Patient Adherence to Cognitive Behavioural Therapy for Obsessive-Compulsive Disorder: A Systematic Review and Meta-analysis

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Abstract

Whilst Cognitive Behavioural Therapy (CBT) is the treatment of choice for obsessive-compulsive disorder (OCD), around half of the participants do not experience remission following treatment. As yet, there is no comprehensive systematic review of the extent to which patient non-adherence presents a challenge to the overall benefit of CBT for OCD. The aim of this systematic review and meta-analysis was to identify the magnitude, moderators and reasons for poor patient adherence to CBT for OCD in terms of: (1) treatment refusal; (2) treatment dropout; (3) session attendance/module completion, and (4) between-session CBT task adherence. Sociodemographic and clinical variables, treatment and study design characteristics were examined as moderators of adherence. The systematic search identified 123 studies including 5627 participants taking part in CBT or control conditions. A pooled rate of 15.6% of eligible patients refused CBT and a further 15.9% of treatment starters dropped out from treatment. Group CBT had significantly lower dropout rates than individually-delivered CBT. No other significant moderators were found. Most studies reported moderate to good adherence to between-session CBT tasks, which had a significant medium to large association with post-treatment OCD symptom reduction. Recommendations for enhanced measurement and reporting of patient adherence to CBT for OCD are made along with clinical implications of findings.

Keywords: Obsessive compulsive disorder; adherence; refusal; attrition; CBT; meta-analysis

1. Introduction

1.1. Background

Obsessive compulsive disorder (OCD) is a mental health condition characterised by persistent intrusive thoughts, images or urges that cause significant anxiety (obsessions), and repetitive, ritualistic behaviours or mental acts aimed at neutralising anxiety or preventing a dreaded event (compulsions) (American Psychiatric Association (APA), 2013). It has a high current and lifetime comorbidity with depression and anxiety and is associated with poor quality of life (Macy et al., 2013).

UK and US practice guidelines recommend exposure and response prevention (ERP), delivered with or without cognitive therapy strategies, as the psychological therapy of choice for OCD (APA, 2007; National Institute for Health and Care Excellence (NICE), 2005). Exposure and response prevention is a behaviour therapy during which patients engage in repeated, prolonged exposure to obsessions whilst refraining from compulsions (Kozak & Foa, 1997). Cognitive strategies, rooted in the cognitive therapy (CT) model of OCD, help patients re-evaluate the accuracy of appraisals (i.e. exaggerated beliefs about personal responsibility for preventing harm) that result in the misinterpretation of common intrusive thoughts as significant and therefore anxiety-provoking (OCCWG, 1997; 2005). In this review, CBT is the umbrella term for ERP, CT and a combination of both.[a]

Öst and colleagues (2015) conducted a large meta-analysis of the efficacy of CBT for OCD. They report a large post-intervention between-group effect size for CBT compared to waitlist (Hedges' g= 1.31, CI [1.08,1.55], k=15) and placebo (g=1.33, 95% CI [.91-1.76], k=8) conditions and a medium effect size compared to antidepressant medication (g=.55, 95% CI [.05, 1.04], k=4), using

[a] In the meta-analysis, CBT also denotes the combination of ERP and cognitive therapy strategies, contrasted with ERP and CT on their own.

the Yale–Brown Obsessive Compulsive Scale (Y-BOCS) (Goodman et al., 1989) as the outcome measure.

Whilst CBT is the gold standard in the treatment of OCD, not all patients achieve post-treatment OCD symptom remission. A patient is in remission when they no longer meet diagnostic criteria for OCD and have minimal to no symptoms and no functional impairment, lasting for at least one week (Mataix-Cols et al. 2016). Research trials of CBT for OCD typically determine remission based on whether the patient moved from above to below a nominated YBOCS cut-off score from pre- to post-treatment (Mataix-Cols et al., 2016). However, attempts to establish a reliable remission rate have been marred by the variability in nominated Y-BOCS cut-off scores (Mataix-Cols et al., 2016). For example, Öst et al. (2015) found that just 42 to 52% of patients experienced remission following CT, ERP or CBT. Eighteen of the 20 primary studies contributing to these pooled estimates determined remission based on a YBOCS cut-off score. In the absence of normative data for the YBOCS, studies used cut-off scores derived from sample-dependent calculations (e.g. pre-treatment sample mean - 2SDs) (Jacobson & Truax, 1991), or from empirical studies (e.g. Fisher & Wells, 2005; Lewin et al., 2011) or followed recommendations from OCD experts (e.g. Pallanti et al., 2002). Consequently, Y-BOCS cut-off scores ranged from 7 to 16 across studies. Some international OCD experts recently suggested that a YBOCS score of ≤ 12 should be used (Maitaix- Cols, 2016). However, other experts have made a distinction between wellness and recovery and have underlined that recovery from illness in OCD, as is the case for other disorders, should be defined as no longer meeting criteria for illness, that is YBOCS ≤ 7, with consistency among interview and psychometric indices (e.g. Pallanti & Quercioli, 2006; Sookman & Steketee, 2010). Therefore, several of the primary studies in Öst et al. (2015) used Y-BOCS scores that were either too lenient or too stringent. Despite these methodological limitations, these figures suggest that a significant proportion of people with OCD do not experience OCD symptom remission following CBT.

CBT for OCD is often seen as a challenging therapy; it is anxiety provoking by design and this is magnified by high levels of distress intolerance associated with OCD (Cougle, Timpano, Fitch, & Hawkins, 2011; Olatunji, Deacon, & Abramowitz, 2009). It is often suggested this may result in poor patient adherence to treatment and account for the moderate remission rates for CBT for OCD (e.g. Whittal, Thordarson & McClean, 2005). However, little is known about the magnitude and moderators of patient adherence to CBT for OCD and the extent to which non-adherence may be attributable to patients finding the therapy challenging. This is an important evidence gap to address – understanding these factors could lead to therapy modifications to improve adherence and ultimately to improve patient outcomes. This is the focus of the present study.

The World Health Organisation defines adherence as 'the extent to which a person's behaviour… corresponds with agreed recommendations from a health care provider' (Sabate, 2003, p.3). In this study, we consider four adherence factors that could contribute to disappointing outcomes: (1) therapy refusal, i.e. choosing to decline treatment despite professional recommendation; (2) therapy dropout, i.e. the patient prematurely discontinues therapy recommended by their health care provider and is unlikely to have received the full benefit of treatment; (3) poor attendance at therapy sessions despite treatment completion, which can result in people not receiving the therapist recommended 'dose' of the therapy; and (4) poor adherence to therapist recommended between-session ERP/behavioural tasks considered key in achieving symptom improvement.

1.2. Refusal

Research to date has not yet established a reliable estimate of the refusal rate for CBT for OCD. Öst et al. (2015) report an average 15% rate of refusal, pre- and post-randomisation, across 32 RCTs of CBT for OCD. Refusal rates were highly variable across studies (*SD*: 11.6, range: 0-63%). Assessing the magnitude of CBT refusal in the context of RCTs can be problematic as it may reflect refusal unrelated to CBT, e.g. refusal to be randomised. To gain a reliable estimate of the magnitude of CBT refusal, it may be more appropriate to examine patient refusal of CBT for OCD in uncontrolled studies.

1.3. Dropout

Dropout occurs when the patient accepts the offer of CBT and attends at least one session but does not complete the full recommended course of treatment. There are a few meta-analyses of the magnitude of dropout from CBT for OCD, with a modest number of studies. Öst et al. (2015) report a pooled dropout rate for (remote and face-to-face) CBT ranging from 11% (CT, *k*=8) to 19% (ERP, *k*=28). Swift & Greenberg (2014) found a CBT (all types) dropout rate of 16.3% across a combination of controlled and uncontrolled studies (*k*=45), whilst Hans and Hiller (2013) report a dropout rate of 12% for face-to-face CBT for OCD across 20 nonrandomised effectiveness studies.

1.4. Session Attendance

US practice guidelines (APA, 2007) recommend a minimum of 13 sessions of CBT whilst UK guidelines (NICE, 2005) propose high intensity CBT (> 10 therapist hours per patient, i.e. individual CBT) for those patients with moderate to severe OCD or those with mild OCD who failed to engage with or benefit from low intensity CBT (<10 therapist hours per patient, i.e. guided self-help, group CBT). It is therefore important to consider whether among patients completing therapy, session attendance or module completion (for remote therapies) was optimal. However, this aspect of adherence is infrequently considered (Tetley, Jinks, Huband, & Howells, 2011).

1.5. Between-Session Tasks

Cognitive behavioural therapy places central importance on the regular completion of between-session therapy tasks. A recent meta-analysis found significant large effect sizes for the association of quality (Hedges' *g*=.78, 95% CI [.03, 1.53], *k*=3, *n*=417, I^2=91) and quantity (*g*=.79, 95% CI [.57, 1.02], 1.53], *k*=15, *n*=1537, I^2=81) of homework compliance with post-treatment outcomes for CBT for a range of mental health conditions and physical health issues (Kazantzis et al., 2016). However, results were not specific to key homework tasks of CBT for OCD.

1.6. Reasons for Non-adherence

An examination of moderators of adherence to CBT for OCD is key in the identification of risk factors for nonadherence, to drive a targeted approach to keeping patients engaged with therapy (Barrett, Chua, Crits-Christoph, Gibbons, & Thompson, 2008). To date, there are no meta-analyses that consider moderators of refusal, session/module completion and therapy task adherence, but a few studies have tested moderators of dropout from CBT for OCD. Öst et al. (2015) examined CBT type and found that dropout from ERP + antidepressant medication (32%, *k*=7) was significantly higher than from CT, ERP or CBT (15.5%, *k*=19), suggesting that the elevated dropout rate might be due to the addition of medication (dropout from antidepressant medication alone was 30%). Ong, Clyde, Bluett, Levin, & Twohig (2016) found that treatment type and format did not moderate dropout from ERP. Therapist experience (coded as: i) no professional experience, ii) professional experience not specific to CBT and, iii) professional experience with or expertise in CBT) and qualification (coded as: i) student, ii) non-psychologist professional or therapist, or iii) doctoral level therapist or psychologist) and number of sessions also did not predict dropout. These meta-analyses examined a small number of moderators and some were conducted with a relatively small (sub)group of studies and could have been under-powered to detect moderator effects (Borenstein et al., 2009).

To understand what might help patients to engage with therapy, it is important to consider the reasons participants give for not adhering to therapy. However, few studies have foregrounded this. An observational study found that environmental barriers (e.g. costs, inconvenience) was the main reason for refusing (55%) and dropping out (46%) from CBT for OCD (Mancebo, Eisen, Sibrava, Dyck, & Rasmussen, 2011). Interestingly, 20 % of refusal and 12% of dropout was primarily due to feeling too anxious or fearful to participate in CBT. This suggests that (patient perceptions of) the challenging nature of CBT for OCD may contribute to nonadherence. Further studies are needed to establish if this is a consistent finding.

