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A randomised controlled trial of guided internet-based cognitive behavioural therapy for perfectionism: Effects on psychopathology and transdiagnostic processes

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ABSTRACT

Background and objectives: Perfectionism is a transdiagnostic process that has been associated with a range of psychopathology and also with other transdiagnostic processes. We have previously shown that guided internet-based cognitive behavioural therapy (ICBT) can reduce symptoms of dysfunctional perfectionism, however, no impact was observed on symptoms of depression and anxiety. Here we explore the impact of guided ICBT for perfectionism on symptoms of other associated psychopathology, specifically obsessive-compulsive disorder (OCD) and eating disorders, and also on other associated transdiagnostic processes (self-esteem, intolerance of uncertainty, and self-compassion).

Methods: Participants who presented with clinical levels of perfectionism were randomised to an experimental group that received the intervention (n = 62), or a wait list control group (n = 58). Questionnaires assessing symptoms of OCD, eating disorders, self-esteem, intolerance of uncertainty, and fear of self-compassion were completed pre-intervention, post-intervention (12 weeks), and at follow-up (24 weeks). Between group effect sizes are reported.

Results: The intervention led to significant decreases in symptoms of OCD ($d = -0.9$; CI: -1.4, −0.4) and eating disorders ($d = -0.6$; CI: -1.0, −0.1), and had an impact on other transdiagnostic processes resulting in increased self-esteem ($d = 0.7$; CI: 0.2, 1.2), decreases in intolerance of uncertainty ($d = -0.9$; CI: -1.4, −0.4), and fear of self-compassion ($d = -0.8$; CI: -1.3, −0.3). At follow-up changes were maintained in symptoms of OCD ($d = -1.3$; CI: -1.8, −0.8), disordered eating ($d = -0.7$; CI: -1.2, −0.2), intolerance of uncertainty ($d = -0.8$; CI: -1.2, −0.3), and fear of self-compassion ($d = -1.0$; CI: -1.5, −0.5).

Conclusions: Guided ICBT for perfectionism improves associated psychopathology and transdiagnostic processes. *ClinicalTrials.gov registration no. NCT02756871.*

1. Introduction

Perfectionism has, for some time now, been considered to present in both adaptive and maladaptive forms, and the numerous theoretical accounts of perfectionism tend to agree that it comprises of two factors: one, having high standards; and two, engaging in intense self-criticism in response to these standards not being met (Burns, 1980; Frost, Marten, Lahart, & Rosenblate, 1990; Hamachek, 1978; Hewitt & Flett, 1991; Shafran, Cooper, & Fairburn, 2002; Slaney, Rice, & Ashby, 2002). This distinction is supported by factor analytic studies of the most

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commonly used measures of perfectionism which have resulted in a two-factor solution: perfectionistic strivings and perfectionistic concerns, respectively (Stoeber & Otto, 2006).

Both dimensions of perfectionism have been associated with generalised anxiety disorder (GAD), depression, eating disorders, obsessive compulsive disorder (OCD), and panic disorder; however, a recent meta-analysis found that most psychopathology was more strongly associated with perfectionistic concerns, except for eating disorders which were found to be strongly associated with both (Limburg, Watson, Hagger, & Egan, 2016; Smith et al., 2017). Perfectionism has been identified as a transdiagnostic process, meaning that it increases risk for, and contributes to maintenance of, a range of psychopathology and mental health disorders (Coughtrey, Shafran, Bennett, Kothari, & Wade, 2017; Egan, Wade, & Shafran, 2011; Radomsky, Rachman, Shafran, Coughtrey, & Barber, 2014; Shafran & Mansell, 2001; Stoeber & Otto, 2006). Maladaptive perfectionism can also be clinically problematic in its own right, causing both practical and emotional difficulties, and commonly resulting in a narrowing of interests and social isolation (Shafran, Coughtrey, & Kothari, 2016).

Cognitive behavioural therapy (CBT) for perfectionism is efficacious in reducing symptoms of perfectionism in individual, group and guided self-help formats (Egan, van Noort et al., 2014; Lloyd, Schmidt, Khondoker, & Tchanturia, 2015), and in reducing symptoms of anxiety, depression, and eating disorders (Egan & Hine, 2008; Egan, van Noort et al., 2014; Glover, Brown, Fairburn, & Shafran, 2007; Lloyd et al., 2015; Riley, Lee, Cooper, Fairburn, & Shafran, 2007; Steele & Wade, 2008; Steele et al., 2013). More recently, such benefits have also been found with internet-based CBT (ICBT) interventions for perfectionism (Egan, van Noort et al., 2014; Rozental, Shafran, Wade, Egan, et al., 2017; Shafran et al., 2017). Internet-based interventions, where patients work with or without support, are able to fill the gap between need and availability and have been associated with a number of advantages such as increased convenience, patient anonymity, lower cost to health care providers, and improved mental well-being (Andersson & Cuijpers, 2009; Cuijpers, Van Straten, & Andersson, 2008; Lauder, Chester, & Berk, 2007; Mitchell, Stanimirovic, Klein, & Vella-Brodrick, 2009; Musiat, Goldstone, & Tarrier, 2014; Powell et al., 2013; Wagner, Horn, & Maercker, 2014).

