Cognitive Predictors of Outcomes in Cognitive Behavioural Therapy

Dorothy King

June 2018

Research submitted in partial fulfilment of the requirements for the degree of Doctor in Clinical Psychology (DClinPsy), Royal Holloway, University of London

Acknowledgements

I would like to thank Dr Gary Brown for his supervision throughout this project, particularly during the data collection process. I would also like to thank Dr Jon Wheatly, Dr Mirko Cirkovic and Sharon Germain for their support with data collection in their service. I am also grateful to clinicians and administration staff at the service for their efforts with recruitment and to those I shared the office with, particularly for making me feel welcome and to Maria for all her enthusiasm and conversations during data collection.

I would also like to thank my family for their continued encouragement and support during each stage of this project and DClinPsy training. Thank you to friends and fellow trainees at Royal Holloway for their unending advice and motivation, and to Glorianne for her invaluable support throughout our final year of training.

Last, but not least, I would also like to thank all those who participated in this study.

Table of Contents

List of Tables

Systematic Review

Empirical Article

List of Figures

Systematic Review

Executive Summary

Background

This thesis focuses on mechanisms of change and predictors of outcome in cognitive behavioural therapies for depressive and anxiety disorders.

Cognitive behavioural therapies encompass a range of approaches. Therapies falling under the cognitive-behavioural umbrella have become one of the most dominant modalities of psychotherapy (Gaudiano, 2008) with a well-established evidence base for a range of mental health difficulties (Butler, Chapman, Forman, & Beck, 2006; Carpenter et al., 2018; Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012; Piet & Hougaard, 2011). Cognitive behavioural therapies are routinely recommended in national guidelines for the treatment of various mental health disorders, including the National Institute for Health and Care Excellence (NICE) guidelines in the UK. A recent commission on the future of psychological treatments research highlights that psychological treatments have a key role in the treatment of mental health difficulties, however there is a need to improve their efficacy as current treatments do not work for everyone (Holmes et al., 2018). Two recommendations for advancing psychological treatments include furthering research into their mechanisms and developing personalised models of treatment to understand who should be treated, "for what and with what" (Holmes et al., 2018). This research has the potential to support the refinement of treatments to directly target the processes responsible for change, improve precision in matching treatments to individuals, guide case formulation and identify the factors that contribute to differential treatment responses (Holmes et al., 2018; Kazdin, 2007; Laurenceau, Hayes, & Feldman, 2007). This could enhance the

effectiveness and efficiency of existing treatments and support the development of novel treatments.

There are several categories potential mechanisms of therapy might fall into including psychological, therapeutic, biological and neuropsychological, therapist related, demographic, disorder specific and social factors. Research into the process of psychotherapy and treatment mechanisms typically focuses on three questions: the course of change (individual trajectories over the course of therapy), moderators of change (for whom and under what conditions does change occur) and mediators of change (how and why change is occurring; Laurenceau et al., 2007). The systematic review chapter of this thesis focuses on psychological mediators of change in cognitive behavioural therapies for generalised anxiety disorder (GAD). The empirical study examines cognitive predictors of outcome in CBT for depression and anxiety disorders, which aimed to develop current understanding of treatment moderators.

Systematic review

The systematic review aimed to clarify the current position of research into mechanisms underlying therapeutic change in GAD. This was achieved through identifying research examining psychological mediators across cognitive behavioural psychotherapies for adults with GAD and providing a critical appraisal of this research, in line with the criteria recommended for mediation research (Kazdin, 2007).

There are five main theoretical models which outline various psychological processes underlying the development and maintenance of GAD:

- the avoidance model (Borkovec, 1994; Borkovec, Alcaine, & Behar, 2004)

- the intolerance of uncertainty model (Dugas, Letarte, Rheaume, Freeston, & Ladouceur, 1995; Freeston, Rheaume, Letarte, Dugas, & Ladouceur, 1994)
- the metacognitive model (Wells, 1995)
- the emotion dysregulation model (Mennin, Heimberg, Turk, & Fresco, 2002)
- the acceptance-based model (Roemer & Orsillo, 2002)

These form the basis for different psychological treatments for GAD and provide a starting point from which to understand potential mechanisms responsible for symptom change during therapy.

In this review, three databases (PsychINFO, PubMed and Web of Science) were systematically searched to identify potentially relevant articles. Search terms were determined using three concepts: cognitive behavioural therapies, generalised anxiety disorder and mechanisms of change. Inclusion criteria were:

Participants:

1. met diagnostic criteria for GAD
2. were aged 18 and over
3. received a cognitive behavioural intervention

Studies:

4. had a primary focus on examining psychological mediators of change over the course of therapy
5. were available in English
6. were empirical research reports, rather than reviews, theoretical essays or commentaries
7. employed a quantitative research design

Database searching identified 1,784 articles. Following removal of duplicates and screening titles, abstracts and full texts, 15 articles were included in the final review. Data extraction pulled out key details from each study and data assessment and critical appraisal assessed the extent to which studies met the criteria for mediation research (Kazdin, 2007):