1.7. Objectives for a systematic review and meta-analysis

Developing a better understanding of the magnitude and moderators of adherence to CBT to OCD is crucial if we want to improve patient outcomes. To the best of our knowledge, this is the first

systematic review and meta-analysis with a primary focus on patient adherence to CBT for OCD. The aim was to examine the magnitude of refusal and dropout, session attendance, step/module completion and between-session task adherence and to summarise participants' reasons for refusing or dropping out from CBT across studies. In line with models of health service utilisation (Andersen, 2017; Barrett et al., 2008; Owens et al., 2002), a range of sociodemographic, clinical, treatment characteristics were tested as potential moderators of patient adherence to CBT. Study characteristics were also examined as they may influence adherence (e.g. Fernandez et al. 2015; Swift & Greenberg, 2012). The aim was also to examine the strength of the association of session attendance and therapy task adherence with post-treatment OCD symptom reduction, to further our understanding of the importance of these aspects of adherence to therapy outcomes. Findings will help inform recommendations for improving adherence to CBT for OCD and thereby improving patient outcomes.

2. Method

2.1. Literature search

PsycINFO, PsycArticles, Medline, Web of Science and SCOPUS were searched from their inception until 31st October, 2017, using the search terms: *(OCD OR "Obsessive compulsive disorder" OR obsess*) AND (cognitive therapy OR behavio?r* therapy OR exposure* OR CBT).* OCD terms were searched in the title and CBT terms were searched in the title, abstract or keyword/subject.

Results from electronic searches were checked against systematic reviews of CBT for OCD (Mataix-Cols & Marks, 2006; Öst et al., 2015; McKay et al. 2015; Olatunji, Davis, Power & Smits, 2013; Ponniah, Magiati & Holland, 2013; Rosa-Alcazar, Sanchez-Meaca, Gomez-Conesa & Marin-Martinez, 2008). International clinical trial registries (ClinicalTrials.gov, ISRCTN, EU clinical trials register) were searched using the terms OCD and obsessive-compulsive disorder. Finally, the references of all eligible articles were hand-searched.

2.2. Selection criteria

Studies were included if: 1) they evaluated CBT for OCD using any design, except single case; 2) they were published in English; 3) they recruited a working age adult sample (majority of participants aged 18+); 4) with participants who met diagnostic criteria for OCD, based on DSM/ICD or equivalent criteria; 5) intervention participants received CBT for OCD in an outpatient setting; 6) quantitative or qualitative data on (reasons for) CBT treatment refusal, treatment drop-out and/or degree or quality of client adherence to therapy sessions and/or therapy tasks was provided.

In this meta-analysis, CBT type is defined as ERP, CT or a combination of (components of) the two (CBT). Face-to-face and remote therapies were included as were therapies delivered in combination with psychotropic medication or (psychological) placebo.

Studies were excluded if they: 1) included participants who met diagnostic criteria for psychosis, autistic spectrum disorder or a learning disability; 2) were single case studies; 3) lacked details of the CBT provided, e.g. no information about duration or content ; 4) recruited inpatients, as inpatient treatment refusal may reflect refusal of a hospital stay more generally; and 5) if identical adherence data from the same study were reported in multiple papers only the first published paper was selected for review.

2.3. Data extraction & coding

The following information was extracted and coded for each study: authors, year of publication, design, treatment type (ERP, CT or CBT with or without medication and/or (psychological) placebo), treatment format (i.e. (therapist assisted or self-help) remote therapies versus face-to-face (individual, family, couple or group) therapies), protocol treatment duration in weeks, number and hours of sessions, weekly frequency of treatment sessions, therapist experience, sample characteristics (age, % female, % married or co-habiting, % working full-time or part-time, mean years of education, pre-treatment scores on measures of OCD, anxiety and depression; % of

sample with prior (adequate) CBT, % on medication at the start of therapy, % comorbidity), refusal data (number of eligible participants, number of eligible participants refusing participation, reasons for refusal), dropout data (number of participants starting and dropping out from treatment, stage of dropout, reasons for dropout), session and task adherence data (percentage or average number of sessions attended, percentage or average number of (hours of) between-session CBT tasks completed; (source, type and timing of) measures of therapy task adherence; the association between task adherence and therapy outcome; predictors of adherence). In addition, this review coded the **clinical representativeness** of the study sample. Based on guidelines set out in Hans & Hiller (2013), the following criteria were applied: 1) routine referrals (vs some active recruitment, e.g. through advertising); 2) allowance of medication; 3) common exclusion criteria for routine outpatient treatment (vs additional exclusion criteria). A score of 1 meant the criterion for clinical representativeness was met (see appendix A for the scale).

2.4. Categorisation of variables

The following sets out how the different adherence variables examined in this review were categorised.

2.4.1. CBT refusal

Any patient who was eligible to commence CBT but declined participation for any reason counted as a refusal. Assessing refusal in RCTs is challenging because pre-randomisation refusal could reflect refusal of conditions other than CBT (e.g. medication, wait-list) or of randomisation, whereas post-randomisation refusal of CBT underestimates refusal rate as it excludes patients who refused pre-randomisation based on the possibility of receiving CBT. Therefore, only refusal data from uncontrolled studies was used to calculate the CBT treatment refusal rate as it was clear which treatment patients refused.

2.4.2. CBT dropout

A patient was counted as a treatment dropout if they attended at least 1 treatment session but discontinued treatment before the final planned session. Patients who completed treatment but did not attend a post-treatment assessment were not counted as CBT dropouts. For studies comparing more than one treatment, separate dropout rates were recorded for each treatment. The reasons for CBT treatment dropout were not taken into consideration, to ensure equivalence between studies that did and did not report this information. Reasons for dropout were analysed separately (below).

2.4.3. CBT session attendance or step/module completion

The mean number and percentage of attended sessions, as a proportion of the total number of planned sessions, were recorded. For remote therapies, the number and percentage of completed modules or steps completed were recorded.

2.4.4. CBT task adherence

The mean degree of adherence to between-session CBT tasks, e.g. mean number or percentage of tasks completed or the mean score on a CBT task adherence questionnaire, was extracted. Where available, ratings of the quality of task adherence were also recorded.

2.5. Statistical analyses

All data analyses were conducted using Comprehensive Meta-Analysis version 3 (Borenstein et al., 2009).

2.5.1. Mean adherence

Where possible, the following inverse variance weighted effect sizes were calculated and pooled using random effects models, as the true effect size was expected to vary between studies (Borenstein et al., 2009): i) Meta-proportions of refusal and dropout using logit-transformed

proportions (Borenstein et al., 2009; Lipsey & Wilson, 2001). Dropout rates were calculated at the treatment level. To ease interpretation, logit-transformed proportions and 95% confidence-intervals were back-transformed into proportions; ii) Mean number and percentage of completed CBT sessions or modules, calculated at treatment level; iii) Mean number, percentage and/or mean score for between-session CBT task adherence, calculated at treatment level; iv) Risk ratio of early (session 1-5) versus late (sessions 6 and after) dropout, calculated at treatment level. The sensitivity of the pooled effect sizes to the impact of individual studies was examined by removing one study at a time and obtaining the re-calculated mean rate, number or percentage (Borenstein et al., 2009).

2.5.2. Moderator/subgroup analysis

The following categorical study and therapy characteristics were tested as potential moderators of adherence: 1) study design (controlled versus uncontrolled); 2) type of CBT (ERP, CT, CBT with/without medication or pill/psychological placebo); 3) therapy format (i.e. face-to-face versus remote therapies; individual versus group, couple or family therapies; therapist-assisted versus self-help remote therapies) 4) intensity (face-to-face and remote therapies involving 10 hours or less of sessions or modules are considered 'low intensity' whereas those of more than 10 sessions or modules are considered high intensity (from the patient perspective); 5) face-to-face session frequency (more than twice weekly; twice weekly; once weekly or less); 6) face-to-face therapy duration (in weeks); 7) therapist experience for therapist delivered treatment (pre-attainment, post-attainment, mixed); 8) recruitment (routine vs active (e.g. using advertising)); 9) patients (routine vs non-routine exclusion criteria); 10) medication (allowed, not allowed).

Subgroup effect sizes were calculated if there were at least 4 studies per subgroup (Fu et al., 2011). A mixed-effect model was used to compare differences between subgroup effect sizes as effect sizes of studies within each subgroup were expected to vary (Borenstein et al., 2009). Differences between subgroup effect sizes were tested with the Q-statistic, which is analogous to using ANOVA

or t-tests for testing group differences in primary studies (Borenstein et al., 2009), i.e. it determines if differences in effect size between subgroups are statistically significant.

Moderator analyses of the following continuous socio-demographic and clinical variables were carried out where possible, using a mixed-effects model of meta-regression (Method of Moments) (Borenstein et al. 2009; Kelley & Kelley, 2012): 1) mean age; 2) gender (% female); 3) ethnicity (% Caucasian); 4) marital status (% married or cohabitating); 5) employment status (% working full- or part-time); 6) mean years of education; 7) pre-treatment mean OCD symptom severity (Y-BOCS); 8) % patients with comorbid axis I or II disorders; 9) pre-treatment depression and/or anxiety symptom severity; 10) % patients with prior CBT, and 11) % patients on concurrent medication. Only covariates for which at least 10 studies (k) provided data were included (Borenstein et al., 2009).

2.5.3. Association of CBT task adherence with post-treatment OCD symptom reduction.

The association between task adherence and post-treatment OCD symptom reduction was tested by meta-analysing Fisher's *z*-transformed correlations of mean between-session CBT task adherence with post-treatment OCD symptom reduction. Where correlations were not reported, the available statistics were converted into correlations using standard formulas (Borenstein et al., 2009). Where possible, correlations based on post-treatment OCD symptom severity adjusted for pre-treatment OCD symptom severity were selected; otherwise correlations with change scores or post-treatment scores were used. The type of correlation and outcome measure needed to be equivalent across studies to pool effect sizes (Aloe & Thompson, 2013).

2.5.4. Homogeneity analysis

The Q-statistic (Hedges & Olkin, 1985) was calculated to test for statistically significant heterogeneity of results. As the Q-statistic is affected by the number of studies, I^2 was also calculated

to assess the degree of heterogeneity using the following guidelines: 25% (small), 50% (moderate), 75% (large) heterogeneity (Higgins, Thompson, Deeks & Altman, 2003).

2.5.5. Publication bias

Risk of publication bias was analysed using Egger's regression intercept (Egger, Davey Smith, Schneider, & Minder, 1997) and Duval and Tweedie (2000) trim-and-fill methods (Borenstein et al., 2009).

2.6 Reasons for dropout or refusal

Reasons for refusal or dropout were recorded as stated by study authors, along with the number of participants that the reason applied to. The frequencies for identical reasons (that differed minimally in their wording), were totalled across studies and grouped into different low-level categories, using conventional content analysis (Hsieh & Shannon, 2005) (see result for further details).

3. Results

3.1. Study flow and characteristics

The database and hand searches identified 7725 references. After the removal of 3527 duplicates, 4198 references remained. After excluding 3812 references based on their title, abstract or source, 386 full-text articles were read to assess their eligibility. This resulted in the inclusion of 123 studies (see Fig. 1). Six studies that conducted further analyses with adherence data drawn from outcome studies already included in the meta-analysis were not included in the study characteristics below. The 117 remaining studies included 59 controlled and 58 uncontrolled studies, published between 1984 and 2017. A total of 5627 participants took part in CBT or control conditions. Averaging the unweighted sample means, the mean age was 34.9 (range: 25.71 - 47.93) and 58% of participants were female (range: 17-100%). Pre-treatment total Y-BOCS scores ranged from 14.35 to

30.38 with a mean of 24.49 (severe symptoms). Mean pre-treatment depression symptom severity (measured with the Beck Depression Inventory (BDI) (Beck, Steer & Garbin, 1988) was 17.58 (mild depression) (range: 10.40-28.50). Mean duration of OCD symptoms was 14.10 years (range: 4.6 - 26.40) and 53% of participants were on medication (range: 13 - 100%). The studies delivered 161 CBT treatments in total, including ERP (68), CBT (55), CT (16), ERP + medication (12), ERP + Placebo pill (6), CBT + medication (2), CT + medication (1), and ERP + Psychological Placebo (1). Treatments were delivered face-to-face (*k*=125) and remotely (*k*=36). See Appendix B for study references, Table C.1., Appendix C for details of primary studies included under each adherence variable and Table C.2 and C.3, Appendix C for study characteristics.