In a recent publication we provided evidence that guided ICBT is effective at reducing symptoms of maladaptive perfectionism, as measured by the concern over mistakes subscale of the Frost Multidimensional Perfectionism Scale (FMPS; Frost et al., 1990) and the Clinical Perfectionism Questionnaire (CPQ; Fairburn, Cooper, & Shafran, 2003). No impact was found on symptoms of depression and anxiety however. In this paper we explore the impact of this guided ICBT intervention on other forms of psychopathology that have been associated with perfectionism, specifically symptoms of OCD and eating disorders. In addition to this, and based on previous evidence that perfectionism is associated with other constructs also hypothesised to be transdiagnostic in nature, we also explore in this paper the impact of guided ICBT for perfectionism on self-esteem, intolerance of uncertainty, and self-compassion. We have previously reported on correlations between variables in this sample which show that perfectionism, as measured by the CPQ and subscales of the FMPS, is negatively associated with self-esteem and positively associated with intolerance of uncertainty and fear of self-compassion with small to medium effect sizes (Coughtrey et al., 2017; Kothari, 2017).

Self-esteem, defined as an individual's subjective appraisal of the self at an affective and evaluative level (Rosenberg, 1965a, 1965b), has been associated with risk for and maintenance of a number of mental health disorders and may be negatively associated with perfectionism (Coopersmith, 1967; Fairburn et al., 2003; Kothari, 2017; Krabbendam et al., 2002; Orth, Robins, Trzesniewski, Maes, & Schmitt, 2009; Rosenberg, 1965a, 1965b). It has been hypothesised that extreme perfectionism may result in comparision between the real and ideal self and between perfectionistic goals and actual performance, resulting in low self-esteem; or that low self-esteem may result from individuals with clinical perfectionism basing their self-worth on their ability to achieve unattainable standards and being highly self-critical when standards are not met (Beck, 1976; Burns & Beck, 1978).

Intolerance of uncertainty, initially defined as a negative and fearful style of responding at a cognitive, emotional, and behavioural level to uncertain situations (Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994), is also hypothesised to be a transdiagnostic process, contributing to the development and maintenance of most anxiety disorders, depression, and OCD (Gentes & Ruscio, 2011; Mahoney & McEvoy, 2012). Intolerance of uncertainty has been defined as having two factors: desiring and actively seeking predictability and certainty, and being cognitively and behaviourally paralysed in the face of uncertainty (Birrell, Meares, Wilkinson, & Freeston, 2011). The Obsessive Compulsive Cognitions Working Group (OCCWG; 2003) have suggested that among individuals with OCD perfectionism acts in conjunction with intolerance of uncertainty and that the need to achieve perfection is an attempt to make the future more certain, particularly in domains that are experienced as uncertain or distressing. Empirical research supports the theorised relationship between perfectionism and intolerance of uncertainty, with most studies finding a positive correlation between the two constructs in the general population, and among eating disordered and socially anxious samples (Kothari, 2017).

Self-compassion, the ability to be kind, empathic, gentle, and warm towards oneself, even in times of difficulty, may also be a transdiagnostic process, though more research is required to show this empirically (Gilbert, McEwan, Matos, & Rivis, 2011). Self-compassion is negatively associated with maladaptive facets of perfectionism which are representative of self-criticism, key to theoretical accounts of perfectionism (Frost et al., 1990; Neff, 2003; Shafran et al., 2002). Fear of self-compassion, theorised to occur when compassion is associated with negative emotions such as grief or threat, is positively associated with self-criticism (Gilbert & Procter, 2006). Given the growing evidence of a negative association between self-compassion and perfectionism, it is possible to hypothesise that fear of self-compassion may be directly positively associated with perfectionism (Egan, Wade, Shafran, & Antony, 2014). Compassion towards others and the self requires an understanding that imperfection and the making of mistakes is a normal part of the human condition, and individuals high in perfectionism may fear that self-compassion might reduce motivation to meet high standards without making errors (Gilbert, 2009; Gilbert et al., 2011).

Though there is growing evidence for relationships between perfectionism and self-esteem, intolerance of uncertainty, and self-compassion, the directions of causality, and indeed whether associations are direct, have not yet been determined.

1.1. Aims

We have previously shown that guided ICBT for perfectionism results in significant decreases in symptoms of perfectionism, both post-intervention and at six month follow-up, with medium to large effect sizes (Kothari, 2017; Shafran et al., 2017). In contrast to our hypotheses, no impact was observed on symptoms of depression or anxiety. Here we explore the impact of the intervention on symptoms of other psychopathology associated with perfectionism, specifically OCD and eating disorders. We also explore the impact on other transdiagnostic processes, associated with and theoretically relevant to the maintenance of perfectionism: self-esteem, intolerance of uncertainty, and self-compassion.

1.2. Hypotheses

Theoretical models indicate that perfectionism contributes to the development and/or maintenance of OCD and eating disorders. Experimental evidence supports this theoretical perspective, and interventions targeting perfectionism appear to result in a reduction in

symptoms of both disorders. Based on this we hypothesised that this guided ICBT intervention for perfectionism would also result in reduced symptoms of OCD and eating disorders (Egan et al., 2011; Handley, Egan, Kane, & Rees, 2015; Obsessive Compulsive Cognitions Working, 1997, 2003; Pleva & Wade, 2007; Shafran et al., 2002; Steele & Wade, 2008).

Based upon current evidence of the relationship between perfectionism and other transdiagnostic processes reviewed above, it was hypothesised that guided ICBT for perfectionism would also result in increased self-esteem and decreases in intolerance of uncertainty and fear of self-compassion.

2. Method

2.1. Protocol, ethics and trial registration

We report here on secondary findings from a randomised controlled trial of a guided ICBT intervention for clinical perfectionism called Overcoming Perfectionism. Ethical approval was granted by the University College London(UCL) Research Ethics Committee (Project ID: 6222:001). The full protocol has previously been published (Kothari, Egan, Wade, Andersson, & Shafran, 2016) and the study was registered as a clinical trial on ClinicalTrials.gov (NCT02756871).

