## Additional Literature Review

Perfectionism has been found to predict poorer treatment response in obsessive compulsive disorder (OCD). Chik, Whittal and O'Neill (2008) reported that perfectionism, as measured by the doubts about actions subscale of the Frost Multidimensional Perfectionism Scale (Frost, Marten, Lahart, and Rosenblate, 1990), predicted poorer treatment response in OCD. Manos et al. (2010) found that changes from pre to post treatment in perfectionism and intolerance of uncertainty were a unique predictor of change in OCD severity. Kyrios, Hordern and Fassnacht (2015) found that pre-treatment perfectionism and intolerance of uncertainty were the only significant and unique predictors of treatment outcome in OCD. Kyrios et al. (2015) concluded that future OCD treatment may need to focus on changing perfectionism earlier in treatment to enhance outcomes. Similarly, Wilhelm, Berman, Keshaviah, Schwartz and Steketee (2015) found that changes in perfectionism and intolerance of uncertainty mediated successful treatment response in OCD. These findings suggest that it may be useful to directly target perfectionism in the treatment of OCD.

A recent meta-analysis of eight trials found that CBT for perfectionism (CBT-P) is associated with large reductions in perfectionism and medium reductions in anxiety and depression (Lloyd, Schmidt, Khondoker, and Treasure, 2015). In a non-clinical sample, Pleva and Wade (2007) found that self-help CBT-P resulted in significant reductions in obsessive-compulsive and depressive symptoms. In randomised controlled trials (RCTs) that have found individual CBT-P to be efficacious across disorders, only small numbers of participants with OCD have been included, which has precluded an examination of effects on OCD symptoms (e.g., Riley, Lee, Cooper, Fairburn and Shafran, 2007; OCD *n*= 2, Egan, van Noort et al., 2014; OCD *n*= 2).

There have been two trials of CBT-P delivered on a group basis. Using a case series design in a mixed clinical sample with anxiety, panic and depressive disorders, Steele et al.

(2013) found CBT for perfectionism was effective in reducing anxiety and depression however only one participant had an OCD diagnosis. Handley, Egan, Kane and Rees (2015) conducted an RCT of group CBT for perfectionism in a mixed sample of participants with OCD, anxiety disorders, eating disorders and depression (*N*=42). They found moderate to large reductions in symptoms, however there were again insufficient numbers of people with OCD to examine efficacy regarding OCD. Consequently, to date there has been no examination of the efficacy of CBT-P in a sample with OCD.

## Extended Methodology

The study was designed as a randomised controlled trial with a view to execute a large trial comparing three research arms: CBT-P, Exposure and Response Prevention (ERP) and a waitlist-control group. Due to insufficient appropriate referrals to the study and difficulties with participant retention as specified in the consort diagram, and in order to maximise power, the ERP arm of the study was dropped and the study was modified to a comparison of CBT-P versus waitlist only (see Australian and New Zealand Clinical Trials Registry, 2007; ACTRN12614000295640).

### Procedure

Ethical approval for this study was obtained by the Curtin University Human Research Ethics Committee and it took place at Curtin University in Perth, Western Australia between March 2014 and September 2015. Individuals who were referred or expressed interest in the study were provided with an information pack and provided their signed consent to participate. Individuals were first screened over the telephone which involved: obtaining relevant background information, administration of the Mini International Neuropsychiatric Interview screen version 5.0 (MINI; Sheehan, 1998) to determine suicide risk and the presence of OCD symptoms, and elevated perfectionism (≥ 22) on concern over

mistakes (Frost et al., 1990). Individuals who were appropriate based on this screening were then assessed face to face using the Structured Clinical Interview for DSM-IV (SCID-IV; First, Spitzer, Gibbon and Williams, 1997) and the outcome measures outlined below.