3.2. Mean adherence

Twenty-six uncontrolled studies contributed to the **refusal rate**. CBT treatments included CBT (13), ERP (12) and ERP + Medication (1). The pooled mean **dropout rate** was calculated with data from 111 studies (controlled studies: 55, uncontrolled studies: 56) that included 153 treatments: ERP (62), CBT (53), CT (16), ERP + Meds (12), ERP + Pill Placebo (6), CBT + Meds (2), CT + Meds (1), ERP + Psych Pla (1). The **mean number of sessions** attended by patients completing face-to-face CBT could be extracted from only 8 studies, whilst the **mean percentage sessions attended** was calculated with data from 7 studies. Treatments included ERP (7), CBT (2) and CT (1) using group (2) and individual (8) formats. Eight studies reported the **average number of steps or modules** completed in remote therapies. Eight out of 10 treatments involved CBT (i.e. ERP and cognitive strategies combined). All were internet-based apart from one bibliotherapy treatment. Seven of the 10 treatments involved (a degree of) therapist assistance. See Appendix B for details of primary studies included under each adherence variable.

The pooled CBT refusal rate was 15.6% (95% CI [11.9, 20], *k*=26, I^2 =52.36, *Q* = 52.47, *p* <.001) and pooled dropout rate was 15.9% (95% CI [14.2, 17.8], *k*=153, I^2 =50.8, *Q* =308.95, *p* <.001). Participants who completed face-to-face therapy attended a mean of 12.8 sessions (95% CI

[12.03, 13.56], k=10, I^2 =95.79, Q =213.64, p<.001) or 87.32% of all scheduled sessions (95% CI [82.63, 92.09], k=9, I^2 =95.4, Q =174.03, p<.001). Participants accessing remote therapies completed a mean of 5.69 steps/modules (95% CI [4.28, 7.1], k=10, I^2 =98.76, Q =724.35, p <.001) or 75.7% of all scheduled steps/modules (95% CI [60.61, 91.12], k=10, I^2 =97.73, Q =397.13, p <.001). Due to the use of varied measures of between-session CBT task adherence and a mix of ITT and completer samples, it was not possible to meta-analyse mean CBT task adherence scores (see descriptive summary below).

There was moderate heterogeneity of study refusal and dropout rates. Sensitivity analyses showed that the pooled rate of refusal (range: 14.7 - 16.5%) and dropout (range: 15.6 - 16.1%) was stable when removing one study per pass. The study estimates for session attendance and module completion were highly heterogeneous, which suggests session attendance and step/module completion were influenced by moderator effects. The mean number (range: 12.7 - 13.6) and percentage of sessions attended (range: 86.7% - 89.1%.) was stable across studies. For remote therapies, the mean number (range: 4.6 - 6.9) and percentage (range: 66.4% - 92.4%) of completed steps/modules was less stable.

3.3. Mean between-session CBT task adherence

Table 1 provides an overview of the 14 studies (k=20) that reported mean between-session CBT task adherence. Treatments included therapist-delivered (face-to-face) ERP (9), CBT (1) ERP + meds (2), ERP + Placebo (2; pill=1, psychological = 1) and CT (2), and remotely delivered ERP (3; self-help (1), therapist-assisted (2)) and CBT (1, self-help). Thirteen out of 14 studies rated adherence to between-session ERP tasks and one study rated adherence to CT appraisal change exercises such as behavioural experiments and surveys (Whittal, Woody, McLean, Rachman & Robichaud, 2010). Two studies also rated the extent to which participants read ERP self-help materials (Tolin et al., 2007; Tolin, Diefenbach & Gilliam, 2011). Rowa et al. (2007) and Tolin et al. (2011) reported a combined score for within- and between-session task adherence. Five studies rated task adherence at or after the

final therapy session (Abramowitz et al., 2002; Fals-Stewart et al., 1993; Seol et al., 2016; Tolin et al., 2004; Tolin et al., 2007). The remaining nine studies rated task adherence at each session.

Three therapist-rated measures were used in more than one study: i) Patient Exposure Adherence Scale (PEAS) (Simpson, Maher, et al., 2010); ii) Homework Compliance Scale (HCS) (Primakoff, Epstein & Covi, 1986; Leung & Heimberg, 1996), and iii) Clinician Rated Effort Scale (CRES) (Tolin, Maltby, Diefenbach, Hannan & Worhunsky, 2004). The PEAS calculates a total score based on an aggregate of participant scores on a 7-point Likert scale for: a) quantity of exposure, b) quality of exposure, and c) degree of ritual prevention. Scores are aggregated across these items for each session, then averaged across all sessions. The PEAS has good content validity and excellent inter-rater reliability (*ICC* ≥.97) (Simpson, Maher et al., 2010). The HCS rates the extent to which participants attempted to complete their assigned ERP tasks on a 6-point Likert scale. It has no reported evidence for its psychometric properties. The CRES is a 5-point Likert scale rating the degree of effort participants put into assigned ERP tasks and, for bibliotherapy, the proportion of assigned reading completed (Tolin et al., 2007, 2011). Tolin et al. (2004) demonstrated good inter-rater reliability for the CRES (*r*=.82) but other psychometric properties are unknown. Tolin et al. (2011) elaborated on the CRES with the **Homework Compliance Rating Form (HCRF)**, using 6-point Likert scales to score i) the amount of effort participants put into ERP, ii) the time spent on exposure and, iii) the amount of assigned reading completed (bibliotherapy). Both patients and therapist scored the HCRF. See Table D.1 in Appendix D for an overview of anchor points for these scales.

Other measures of adherence included: iv) a therapist-rated 7-point Likert scale of compliance (0 *(poor)* to 6 *(outstanding)*) with homework exposure instruction and self-monitoring of rituals (refraining from rituals/accuracy of recording rituals) (Abramowitz, Franklin, Zoellner, & DiBernardo, 2002), v) the number of ERP assignments completed (Vogel, Stiles & Gotestam, 2004) or uncompleted (Falst-Stewart & Lucente, 1993); vi) participant and/or therapist rated % ERP

homework tasks completed (or effort made) (0-100%) (Cottraux et al., 1990; Rowa et al., 2007); vii) patient-rated extent of participation in remote CBT (0-100%) (Seol, Kwon, Kim, Kim & Sin, 2016).

For **therapist-delivered treatments** (13 studies including 17 treatments (face-to-face =16 , videoconference = 1) , the results from 5 studies suggest good/above average mean adherence to between-session ERP tasks, based on study authors' interpretation of mean adherence ratings as 'good' (75-90 % good quality task completion with some to minimal compulsions) or 'high' (77-82.5 % task completion) (Cottraux et al.,1990; Goetter et al. 2013; Rowa et al., 2007; Simpson, Zuckoff, et al., 2010; 2013). Three further studies report moderate/average mean adherence, as mean ratings showed patients were 'moderately compliant' and put in 'between some to much' and 'between some to average' effort, respectively (Abramowitz et al., 2002; Tolin et al., 2007, 2011). One study reported poor/below average mean adherence as authors describe patients as putting in 'minimal to some' effort (Tolin et al., 2004). The latter study attributed the relatively poor adherence to their treatment refractory sample of participants with severe OCD, high rates of comorbidity and relatively poor insight. The results from 4 further studies were not entirely clear. Fals-Stewart & Lucente (1993) did not stipulate the number of assigned homework tasks so it was not possible to calculate the proportion of completed assigned tasks. However, the authors report that participants, who on average missed 3 assigned homework tasks, were compliant. Vogel et al. (2004) also do not report the exact number of assigned tasks but results suggest that mean adherence was at least adequate as on average participants engaged in a total of 17-20 weekly tasks ERP tasks over a 9-week period. Results from studies involving the HCS were also more ambiguous (Whittal et al., 2005; Whittal et al., 2010) as the mean CBT task adherence score represented participants doing 'a portion' of the assigned homework tasks (scale-point 4), without specifying the size of the portion or the quality of exposure (Primakoff et al., 1986). Whittal et al. (2010) did specify that participants did 'most of their assigned tasks each week' (p. 298), which suggests a good degree of adherence. For **self-administered ERP**, mean adherence to CBT tasks was reported by 3 studies and ranged from below average for self-help ERP

(Tolin et al., 2007) to moderate adherence for ERP with at least some therapist assistance (Seol et al., 2016; Tolin et al., 2011).

3.4. Stage of dropout

Twenty-four studies reported the stage of dropout, coded as early (after sessions 1-5) or late (after session 6). Across studies, 690 participants started CBT treatment and 130 dropped out. Treatments included ERP (12), CBT (11), CT (3) and ERP + meds (2). The pooled risk ratio (RR) was **2.45** (95% CI [1.38, 4.35], *k*=28, *z*=3.044, *p*=.002; I^2 = 31.39, *Q* (27) = 39.35, *p* =.06) towards early dropout (see Appendix E for the forest plot).

3.5. Moderators of adherence

There were no significant categorical **moderators of refusal**; treatment and study design characteristics did not predict refusal (see Table F.1 in Appendix F). As studies did not include patients refusing participation in their reported sociodemographic and clinical sample characteristics, it was not possible to conduct a meta-regression with these variables.

There was just one significant moderator effect for dropout (see Table F.2 in Appendix F). The dropout rate for group therapy (12.9%, 95% CI [10.0, 16.6], *k*=23, I^2 = 18.36, *Q*=28.17, *p*=.17) was significantly lower (*Q*=4.28, *p* =.039) than for individual face-to-face therapy (17.3%, 95% CI [15.4, 19.4, k=99, I^2 = 38.36, Q=158.99, *p* <.001). Meta-regression showed that none of the pre-determined socio-demographic (age, gender, ethnicity, educational attainment, employment and marital status) or clinical variables (OCD, depression and anxiety symptom severity, OCD duration, rates of Axis 1 comorbidity, major depression, medication and prior CBT) of treatment starters were significant moderators of dropout (see Table F.3 in Appendix F).

There were too few cases (in each subgroup) to conduct moderator analyses of mean number and % session attendance and/or module completion (Borenstein et al., 2009). As mean CBT task adherence could not be meta-analysed it was also not possible to test moderator effects.

3.6. Reasons for non-adherence

Reasons for refusal were reported by just 8 of the 26 uncontrolled studies for which refusal rates were established. Reasons for refusal were given for a total of 29 participants. Treatment conditions included ERP (3), CBT (4), ERP + medication (1). Therapies were delivered individually (2), in a group (3), couple (1) and remotely with therapist assistance (2).

Forty-one (controlled: 24, uncontrolled: 17) of the 111 primary studies contributing to the pooled dropout rate provided reasons for 211 dropouts. A total of 50 treatments included CBT (21), followed by ERP (13), ERP + medication (6), CT (5), CBT + medication (2), ERP + Placebo (2) and CT + medication (1). Studies involved therapist-delivered individual (27), group (12), family (1), couple (1) and a combination of group and individual (1) therapy. Remote, internet-based therapist-assisted (7) and self-help (1) therapies were also included.