2.2. Setting and intervention

This version of the treatment was adapted from the Cognitive Behavioural Treatment of Perfectionism (Shafran, Egan, & Wade, 2010). For the internet-based version the content was made briefer, video was used, and worksheets were adapted to be interactive. The intervention was divided into eight modules designed to be completed weekly (Fig. 1); however, participants were provided with guidance and support over 12 weeks to allow for breaks such as illness and holidays. Participants continued to have access to the intervention after 12 weeks, but ongoing guidance was not provided. Post-intervention measures were collected 12 weeks after participants were randomly allocated to the experimental or control group (T_2) and follow-up measures were collected 24 weeks after (T_3). As a token of thanks participants were given a ten pound voucher after completing measures at T_2 and another when completing measures at T_3.

Psychoeducation and examples were provided in each module, followed by an interactive section requiring participants to answer questions and complete worksheets. In this way participants were able to create an idiosyncratic model (or formulation) of their own unhelpful perfectionism, challenge and restructure unhelpful cognitions, and also design surveys and behavioural experiments.

2.3. Guidance and feedback

Guidance and feedback were provided by 12 guides who were psychology undergraduates, Masters students, PhD students/graduates, or trainee clinical psychologists. Each participant was allocated a guide who was able to view submitted worksheets and responses. Guides provided feedback and suggestions to the participant in the form of asynchronous internet-based written communication. Participants received feedback and guidance as they completed each module and submitted the relevant worksheets. The average length of feedback for each worksheet was one to two paragraphs. Participants were also able to ask questions and respond to feedback and they received guidance if they specifically requested help with understanding or completing modules and between-session work. Guides were provided with regular supervision by a clinical psychologist and research psychologist to discuss guidance and ensure consistency.

2.4. Participants

An a priori power calculation was conducted using a tool designed by Hedeker and colleagues which is appropriate for determining power for longitudinal designs (Hedeker, Gibbons, & Waternaux, 1999). A two-tailed alpha of .05, three assessment points (pre, post and follow-up), a pre-post correlation for the primary outcome measure (concern over mistakes subscale, see below) of 0.61 and attrition rates of 50%, were used. Both the pre-post correlation and expected attrition rate were based upon a similar RCT of a web-based intervention for perfectionism (Egan, van Noort et al., 2014). A sample size of 40 participants per group, with 20 participants completing per group, was found to provide 80% power at a two-tailed $p < .05$ to detect a large effect size (0.80) difference between the control and intervention groups. This use of a large effect size was also based upon the previous RCT (Egan, van Noort et al., 2014).

Full details of participant recruitment and consent have previously been published (Kothari, 2017; Shafran et al., 2017). Participants completed questionnaires online which included screening measures to determine their eligibility. To be eligible for inclusion participants had to be 18 or over, with no upper age limit, score one standard deviation above published norms on the 'concern over mistakes' subscale of the Frost Multidimensional Perfectionism Scale (Frost et al., 1990), a score of ≥ 29 (Suddarth & Slaney, 2001), and be fluent in English. Participants were excluded if they reported suicidal thoughts or intent, either current or in the past, at any point over the duration of the intervention. Due to the established co-occurrence between a range of psychopathology and perfectionism, participants reporting symptoms of co-occurring mental health disorders (depression, anxiety, OCD and eating disorders) were not excluded from the study. If eligible, participants were randomly allocated to the experimental group to complete the intervention, or the control group (no intervention). Randomisation of participants was performed by a third party, unconnected to the study, who created a randomisation schedule using a Web-based randomizer ("Sealed Envelope,").

A total of 156 participants registered for participation and completed the screening measures, of whom 35 (22.4%) participants were excluded as they did not meet the inclusion criteria of ≥ 29 on the FMPS concern over mistakes subscale (Frost et al., 1990) and one participant refused to be randomised, resulting in a total of 120 participants that were randomised into the experimental ($n = 62$) and control ($n = 58$) groups (Fig. 2). Participants allocated to the experimental group were paired with guides after randomisation. Participants who did not meet criteria for inclusion in the study were sent a copy of *Overcoming Perfectionism: A Self-Help Guide Using Cognitive Behavioural Techniques* (Shafran et al., 2010) and were signposted to other services.

2.5. Measures

Participants completed self-report questionnaires at three time points: (i) prior to any intervention at baseline (T_1), (ii) 12 weeks after the participant was randomised to the experimental or control group to assess change post-intervention (T_2), and (iii) 24 weeks after the participant was randomised to assess whether change was maintained at follow-up (T_3). Findings pertaining to the effect of the intervention on symptoms of perfectionism, depression and anxiety have previously been published (Shafran et al., 2017). This study reports on a different set of measures to Shafran et al. (2017) which assess symptoms of other psychopathology (specifically symptoms of OCD and eating disorders) and other transdiagnostic processes (self-esteem, intolerance of uncertainty, and self-compassion).

2.5.1. Measures of psychopathology

The Obsessive-Compulsive Inventory – Revised (OCI-R; Foa et al., 2002), a shortened version of the Obsessive-Compulsive Inventory, assesses symptoms of OCD. The measure consists of 18 items (e.g. "I

