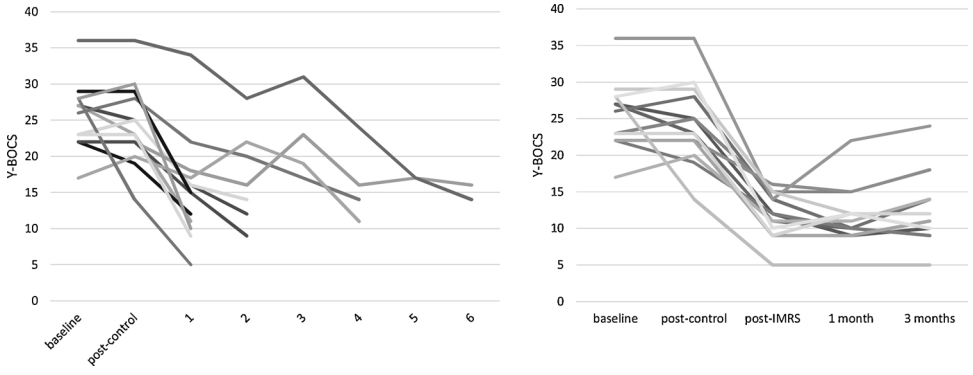

Fig. 1. Y-BOCS change with ImRS. A. Y-BOCS scores in 13 patients at baseline (post-ERP), following the control session, and over the course of 1–6 sessions if imagery re-scripting (ImRS). **B.** Y-BOCS scores at baseline, following the control session, following the last ImRs session (i.e. post-treatment), and at 1-month and 3-month follow-up.

$p < 5 \times 10^{-8}$, $d = 3.15$ and $p < 2.5 \times 10^{-6}$, $d = 2.75$, respectively). RC at 1 month ranged from 4.9 to 18.7 with an average of 11.2 ± 1.1; 13 of 13 subjects exhibited RC > 1.96 at 1 month. 10 of 13 subjects achieved a Y-BOCS of ≤12 at 1 month. RC at 3 months ranged from 1.5 to 11.8, with an average of 7.8; 11 of 12 subjects exhibited RC > 1.96 at 13 of 13 subjects exhibited RC > 1.96 at 3 months. 8 of 12 subjects maintained a Y-BOCS of ≤12 at 3 months.

A single subject (#7) showed a clinically significant recrudescence of symptoms during the follow-up period; however, as this individual had the highest baseline Y-BOCS in the study and a particularly robust response to ImRs (53% improvement after 5 sessions), he remained a partial responder despite this partial return of symptoms (33% improvement from post-control at 3 months). A single subject (#6) failed to achieve 35% improvement in Y-BOCS even after six ImRs sessions, the maximum number allowed under our protocol. Interestingly, this was one of only two subjects in our cohort who identified primarily contamination rather than fear-of-harm symptoms (Bloch et al., 2008). The other subject with primarily contamination symptoms, #13, exhibited a robust and lasting improvement.

3.4. Secondary clinical measures

We next examined improvement in other clinical measures from baseline to endpoint and follow-up. The OCI is a self-report measure of OCD symptomatology. OCI was 54.3 ± 6.4 at baseline; it improved to 33 ± 4.2 after the last ImRs session (t[12] = 5.62, p < 0.001) and remained low at 1-month and 3-month follow-up (t[12] = 6.85, p < 0.001 and t[11] = 5.3, p < 0.001, respectively; see Table 5). However, improvement in OCI did not correlate across subjects with improvement in Y-BOCS at post-treatment or at follow-up (all r < 0.15; app p > 0.5). 11 of 13 subjects achieved a RC > 1.96 on the OCDI at post-treatment, 12 of 13 at 1 month, and 11 of 12 at 3 months.