For each included study, reported reasons for refusal or dropout were recorded together with the number of participants the reason applied to. The frequencies for semantically identical reasons were totalled across studies and grouped into different low-level categories, e.g. ‘preferred to wait for individual therapy’ and ‘did not want group therapy’ were grouped together under ‘did not want group treatment (preferred individual therapy)’. These low-level categories were grouped together under higher-level categories, e.g. refusal due to ‘treatment type and format’.

Table 2 reports the total number and proportion of participants (out of 29) to which each refusal reason and category applied. Results show that within this small group of 8 studies, not having one’s treatment preferences met was the most common reason for refusal (79%), particularly participants not wanting to take part in group therapy (41%) or rejecting ERP (21%).

Table 3 provides an overview of the reasons for dropout. The most common reason was low motivation or a lack of engagement (28%). For 14% of the participants, feeling too anxious about ERP or a reluctance to engage with (further) ERP was specifically listed as the reason for dropout. The second most common reason for dropout was (adverse) life-events (13 %), followed by practical barriers (11%). A (perceived) lack of improvement/benefit, patient dissatisfaction with treatment and/or wish for different treatment, together accounted for 14% of dropout. Just over 4% of dropout was due to symptom improvement.

3.7. Association of CBT task adherence with post-treatment OCD symptom reduction

3.7.1. Face-to-face therapies

Table 4 provides a descriptive summary of 7 studies (including one study reporting findings for therapist-delivered and self-help ERP combined (Tolin et al., 2007)) that tested the association between CBT task adherence and post-treatment OCD symptom severity. Studies used a range of task adherence measures and types of correlation (i.e. bivariate, partial and semi-partial), making it inadvisable to pool effect sizes (Aloe & Thompson, 2013). All 7 studies report a significant medium to large association of between-session CBT task adherence with post-treatment OCD symptom reduction.

Three studies also considered the relationship between CBT task adherence and post-treatment OCD symptom remission (Mataix-Cols et al., 2016). Simpson and colleagues (2011) showed that participants needed to achieve a mean total PEAS score of at least 5.6 (i.e. a minimum of 75-90% good quality adherence to between-session ERP tasks as assigned and with minimal to no compulsions or safety aids) to achieve OCD symptom remission post-treatment. Wheaton, Galfalvy, et al. (2016) furthermore showed that when the three sub-scales of the PEAS were considered, i.e. a) quantity of exposure, b) quality of exposure, c) degree of success with response prevention or percentage resisted urges to ritualise, only item c was independently and positively associated with post-treatment OCD symptom severity and increased odds for achieving post-treatment remission.

Abramowitz et al. (2002) also found that patients who achieved remission were significantly more adherent to between-session ERP task assignments and had a better understanding of the treatment rationale than those who did not. However, the authors used a Y-BOCS cut-off score of ≤ 16 to define remission rather than the recommended score of ≤12 (Mataix-Cols et al., 2016). Therefore, as some patients may not in fact have been in remission, these results need to be considered with caution.

3.7.2. Remote therapies

Six studies of remote therapies tested the relationship between the number of completed exposure tasks and post-treatment OCD symptom reduction, measured by the Y-BOCS. All studies involved the BT-STEPS programme, delivered via a web-based format (Diefenbach, Wootton, Bragdon, Moshier & Tolin, 2015; Kobak et al.,2015) or interactive voice response system (Bachofen et al., 1999; Greist et al., 1998, 2002; Kenwright et al., 2005). The BT-STEPS programme consists of 9 steps; the first 3-4 involve self-assessment, the remainder self-treatment. Within the latter phase, ERP sessions can be completed as many times as needed.

To meta-analyse the relationship between task adherence and post-treatment OCD symptom reduction, effect types other than correlations were converted into correlations using standard formulae (e.g. Borenstein et al., 2009). Diefenbach et al. (2015) was not included in the meta-analysis as it measured adherence differently, rating the highest step (out of 9) rather than the number of ERP tasks completed.

There was a medium positive association between the number of ERP tasks/remote sessions completed and post-treatment OCD symptom reduction: r =.39 (95% CI [.23, .52], k=5, z= 4.66, p<.001; I^2=31.9, $Q(4)$ = 6.67, p =.16) (see Appendix G for forest plot). The correlation was reasonably stable (range: .34 - .43) when removing one study per pass. Heterogeneity of study estimates was small to moderate.

3.8. Publication bias

There was no significant potential publication bias for the CBT refusal rate as Egger's intercept test indicated the funnel plot asymmetry was not significant. For dropout, Egger's intercept test shows significant funnel plot asymmetry (Intercept: -1.88, t=8.36, p <.001), indicating a potential publication bias towards excluding smaller studies with larger dropout rates. The trim-and-fill method showed that 52 study treatments should be trimmed to achieve an adjusted higher dropout rate of 21.6% (95% CI [20.3, 23]). Too few studies contributed to the mean number and percentage of completed sessions or modules and to the association between remote ERP and post-treatment symptom reduction to consider publication bias (Borenstein et al., 2009, Sterne, Egger & Moher, 2011).

4. Discussion

This meta-analysis found refusal and dropout rates of 15.6% and 15.9% respectively, suggesting that over 30% of eligible patients who are recommended CBT for OCD fail to initiate or complete treatment. Whilst a pooled refusal rate for CBT for OCD has not previously been reported, the dropout rate is consistent with two earlier meta-analyses of studies evaluating CBT for OCD (Öst et al, 2015; Swift & Greenberg, 2012). The risk of early dropout was 2.5 times greater than for late dropout. As early rather than late dropout appears to be related to poor outcomes (Aderka et al., 2011), it suggests most patients who drop out from CBT for OCD are unlikely to have experienced clinically significant benefit. Indeed, the examination of reasons for dropout showed that dropout was rarely due to clinically significant symptom improvement. This reinforces the need to better understand and address the risk of refusal and (early) dropout from CBT for OCD.

This meta-analysis failed to find any significant moderators of refusal to inform our understanding of potential risk factors of refusal of CBT for OCD. Although refusal rates were not significantly higher for group than individual CBT, the exploration of reasons for refusal carefully suggests that a mismatch between patient preference and the treatment on offer, particularly when the treatment is group CBT, may affect patients' opt-in to therapy. Feelings of unease or shame or comorbid social anxiety may contribute to a reluctance to engage in group therapy, or perhaps

participants anticipated insufficient individually tailored treatment within a group setting. As dropout was significantly lower for group than individual therapy, it suggests that the group format may enhance adherence once participants commence therapy, e.g. being with other patients with OCD might help to normalise difficulties and support participants during challenging times in therapy. However, this finding could reflect a selection bias; e.g. group CBT participants may be more motivated or less (socially) anxious than participants in individual CBT. We would therefore urge caution in drawing the conclusion the group CBT is inherently more engaging than individual CBT.

The examination of patient reasons for nonadherence lends some support to the notion that negative perceptions of CBT and a lack of satisfaction or perceived benefit from therapy may contribute to treatment refusal and dropout (Mancebo et al., 2011). Interestingly, a sizeable portion of dropout was due to patients violating research eligibility criteria, e.g. changes in medication. This would typically not require withdrawal from CBT in routine clinical settings.

This review did not find a significant difference in dropout for different types of CBT (i.e. ERP, CBT, CT), which is consistent with other meta-analyses (Ong et al. 2016; Öst et al., 2015; Swift & Greenberg, 2014). Also, whilst one would assume that participants are more likely to stay motivated in therapy with increased therapist support, dropout from remote therapies was not significantly higher than for face-to-face therapies and therapist assistance in remote therapies did not moderate dropout from remote therapies. Therapist experience also did not affect dropout, which mirrors results from a meta-analysis of dropout from ERP (Ong et al., 2016).

Results suggest that, on average, participants who completed face-to-face CBT received a therapeutic 'dose' of therapy, commensurate with US and UK practice guidelines (APA, 2007; NICE, 2005). However, results were highly heterogeneous and a significant number of treatment completers may not have received the recommended minimum 13 sessions; studies did not report the data needed to examine this further. Session/module completion for remote therapies appeared lower than for therapist-delivered therapies but, as most remote therapy studies reported figures for ITT rather than completer samples, a direct comparison was not possible.

This review showed a consistent medium to large significant association between CBT task adherence and post-treatment OCD symptom reduction, in line with previous research into the association of homework with outcomes for CBT for a range of psychological disorders (e.g. Kazantzis et al., 2016). Most studies of CBT task adherence reported that adherence was at least satisfactory. However, as between-session task adherence likely needs to be high to achieve post-treatment OCD symptom remission (e.g. Simpson et al., 2011), this may not necessarily be adequate (Mataix-Cols et al., 2016).

4.1. Strengths and limitations

To the best of our knowledge, this is the first comprehensive systematic review of the magnitude, moderators and reasons for poor adherence to CBT for OCD. It included a larger number of studies than previous meta-analyses of refusal and dropout (e.g. Ong et al., 2016; Öst et al., 2015; Swift & Greenberg, 2015) and considered both controlled and uncontrolled studies. This review adopted a wider focus on adherence by examining session attendance, module completion and between-session task adherence and reasons for non-adherence. By adopting a broad search strategy, it highlighted findings that were not necessarily foregrounded in study titles or abstracts. The large number of included studies allowed the examination of a range of moderators of refusal and dropout.

Whilst a broad range of moderators were included, potentially important moderators may have been missed and some moderator analyses may have been under-powered. The quality of the included studies was not formally assessed. However, as quality assessment tools typically assess study features pertinent to a potential bias in effect sizes for therapy outcomes, they were not directly relevant to the current review (e.g. Jadad et al., 1996; Öst et al., 2008; Schulz, Altman & Moher, 2010).

This review attempted to include studies reflective of real-life settings by including uncontrolled studies and examining the moderating effect of the sample's clinical representativeness. However, other features of effectiveness studies were not coded for (e.g. absence of manualised

treatment, additional supervision) (Hans & Hiller, 2013)) and only published papers were included. The current refusal and dropout rates might therefore not adequately reflect attrition in routine clinical settings. For example, Di Bona and colleagues (2014) found that 48% of respondents referred to Improving Access to Psychological Therapy (IAPT) services that routinely treat UK patients with common mental health difficulties including OCD, reported not attending the service. Richards and Borglin (2010) showed that, over a three-year period, 23% of IAPT patients dropped out of treatment. Attrition from CBT for OCD in routine settings may therefore be higher than the current rates suggest.

Many studies reported a two-step eligibility check; an initial (telephone) screening for eligibility, followed by face-to-face assessment to confirm the OCD diagnosis and severity of symptoms. Often a considerable number of patients met the inclusion criteria at telephone screening but disengaged prior to the confirmation of their eligibility following clinic-based assessment (when the refusal rate was calculated). This suggests that the current refusal rate is probably a conservative estimate. Reasons for refusal and dropout were based on a small subset of studies and may not adequately represent reasons for dropout for all studies included in the aggregation of refusal and dropout rates.

The reported mean dropout rate was affected by a potential publication bias; the trim-and-fill test proposed an upwardly adjusted dropout rate (21.6%). Whilst small studies may have lower dropout rates associated with study design characteristics, the latter did not significantly moderate dropout. Alternatively, smaller studies were perhaps more often excluded due to ambiguous reporting on dropout. However, in that case, a small study absence would be observed at both the low and high end of study dropout. It is therefore possible that smaller studies with higher dropout rates are indeed less likely to be published.