Module	Module Components
1. Understanding Perfectionism	1.1. What is unhelpful perfectionism? 1.2. Why perfectionism continues 1.3. Fact or fiction? 1.4. "The harder you work, the better you'll do" - Fact or fiction? 1.5. Facts about perfectionism and performance 1.6. Preparing for change 1.7. Key take away 1.8. Between module work
2. Your Perfectionism Cycle	2.1. Between-module work 2.2. A reminder 2.3. The first steps 2.4. Drawing your own diagram 2.5. Between-module work 2.6. Take-home message
3. Surveys and Experiments	3.1. Between-module work 3.2. Perfectionism behaviours 3.3. Surveys 3.4. Reflect on the responses 3.5. Behavioural experiments 3.6. Different forms of behavioural experiments 3.7. An added benefit 3.8. Between-module work 3.9. Take home message
4. New Ways of Thinking	4.1. Between-module work 4.2. Changing thinking 4.3. Imagining vivid future positive outcomes 4.4. From all or nothing thinking to flexibility and freedom 4.5. "Rules break, guidelines bend": Turning rigid rules into guidelines 4.6. Changing thinking styles 4.7. Between module work 4.8. Key take away
5. Useful Skills for Managing Unhelpful Perfectionism	5.1. Procrastination 5.2. Problem solving 5.3. Pleasant events 5.4. Take home message 5.5. Before the next module
6. Self-criticism or Self-compassion	6.1. How to respond 6.2. Take home message 6.3. Before the next module
7. Re-examining the way we Examine our Self-worth	7.1. Your self-worth 7.2. Step 1. Recognizing that your self-worth can be independent of your achievements 7.3. Step 2. Encouraging flexible and realistic goals 7.4. Step 3. Spreading your self-worth across as many areas of your life as possible 7.5. Step 4. Develop more balance in what you pay attention to daily 7.6. Take home message 7.7. Before the next module
8. Staying Well – Managing Unhelpful Perfectionism in the Long-term	8.1. Improve your sense of self-worth 8.2. Questions 8.3. Thank you!

Fig. 1. Modules and components of Overcoming Perfectionism.

frequently have nasty thoughts and have difficulty in getting rid of them"). On a five-point scale, respondents rate how distressed or bothered they have been in the past month by the symptom described, with responses ranging from "Not at all" to "Extremely." It has been found to have good validity and reliability in both clinical and non-clinical samples (Hajcak, Huppert, Simons, & Foa, 2004; Huppert et al., 2007). Cronbach's alpha in the current study was 0.92.

The Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn, 1994) assesses for symptoms of the eating disorders: Anorexia Nervosa (AN), Bulimia Nervosa (BN), Binge Eating Disorder (BED) and sub-threshold variants. The measure consists of 28 items rated on a seven point scale appropriate to the item: number of days a symptom has been experienced over the past month, ranging from no days to every day; and for remaining questions (e.g. "How dissatisfied have you been with your weight?") responses ranging from "Not at all" to "Markedly." It has been found to have good reliability and has been validated for use among clinical and community samples (Aardoom, Dingemans, Op't Landt, & Van Furth, 2012; Reas, Grilo, & Masheb, 2006). Cronbach's alpha in the current study was 0.92.

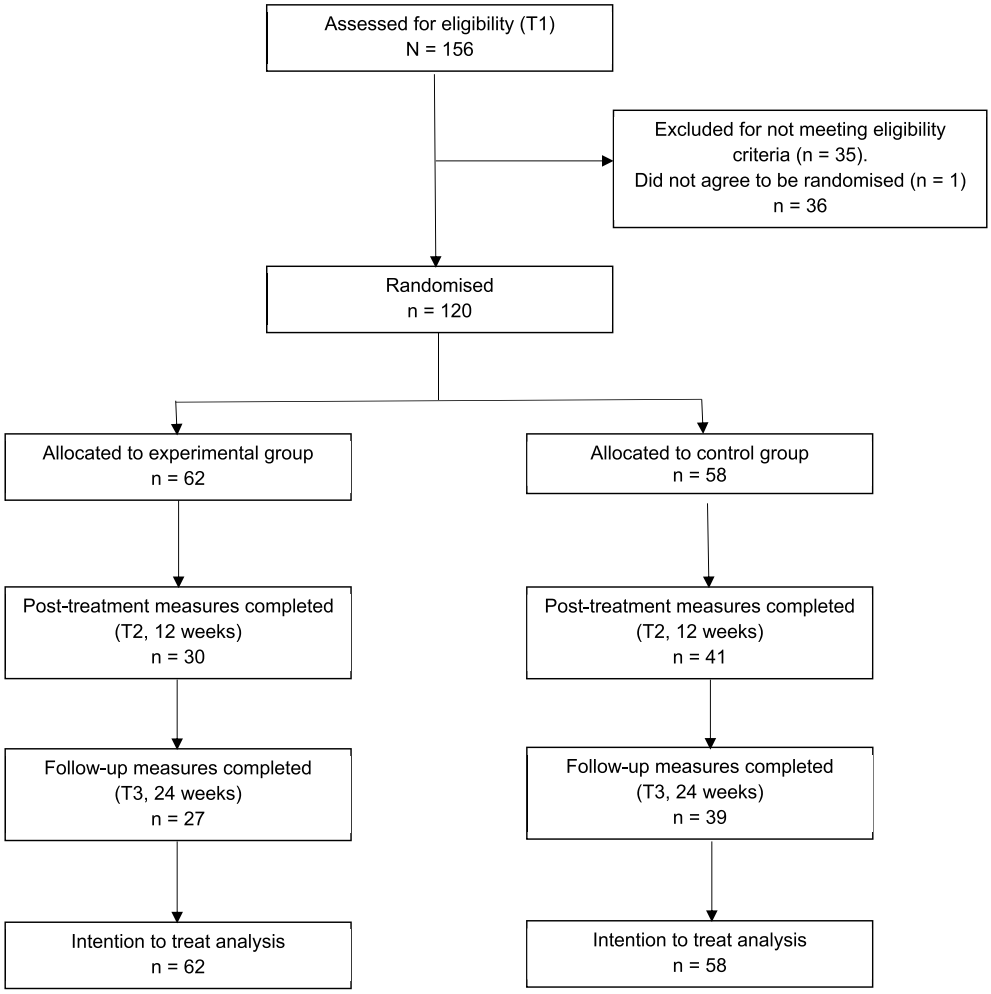

Fig. 2. Flow of participants through trial.