**Measures**

*Yale Brown Obsessive Compulsive Scale* (YBOCS; Goodman et al., 1989). The YBOCS is a 10-item clinician administered measure. Items that are summed to calculate a total severity score, with five items each, relating to obsessions and compulsions. Each item is measured on a 4-point Likert scale ranging from 0 (no symptoms) to 4 (severe symptoms). Total scores are representative of five ordinal categories of severity; 0-7 *subclinical*, 8-15 *mild*, 16-23 *moderate*, 24-31 *severe* and 32-40 *extreme*. The YBOCS was adopted as it is a widely used, clinician administered measure of OCD severity with high internal consistency ($\alpha$=.89), inter-rater reliability and validity (Arrindell et al., 2002; Goodman et al., 1989; Storch et al., 2005).

*Frost Multidimensional Perfectionism Scale* (FMPS; Frost et al., 1990). The FMPS is a 35-item multidimensional measure of perfectionism with six subscales. We administered the concern over mistakes (CM) and personal standards (PS) subscales only, as the remaining subscales were not directly relevant to our hypotheses (e.g. parental criticism and parental expectations). Items are rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicate higher perfectionism. The FMPS has good internal consistency ($\alpha$=.77 – .93) and validity (Frost et al., 1990; Frost and Steketee, 1997; Khawaja and Armstrong, 2005).

*Clinical Perfectionism Questionnaire* (CPQ; Fairburn, Cooper and Shafran, 2003). The CPQ is a 12-item self-report measure of clinical perfectionism pertaining to the past 28 days. Items are rated on a 4-point Likert scale ranging from 1 (not at all) to 4 (all the time). Individual items are summed to a total score (ranging from 12 to 48), with higher scores

indicating higher clinical perfectionism. The focus of the CPQ is on assessing clinical perfectionism and it is sensitive to changes in perfectionism during treatment, unlike multidimensional measures (Egan et al., 2016). As such, it was included in addition to the FMPS. The measure has good internal consistency (α= .83), convergent and predictive validity (Chang and Sanna, 2012; Dickie, Surgenor, Wilson and McDowall, 2012; Egan et al., 2016; Steele, O'Shea, Murdock and Wade, 2011; Stoeber and Damian, 2014).

**Interventional Protocol**

The content of the eight-session Cognitive Behavioural Therapy for Perfectionism group treatment program involved: psycho-education about clinical perfectionism and why it persists, the pros and cons of perfectionism, self-monitoring of perfectionism, increasing flexibility in thinking and learning to accept less than perfect performance, behavioural experiments for perfectionism, challenging unhelpful perfectionism thoughts, reducing self-criticism, increasing self-compassion and relapse prevention strategies (see Egan, Wade et al., 2014). In order to ensure protocol adherence and treatment fidelity, all sessions were video-recorded and reviewed weekly in either group or individual supervision with registered clinical psychologists at the Curtin University Psychology Clinic.

**Participant Symptom Presentation**

The participants in the intervention and control group presented with a number of common themes linked to their OCD presentation which are summarised in Table S1.

Table S1

*Summary of OCD subtype (YBOCS) symptom presentation in the waitlist and immediate intervention group*

| OCD symptom subtype | Waitlist *n*=7 | Immediate intervention *n*=4 |
|---|---|---|
| **Obsessions** | | |
| Aggressive or injurious | 2 | 1 |

| | | |
|---|---|---|
| Contamination | 5 | 2 |
| Sexual | 0 | 0 |
| Hoarding or saving | 0 | 0 |
| Religious | 0 | 0 |
| Symmetry | 1 | 1 |
| Miscellaneous | 3 | 2 |
| Somatic | 1 | 0 |
| **Compulsions** | | |
| Cleaning or washing | 5 | 2 |
| Checking | 6 | 2 |
| Repeating | 3 | 2 |
| Counting | 1 | 1 |
| Ordering | 2 | 2 |
| Hoarding or collecting | 0 | 0 |
| Miscellaneous | 4 | 3 |

*Note.* The waitlist and immediate intervention group were combined into one 'intervention group' (*n*=11) for analyses

## Results

Of the total sample that was accepted and randomised within the study (*N*=19), 73% participants met criteria for a diagnosis in addition to OCD, with the most common being generalised anxiety disorder (GAD; 63%), major depression (MDD; 54%) and dysthymia (54%). All participants met SCID-IV criteria for OCPD. Given the 42% attrition rate in this study, pooled demographic and pre-treatment severity data are reported in Table S2 for those who completed the study (i.e. completed waitlist or intervention) compared with non-completers (i.e. dropout after randomisation).