1. Statistical mediation: statistically demonstrating that the effect of treatment on the outcome is explained by the mediator
2. Temporality: establishing the temporal relationship between mediator and outcome variables
3. Experiment: experimentally manipulating the proposed mediator to rule out alternative explanations
4. Specificity: demonstrating that associations between the intervention, proposed mediator and outcome are specific to that mediator
5. Plausible processes: a plausible and coherent explanation accounting for the operation of the proposed mediator, typically in line with existing theory and evidence base
6. Gradient: greater activation of the mediator should be associated with greater change in the outcome variable
7. Consistency: associations between the intervention, proposed mediator and outcome should be consistent across studies, samples and conditions

Gradient is included within statistical mediation analysis therefore was not reviewed as a separate criterion. Consistency was considered in the data synthesis rather than during assessment of individual studies. The use of valid and reliable measures

that are sensitive to change, adequate statistical power and fidelity to the intervention were also assessed.

The included studies examined 17 potential mediators across seven treatments. Mediators examined were intolerance of uncertainty (IU), experiential avoidance, decentering, acceptance of internal experiences, engagement in valued action, mindfulness, metacognitive beliefs, cognitive and behavioural avoidance, interpersonal problems, safety behaviours, reassurance seeking, change in worry, change in somatic anxiety, perceived control, risk taking, repetitive negative thinking and flexibility of anxious symptoms. The different treatments were CBT, applied relaxation, acceptance-based behaviour therapy, cognitive therapy, self-control desensitisation, worry exposure and metacognitive therapy.

Of the 15 studies, 13 concluded that the hypothesised mediator was associated with change in outcomes following therapy. Proposed mediators that were not associated with change in outcomes were cognitive and behavioural avoidance, safety behaviours, reassurance-seeking and risk-taking. All other potential mediators were shown to be associated with change in outcomes. However, no studies met all the criteria required for assessing treatment mediators, which limited the conclusions that could be drawn about the operation of the proposed mediators, for example whether the proposed mediator was associated with change, its predictive value, or its specific mediational role over the course of treatment.

IU, change in worry and change in somatic anxiety were examined in more than one study, therefore were the only mediators which could be assessed against the consistency criterion. These processes were shown to mediate change in outcomes, suggesting that these are important processes to consider and work to modify in therapy.

Other studies demonstrated that the proposed mediator was statistically associated with change in treatment outcomes, but it could not be concluded that they had a mediational role. This was primarily because the temporality criterion was not met; under these conditions, it is not known whether change in the proposed mediator led to change in symptoms or vice versa. Other methodological limitations included small sample sizes and that studies did not experimentally manipulate the proposed mediator, although, the external validity of studies able to manipulate the proposed mediator is thought to be limited.

One of the biggest challenges in mediation research is demonstrating the temporal relationship between change in the mediator and change in outcomes and it will therefore be important for future research to address this.

This review was limited by only including published studies and a lack of a second reviewer. However, it was able to summarise the current literature investigating mediators of outcome in cognitive behavioural therapies for GAD, provide a critical appraisal in line with requirements for mediational research, highlight clinical implications and make recommendations for future research.

Empirical study

The empirical study examined cognitive predictors, specifically attitudes and beliefs, of treatments outcomes in CBT.

Research in the depression literature has demonstrated that lower levels of pre-treatment dysfunctional attitudes and beliefs predict improved response to CBT. However, some studies have failed to replicate this association and others argue that there is a limited contributory role for cognitive processes in treatment outcomes. In anxiety disorders, the literature is more limited and results have mixed findings; some

studies have demonstrated that pre-treatment attitudes and beliefs significantly predict treatment outcomes, but others show no association.

This study was designed to examine attitudes and beliefs as predictors of treatment outcomes in CBT for depression and anxiety disorders in the pragmatic context of an Improving Access to Psychological Therapies (IAPT) service. It was hypothesised that:

1. there will be a significant relationship between pre-treatment depression-related attitudes and beliefs and post-treatment outcomes, where greater levels of pre-treatment maladaptive beliefs predict poorer outcomes in CBT.
2. there will be a significant relationship between pre-treatment anxiety-related attitudes and beliefs and post-treatment outcomes, where greater levels of pre-treatment maladaptive beliefs predict poorer outcomes in CBT.

Data were collected from two IAPT services in London.

- Service 1: data were collected in 2017-2018 and information about both depression and anxiety related attitudes and beliefs was gathered.
- Service 2: data were collected in 2013-2014 and examined anxiety related attitudes and beliefs.

Participants were those attending for high intensity CBT. The high intensity therapy pathway within IAPT services is for people with moderate/severe depression and/or anxiety difficulties. Data were collected from 141 individuals; 51 from Service 1 and 90 from Service 2.