2.5.2. Measures of transdiagnostic processes

The Rosenberg Self-esteem Scale (RSES; Morris Rosenberg, 1965a, 1965b) is a self-report measure consisting of 10 items (e.g. "On the whole I am satisfied with myself" and "I wish I could have more respect for myself") and is rated on a four point scale ranging from 1 = "strongly disagree" to 4 = "strongly agree". It has been found to be reliable and has been validated for use among clinical and community samples (Bagley & Mallick, 2001; Schmitt & Allik, 2005). Cronbach's alpha in the present study was 0.87.

The Intolerance of Uncertainty Scale (IUS; Freeston et al., 1994) is a self-report measure consisting of 27 items (e.g. "Uncertainty stops me from having a firm opinion" and "It's unfair not having any guarantees in life") and is rated on a five point scale ranging from 1 = "Not at all characteristic of me" to 5 = "Entirely characteristic of me." It has been found to be reliable and has been validated for use among clinical and community samples (Buhr & Dugas, 2006; Jacoby, Fabricant, Leonard, Riemann, & Abramowitz, 2013). The scale was highly reliable in the present study, Cronbach's alpha .94.

The Fear of Compassion Scales (FCS; Gilbert et al., 2011) consist of three scales which assess fear of compassion for self (e.g. "I worry that if I start to develop compassion for myself I will become dependent on it"), fear of compassion from others (e.g. "I try to keep my distance from others, even if I know they are kind") and fear of compassion for others (e.g. "Being too compassionate makes people soft and easy to take advantage of"). The FCS is made up of 38 items in total which are rated on a four-point scale ranging from "Don't agree at all" to "Completely agree." It has been shown to be reliable and valid for use among clinical and community samples (Gilbert et al., 2011, 2012). In the current study only the first scale was used (fear of compassion for the self), for which Cronbach's alpha was 0.95.

2.6. Statistical analysis

Logistic regression analyses were conducted to determine whether demographic and baseline characteristics were predictive of missing data at T_2 and T_3. Completer and intention-to-treat (ITT) analyses were conducted using SPSS version 24. Multiple imputation was used to manage missing data for ITT analysis as this has been shown to be superior to last observation carried forward (Elobeid et al., 2009). Demographic data and outcome data from all three time points were included in the multiple imputation model and ten datasets were imputed.

To compare change over time between experimental and control groups ANCOVA analyses were conducted using the residualised gains procedure. Observations at T_2 (post-intervention and primary endpoint, 12 weeks after randomisation) were adjusted for observations at T_1 (baseline, pre-intervention). The follow-up effect of the intervention was investigated in the same way, using observations at T_3 (follow-up, 24 weeks after randomisation) as the outcome variable, adjusted for observations at T_1. In line with recent recommendations regarding the reporting of the results of statistical analysis we have adopted an open science approach by reporting Cohen's *d* between group effect sizes and 95% confidence intervals to indicate significance rather than providing significance or '*p*'values (Cumming, 2013; Cumming & Calin-Jageman,

2016). Given our inclusion of baseline observations as a covariate, we interpret a significant difference between groups as being an effect size that does not cross zero. Criteria for reliable change were used to determine whether the difference on all outcomes was reliable and due to the intervention, rather than due to measurement error. A Reliable Change Index (RCI) was computed using the formula $SE_{diff} = SD_1\sqrt{2}\sqrt{1-r}$, where SD_1 is the standard deviation at baseline and r is the Cronbach's alpha reliability coefficient of the measure (Jacobson & Truax, 1991). Change scores are required to exceed 1.96 times the SE_{diff} to show improvement (Evans, Margison, & Barkham, 1998). A negative change score exceeding the RCI was used to determine deterioration (Rozental et al., 2014).

3. Results

3.1. Descriptive statistics

The mean age of the 120 participants was 28.9 years (SD = 8), the majority were female (n = 98; 82%) and just over half were studying for a University degree (n = 62; 52%). A notable proportion of participants had previously received (n = 47; 40%) or were currently receiving (n = 34; 28%) treatment for a mental health disorder (Table 1).

3.2. Missing data analysis

At T_2 (post-intervention at 12 weeks) data was available on 71 participants (experimental = 30, control = 41) and at T_3 (follow-up at 24 weeks) data was available on 66 participants (experimental = 27, control = 39). The flow of participants through the trial is shown in Fig. 2. Logistic regression analysis conducted to identify predictors of missing data showed that having an educational qualification certificate was associated with lower odds of having missing data at T_2, while being in the experimental group was associated with having higher odds of having missing data at T_2 and T_3. Additionally, higher scores on the EDE-Q were associated with having higher odds of having missing data at T_2 and higher scores on the OCI-R were associated with having higher odds of missing data at T_3 (Table 1).

3.3. Completion of modules and measures

Of participants in the experimental group, 17 (27.4%) completed no modules, 36 (58.1%) completed one to four modules (half or less) and nine (14.5%) completed five to eight modules. The mean number of modules completed was 2.48 (SD = 2.37).

Table 1
Baseline characteristics of overall sample and logistic regression analysis of whether baseline variables predict missing data (post-intervention, follow-up).