Studies spanned a period of more than 30 years, during which conceptual and technical aspects of ERP and CT have evolved (e.g. Jacoby & Abramowitz, 2016; Sookman, 2016). This means that studies of the same type of intervention (i.e. ERP, CBT, CT) may not

have been directly comparable and, together with the fact that there is considerable procedural overlap between these three treatment types (Abramowitz, Taylor, &McKay, 2005), limits the conclusions that can be drawn from testing treatment type as a moderator of patient adherence.

There were several limitations of the primary studies. Fifty percent of excluded full-text articles were discarded as they did not (clearly) report attrition data. Few of the 123 included studies reported on CBT task adherence. This is surprising, given the central importance attributed to participants practising therapy tasks between sessions for the success of CBT. The variability in the (quality of) measurement and reporting of CBT task adherence for face-to-face therapies made it impossible to pool study data.

4.2. Clinical implications

Therapists should elicit and address any concerns and misconceptions patients have about CBT, and ERP in particular, at the earliest opportunity, i.e. during the patient's initial assessment, perhaps with the aid of accounts from patients who have successfully completed therapy (using vignettes, audio or video material). Also, patients should ideally have a choice about their preferred treatment format.

It would benefit patients to know that there is a significant relationship between task adherence and OCD symptom reduction and that recovery is more likely when task engagement is high. As is good clinical practice, therapists need to make sustained efforts (early on) to maximise patient engagement with key therapy tasks. It is also important to assess psychological factors such as patients' degree of insight into their OCD symptoms and motivation for treatment (e.g. Bachofen et al., 1999; De Araujo et al., 1996; Tolin et al., 2004). Whilst Simpson, Zuckoff, et al. (2010) found that adding motivational interviewing to CBT did not enhance adherence, this was in a context of high patient engagement and therefore motivational interviewing may still have a role to play with patients

showing poor motivation. Therapists should achieve a clear agreement with the patient on the tasks of therapy as Wheaton, Huppert et al. (2016) found that this predicted greater adherence to between-session exposure tasks. As some studies show that task adherence predicted therapy outcomes early on in therapy (Simpson et al., 2011; De Araujo, Ito & Marks, 1996), any difficulties and misconceptions about between-session therapy tasks should be addressed at the earliest opportunity and clinicians should consider offering additional support, e.g. offering between-session phone-calls, increasing session frequency and/or including home visits, at this stage. Within the context of remote therapies, it would be advisable to build in (more) therapist assistance when patients first commence self-exposure, as this may enhance task adherence (e.g. Tolin et al., 2007). Wheaton, Galfalvy et al. (2016) show that the degree to which patients engage successfully in response prevention, rather than exposure per se, was predictive of post-treatment symptom reduction. Therefore, clinicians reviewing between-session ERP need to gain a clear understanding of patients' degree and quality of response prevention during between-session ERP.

4.3. Research implications

We recommend that studies of CBT for OCD routinely report refusal and dropout rates and consistently distinguish patient- from clinician/researcher-initiated dropout, to aid research into predictors of patient-initiated dropout. Reasons for refusal and dropout should also be reported, aided by formal therapy adherence measures (e.g. Mancebo, Pinto, Rasmussen & Eisen, 2008). Qualitative, interview-based studies will enable a more in-depth understanding of reasons for non-adherence than a simple tally of refusal or dropout reasons. Enhanced within-study data on differences in sociodemographic and clinical characteristics between eligible patients, refusers, treatment completers and dropouts would enable pooling within-study data to inform our understanding of whether participant-level sociodemographic and clinical variables can predict non-adherence. More research is needed on whether psychological variables, such as participants' beliefs about their mental health difficulties and mental health services, expectations of and motivation for treatment predict non-

adherence (Santana & Fontenelle, 2011; Taylor, Abramowitz & McKay, 2012; Wierzbicki & Pekarik, 1993). The relationships between the client-therapist relationship and patient adherence is also an area for further research (Simpson et al., 2011; Wheaton, Huppert, Foa & Simpson, 2016). An examination of group dynamics and peer relationships, in the context of group CBT, would also aid our understanding of whether and how peer support benefits patient adherence.

The effect of different types of CBT (ERP, CT, CBT) on patient adherence requires further investigation, taking account of the conceptual and technical evolvement of these treatments over time. It would also be helpful to examine whether the way in which ERP tasks are completed, i.e. in a gradual, hierarchical manner (as informed by emotional processing theory (Foa & Kozak, 1986)) or a random, variable manner (as informed by inhibitory learning theory (Jacoby & Abramowitz, 2016)), affects patient dropout, sessions attendance and task adherence.

The OCD research community should also aim to routinely report on task-adherence. It would benefit research in this area if researchers use the same measure of adherence to allow direct comparison between studies. We would recommend the PEAS (Simpson, Maher et al., 2010) as this is a measure of ERP task adherence that has already been used in multiple studies and it separately scores the degree of exposure and of response prevention and also captures the quality of exposure. This measure could be developed further, based on a shared understanding of the key features of well-designed exposure tasks that maximise exposure gains, e.g. informed by recent research on inhibitory learning theory (Craske, Treanor, Conway, Zbozinek & Vervliet 2014), and markers of successful adherence (e.g. Wheaton, Galfalvy, et al., 2016). Further research is needed to establish a suitable measure of adherence to other CBT tasks, e.g. cognitive restructuring, behavioural experiments, in the context of OCD. More objective measures of adherence, e.g. blind rating of video recordings of within- or between-session ERP, would enhance research in this area. Also, using apps to help patients record home practice might benefit self-report. Whilst CBT task adherence is an important predictor of OCD symptom reduction, without repeatedly

measuring both over the course of treatment, it is not possible to firmly establish the direction of this relationship. Consistent application of agreed criteria for symptom remission (e.g. Farris, McLean, Van Meter, Simpson, & Foa, 2013) is also needed to advance our understanding of the role of patient adherence in symptom remission and longer-term recovery (Mataix-Cols et al., 2016). These are important areas of research to inform how best to achieve a high degree and quality of adherence to CBT for OCD for the benefit of patients.

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Conflict of Interest

All authors declare that they have no conflict of interest.

References

Abramowitz, J. S., Franklin, M. E., Zoellner, L. A., & DiBernardo, C. L. (2002). Treatment compliance and outcome in obsessive-compulsive disorder. Behavior Modification, 26(4), 447–463. https://doi.org/10.1177/0145445502026004001.

Abramowitz, J. S., Taylor, S., & McKay, D. (2005). Potentials and limitations of cognitive treatments for obsessive-compulsive disorder. Cognitive Behaviour Therapy, 34(3), 140–147. https://doi.org/10.1080/16506070510041202.

Aderka, I. M., Anholt, G. E., van Balkom, A. J. L. M., Smit, J. H., Hermesh, H., Hofmann, S.G., & van Oppen, P. (2011). Differences between early and late drop-outs from treatment for obsessive–compulsive disorder. Journal of Anxiety Disorders, 25(7), 918–923. https://doi.org/10.1016/j.janxdis.2011.05.004.

Aloe, A. M., & Thompson, C. G. (2013). The synthesis of partial effect sizes. Journal of the Society for Social Work and Research, 4(4), 390–405. https://doi.org/10.5243/jsswr. 2013.24.

American Psychiatric Association (APA) (2007). Practice guideline for the treatment of patients with obsessive-compulsive disorder. Arlington, VA.

American Psychiatric Association (2013). Diagnostic and statistical manual of mental dis- orders (fifth edition). Washington DC: Author.

Andersen, R. M. (2017). Revisiting the Behavioral Model and Access to Medical Care: Does it Matter? Journal of Health and Social Behavior, 36(1), 1–10.

Bachofen, M., Nakagawa, A., Marks, I. M., Park, J. M., Greist, J. H., Baer, L., & Dottl, S. L. (1999). Home self-assessment and self-treatment of obsessive-compulsive disorder using a manual and a computer-conducted telephone interview: Replication of a UK- US study. The Journal of Clinical Psychiatry, 60(8), 545–549.

Barrett, M. S., Chua, W.-J., Crits-Christoph, P., Gibbons, M. B., & Thompson, D. (2008). Early withdrawal from mental health treatment: Implications for psychotherapy practice. Psychotherapy Theory Research Practice Training, 45(2), 247–267. https:// doi.org/10.1037/0033-3204.45.2.247.

Beck, A. T., Steer, R. A., & Garbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. Clinical Psychology Review, 8(1), 77–100.

Borenstein, M., Hedges, L. V., Higgings, J. P. O., & Rothstein, H. R. (2009). Introduction to meta-analysis. West Sussex: Wiley.

Comprehensive Meta-Analysis (2014). (Version 3) [Computer software]. Available from Englewood, NJ: Biostat. http://www.comprehensive.com.

Cottraux, J., Note, I., Yao, S. N., Lafont, S., Note, B., Mollard, E., & Dartigues, J. F. (2001). A randomized controlled trial of cognitive therapy versus intensive behavior therapy in obsessive compulsive disorder. Psychotherapy and Psychosomatics, 70(6), 288–297. https://doi.org/10.1159/000056269.

Cougle, J. R., Timpano, K. R., Fitch, K. E., & Hawkins, K. A. (2011). Distress tolerance and obsessions: An integrative analysis. Depression and Anxiety, 28(10), 906–914.

Craske, M. G., Treanor, M., Conway, C. C., Zbozinek, T., & Vervliet, B. (2014). Maximizing exposure therapy: An inhibitory learning approach. Behaviour Research and Therapy, 58, 10–23. https://doi.org/10.1016/j.brat.2014.04.006.

De Araujo, L. A., Ito, L. M., & Marks, I. M. (1996). Early compliance and other factors predicting outcome of exposure for obsessive–compulsive disorder. The British Journal of Psychiatry, 169(6), 747–752. https://doi.org/10.1192/bjp.169.6.747.

Di Bona, L., Saxon, D., Barkham, M., Dent-Brown, K., & Parry, G. (2014). Predictors of patient non-attendance at Improving Access to Psychological Therapy services demonstration sites. Journal of Affective Disorders, 169, 157–164. https://doi.org/10. 1016/j.jad.2014.08.005.

Diefenbach, G. J., Wootton, B. M., Bragdon, L. B., Moshier, S. J., & Tolin, D. F. (2015). Treatment outcome and predictors of internet guided self-help for obsessive-com- pulsive disorder. Behavior Therapy, 46(6), 764–774. https://doi.org/10.1016/j.beth. 2015.06.001.

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

Egger, M., Davey Smith, G., Schneider, M., & Minder, C. (1997). In BMJ Clinical research (Vol. Ed.), Bias in meta-analysis detected by a simple, graphical test: vol. 315, (pp. 629– 634). . https://doi.org/10.1136/bmj.315.7109.629 BMJ 315.

Fals-Stewart, W., & Lucente, S. (1993). An MCMI cluster typology of obsessive-compulsives: A measure of personality characteristics and its relationship to treatment participation, compliance and outcome in behavior therapy. Journal of Psychiatric Research, 27(2), 139–154.

Fernandez, E., Salem, D., Swift, J. K., & Ramtahal, N. (2015). Meta-analysis of dropout from cognitive behavioral therapy. Journal of Consulting and Clinical Psychology, 83(6), 1108–1122. https://doi.org/10.1037/ccp0000044.