The measures used to assess predictor and outcome variables were:

- Predictor variables
    - Dysfunctional Attitudes Scale – Short Form (DAS-SF). This is a nine-item self-report questionnaire used to measure maladaptive beliefs associated with depression.
    - The Anxiety Attitudes and Beliefs Scale (AABS-18). This is an 18-item self-report scale designed to measure maladaptive beliefs related to anxiety disorders.
- Outcomes
    - The Patient Health Questionnaire-9 (PHQ-9). This is a nine-item self-report measure used to assess symptoms of depression.
    - The Generalised Anxiety Disorder-7 (GAD-7) questionnaire. This is a seven-item self-report measure used to assess anxiety symptoms.
    - Caseness. This term defines a clinical case of anxiety or depression. Someone is in caseness if their score is ≥10 on the PHQ-9 or ≥8 on the GAD-7.
    - Clinically significant improvement (CSI). Change from pre- to post-treatment is deemed to be a clinically significant improvement if pre-treatment scores are in caseness and post-treatment scores no longer meet this criterion.
    - Reliable improvement (RI). If an individual's score changes by ≥6 on the PHQ-9 or ≥4 on the GAD-7, this is deemed to be a statistically reliable improvement, beyond that which could be due to measurement error.

- Reliable and clinically significant improvement (RCSI). A person is deemed to have made a RCSI when they meet the criteria for both CSI and RI.

PHQ-9 and GAD-7 data are collected routinely at each session in IAPT services. DAS-SF and AABS-18 data were introduced as routinely collected measures at high intensity therapy assessment appointments; both the DAS-SF and AABS-18 were collected at assessment in Service 1, but only AABS data were collected in Service 2.

Regression analyses were carried out to examine the predictive role of pre-treatment attitudes and beliefs on treatment outcomes. Hierarchical linear regression analyses were completed where the outcome variable was continuous (PHQ-9 and GAD-7 scores) and logistic regression analyses were completed where the outcome variable was categorical (caseness, CSI, RI and RCSI). Pre-treatment symptom scores were entered at step 1 and DAS-SF or AABS-18 data were entered at step 2. This allowed examination of the predictive role of attitudes and beliefs on post-treatment symptoms over and above pre-treatment symptom levels.

It was found that the hypotheses were not supported; pre-treatment attitudes and beliefs did not significantly predict post-treatment outcomes. Exploratory post-hoc analyses examining specific attitudes and beliefs revealed that body vigilance, anxiety-based reasoning and catastrophising were correlated with post-treatment symptom severity. However, these attitudes and beliefs were not significant predictors of post-treatment symptom severity, assessed in regression analyses.

Results may indicate that pre-treatment anxiety related attitudes and beliefs do not have predictive role in understanding treatment outcomes; it might be that other cognitive or behavioural predictors have a more significant role. It is also possible that

attitudes and beliefs have a mediational, rather than predictive role in understanding treatment outcomes. However, there were some methodological limitations to the current study which may have influenced the findings. The size of the sample examining depression-related attitudes and beliefs was small and analyses were underpowered; it is therefore possible that a Type II error was made and an effect was missed. Participants in the current study had a range of diagnoses but only PHQ-9 and GAD-7 outcomes were collected. The outcome measures used may therefore not have captured the range of symptoms individuals presented with and not represented the change in symptoms individuals experienced during therapy.

Examining predictors of treatment outcome is a complex area and various interacting factors are likely to contribute to treatment outcomes. Future research would benefit from addressing the methodological limitations encountered in this study and continuing to test processes from cognitive behavioural theories.

Integration, Impact and Dissemination

During implementation of the empirical study some challenges were encountered with regards to data collection. This lead to the need to change the study design from examining cognitive mediators over the course of treatment to cognitive predictors. The empirical study therefore did not follow as clearly conceptually and methodologically from the systematic review as initially anticipated, but this allowed an examination of predictors of treatment outcome in line with personalised medicine approaches and key learning around carrying out research in routine clinical practice.

Following discussions with the service manager, clinical lead, admin manager, therapists and service user group various recruitment strategies were tested, which led to administrators giving questionnaires to clients who were attending the service for

their assessment. However, due to the increased workload for administrators, this was carried out for a limited period of one month. An effective solution would have been for me to identify clients attending for an assessment appointment and prepare a list for administration staff to identify clients and distribute questionnaires. An application was made to the Health Research Authority (HRA) Confidential Advisory Group (CAG) to request permission for this, however this was not processed in sufficient time. Future research would benefit from submitting this application at the time of ethical approval.

Following these challenges in recruitment, a research group of therapists in the service is being established to support the partnership between research and clinical practice. It is hoped that this will impact therapists on a personal development level as well as opportunities for research within the service. Attending service user group meetings was important and led to suggestions for future research and understanding of what is acceptable to clients around data collection.

This project led me to reflect on the role of clinical psychologists as researchers and clinicians and informed my understanding of research in the context of routine clinical practice. I hope this will inform my future career and allow me to understand and navigate the processes of clinically applied research effectively.

It is planned that this research will be disseminated through the publication of the systematic review, and possible publication of the results relating to anxiety related attitudes and beliefs in the empirical article, and presentation of the results to the service in which data collection took place.

Psychological Mediators in Cognitive Behavioural Therapies for Generalised Anxiety Disorder: A Systematic Review

Abstract

Cognitive behavioural therapies have become increasingly prevalent in the treatment of mental health disorders and have strong empirical support for their efficacy. However, the mechanisms responsible for change in therapy are less well understood. Understanding mechanisms underlying therapeutic change is crucial in improving the efficacy and efficiency of treatments. This review aimed to examine the empirical literature on mediators of outcomes in cognitive behavioural therapies for generalised anxiety disorder (GAD) and provide a critical appraisal, in line with criteria recommended for mediation research.