Chi-Square ($\chi^2$) and analyses of variance indicated no significant differences between completers (those who completed waitlist and/or intervention) and non-completers (drop-outs) on OCD, perfectionism, gender, medication and engagement in previous psychological intervention; and the magnitude of effect was small according to conventions (Cohen, 1992). The non-completer group consisted of the following: five participants randomised to intervention withdrew before the first treatment session due to (a) lack of response to contact from the first author, *n*=1; (b) conflicting work schedule, *n*=1; (c) intrusive thoughts relating to public transport use and thus could not arrange travel to attend sessions, *n*=1; (d) discomfort with being labelled as having "OCD" *n*=1; and (e) change of mind, *n*=1. One participant dropped out during the second session because they felt as though they were "less severe" in regards to perfectionism symptoms relative to others in the group. Two participants dropped out from the waitlist control condition and were unable to be further contacted by the first author. Demographic and descriptive clinical data for the waitlist and intervention conditions is displayed in Table S3.

Table S2

*Pre-treatment means and standard deviations for study completers versus non-completers*

| Variable | Completer *n*=11 | Non-completer *n*=8 | Test statistic | Effect size |
|---|---|---|---|---|
| Gender (female) | *n*=8 (72%) | *n*=5 (62%) | $\chi^2(1)= 0.22$ | *w*=0.11 |
| Medication (yes) | *n*=8 (72%) | *n*=5 (62%) | $\chi^2(1)= 0.22$ | *w*=0.11 |
| Previous psychological intervention | *n*=6 (55%) | *n*=3 (27%) | $\chi^2(1)= 0.54$ | *w*=0.17 |
| Age (range, years) | 26-61 | 19-64 | $t(17) = 0.00$ | *d*=0.00 |

| | | | | |
|---|---|---|---|---|
| OCD (YBOCS) | 27.45 (3.56) | 26.25 (5.20) | $t(17) = 0.60$ | $d=0.28$ |
| Perfectionism (CM) | 33.63 (6.97) | 28.37 (10.74) | $t(17) = 1.30$ | $d=0.07$ |
| Perfectionism (PS) | 28.64 (4.13) | 26.5 (5.78) | $t(17) = 0.94$ | $d=0.09$ |

*Note:* YBOCS= Yale Brown Obsessive Compulsive Personality Scale; CM= Concern Over Mistakes subscale of the Frost Multidimensional Perfectionism Scale; PS= Personal Standards subscale of the Frost Multidimensional Perfectionism Scale

Table S3

*Demographic and descriptive clinical data for waitlist and intervention participants (M, SD)*

| Variable | Waitlist control $n=7$ | Intervention $n=11$ |
|---|---|---|
| Age (years) | 37.85 | 40.0 |
| Gender (% female) | 85.7% | 72.7% |
| % using medications | 85.7% | 72.7% |
| % in a relationship | 71.4% | 54.5% |
| % full time student/employment | 42.8% | 63.6% |
| Previous psychological intervention | 57.1% | 54.5% |
| No. Comorbid Diagnoses Axis I | 3.42 (2.07) | 3.54 (2.02) |
| No. Comorbid Diagnoses Axis II | 2.0 (.816) | 2.18 (1.25) |

*Note.* The intervention group includes the immediate treatment group and treated waitlist participants.

**Reliable and Clinically Significant Change Criteria**

The pre-post reliable change index (RCI) score is the degree to which the participant changes on the outcome variable divided by the standard error of difference between the pre-test and post-test scores. In accordance with Jacobson and Truax (1991), when the absolute value of the RCI score is greater than 1.96, it is likely that the post-intervention score is reflecting a real and reliable change, rather than the fluctuations of an imprecise measuring instrument and thus statistical error. In the absence of normative reference data for perfectionism, Riley et al. (2007) utilised the CPQ to define that participants were "clinically significantly improved" if their post-treatment CPQ score was two standard deviations below the entire samples' mean pre-treatment score. The reliable change results for participants available at 3-month follow up are reported in Table S4. Two participants reported further improvement from post-test to follow-up in perfectionism on concern over mistakes (Frost et al., 1990), and one participant indicated reliable deterioration perfectionism. One participant reported a reliable improvement in perfectionism according to the CPQ, whilst two participants reported a reliable deterioration. Each participant demonstrated reliable improvement in OCD symptoms.