Characteristics (N = 120)	Frequency (%)	Post-intervention OR (95% CI), p-value	Follow-up OR (95% CI)
Gender			
Female	98 (81.7)	Ref.	Ref.
Male	22 (18.3)	1.26 (0.5–3.2), 0.63	1.6 (0.63–4.05)
Age (years)	28.93 (7.98)	0.96 (0.92–1.01), 0.15	0.98 (0.93–1.02)
Marital Status			
Single (never married)	88 (73.3)	Ref.	Ref.
Married/domestic Partnership	27 (22.5)	3.04 (0.33–28.32), 0.33	1.14 (0.18–7.17)
Divorced/separated/Widowed	5 (4.1)	2.35 (0.23–24.1), 0.47	1.62 (0.23–11.26)
Educational Qualification Certificate			
No	11 (9.2)	Ref.	Ref.
Yes	109 (90.8)	0.23 (0.06–0.9), 0.04*	0.27 (0.07–1.09)
Professional Vocational Certificate			
No	63 (52.5)	Ref.	Ref.
Yes	57 (47.5)	0.73 (0.35–1.52), 0.4	0.92 (0.45–1.88)
Currently studying for degree level qualification			
No	58 (48.3)	Ref.	Ref.
Yes	62 (51.7)	0.96 (0.46–1.98), 0.91	0.68 (0.33–1.39)
Ethnicity			
White British	52 (44.1)	Ref.	Ref.
Other Ethnicity	66 (55.9)	1.48 (0.7–3.14), 0.31	1.14 (0.55–2.37)
Currently receiving treatment for a mental health problem			
No	86 (71.7)	Ref.	Ref.
Yes	34 (28.3)	1.21 (0.54–2.7), 0.65	1.32 (0.6–2.94)
Previously received treatment for a mental health problem			
No	73 (60.8)	Ref.	Ref.
Yes	47 (39.2)	1.12 (0.53–2.37), 0.76	1.3 (0.62–2.71)
Group			
Control	58 (48.3)	Ref.	Ref.
Experimental	62 (51.7)	2.57 (1.21–5.47), 0.01*	2.66 (1.27–5.6)
	Mean (SD)	Post-intervention OR (95% CI), p-value	Follow-up OR (95% CI)
Psychopathology			
OCI-R	27.88 (13.71)	1.02 (1.0–1.05), 0.08	1.03 (1.00–1.06)
EDE-Q	2.43 (1.63)	1.29 (1.02–1.62), 0.03	1.2 (0.96–1.5)
Transdiagnostic Processes			
RSES	11.85 (5.3)	0.98 (0.92–1.05), 0.61	0.96 (0.9–1.03)
US	91.38 (20.95)	1 (0.98–1.01), 0.73	1 (0.98–1.01)
FSC-1	28.98 (14.8)	1.01 (0.99–1.04), 0.36	1.01 (0.99–1.04)

Note: Results of intent to treat analysis presented in italics; d = effect size; 95% CI = 95% confidence intervals; OCI-R = Obsessive Compulsive Inventory – Revised; EDE-Q = Eating Disorder Examination Questionnaire; RSES = Rosenberg Self-Esteem Scale; IUS = Intolerance of Uncertainty Scale; FCS = Fear of Self Compassion Scale (fear of self-compassion).

Table 2
NCOVA analysis comparing control and experimental groups on scores at 12 and 24 weeks, adjusted for pre-intervention scores

Baseline covariate		Control, M (SE) n = 58 (42 Completers)	Experimental, M (SE) n = 62 (31 Completers)	Between group effect size d, 95% C.I.
Post intervention (T_2)				
Psychopathology				
OCI-R	26.07 (13.27)	22.64 (1.46)	14.13 (1.7)	-0.91 (-1.4 – -0.42)
	27.88 (13.71)	*21.69 (1.22)*	*16.51 (1.21)*	*-0.55 (-0.92– -0.19)*
EDE-Q	2.16 (1.46)	2.15 (0.17)	1.54 (0.2)	-0.56 (-1.03– -0.09)
	2.43 (1.63)	*2.03 (0.18)*	*1.77 (0.19)*	*-0.18 (-0.54 – 0.18)*
Transdiagnostic Processes				
RSES	12.06 (5.53)	13.1 (0.54)	15.6 (0.63)	0.72 (0.24 – 1.2)
	11.85 (5.3)	*12.75 (0.75)*	*15.25 (0.78)*	*0.42 (0.06 – 0.79)*
IUS	91.93 (21.71)	89.95 (3.06)	71.71 (3.58)	-0.93 (-1.42– -0.44)
	91.38 (20.95)	*87.38 (2.21)*	*77.4 (2.14)*	*-0.6 (-0.96– -0.23)*
FCS	27.96 (14.68)	26.35 (1.85)	16.72 (2.16)	-0.81 (-1.3– -0.33)
	28.98 (14.8)	*24.78 (1.43)*	*20.06 (1.41)*	*-0.43 (-0.79– -0.07)*
Follow-up (T_3)				
Psychopathology				
OCI-R	25.53 (12.62)	21.19 (1.23)	11.49 (1.42)	-1.27 (-1.78 – -0.75)
	27.88 (13.71)	*19.75 (1.12)*	*14.68 (1.07)*	*-0.6 (-0.97 – -0.24)*
EDE-Q	2.22 (1.51)	2.15 (0.15)	1.52 (0.18)	-0.66 (-1.15 – -0.18)
	2.43 (1.63)	*1.99 (1.19)*	*1.76 (0.17)*	*-0.04 (-0.39 – 0.32)*
Transdiagnostic Processes				
RSES	12.33 (5.29)	13.68 (0.83)	15.09 (1)	0.27 (-0.21 – 0.74)
	11.85 (5.3)	*13.15 (1.49)*	*14.59 (2.78)*	*0.08 (-0.28 – 0.44)*
IUS	92.15 (19.78)	83.65 (3.18)	68.44 (3.83)	-0.75 (-1.24 – -0.26)
	91.38 (20.95)	*81.47 (2.13)*	*73.72 (2.1)*	*-0.48 (-0.84 – -0.11)*
FCS	27.76 (14.72)	26.41 (1.91)	14.64 (2.29)	-0.97 (-1.47 – -0.47)
	28.98 (14.8)	*24.83 (1.47)*	*18.37 (1.47)*	*-0.57 (-0.94 – -0.21)*

3.4. Change in psychopathology

Completer and ITT analysis showed significant group differences on the OCI-R post intervention (T_2) and at follow-up (T_3), and participants in the experimental group had significantly higher odds than those in the control group of meeting criteria for reliable change in the expected direction (Tables 2 and 3). Completer but not ITT analysis also revealed significant between group differences on the EDE-Q at T_2 and T_3; however, participants in the experimental group did not have significantly higher odds of meeting criteria for reliable change.