Following a systematic search of three databases (PsychINFO, PubMed and Web of Science), 15 articles were identified to be included in the review. These studies examined 17 potential mediators relating to the intolerance of uncertainty, metacognitive, acceptance-based and avoidance models of GAD and the general cognitive behavioural model. Of the 15 studies, 13 concluded that the proposed mediator was associated with change in treatment outcomes. However, no studies met all the requirements for treatment mediation research and only intolerance of uncertainty, change in worry and change in somatic anxiety were examined in more than one study. These studies provided evidence that these processes have a mediational role in treatment outcomes, suggesting it is likely to be important to consider and work to modify these processes in treatments for GAD. Other hypothesised mediators were only examined in one study and the extent to which studies met the criteria for mediational research was variable, which limited the conclusions that could be drawn.

Future research would benefit from refinement of research methodology in line with criteria required for mediational research, particularly establishing the temporal relationship between mediator and outcome variables, and building on the current literature by examining potential mediators currently shown to be associated with treatment outcomes.

Introduction

Cognitive Behavioural Therapies.

Research into psychological therapies has grown at an increasing rate over the past 50 years. Cognitive behavioural therapy (CBT) has become an increasingly popular approach (Gaudiano, 2008) with a rapidly growing evidence base for a number of different psychiatric disorders (Butler, Chapman, Forman, & Beck, 2006; Carpenter et al., 2018; S. G. Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012).

Cognitive behavioural interventions hold the basic understanding that maladaptive cognitions and behaviours contribute to the development and maintenance of psychiatric disorders and psychological distress. CBT, therefore, aims to support patients in identifying, evaluating and modifying these maladaptive thinking patterns and behaviours in order to ameliorate symptoms (Hawton, Salkovskis, Kirk, & Clark, 1989). A differing emphasis is placed on cognitive and behavioural strategies depending on factors such as the time point in therapy, diagnosis and client wishes. Recently, there has been an expansion of 'third wave' cognitive and behavioural therapies, which focus more on changing an individual's relationship to their thoughts and emotions than on modifying their content, as in CBT (S. C. Hayes & Hofmann, 2017; S. G. Hofmann, Sawyer, & Fang, 2010). Third wave approaches encompass interventions such as Acceptance and Commitment Therapy (ACT; Steven C Hayes, Luoma, Bond, Masuda, & Lillis, 2006) and Mindfulness-Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002).

Cognitive behavioural therapies have an established evidence base for a broad range of mental health conditions, including depression (Piet & Hougaard, 2011; Zhang, Zhang, Zhang, Jin, & Zheng, 2018), anxiety disorders as a group (Carpenter et

al., 2018; S. G. Hofmann, Sawyer, Witt, & Oh, 2010; Normann, van Emmerik, & Morina, 2014) as well as individually, for example for generalised anxiety disorder (GAD; Cuijpers et al., 2014), panic disorder (Pompoli et al., 2016) and social anxiety disorder (Mayo-Wilson et al., 2014), obsessive compulsive disorder (OCD; Ost, Havnen, Hansen, & Kvale, 2015) and post-traumatic stress disorder (PTSD; Bisson, Roberts, Andrew, Cooper, & Lewis, 2013; Ehlers et al., 2010). However, although there is an established evidence base demonstrating the efficacy of cognitive and behavioural therapies, there remains a more limited understanding about how these therapies work and the extent to which theorised psychological processes influence symptom change over the course of therapy; the mechanisms underlying therapeutic change (Holmes et al., 2018).

Research into possible mechanisms underlying therapeutic change has been increasing in depression and anxiety disorders, and there have been recent systematic reviews published outlining mechanisms of change in psychotherapies for depression (Lemmens, Müller, Arntz, & Huibers, 2016; Lorenzo-Luaces, German, & DeRubeis, 2015; van der Velden et al., 2015) and anxiety disorders as a group (Smits, Julian, Rosenfield, & Powers, 2012). There have been relatively fewer reviews looking at specific anxiety disorders; there are systematic reviews examining mediators of change in CBT for panic disorder (Fentz, Arendt, O'Toole, Hoffart, & Hougaard, 2014) and OCD (Polman, Bouman, van Hout, de Jong, & den Boer, 2010) but none reviewing other anxiety disorders, including GAD.

Generalised Anxiety Disorder.

GAD is characterised by excessive anxiety and worry, among other symptoms such as difficulties concentrating, muscle tension and irritability (Diagnostic and

Statistical Manual of Mental Disorders - fifth edition (DSM-5; American Psychiatric Association, 2013). Worry has been defined as "an anxious apprehension for future, negative events (Barlow, 2002) that involves a predominance of negatively valenced verbal thought activity and minimal levels of imagery (Borkovec, Ray, & Stober, 1998, p. 562)" (Holaway, Rodebaugh, & Heimberg, 2006, p. 3).