Table S4

*Reliable Change Index scores of intervention participants available at 3 month follow-up*

| Outcome Variable | No | Yes | RCI Scores (*n*=3) | | |
|---|---|---|---|---|---|
| FMPS-CM | 1 | 2 | 2.84* | -2.84 | 3.97* |
| FMPS-PS | 2 | 1 | 0.34 | -1.03 | 2.06* |
| CPQ | 2 | 1 | 0.00 | 0.27 | 5.22* |
| YBOCS | 0 | 3 | 5.65* | 6.46* | 15.34* |

*Note:* *Reliable improvement (RCI > 1.96); RCI=Reliable Change Index;

YBOCS=Yale Brown Obsessive Compulsive Scale; CM= concern over

mistakes; PS=personal standards; CPQ=Clinical Perfectionism Questionnaire

## References

**Arrindell, W. A., de Vlaming, I. H., Eisenhardt, B. M., van Berkum, D. E., and Kwee, M. G. T.** (2002). Cross-cultural validity of the Yale-Brown Obsessive-Compulsive Scale. *Journal of Behaviour Therapy and Experimental Psychiatry, 33*, 159-176.

**Chang, E. C., and Sanna, L. J.** (2012). Evidence for the Validity of the Clinical Perfectionism Questionnaire in a Nonclinical Population: More Than Just Negative Affectivity. *Journal of Personality Assessment, 94*, 102-108.

**Chik, H. M., Whittal, M. L., and O'Neill, M. L.** (2008). Perfectionism and treatment outcome in obsessive-compulsive disorder. *Cognitive Therapy and Research, 32*, 676-688.

**Cohen, J. (1992).** A power primer. *Psychological Bulletin, 112*, 155-159. doi:10.1037/0033-2909.112.1.155

**Dickie, L., Surgenor, L. J., Wilson, M., and McDowall, J.** (2012). The structure and reliability of the Clinical Perfectionism Questionnaire. *Personality and Individual Differences, 52*, 865-869.

**Egan, S. J., Shafran, R., Lee, M., Fairburn C. G., Cooper, Z., Doll, H. A., Palmer, R. L., and Watson, H. J.** (2016). The reliability and validity of the clinical perfectionism questionnaire in eating disorder and community samples. *Behavioural and Cognitive Psychotherapy, 44*, 79-91.

**Egan, S. J., van Noort, E., Chee, A., Kane, R. T., Hoiles, K. J., Shafran, R., and Wade, T. D.** (2014). A randomised controlled trial of face to face versus pure online self-help cognitive behavioural treatment for perfectionism. *Behaviour Research and Therapy, 63*, 107-113.

**Egan, S. J., Wade, T. D., Shafran, R., and Antony, M. M.** (2014). *Cognitive-behavioral treatment of perfectionism*. New York, NY, USA: Guilford Publications.

**Fairburn, C. G., Cooper, Z., and Shafran, R.** (2003). Cognitive behaviour therapy for eating disorders: A "transdiagnostic" theory and treatment. *Behaviour Research and Therapy, 41*, 509-528.

**First, M.B., Spitzer, R.L., Gibbon, M., and Williams, J.B.W.** (1997). *Structured Clinical Interview for DSM-IV Axis I disorders (SCID I)*. New York: Biometric Research Department.

**Frost, R. O., Marten, P., Lahart, C., and Rosenblate, R.** (1990). The dimensions of perfectionism. *Cognitive Therapy and Research, 14*, 449-468.

**Frost, R. O., and Steketee, G.** (1997). Perfectionism in obsessive-compulsive disorder patients. *Behaviour Research and Therapy, 35*, 291-296.