Foa, E. B., & Kozak, M. J. (1986). Emotional processing of fear. Exposure to corrective information. Psychological Bulletin, 99(1), 20–35. https://doi.org/10.1037/0033-2909.99.1.20.

Fisher, P. L., & Wells, A. (2005). How effective are cognitive and behavioral treatments for obsessive-compulsive disorder? A clinical significance analysis. Behaviour Research and Therapy, 43(12), 1543–1558. https://doi.org/10.1016/j.brat.2004.11.007.

Fu, R., Gartlehner, G., Grant, M., Shamliyan, T., Sedrakyan, A., Wilt, T. J., ... Trikalinos, T. A. (2011). Conducting quantitative synthesis when comparing medical interventions: AHRQ and the Effective Health Care Program. Journal of Clinical Epidemiology, 64(11), 1187–1197. https://doi.org/10.1016/j.jclinepi.2010.08.010.

Goetter, E. M., Herbert, J. D., Forman, E. M., Yuen, E. K., & Thomas, J. G. (2014). An open trial of videoconference-mediated exposure and ritual prevention for obsessive- compulsive disorder. Journal of Anxiety Disorders, 28(5), 460–462. https://doi.org/ 10.1016/j.janxdis.2014.05.004.

Goodman, W., Price, L., Rasmussen, S., Mazure, C., R, F., & Charney, D. (1989). The yale- brown obsessive compulsive scale. I. development, use, and reliability. Archives of General Psychiatry, 46(11), 1006–1111.

Goodwin, R., Koenen, K. C., Hellman, F., Guardino, M., & Struening, E. (2002). Helpseeking and access to mental health treatment for obsessive-compulsive dis- order. Acta Psychiatrica Scandinavica, 106(2), 143–149. https://doi.org/10.1034/j. 1600-0447.2002.01221.x.

Greist, J. H., Marks, I. M., Baer, L., Kobak, K. A., Wenzel, K. W., Hirsch, M. J., & Clary, C. M. (2002). Behavior therapy for obsessive-compulsive disorder guided by a computer or by a clinician compared with relaxation as a control. The Journal of Clinical Psychiatry, 63(2), 138–145.

Greist, J. H., Marks, I. M., Baer, L., Parkin, J. R., Manzo, P. A., Mantle, J. M., ... Forman, L. (1998). Self-treatment for obsessive compulsive disorder using a manual and a computerized telephone interview: A US-UK study. M D Computing, 15(3), 149–157.

Hans, E., & Hiller, W. (2013). A meta-analysis of nonrandomized effectiveness studies on outpatient cognitive behavioral therapy for adult anxiety disorders. Clinical Psychology Review, 33(8), 954–964. https://doi.org/10.1016/j.cpr.2013.07.003.

Hedges, L., & Olkin, I. (1985). Statistical methods in meta-analysis. Orlando, FL: Academic Press.

Higgins, J. P. T., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring in- consistency in meta-analyses. BMJ : British Medical Journal, 327(7414), 557–560.

Hsieh, H.-F., & Shannon, S. E. (2005). Three appproaches to qualitative content analysis.Qualitative Health Research, 15(9), 1277–1288. https://doi.org/10.1177/1049732305276687.

Jacobson, N. S., Roberts, L. J., Berns, S. B., & McGlinchey, J. B. (1999). Methods for defining and determining the clinical significance of treatment effects: Description, application, and alternatives. Journal of Consulting and Clinical Psychology, 67(3), 300–307. https://doi.org/10.1109/APCC.1999.820481.

Jacobson, N. S., & Truax, P. (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. Journal of Consulting and Clinical Psychology, 59(1), 12–19 http://doi.org/00224006X/9.

Jacoby, R. J., & Abramowitz, J. S. (2016). Inhibitory learning approaches to exposure therapy: A critical review and translation to obsessive-compulsive disorder. Clinical Psychology Review, 49, 28–40. https://doi.org/10.1016/j.cpr.2016.07.001.

Jadad, A. R., Moore, R. A., Carroll, D., Jenkinson, C., Reynolds, D. J. M., Gavaghan, D. J., & McQuay, H. J. (1996). Assessing the quality of reports of randomized clinical trials: Is blinding necessary? Controlled Clinical Trials, 17(1), 1–12. https://doi.org/10.1016/0197-2456(95)00134-4.

Kazantzis, N., Whittington, C., Zelencich, L., Kyrios, M., Norton, P. J., & Hofmann, S. G. (2016). Quantity and quality of homework compliance: A meta-analysis of relations with outcome in cognitive behavior therapy. Behavior Therapy, 47(5), 755–772.https://doi.org/10.1016/j.beth.2016.05.002.

Kelley, G. A., & Kelley, J. S. (2012). Statistical models for meta-analysis: A brief tutorial. World Journal of Methodology, 2(4), 27. https://doi.org/10.5662/wjm.v2.i4.27.

Kenwright, M., Marks, I., Graham, C., Franses, A., & Mataix-Cols, D. (2005). Brief scheduled phone support from a clinician to enhance computer-aided self-help for obsessive-compulsive disorder: Randomized controlled trial. Journal of Clinical Psychology, 61(12), 1499–1508. https://doi.org/10.1002/jclp.20204.

Kobak, K. A., Greist, R., Jacobi, D. M., Levy-Mack, H., & Greist, J. H. (2015). Computer-assisted cognitive behavior therapy for obsessive-compulsive disorder: A randomized trial on the impact of lay vs. Professional coaching. Annals of General Psychiatry, 14. https://doi.org/10.1186/s12991-015-0048-0.

Kozak, M., & Foa, E. (1997). Mastery of obsessive-compulsive disorder: A cognitive-behavioral approach. Therapist guide. San Antonio TX: Graywind.

Lewin, A. B., De Nadai, A. S., Park, J., Goodman, W. K., Murphy, T. K., & Storch, E. A. (2011). Refining clinical judgment of treatment outcome in obsessive-compulsive disorder. Psychiatry Research, 185(3), 394–401. https://doi.org/10.1016/j.psychres.2010.08.021.

Leung, A. W., & Heimberg, R. G. (1996). Homework compliance, perceptions of control, and outcome of cognitive-behavioral treatment of social phobia. Behaviour Research and Therapy, 34(5–6), 423–432.

Lipsey, M. W., & Wilson, D. B. (2001). Practical meta-analysis. Thousand Oaks, Calif: Sage Publications.

Macy, A. S., Theo, J. N., Kaufmann, S. C., Ghazzaoui, R. B., Pawlowski, P., Fakhry, H. I., & IsHak, W. W. (2013). Quality of life in obsessive compulsive disorder. CNS Spectrums, 18(1), 21–33. https://doi.org/10.1017/S1092852912000697.

Mancebo, M. C., Pinto, A., Rasmussen, S. A., & Eisen, J. L. (2008). Development of the treatment adherence survey-patient version (TAS-P) for OCD. Journal of Anxiety Disorders, 22(1), 32–43. Retrieved from http://search.proquest.com/docview/ 70159124?accountid=14182.

Mancebo, M. C., Eisen, J. L., Sibrava, N. J., Dyck, I. R., & Rasmussen, S. A. (2011). Patient utilization of cognitive-behavioral therapy for OCD. Behavior Therapy, 42(3), 399. Retrieved from http://search.proquest.com/docview/884294084?accountid=14182.

Mataix-Cols, D., & Marks, I. M. (2006). Self-help with minimal therapist contact for obsessive-compulsive disorder: A review. European Psychiatry, 21(2), 75–80.

Mataix-Cols, D., Fernandez de La Cruz, L., Nordsletten, A. E., Lenhard, F., Isomura, K., & Simpson, H. B. (2016). Towards an international expert consensus for defining

treatment response, remission, recovery and relapse in obsessive-compulsive dis- order. World Psychiatry : Official Journal of the World Psychiatric Association (WPA), 15(1), 80–81. https://doi.org/10.1002/wps.20299.

McKay, D., Sookman, D., Neziroglu, F., Wilhelm, S., Stein, D. J., Kyrios, M., ... Veale, D.(2015). Efficacy of cognitive-behavioral therapy for obsessive–compulsive disorder. Psychiatry Research, 225(3), 236–246. https://doi.org/10.1016/j.psychres.2014.11.058.

National Institute of Health and Care Excellence [NICE] (2005). Obsessive-compulsive disorder: Core interventions in the treatment of obsessive-compulsive disorder and body dysmorphic disorder. London: Author.

Obsessive Compulsive Cognitions Working Group (1997). Cognitive assessment of obsessive-compulsive disorder. Behaviour Research and Therapy, 35(7), 667–681.

Obsessive Compulsive Cognitions Working Group (2005). Psychometric validation of the obsessive belief questionnaire and interpretation of intrusions inventory – Part 2: Factor analyses and testing of a brief version. Behaviour Research and Therapy, 43(11), 1527–1542.

Olatunji, B. O., Davis, M. L., Powers, M. B., & Smits, J. A. J. (2013). Cognitive-behavioral therapy for obsessive-compulsive disorder: A meta-analysis of treatment outcome and moderators. Journal of Psychiatric Research, 47(1), 33–41. https://doi.org/10.1016/j.jpsychires.2012.08.020.

Olatunji, B. O., Deacon, B. J., & Abramowitz, J. S. (2009). The cruelest cure? Ethical issues in the implementation of exposure-based treatments. Cognitive and Behavioral Practice, 16(2), 172–180. https://doi.org/10.1016/j.cbpra.2008.07.003.

Ong, C. W., Clyde, J. W., Bluett, E. J., Levin, M. E., & Twohig, M. P. (2016). Dropout rates in exposure with response prevention for obsessive-compulsive disorder: What do the data really say? Journal of Anxiety Disorders, 40, 8–17. https://doi.org/10.1016/j. janxdis.2016.03.006.

Öst, L. G. (2008). Cognitive behavior therapy for anxiety disorders: 40 years of progress. Nordic Journal of Psychiatry, 62(Suppl 47), 5–10. https://doi.org/10.1080/ 08039480802315590.

Öst, L. G., Havnen, A., Hansen, B., & Kvale, G. (2015). Cognitive behavioral treatments of obsessive-compulsive disorder. A systematic review and meta-analysis of studies published 1993–2014. Clinical Psychology Review, 40, 156–169. https://doi.org/10. 1016/j.cpr.2015.06.003.

Owens, P. L., Hoagwood, K., Horwitz, S. M., Leaf, P. J., Poduska, J. M., Kellam, S. G., & Ialongo, N. S. (2000). Barriers to children's mental health services. Journal of the American Academy of Child and Adolescent Psy, 41(6), 731–738. https://doi.org/10. 1097/00004583-200206000-00013.

Pallanti, S., International Treatment Refractory OCD Consortium, Hollander, E., Bienstock, C., Koran, L., Leckman, J., & Zohar, J. (2002). Treatment non-response in OCD: Methodological issues and operational definitions. The International Journal of Neuropsychopharmacology, 5, 181–191.

Pallanti, S., & Quercioli, L. (2006). Treatment-refractory obsessive-compulsive disorder: Methodological issues, operational definitions and therapeutic lines. Progress in Neuro-Psychopharmacology and Biological Psychiatry, 30(3), 400–412.