The global lifetime prevalence rate for GAD is assessed to be the highest out of the anxiety disorders and is estimated to be 6.2% (Remes, Brayne, Linde, & Lafortune, 2016). In the UK, the most recent adult psychiatric morbidity survey estimated the one-week prevalence rate of GAD to be 5.9% (McManus, Bebbington, Jenkins, & Brugha, 2016), which is higher than other common mental health disorders including depression, phobias, obsessive compulsive disorder and panic disorder.

The natural course of GAD tends to be chronic with a low spontaneous remission rate (Wittchen, 2002). There is a .38 probability of remission without treatment at 5 years after diagnosis, where remission is defined as occasional or no symptoms for eight consecutive weeks (Yonkers, Dyck, Warshaw, & Keller, 2000). Effective treatments for GAD are therefore key to recovery. However, even where people receive treatment, not everyone will see a remission in symptoms. A recent meta-analysis demonstrated that the mean remission rate in CBT for people with GAD is 51.4% and it was concluded that there is the potential and need to improve recovery rates (Springer, Levy, & Tolin, 2018).

Theoretical models of GAD.

There are a number of key theoretical models of GAD; the avoidance model (AM; Borkovec, 1994; Borkovec, Alcaine, & Behar, 2004), the intolerance of uncertainty model (IUM; Dugas, Letarte, Rheaume, Freeston, & Ladouceur, 1995;

Freeston, Rheaume, Letarte, Dugas, & Ladouceur, 1994), the metacognitive model (MCM; Wells, 1995), the emotion dysregulation model (EDM; Mennin, Heimberg, Turk, & Fresco, 2002), and the acceptance-based model (ABM; Roemer & Orsillo, 2002).

Each model emphasises varying psychological processes underlying the development and maintenance of GAD. The intolerance of uncertainty and metacognitive models are primarily cognitive models where maladaptive cognitions are hypothesised to be the primary mechanism contributing to the development and maintenance of GAD. The acceptance-based and emotion dysregulation models are emotional or experiential models, where the key contributing mechanisms are maladaptive emotions and behaviours. The avoidance model is an integrated model which places equal emphasis on cognitive, emotional and behavioural elements as mechanisms responsible for the development and maintenance of GAD, alongside other factors including interpersonal relationships and attachment style. The different theorised processes underlying each of these models are outlined in Table 1; however common to all the models is an emphasis on a key role for avoidance of internal experiences, whether this is vivid images and somatic activation (AM), uncertainty (IUM), worrying about worry (MCM), emotions (EDM) or is a type of experiential avoidance of internal experiences (ABM; Behar, DiMarco, Hekler, Mohlman, & Staples, 2009).

Table 1

Summary of the key theoretical components of each model of GAD (Behar et al., 2009)

Model of GAD	Theoretical components
Avoidance model	Cognitive avoidance
	Positive worry beliefs
	Ineffective problem-solving/emotional processing
	Interpersonal issues
	Attachment style
	Previous trauma
Intolerance of uncertainty model	Intolerance of uncertainty
	Negative problem orientation
	Cognitive avoidance
	Beliefs about worry
Metacognitive model	Positive beliefs about worry
	Type 1 Worry
	Negative beliefs about worry
	Type 2 Worry
	Ineffective coping
Emotion dysregulation model	Emotional hyperarousal
	Poor understanding of emotions
	Negative cognitive reactions to emotions
	Maladaptive emotion management and regulation
Acceptance-Based model	Internal experiences
	Problematic relationship with internal experiences
	Experiential avoidance
	Behavioural restriction

These models have a theoretical and empirical basis for understanding the development and maintenance of GAD, have formed the basis of different

psychotherapeutic interventions for GAD (Behar et al., 2009) and point towards various possible psychological mechanisms that might contribute to therapeutic change.

Interventions for GAD.

CBT has the strongest evidence base for the psychotherapeutic treatment of GAD (Cuijpers et al., 2014; Hunot, Churchill, Teixeira, & de Lima, 2007), alongside applied relaxation (AR; Arntz, 2003; Ost & Breitholtz, 2000), and both are recommended in the National Institute for Health and Care Excellence (NICE) guidelines for the treatment of GAD (NICE, 2011). CBT interventions typically focus on the intolerance of uncertainty (Dugas & Ladouceur, 2000) and metacognitive (Wells & King, 2006; Wells et al., 2010) models, both of which have been shown to be effective for the treatment of GAD (van der Heiden, Muris, & van der Molen, 2012).

However, as previously outlined, there remains the need to enhance the efficacy of these interventions and improve recovery rates (Behar et al., 2009; Springer et al., 2018). This has led to the development of new therapies which refine and expand on existing models of GAD. Recently, acceptance-based behaviour therapy (ABBT) has been developed, based on the acceptance-based model (Roemer & Orsillo, 2002), which has emerging evidence for the efficacy of treating GAD (Hayes-Skelton, Roemer, & Orsillo, 2013).

Mechanisms of psychological treatments.