The BAI is a self-report measure of anxiety. BAI at baseline (16.5 ± 2.3) improved at post-treatment (11.1 ± 2.3) and improved further at 1-month and 3-month follow-up (8.9 ± 2.0 and 7.0 ± 1.2, respectively). These improvements were all statistically significant (t[12] = 4.2, p = 0.001; t[12] = 8.0, p < 0.001; t[11] = 4.3, p = 0.001, respectively; see Table 5). 9 of 13 subjects achieved a RC of > 1.96 for the BDI at post-treatment, 12 of 13 at 1 month, and 10 of 12 at 3 months. Improvement in BAI did not correlate significantly with improvement in Y-BOCS or OCI at post-treatment or at follow-up. These findings suggest that the clinician-administered Y-BOCS and the self-report OCI and BAI are capturing different aspects of symptomatology and of symptom improvement in these patients.

The BDI is a self-report measure of depression. BDI at baseline (12.9 ± 2.5) improved at post-treatment (7.9 ± 1.6; t[12] = 3.44, p = 0.005; see Table 5). This improvement was maintained at 1-month follow-up, at trend level (8.2 ± 2.3; t[12] = 2.1, p = 0.055), and at 3-month follow-up (5.4 ± 1.1; t[11] = 3.4, p = 0.005). Improvement in BDI correlated at trend level with improvement in OCI at post-treatment (r = 0.532; p = 0.061) and at 1-month follow-up (r = 0.466, p = 0.11), and significantly at 3-month follow-up (r = 0.774, p = 0.003). 8 of 12 subjects achieved a RC of > 1.96 at post-treatment, 5 of 13 at 1 month, and 7 of 12 at 3 months. Improvement in BDI did not correlate with improvement in Y-BOCS or in BAI.

3.5. Changes in aversive memory characteristics

Subjects rated several characteristics of their aversive memories on a scale of 0-100: their conviction that the memory and their interpretation of it were accurate, its vividness, the associated distress, and the frequency with which the memory occurred (see Table 3). We examined changes in these measures following ImRs. All of these measures were reduced at post-treatment, and these reductions persisted at 1-month and 3-month follow-up. These changes were more marked for patients' conviction that their memories were true (from 75 ± 5.8 at

Table 5
Secondary clinical measures.

Measure	Baseline	Post-treatment	Post-treatment RC	1 month	1 month RC	3 months	3 months RC
OCI	54 ± 6.4	33 ± 4.2	5.6 ± 1.0	28 ± 5.0	6.85 ± 1.0	26 ± 5.5	5.5 ± 1.04
BAI	16.5 ± 2.3	`11.1 ± 2.3	4.2 ± 1.0	8.8 ± 2.0	8.0 ± 1.0	7.0 ± 1.1	4.4 ± 1.0
BDI	12.9 ± 2.5	7.8 ± 1.6	3.4 ± 1.0	8.2 ± 2.3	2.1 ± 1.0	5.4 ± 1.1	3.6 ± 1.0

baseline to 26–29 at post-treatment and follow-up; $p < 0.001$) and distress (from 67 ± 5.4 to 17–22; $p < 0.001$) than for vividness (from 72 ± 6.9 at baseline to 39–49 at post-treatment and follow-up; $p < 0.002$) and frequency (41 ± 9.8–18; $p < 0.02$).

Only change in aversive memory vividness correlated with improvement in any of our clinical measures, and only at follow-up. At 1-month follow-up, change in memory vividness correlated with change in OCI ($r = 0.593$, $p = 0.033$) and in BAI ($r = 0.599$, $p = 0.030$). At 3-month follow-up, change in memory vividness correlated at trend level with change in OCI ($r = 0.527$, $p = 0.096$) and significantly with BDI ($r = 0.626$, $p = 0.039$). These correlations were exploratory and were not corrected for multiple comparisons, and must therefore be viewed as provisional.

3.6. Predictors of symptom improvement

Nearly half of our patients improved markedly after a single ImRs session. We examined the association between baseline clinical measures and % Y-BOCS improvement after a single ImRs session to search for predictors of who is most likely to respond rapidly to this intervention. Baseline Y-BOCS was negatively correlated with % Y-BOCS improvement after a single ImRs session ($r = 0.591$; $p = 0.033$) – that is, lower baseline Y-BOCS predicts a greater % improvement after a single session. Other clinical measures (including the OBQ and its subscales and the RIQ) and measures of the characteristics of the aversive memories did not correlate with Y-BOCS improvement after the first ImRs session.