Ponniah, K., Magiati, I., & Hollon, S. D. (2013). An update on the efficacy of psychological therapies in the treatment of obsessive-compulsive disorder in adults. Journal of Obsessive-compulsive and Related Disorders, 2(2), 207–218. https://doi.org/10.1016/j. jocrd.2013.02.005.

Primakoff, L., Epstein, N., & Covi, L. (1986). Homework compliance: An uncontrolled variable in cognitive therapy outcome research. Behavior Therapy, 17(4), 433–446. https://doi.org/10.1016/S0005-7894(86)80073-9.

Richards, D. A., & Borglin, G. (2011). Implementation of psychological therapies for anxiety and depression in routine practice: Two-year prospective cohort study. Journal of Affective Disorders, 133(1–2), 51–60.

Rosa-Alcazar, A. I., Sanchez-Meca, J., Gomez-Conesa, A., & Marin-Martinez, F. (2008). Psychological treatment of obsessive-compulsive disorder: A meta-analysis. Clinical Psychology Review, 28(8), 1310–1325. https://doi.org/10.1016/j.cpr.2008.07.001.

Rowa, K., Antony, M. M., Summerfeldt, L. J., Purdon, C., Young, L., & Swinson, R. P.(2007). Office-based vs. Home-based behavioral treatment for obsessive-compulsive disorder: A preliminary study. Behaviour Research and Therapy, 45(8), 1883–1892. https://doi.org/10.1016/j.brat.2007.02.009.

Sabate, E. (2003). Adherence to long term therapies: Evidence for action. Geneva: World Health Organization.

Santana, L., & Fontenelle, L. F. (2011). A review of studies concerning treatment ad- herence of patients with anxiety disorders. Patient Preference and Adherence, 5, 427–439. https://doi.org/10.2147/PPA.S23439.

Schulz, K. F., Altman, D. G., & Moher, D. (2010). CONSORT 2010 statement: Updated guidelines for reporting parallel group randomised trials. Journal of Pharmacology & Pharmacotherapeutics, 1(2), 100–107.

Seol, S. H., Kwon, J. S., Kim, Y. Y., Kim, S. N., & Shin, M. S. (2016). Internet-based cognitive behavioral therapy for obsessive-compulsive disorder in Korea. Psychiatry Investigation, 13(4), 373–382. https://doi.org/10.4306/pi.2016.13.4.373.

Simpson, H. B., Maher, M., Page, J. R., Gibbons, C. J., Franklin, M. E., & Foa, E. B. (2010). Development of a patient adherence scale for exposure and response prevention therapy. Behavior Therapy, 41(1), 30–37. https://doi.org/10.1016/j.beth.2008.12.002.

Simpson, H. B., Zuckoff, A. M., Maher, M. J., Page, J. R., Franklin, M. E., Foa, E. B., ... Wang, Y. (2010). Challenges using motivational interviewing as an adjunct to exposure therapy for obsessive-compulsive disorder. Behaviour Research and Therapy, 48(10), 941–948. https://doi.org/10.1016/j.brat.2010.05.026.

Simpson, H. B., Maher, M. I. J., Wang, Y., Bao, Y., Foa, E. B., & Franklin, M. (2011).Patient adherence predicts outcome from cognitive behavioral therapy in obsessive- compulsive disorder. Journal of Consulting and Clinical Psychology, 79(2), 247–252. https://doi.org/10.1037/a0022659.

Simpson, H. B., Foa, E. B., Liebowitz, M. R., Huppert, J. D., Cahill, S., Maher, M. J., & Campeas, R. (2013). Cognitive-behavioral therapy vs risperidone for augmenting serotonin reuptake inhibitors in obsessive-compulsive disorder a randomized clinical trial. JAMA Psychiatry, 70(11), 1190–1198. https://doi.org/10.1001/jamapsychiatry. 2013.1932.

Sookman, D. (2016). Specialized cognitive behavior therapy for obsessive compulsive disorder. An expert clinician guidebook. New York, NY: Guilford Press.

Sookman, D., & Steketee, G. (2010). Specialized cognitive behavior therapy for treatment resistant obsessive compulsive disorder. In D. Sookman, & R. L. Leahy (Eds.).Treatment resistant anxiety disorders. Resolving impasses to symptom remission (pp. 31– 74). New York, NY: Routledge.

Sterne, J. A. C., Egger, M., & Moher, D. (2011). Chapter 10: Addressing reporting biases. In J. P. T. Higgins, & S. Green (Eds.). Cochrane handbook for systematic reviews of intervention. Version 5.1.0 (updated March 2011)The Cochrane Collaboration .Available from www.handbook.cochrane.org.

Swift, J. K., & Greenberg, R. P. (2014). A Treatment by disorder meta-analysis of dropout from Psychotherapy. Journal of Psychotherapy Integration, 24(3), 193–207. https:// doi.org/10.1037/a0037512.

Swift, J. K., Greenberg, R. P., Whipple, J. L., & Kominiak, N. (2012). Practice re- commendations for reducing premature termination in therapy. Professional Psychology, Research and Practice, 43(4), 379–387. https://doi.org/10.1037/ a0028291.

Taylor, S., Abramowitz, J. S., & McKay, D. (2012). Non-adherence and non-response in the treatment of anxiety disorders. Journal of Anxiety Disorders, 26(5), 583–589. https://doi.org/10.1016/j.janxdis.2012.02.010.

Tetley, A., Jinks, M., Huband, N., & Howells, K. (2011). A systematic review of measures of therapeutic engagement in psychosocial and psychological treatment. Journal of Clinical Psychology, 67(9), 927–941. https://doi.org/10.1002/jclp.20811.

Tolin, D. F., Diefenbach, G. J., & Gilliam, C. M. (2011). Stepped care versus standard cognitive-behavioral therapy for obsessive-compulsive disorder: A preliminary study of efficacy and costs. Depression and Anxiety, 28(4), 314–323. https://doi.org/10.1002/da.20804.

Tolin, D. F., Hannan, S., Maltby, N., Diefenbach, G. J., Worhunsky, P., & Brady, R. E. (2007). A randomized controlled trial of self-directed versus therapist-directed cognitive-behavioral therapy for obsessive-compulsive disorder patients with prior medication trials. Behavior Therapy, 38(2), 179–191. https://doi.org/10.1016/j.beth. 2006.07.001.

Tolin, D. F., Maltby, N., Diefenbach, G. J., Hannan, S. E., & Worhunsky, P. (2004).Cognitive-behavioral therapy for medication nonresponders with obsessive-compulsive disorder: A wait-list-controlled open trial. The Journal of Clinical Psychiatry, 65(7), 922–931.

Vogel, P. A., Stiles, T. C., & Gotestam, K. G. (2004). Adding cognitive therapy elements to exposure therapy for obsessive compulsive disorder: A controlled study. Behavioural and Cognitive Psychotherapy, 32(3), 275–290. https://doi.org/10.1017/s1352465804001353.

Wheaton, M. G., Galfalvy, H., Steinman, S. A., Wall, M. M., Foa, E. B., & Simpson, H. B. (2016). Patient adherence and treatment outcome with exposure and response prevention for OCD: Which components of adherence matter and who becomes well? Behaviour Research and Therapy, 85, 6–12. https://doi.org/10.1016/j.brat.2016.07. 010.

Wheaton, M. G., Huppert, J. D., Foa, E. B., & Simpson, H. B. (2016). How important is the therapeutic alliance in treating obsessive-compulsive disorder with exposure and response prevention? An empirical report. Clinical Neuropsychiatry: Journal of Treatment Evaluation, 13(6), 88–93.

Whittal, M. L., Thordarson, D. S., & McLean, P. D. (2005). Treatment of obsessive compulsive disorder: Cognitive behavior therapy vs. Exposure and response pre- vention. Behaviour Research and Therapy, 43(12), 1559–1576. https://doi.org/10. 1016/j.brat.2004.11.012.

Whittal, M. L., Woody, S. R., McLean, P. D., Rachman, S. J., & Robichaud, M. (2010). Treatment of obsessions: A randomized controlled trial. Behaviour Research and Therapy, 48(4), 295–303. https://doi.org/10.1016/j.brat.2009.11.010.

Wierzbicki, M., & Pekarik, G. (1993). A meta-analysis of psychotherapy dropout. EBSCOhost, 24(2), 190–195. https://doi.org/10.1037/0735-7028.24.2.190.

Table 1

Descriptive summary of studies measuring mean CBT task adherence.

Adherence Measure	Study	Treatment	*M (SD)*	Study authors' description*
PEAS (Simpson et al., 2010) 7-point Likert scales: **Item a)** quantity of attempted exposure compared to quantity assigned (1= 0%, 7=100%) **Item b**) quality of exposures attempted (1= refused, 7=excellent) **Item c)** degree of ritual prevention (1= refused, 7=>90%) See table E.1, Appendix E for further details	Simpson (2010)	Twice-weekly ERP (*N*=15)	**5.08 (.88) total**	**good**
			5.37 (.93) quantity	75-90%
			5.04 (.97) quality	Good
			4.83 (1.21) ritual prevention	Some to minimal compulsions /safety aids (between 50-75% response prevention)
	Simpson (2013)/ Wheaton (2016)	Twice-weekly ERP augmentation therapy (*N*=37)	**5.33 (.89) total**	**Good**
			5.33 (1.14) quantity	75-90%
			5.34 (.82) quality	Good
			5.30 (.97) ritual prevention	Minimal compulsions/safety aids (between 75-90% response prevention)
	Goetter (2013)	Once-weekly remote ERP (video conference)	**5.19 (1.13) total**	Good
HCS (Primakoff et al., 1986) 6-point Likert scale: 1 = did not attempt the assigned homework, 6 = attempted more than was requested.	Whittal (2005)	Once-weekly CT (*N*=30)	4.58 (.42)	[4= The patient did a portion of the assigned homework, 5= the patient did the homework]
		Once-weekly ERP (*N*=29)	4.59 (.43)	
HCS (Primakoff et al., 1986) 6-point Likert scale: 0 = did not attempt the assigned homework, 5 = attempted more than was requested.	Whittal (2010)	Once-weekly CT (*N*=37)	3.50 (.95)	'…did most of their assigned tasks each week' (p.298) [3= The patient did a portion of the assigned homework, 4= the patient did the homework]
CRES (Tolin et al., 2004) 5-point Likert scale (0=made no effort to do ERP; 4=put their best effort into ERP) For remote ERP: therapist considered amount of book read, frequency and duration of exposure exercises and degree of effort to abstain from compulsive behaviours.	Tolin (2004)	Once-weekly ERP (*N*=15)	1.61 (1.20)	Minimal to some effort
	Tolin (2007)	Once-weekly ERP (*N*=17)	2.76 (1.15)	Between some and much effort
		Self-administered ERP (bibliotherapy) (*N*=17)	1.50 (1.15)	minimal to some effort
Homework Compliance Rating Form (Tolin et al.. 2011).	Tolin (2011)	Self-administered ERP	2.54 (.71) **overall effort** (therapist)	'Some' to 'average' effort