Mechanisms are defined as "the processes or events that are responsible for the change; the reasons why change occurred or how change came about" (Kazdin, 2007, p. 3). Holmes et al. (2018) explain that a mechanism is "an explanatory construct and not simply an intervening variable that explains the statistical association between an intervention and an outcome" (p. 241). Identifying mechanisms underlying therapeutic

change is crucial in understanding the links between psychological treatments and the diverse outcomes observed, understanding the specific therapeutic components required for change, refining treatment to directly target the mechanisms, developing new treatments with enhanced efficiency and efficacy, and in generalising treatment effects from research to clinical practice (Holmes et al., 2018; Kazdin, 2007; Laurenceau, Hayes, & Feldman, 2007). Identifying key mechanisms of psychological treatments may develop our understanding of individual factors contributing to differential treatment responses, thus improving personalised treatments, which has the potential to improve intervention efficacy.

Mechanisms underlying psychotherapeutic change often overlap with processes that underlie the development and maintenance of psychopathology (Holmes et al., 2018) and recent recommendations suggest identifying biopsychosocial factors that could explain change throughout treatment (Holmes et al., 2018; Kozak & Cuthbert, 2016). Potential mechanisms of therapeutic change may fall into the following categories (Schneider, Arch, & Wolitzky-Taylor, 2015):

- *Psychological factors*. This includes factors such as thoughts (content and process), attitudes, beliefs and schemas, behaviours, coping strategies, dispositional characteristics such as intolerance of uncertainty, attachment style, attentional control, memory, executive functioning, and information processing.
- *Therapeutic factors,* such as the therapeutic alliance and trust, client and therapist beliefs and expectations about therapy, motivation to engage in therapy, resistance and ambivalence, participation in therapy, early changes and sudden gains in treatment, therapy specific behaviours, treatment preferences, and the language used in therapy (e.g. change talk).

- *Biological and neuropsychological factors* such as genetics, neural circuits and physiology.
- *Therapist factors* such as therapist experience and competence and perceived therapist empathy.
- *Client demographic factors* such as age, gender, ethnicity and level of education.
- *Disorder specific factors* such as symptom severity, comorbid disorders and length of time a person has had the disorder.
- *Social factors* such as level of social support.

Mechanisms underlying the development and maintenance of psychopathology have been described as varying from predominantly distal (for example the influence of adverse events in childhood that impact a person in adulthood) to predominantly proximal (for example attentional biases in anxiety disorders) and predominantly fixed (for example genes) to predominantly malleable (for example cognitive biases); psychological treatments typically target proximal, malleable mechanisms (Holmes et al., 2018).

Establishing mechanisms of change.

To examine mechanisms of change in psychological treatments, the identification of mediators is a crucial step (Kazdin, 2007). Mediators represent potential mechanisms and are defined as "a variable that statistically explains why and in what way a treatment has an effect on outcome" (Lemmens et al., 2017, p. 96) and are typically the constructs that an intervention is designed to change (Laurenceau et al., 2007). A mediator does not necessarily explain the exact process by which change occurred; mediators might indicate possible mechanisms but are not necessarily

mechanisms of change (Kazdin, 2007). In contrast, a moderator is defined as a "characteristic that influences the direction or magnitude of the relation between the intervention and outcome" (Kazdin, 2007, p. 3). Moderators indicate for whom and under what conditions an intervention works and are factors that would be present prior to treatment (Laurenceau et al., 2007).

There are a number of criteria required to establish a mediator. Previously, identifying mediator variables referred only to statistical mediation: statistically demonstrating that the effect of treatment on the outcome is explained by the mediator (Lemmens et al., 2016). This predominantly included methods proposed by Baron and Kenny (1986) and, more recently, the MacArthur group (Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001; Kraemer, Wilson, Fairburn, & Agras, 2002). Statistical mediation should show that the therapeutic intervention is associated with change in the proposed mediator and that change in the proposed mediator is associated with change in the outcome (Holmes et al., 2018; Kazdin, 2007; Lemmens et al., 2016). However, although statistical mediation is important, it is now considered to be insufficient to draw clear conclusions about whether a hypothesised mediator explains change in outcomes (Johansson & Høglend, 2007; Lemmens et al., 2016). In addition to statistical mediation, demonstrating the direction of causality is considered to be crucial (Lemmens et al., 2016) and, in order to do this, Kazdin (2007, 2009) suggests six requirements:

1. *Temporality*: establish a temporal relationship between the proposed mediator and outcome. This involves assessment of both the mediator and outcome variables on multiple occasions during treatment, ideally in every treatment session (Holmes et al., 2018). It should be established that treatment causes the

mediator variable to change, which in turn leads to change in the outcome variable, and not the other way around.

2. *Experiment*: experimental manipulation of the proposed mediator can help to rule out alternative explanations for associations between the proposed mediator and outcome.
3. *Specificity*: demonstrating that associations between the intervention, proposed mediator and outcome are specific to that mediator, rather than multiple mediators accounting for changes in outcome.
4. *Plausible processes*: there should be a plausible and coherent explanation to account for how the proposed mediator operates, which should typically be in line with theory and the existing evidence base.
5. *Gradient*: demonstrating that greater activation of the mediator is associated with greater change in the outcome variable or that a dose-response relationship between the mediator and outcome variables is present.
6. *Consistency*: demonstrating that associations between the intervention, proposed mediator and outcome are consistent across studies, samples and conditions.