Table 3
Frequency and odds of participants in the experimental group (vs. control group) achieving reliable change on all outcomes, post-treatment.

Cronbach's Alpha		Change Criterion	Control, n (%) Improvement	No Change	Det.	Experimental, n (%) Improvement	No Change	Det.	OR (95% CI)
Post-treatment (T_2)									
Psychopathology									
OCI-R	0.92	± 10.75	16 (27.6)	40 (69.0)	2 (3.4)	29 (46.8)	30 (48.4)	3 (4.8)	2.42 (1.04–5.66)
EDE-Q	0.92	± 1.28	11 (19.0)	41 (70.7)	6 (10.3)	21 (33.9)	31 (50)	10 (16.1)	2.48 (0.96–6.37)
Transdiagnostic Processes									
RSES	0.87	± 5.3	9 (15.5)	45 (75.9)	5 (8.6)	18 (29)	41 (64.5)	4 (6.5)	2.32 (0.78–6.92)
IUS	0.94	± 14.22	20 (34.5)	28 (48.3)	10 (17.2)	26 (41.9)	29 (46.8)	7 (11.3)	1.35 (0.62–2.95)
FCS-1	0.95	± 9.17	22 (37.9)	31 (53.4)	5 (8.6)	35 (56.5)	17 (27.4)	10 (16.1)	2.98 (1.29–6.87)
Follow-up (T_3)									
Psychopathology									
OCI-R	0.92	± 10.75	21 (36.2)	36 (62.1)	1 (1.7)	35 (56.5)	25 (40.3)	2 (3.2)	2.42 (1.09–5.41)
EDE-Q	0.92	± 1.28	12 (20.7)	41 (70.7)	5 (8.6)	18 (29.0)	38 (61.3)	6 (9.7)	1.60 (0.6–4.29)
Transdiagnostic Processes									
RSES	0.87	± 5.3	13 (22.4)	37 (63.8)	8 (13.8)	23 (37.1)	26 (41.9)	13 (21)	1.98 (0.74–5.26)
IUS	0.94	± 14.22	28 (48.3)	23 (39.6)	7 (12.1)	29 (46.8)	26 (41.9)	7 (11.3)	0.95 (0.45–1.99)
FCS-1	0.95	± 9.17	21 (36.2)	27 (46.6)	10 (17.2)	31 (50.0)	23 (37.1)	8 (12.9)	1.76 (0.77–4.03)

1. Reliable change criterion calculated using *Reliable Change Criterion Calculator* (Chris Evans, 1998).
2. Det. = Deterioration.
3. Table shows results of logistic regression analysis (OR, 95% CI).
4. OCI-R = Obsessive Compulsive Inventory – Revised; EDE-Q = Eating Disorder Examination Questionnaire; RSES = Rosenberg Self-Esteem Scale; IUS = Intolerance of Uncertainty Scale; FCS = Fear of Self Compassion Scale 1 (fear of self-compassion).

3.5. Change in other transdiagnostic processes

Completer and ITT analysis revealed significant between group differences on the IUS and the FCS at T_2 and T_3, and on the RSES at T_2 but not T_3. Participants in the experimental group also had significantly higher odds than those in the control group of meeting criteria for reliable change on the FCS at T_2.

4. Discussion

We have previously shown that guided ICBT for perfectionism can be effective at reducing perfectionism as measured by the clinical perfectionism questionnaire and the concern over mistakes subscale of the Frost Multidimensional Perfectionism Scale (Frost et al., 1990), post intervention and at follow-up. Here we show that the same intervention reduced symptoms of other psychopathology, specifically OCD and eating disorders, and also had an impact on other transdiagnostic processes associated with perfectionism, with participants showing decreased intolerance of uncertainty and fear of compassion post intervention and at follow-up. Increased self-esteem was also observed post intervention, but not at follow-up.

Our findings contribute to the literature suggesting that an intervention aimed at decreasing perfectionism can also lead to a reduction in associated psychopathology, specifically symptoms of OCD and eating disorders (Handley et al., 2015; Pleva & Wade, 2007; Steele & Wade, 2008). In comparison to the control group, participants in the experimental group showed decreases in symptoms of OCD with medium to large effect sizes, post-intervention and at follow-up. Between group differences in symptoms of OCD were statistically significant when conducting completer and intent to treat analysis, and participants in the experimental group had over twice the odds of meeting criteria for reliable change in the hypothesised direction (i.e. decreased scores on the OCI-R). Between group effect sizes in ED symptoms were also medium to large, both post-intervention and at follow-up, but differences only met criteria for statistical significance when analysing data from completers so this finding must be interpreted with caution. Additionally, participants in the experimental group were not significantly more likely to meet criteria for reliable change; however, scores on the EDE-Q for the current sample were low to begin with, meaning only limited change would be expected.

A novel finding is that guided ICBT for perfectionism may impact on other associated transdiagnostic processes. The experimental group showed comparative increases in self-esteem with medium to large effect sizes post-intervention which were statistically significant when conducting completer and intent to treat analysis. This improvement was not maintained at follow-up, however. One could hypothesise that engagement with treatment generally, rather than treatment for perfectionism specifically, is what led to an increase in self-esteem, potentially explaining why self-esteem scores decreased again once engagement ceased. This might be an interesting line of enquiry for future research, particularly if it was possible to maintain this increase.