6-point Likert Scales: i) amount of **effort** put in (0=no effort, 5=best effort), ii) **time** spent on daily self-exposure (0=none, 5=more than 2 hours), iii) **reading**: amount of the book read (0=none, 5=all)		(bibliotherapy, *N*=18)	2.99 (1.01) overall effort (participant)	'Average' amount of effort
			3.48 (1.34) reading (participant)	'Half' to 'most 'read
			2.08 (1.11) time spent (participant)	30-60 mins. daily self-exposure
		Once-weekly ERP (*N*=22)	2.56 (.87) **overall effort** (therapist)	'Some' to 'average' effort
			2.88 (.95) time spent (participant)	60-90 mins daily self-exposure
			3.41 (.77) amount of effort (participant)	'Average' to 'a lot'
7-point Likert Scale (0 = poor, 6 = outstanding) rating compliance with: i) patient understanding of treatment rationale (not reported here), ii) compliance with in-session exposure instruction (not reported here), iii) compliance with homework exposure instruction, iv) compliance with self-monitoring of rituals	Abramowitz (2002)	Twice-weekly to intensive ERP (*N*=28)	3.56 (1.93) (Homework exposure)	Moderately compliant
			(3.30 (1.73) Self-monitoring of rituals)	
Non-compliance = number of homework assignments (ERP) that were not completed. Based on patient logs. Completion = daily practice at least once a day and no compulsions for at least 1 hour after exposure	Fals-stewart (1993)	Twice-weekly ERP for 12 weeks (24 session total) (*N*=121)	2.9 (2.1)	Compliant. On average, participants did not complete almost 3 assigned homework tasks.
Number of home exposure exercises completed. (Minimum of 2 tasks after each session (sessions 3-11). Minimum total =18)	Vogel (2004)	Once-weekly CBT (ERP + CT) (*N*=15)	17.3 (10)	At least 18 assignments were set and on average 17 tasks were completed
		Once-weekly ERP + Psych Placebo (relaxation) (*N*=10)	20.6 (7.2)	At least 18 assignments were set and on average 20 tasks were completed
Percentage of completed homework tasks	Cottraux (1990)	Once-weekly ERP + meds (*N*=16)	70%	Good compliance
		Once-weekly ERP + Pla (*N*=15)	78%	
0-100% scale (0= 'I did not try at all or I did not complete any of the exercises', 100 =' I gave the exercise a 100% effort and I completed exercise as discussed') **applied to both within- and between-session ERP**	Rowa (2007)	Twice-weekly ERP in clinic (*N*=8-9)	77% (average of client and therapist rating)	High
		Twice-weekly ERP at home (*N*=9-11)	82.5% (average of therapist and client rating)	

Extent of participation on 0-100% scale	Seol (2016)	Remote CBT (minimal therapist contact) (*N*=27)	67.9% (17.16)	'participated relatively hard' (participant-rated)

Note: PEAS = Patient Exposure Adherence Scale, HCS = Homework Compliance Scale, CRES = Clinician Rated Effort Scale, HCRF = Homework Compliance Rating Form, T = Therapist, P = participant, *primary study authors.

Table 2

Summary of reasons given for refusal (aggregated across studies)

Categories (N, %)	**Reason**	**N (%)**
Treatment type and format (23, 79.3)	Did not want group treatment/preferred to wait for ind. therapy	12 (41.4)
	Rejected ERP	6 (20.7)
	Wanted face-to-face sessions	2 (6.9)
	Preferred group treatment	2 (6.9)
	Rejected computerized treatment programme	1 (3.4)
Comorbidity (3, 10.3)	Wanted/needed treatment for comorbid conditions	2 (6.9)
	Too anxious to participate (due to other anxiety problems)	1 (3.4)
Practical barriers (3, 10.3)	Too far/long to travel to clinic	1 (3.4)
	Moved out of area	1 (3.4)
	Sought treatment elsewhere	1 (3.4)
Total		**29**

Note: N=number of patients to which reason applied, %=percentage of patients (out of 29) to which reason applied.

Table 3: Summary of reasons given for dropout (aggregated across studies)

Category (N, %)	**Reason**	**N (%)**
Lack of engagement (60, 28.4)	Did not wish to engage (further) in ERP	25 (11.8)
	Low/lack of motivation*	23 (10.9)
	Noncompliance**	7 (3.3)
	Too anxious about exposure	5 (2.4)
Life events (27,12.8)	Adverse life events (incl. medical illness)	16 (7.6)
	Moved out of area	7 (3.3)
	Pregnancy	4 (1.9)
Practical barriers (24,11.4)	Too little time to participate/work commitments	20(9.5)
	Too far/long to travel to clinic	3 (1.4)
	Technical problems (remote therapies)	1 (.5)
No longer meets eligibility criteria (23,10.9)	Stop/start medication	18 (8.5)
	alcohol misuse, change in diagnosis	5 (2.4)
Deterioration in mental health (21,10)	Deterioration in mental health/suicidality (requiring treatment)	21 (10)
Medication (18,8.5)	Medication/placebo side effects	12 (5.7)
	Medication side-effects and/or noncompliance	6 (2.8)
Lack of improvement (16, 7.6)	Lack of improvement	7 (3.3)
	Patient reports treatment ineffective	5 (2.4)
	Limited benefit	4 (1.9)
Dissatisfaction with treatment/wish for different treatment (13, 6.2)	Wants more intensive treatment (than remote therapy)	3 (1.4)
	Wants to pursue psychopharmacological treatment	1 (.5)
	Treatment no longer corresponded to patient goals	2 (.9)
	Not willing to continue group therapy	1 (.5)
	No longer wants treatment	3 (1.4)
	Doesn't feel ready to change	1 (.5)
	Treatment too emotionally burdensome	1 (.5)
	Dissatisfied with treatment	1(.5)
Symptom improvement (9, 4.3)	Treatment no longer required due to symptom improvement	9 (4.3)
Total		**211**

Note: N=number of patients to which reason applied, %=percentage of patients (out of 211) to which reason applied

***** ERP (+/- medication/placebo)

** ERP + meds (*n*=20), CT (*n*=2), CBT (*n*=1)

Table 4: Descriptive summary of studies of therapist-delivered therapies examining the association of between-session task adherence with post-treatment OCD symptom reduction.

Task adherence measure	**Study**	**TX**	**Outcome measure**	**N**	**Type of Effect**	**ES value**
HCS	Goodwin et al. (2002)	Daily/twice weekly ERP combined	Post-treatment Y-BOCS score	28 (ITT)	*pr* (a)	-.61**
	Whittal et al. (2005)	ERP + CT samples combined	Post-treatment Y-BOCS Score	58 (C)	*pr* (a)	-.40**
CRES	Tolin (2004)	ERP	% **reduction** post-treatment Y-BOCS score	15 (C)	*r*	.53*
	Tolin et al. (2007)	Self-administered and therapist-administered ERP combined	% **reduction** post-treatment Y-BOCS score	34 (C)	*r*	.50**
PEAS (TOTAL)	Simpson et al. (2011)	Twice-weekly ERP + ERP-MI combined (no sig. difference in adherence/outcomes)	Post-treatment Y-BOCS score	25 (C)	sr(a)	**-.70*** **
	Wheaton et al. (2016), using Simpson et al. (2013) data	Twice-weekly ERP	Post-treatment Y-BOCS score	37 (C)	sr(a)	**-.56*** **
% completed exposure tasks (in **week 1**)	De Araujo et al. (1996)	Weekly (in vivo ± imaginal) ERP	Target obsession **change** score	46 (C)	r	**.33**

Note: Note. HCS = Homework Compliance Scale, CRES = Clinician Rated Effort Scale, PEAS = Patient Exposure Adherence Scale, Y-BOCS = Yale-Brown Obsessive-Compulsive Scale, ITT = intention to treat sample, C = completer sample, ES = effect size, a = controlled for baseline Y-BOCS /baseline Y-BOCS entered in step 1, pr = partial correlation, sr = semi-partial correlation.
* *p<.05,*
** *p<.01,*
*** *p<.001*

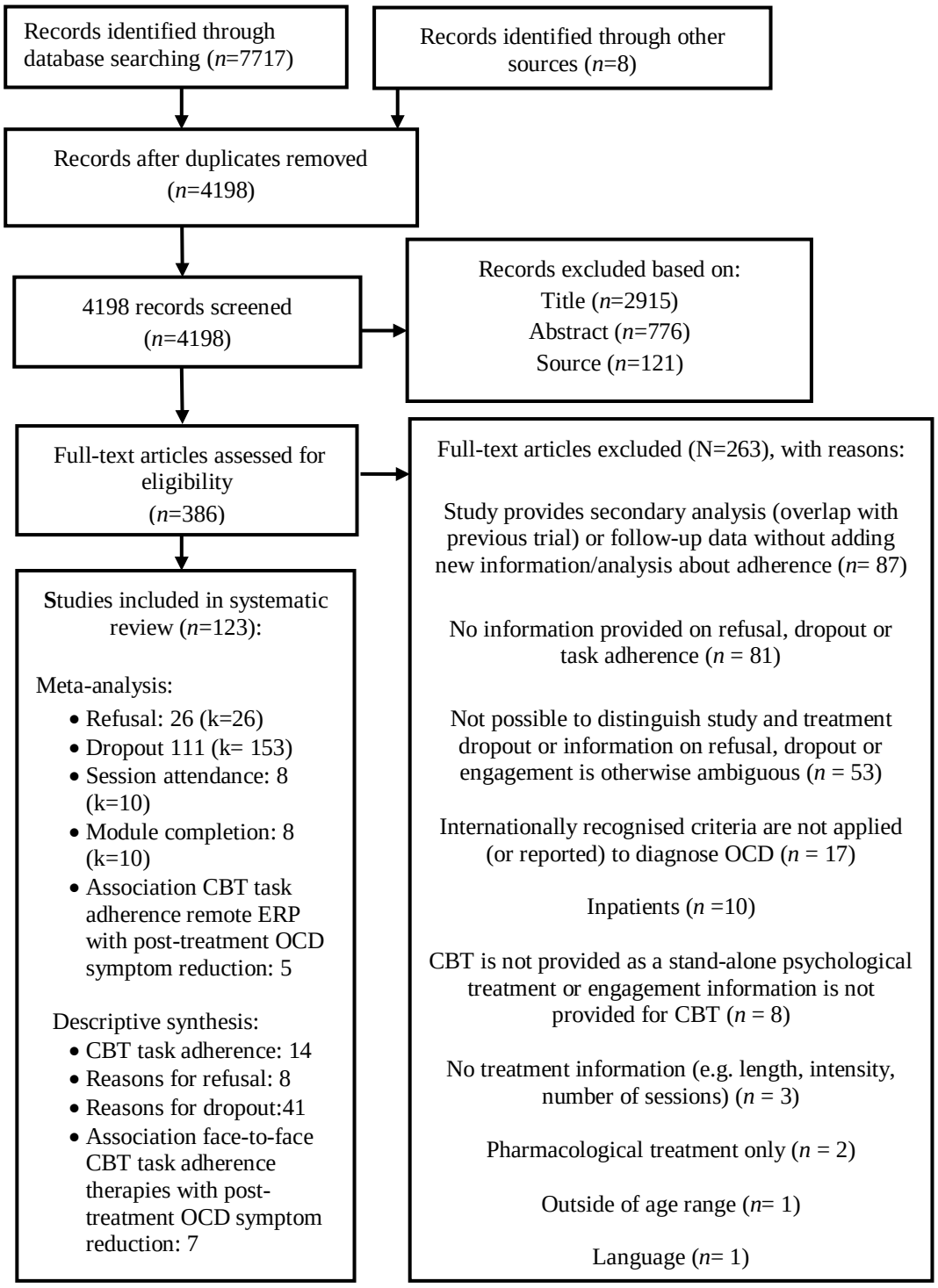

Fig. 1: Study flow