Examination of the role of proposed mediators should begin with statistical tests of mediation, after which each criterion can be reviewed to establish the extent to which each is met (Lemmens et al., 2016). Considering these criteria strengthen the evidence as, if fulfilled, this increases confidence in conclusions about the role of a proposed mediator (Kazdin, 2007). However, Kazdin and Nock (2003) highlight that not all criteria should be given equal weighting; they suggest that *statistical association*, *temporality*, *experiment* and *specificity* are the most important, with *plausible*

processes, *consistency* and *gradient* being used to further enhance the evidence. In addition, measures used to assess potential mediators should be reliable, valid and sensitive to change and mediators should be assessed in the context of adequately powered clinical trials (Holmes et al., 2018).

Aims of the current review.

Given the chronic course and low rates of spontaneous remission for GAD, the development and refinement of effective treatments is critical. Although there are effective treatments for GAD, there remains a limited understanding about the mechanisms underlying therapeutic change and the capacity to improve treatment recovery rates (Holmes et al., 2018; Smits et al., 2012; Springer et al., 2018). Understanding the mechanisms of therapeutic change has the potential to develop our understanding of how treatments for GAD work and therefore allow the development and refinement of treatments to improve efficacy. A recent commission by Holmes et al. (2018) makes ten suggestions for advancements in psychological treatment research which highlights the importance of furthering understanding of the mechanisms underlying psychological treatments.

This review aimed to focus on psychological mechanisms of change in cognitive behavioural therapies for GAD. There have been recent reviews on mechanisms of therapeutic change in other mental health disorders including depression (Lemmens et al., 2016; Lorenzo-Luaces et al., 2015), anxiety disorders as a group (Arch & Craske, 2008; Powers, de Kleine, & Smits, 2017; Smits et al., 2012), personality disorders (Forster, Berthollier, & Rawlinson, 2014), panic disorder (Fentz et al., 2014) and OCD (Polman et al., 2010), however none that have specifically focused on generalised anxiety disorder. This review aimed to clarify the current

position of research into mechanisms underlying therapeutic change in GAD through understanding which psychological mediators have been identified across cognitive behavioural psychotherapies for adults with GAD and providing a critical appraisal of this research.

Method

This review was designed and conducted with reference to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009).

Eligibility Criteria.

The current review sought to identify empirical studies that examined psychological mediators of change over the course of cognitive behavioural therapies for GAD. The literature search included all published articles up to January 2018. The inclusion criteria were: (a) participants met diagnostic criteria for generalised anxiety disorder, (b) participants were aged 18 and over, (c) participants received a cognitive behavioural intervention (d) studies had a primary focus on examining psychological mediators of change over the course of therapy, (e) studies were available in English, (f) studies were empirical research reports, rather than reviews, theoretical essays or commentaries and (g) studies employed a quantitative research design.

Search strategy.

Three databases (PsychINFO, PubMed and Web of Science) were systematically searched to identify potentially relevant articles. Search terms were determined using three concepts: cognitive behavioural therapies, generalised anxiety disorder and mechanisms of change. Within each concept, the Boolean operator 'OR' was used and the Boolean operator 'AND' was used to combine concepts. The search terms are outlined in Table 2.

Following the initial database search, records were exported to Endnote and duplicates removed. After this, titles, abstracts and then full texts were screened to assess for eligibility. When screening full texts, reasons for exclusion were noted.

Reference lists of selected articles were subsequently searched to identify any other relevant articles, of which the abstracts then full texts were screened for eligibility.

Table 2
Search terms used to identify articles

Concept	Search Term
Cognitive Behavioural Therapies	Psychotherap* OR Psychological treatment OR Psychological intervention OR psychological therap* OR Cognitive behavio*ral therapy OR CBT OR cognitive therap* OR cognitive psychotherap* OR behaviour* therapy OR behavior* therapy OR metacognitive therap* OR acceptance and commitment therapy OR ACT OR mindfulness-based cognitive therapy OR MBCT
Generalised Anxiety Disorder	Generalised anxiety disorder OR Generalized anxiety disorder OR GAD
Mechanisms of change	mechanisms OR mechanisms of change OR mediation OR mediator OR mediating effects OR process OR processes OR process research OR change OR processes of therapy OR predictor

Data extraction.

The following information was extracted from each study: (a) study design, (b) study location, (c) participant characteristics including age, gender and diagnosis, (d) hypothesised mediators, (e) intervention, (f) measures used to assess mediators and outcomes, (g) frequency of measurement, and (h) the key findings.

Data assessment and critical appraisal.

Given the recommendations for criteria required to assess potential mediator variables, articles were assessed to establish whether they met the requirements for mediation research. This approach has been used in other systematic reviews examining

mechanisms of change in therapy (Lemmens et al., 2016; Smits et al., 2012) and allowed review-specific rather than generic data appraisal. The criteria examined were: (a) inclusion of statistical mediation analysis, (b) assessment of *temporality* (defined by three or more assessments in the treatment phase (Lemmens et al., 2016), (c) *experimental manipulation* of the proposed mediator to rule out alternative explanations, (d) assessment of *specificity* through testing multiple mediators or multiple treatments where potential mediators both have and do not have a theoretical association with the treatment, (e) the use of valid and reliable measures that are sensitive to change, (f) adequate statistical power, and (g) a *plausible* and coherent explanation of how the proposed mediator operates. Fidelity to the intervention was also examined to review whether all participants received the same intervention and whether the intervention delivered was in line with the treatment protocol.