In comparison to the control group, participants in the experimental group showed a decrease in intolerance of uncertainty and in fear of self-compassion, post-intervention and at follow-up with medium to large effect sizes. Between group differences were statistically significant for both completer and intent to treat analysis. It is possible that the impact on intolerance of uncertainty and fear of self-compassion is due to aspects of the intervention acting directly on these processes. While modules one to four focus specifically on understanding and challenging perfectionistic thoughts and beliefs, modules five to eight are broader. For example, modules seven and eight target self-worth and self-compassion, meaning a potentially direct impact on fear of self-compassion. Module five also teaches problem solving skills, which may increase an individual's confidence in their ability to deal with uncertain situations and unexpected events, potentially leading to a decrease in intolerance of uncertainty. It is worth bearing in mind, however, that fewer than 15% of participants completed more than four modules, meaning that the majority of participants only completed modules that focus specifically on perfectionism. Given this, the findings might be indication of causal relationships between perfectionism and intolerance of uncertainty, and perfectionism and self-compassion. Results of completer analysis may also be taken in support of this as effect sizes were found to be larger for intolerance of uncertainty and fear of self-compassion amongst completers; however, it is not possible to determine causality from the design of the current study.

To our knowledge this is the first study to show that CBT for perfectionism can lead to improvement in other associated transdiagnostic processes, specifically intolerance of uncertainty and self-compassion. Although the odds of meeting criteria for reliable change in self-esteem and intolerance of uncertainty were not significantly higher for participants in the experimental group, the current sample were not observed to have extreme scores on these processes, meaning only small changes might be expected. Given this, more research is warranted and should also investigate whether any causal relationships are direct or are due to other unknown variables.

Research investigating the causal relationship between perfectionism and OCD, and perfectionism and the transdiagnostic processes of intolerance of uncertainty and self-compassion, may be particularly fruitful given the strong evidence that guided ICBT for perfectionism can impact on these. It was not possible here to investigate whether change in perfectionism was a potential mediator for changes in psychopathology and other associated transdiagnostic processes due to limitations inherent in the design of this study, and limited evidence regarding the direction of causality between variables. Future studies would benefit from including multiple time-points of measurement during the period of treatment so that change can be tracked over time and analysis of potential mediators of change is possible. This would also allow exploration of causal direction, i.e. does change in perfectionism mediate change in associated psychopathology and other transdiagnostic processes, or vice versa.

This research derives many of its strengths from its design. A randomised controlled trial allows for causal inferences to be made, which means that changes in psychopathology and transdiagnostic processes can be attributed (either directly or indirectly) to the guided ICBT intervention. Because participants were randomly allocated, differences between groups and potential confounding factors were minimised. This was confirmed in an exploratory analysis which showed no significant differences between experimental and control groups in demographics or baseline scores of outcome variables. In addition, the randomisation schedule was created by a third party uninvolved with the research, reducing the likelihood of randomisation bias.

Considerable drop-out was observed, with over a quarter of participants in the experimental group completing no modules after being allocated and fewer than 15% completing more than half the intervention. This is a limitation common to studies of online interventions. A systematic review found that drop-out for online psychological interventions ranged from 2% to 83% and average drop-out was 35% (Melville, Casey, & Kavanagh, 2010). The review also found that the majority of individuals drop out before commencing treatment, which is in line with the current findings. It has been suggested that reminders might prompt participants to persevere (Donkin & Glozier, 2012). In the current research guides were directed to prompt participants who were inactive for a week or more. Though drop-out was still high, it was not as high as a previous RCT evaluating ICBT for perfectionism without guidance, so it is possible that the addition of guidance is effective in increasing retention (Egan, van Noort et al., 2014). It should also be noted that the pattern of missing data was somewhat impacted by education, and symptoms of disordered eating and obsessionality, which may challenge some assumptions of the statistical testing used. An RCT evaluating the effectiveness of the current intervention was run in Sweden at the same time as the current RCT and much lower drop-out rates were observed (approximately 80% retention; Rozental,

Shafran, Wade, Egan, et al., 2017). It is likely that important procedural differences in the design of the trials might have contributed to this difference in drop-out. In particular, participants in the Swedish trial were contacted via telephone by their therapists prior to commencing the intervention to confirm their intention to participate. It is likely that this meeting not only boosted retention through checking that participants still wanted to participate after being randomised, but also that it laid a better foundation for the building of a good therapeutic relationship, which in turn may have increased motivation to participate (Shafran et al., 2017).

Finally, multiple comparisons are subject to statistical analysis and though this is typical in the reporting of randomised controlled trials, the risk of experiment-wise error rate must be considered. We have refrained from adjusting for multiple comparisons as such an approach assumes that all null hypotheses are true simultaneously and can therefore increase the likelihood of type II errors, meaning truly important differences are deemed non-significant. Instead we have taken the approach of clearly describing the statistical tests that have been performed (Perneger, 1998).

5. Conclusions

The current study contributes to existing literature showing that treating perfectionism can have a positive impact on symptoms of associated psychopathology, specifically OCD and eating disorders. It also provides preliminary evidence for the hypothesis that effecting change in one transdiagnostic process can lead to change in other associated transdiagnostic processes. Exploring the nature of the relationships observed between these transdiagnostic processes and how they interact within different mental health disorders could provide new insights into how to identify those at high risk and the best and most effective method of treating these disorders. With further understanding it is possible that CBT and ICBT interventions focussing on a cluster of transdiagnostic processes could become integral to the treatment of mental health disorders and provide an effective early intervention strategy.

Conflicts of interest

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jbtep.2019.03.007.

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