**Goodman, W. K., Price, L., Rasmussen, S. A., Mazure, C., Fleischmann, R. N., Hill, C. L., . . . Charney, D. S.** (1989). The Yale-Brown Obsessive Compulsive Scale: I. Development, Use, and Reliability *Archives of General Psychiatry, 46*, 1006-1011.

**Handley, A. K., Egan, S. J., Kane, R. T., and Rees, C. S.** (2015). A randomised controlled trial of group cognitive behavioural therapy for perfectionism. *Behaviour Research and Therapy, 68*, 37-47.

**Jacobson, N. S., and Truax, P.** (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology, 59*, 12-19.

**Khawaja, N. G., and Armstrong, K. A.** (2005). Factor structure and psychometric properties of the Frost Multidimensional Perfectionism Scale: Developing shorter versions using an Australian sample *Australian Journal of Psychology, 57*, 129-138.

**Kyrios, M., Hordern, C., and Fassnacht, D. B.** (2015). Predictors of response to cognitive behaviour therapy for obsessive-compulsive disorder. *International Journal of Clinical and Health Psychology, 15*, 181-190.

**Lloyd, S., Schmidt, U., Khondoker, M., and Tchanturia, K.** (2015). Can psychological interventions reduce perfectionism? A systematic review and meta-analysis. *Behavioural and Cognitive Psychotherapy, 43*, 705-731.

**Manos, R. C., Cahill, S. P., Wetterneck, C. T., Conelea, C. A., Ross, A. R., and Riemann, B. C.** (2010). The impact of experiential avoidance and obsessive beliefs on obsessive-compulsive symptoms in a severe clinical sample. *Journal of Anxiety Disorders, 24*, 700-708.

**Pinto, A., Liebowitz, M. R., Foa, E. B., and Simpson, H. B.** (2011). Obsessive compulsive personality disorder as a predictor of exposure and ritual prevention outcome for obsessive compulsive disorder. *Behaviour Research and Therapy, 49*, 453-458.

**Pleva, J., and Wade, T. D.** (2007). Guided self-help versus pure self-help for perfectionism: A randomised controlled trial. *Behaviour Research and Therapy, 45*, 849-861.

**Riley, C., Lee, M., Cooper, Z., Fairburn, C. G., and Shafran, R.** (2007). A randomised controlled trial of cognitive-behaviour therapy for clinical perfectionism: A preliminary study. *Behaviour Research and Therapy, 45*, 2221-2231.

**Sheehan, D. V., Lecrubier, Y., Sheehan, H., Armorim, P., Janavs, J., Weiller, E., . . . Dunbar, G. C.** (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I): The development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry, 59*, 22-23.

**Steele, A. L., Waite, S., Egan, S. J., Finnigan, J., Handley, A., and Wade, T. D.** (2013). Psycho-education and group cognitive-behavioural therapy for clinical perfectionism: A case-series evaluation. *Behavioural and Cognitive Psychotherapy*, *41*, 129-143.

**Steele, A. L., O'Shea, A., Murdock, A., and Wade, T. D.** (2011). Perfectionism and its relation to overevaluation of weight and shape and depression in an eating disorder sample. *International Journal of Eating Disorders, 44*, 459-464.

**Stoeber, J., and Damian, L. E.** (2014). The Clinical Perfectionism Questionnaire: Further evidence for two factors capturing perfectionistic strivings and concerns. *Personality and Individual Differences, 61,* 38-42.

**Storch, E., Storch, N., Shapira, E., Dimoulas, G., Geffken, T., Murphy, W., and Goodman.** (2005). Yale-Brown Obsessive Compulsive Scale: The dimensional structure revisited. *Depression and Anxiety, 22,* 28-35.

**Wilhelm, S., Berman, N. C., Keshaviah, A., Schwartz, R. A., and Steketee, G.** (2015). Mechanisms of change in cognitive therapy for obsessive compulsive disorder: Role of maladaptive beliefs and schemas. *Behaviour Research and Therapy*, *65*, 5-10.