4. Discussion

The efficacy of imagery rescripting as an adjunct psychological intervention for OCD resistant to standard ERP was examined in these single case experimental designs of 13 patients. We varied the number of ImRs sessions for each patient, as clinically indicated.

92% of patients (12/13) achieved a clinically significant change, defined as a reduction of at least 35% on the Y-BOCS. These improvements were maintained for 12 of 13 patients at one month and 11 of 12 patients at three-month follow-up.

The current study used a similar methodology to Veale et al. (2015), the only other published study to investigate the use of ImRs and OCD. Almost half of our patients reported a clinically significant change after their first ImRs session, which is similar to the response rate seen after a single session used by Veale and colleagues. Furthermore, the current study found that lower pre-treatment Y-BOCS scores predicted a greater percentage improvement after a single ImRs session. This finding is similar to the 71% of patients in Veale et al.'s study who reported significant change after a single ImRs session and also had pre-treatment Y-BOCS scores in the mild-moderate range.

This is the first study to examine the utility of using a variable number of ImRs sessions, based on the individual clinical needs of each patient, in OCD. While half of the patients achieved clinically significant change after a single session of ImRs, the remaining patients required between 2–5 ImRs sessions (average of 2.08 sessions) to achieve similar levels of change. These findings lend support to Morina et al.'s (2017) conclusions from their recent meta-analytic study that found ImRs to be an effective intervention using an average of 4.3 sessions across a variety of psychological disorders.

Successful ImRs treatment in OCD can be interpreted with reference to the leading US revaluation theory (Arntz, 2015). Following successful modification of meaning of the aversive memory, a patient would experience an associated reduction in the intensity and distress of obsessive thoughts and images that would no longer require the same desire or need to engage in compulsions. Further research into the theory underlying ImRs is required before firm conclusions as to psychological mechanism can be drawn.

This preliminary study has several limitations. There is an inherent selection bias associated with asking Clinical Psychologists to invite their own patients to participate in a study. Randomization to the treatment phase was also variable, as it was based on appointment availability and corresponding patient availability. Generalizability is also limited as the results were based on only 13 patients, who were all of Caucasian decent.

While, these factors make it difficult to ascertain with certainty the efficacy of ImRs in the current design, the patients were representative of a private practice setting, with a range of OCD presentations and comorbid psychological disorders; and the variability in timing of treatment sessions is typical of that often seen in such a setting due to scheduling constraints considerations. Furthermore, there was no significant change between Y-BOCS scores at baseline and the control intervention. Treatment was provided by three Clinical Psychologists to enhance replicability. Spontaneous remission in treatment-resistant cases of OCD is rare. These aforementioned factors make it unlikely that time and maturation alone accounted for the symptom reductions observed.

Taken together, the findings of both the current study and Veale et al. (2015) provide intriguing preliminary evidence for the efficacy of imagery rescripting as an adjunct therapy for treatment-resistant OCD, especially when symptomatology remains in the mild-moderate range despite conventional ERP and when intrusive imagery is linked to an aversive past event. As previous research has found that 81% of OCD cases reported associated aversive memories (Speckens et al., 2007), this is an important area for further research. Morina et al. (2017) concluded that using more ImRs sessions, up to 16, is expected to result in larger effect sizes. Future research on treatment resistant OCD patients with identified associated aversive memories should compare three treatment conditions in a randomized control trial – ERP (recommended 13–20 sessions), stand-alone ImRs (with recommended 16 sessions), and ERP with adjunct ImRs. Future research should also note the degree of distress and conviction of belief associated with the rescripted memory as these factors were found to be associated with greater clinical change in the outcome measures. It may also be interesting to investigate whether the sense of 'nowness' associated with the updated memory changes at each intervention point is a possible mechanism of change. Qualitative research analyzing interactions between therapist and patient during each phase of the ImRs intervention would also be beneficial for clinicians.

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