Gradient is included within statistical mediation analysis therefore was not reviewed as a separate criterion. Given that the criterion of *consistency* requires reviewing mediators across studies, it was not appropriate to include this in an assessment of individual studies, however this is considered in the data synthesis.

Each study was rated with respect to whether they met (+) or did not meet (-) each of these criteria, and this information was compared across the studies and summarised.

Results

Database searching identified 1,784 articles. Two additional articles were identified though other sources. Removal of duplicates left a total of 1,175 unique articles. During screening titles and abstracts, 1,153 studies were deemed not to meet inclusion criteria and were therefore excluded. The full text of 27 articles were assessed for eligibility and reference lists were screened to check for other relevant articles. One new article was found, and 15 were included in the final review. Figure 1 highlights the article selection process.

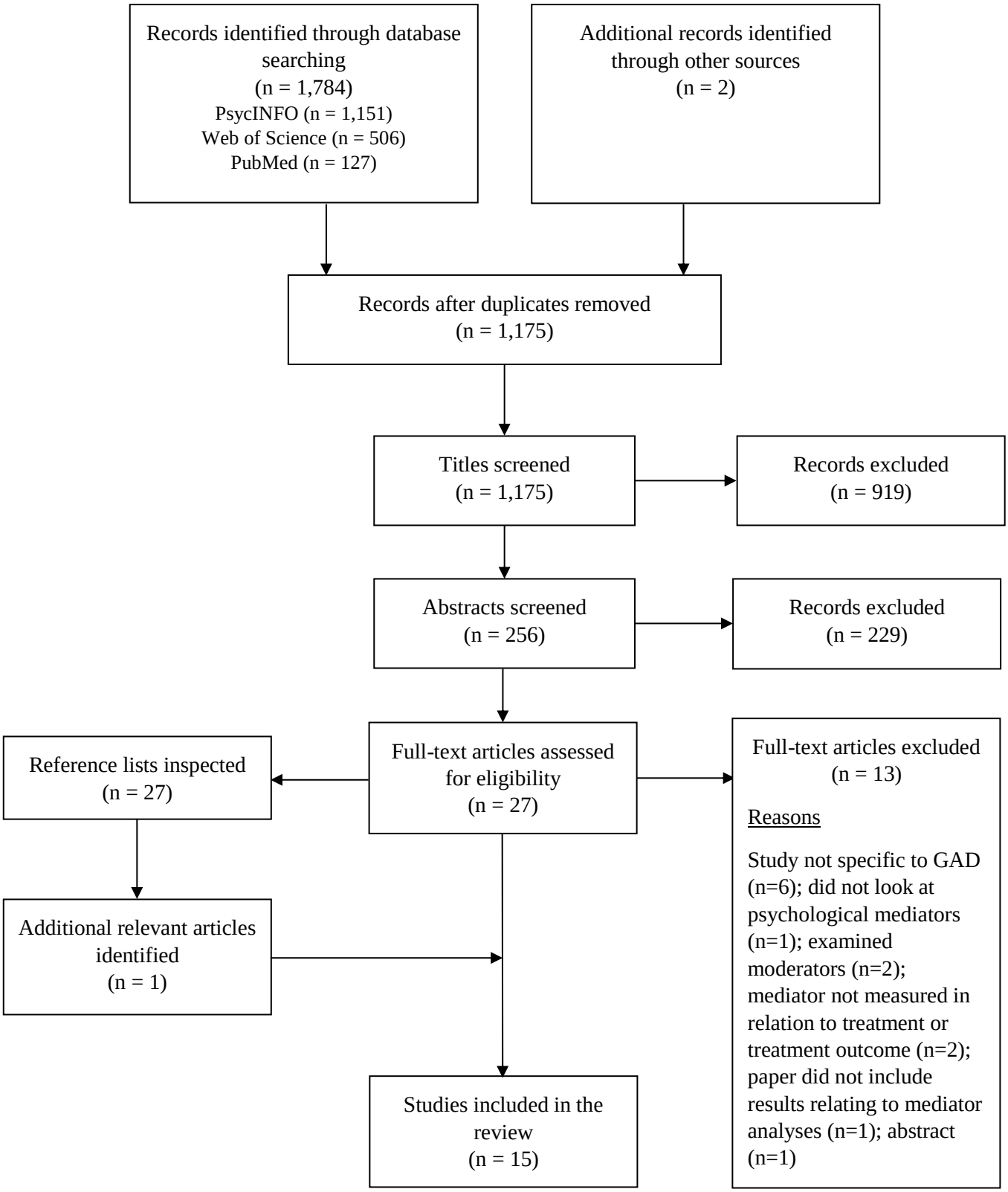


Figure 1. PRISMA flow diagram outlining the study selection process

Study characteristics.

Table 3 provides an overview of the characteristics and results of studies included in this review. All the studies were carried out in the Western world, the majority in the USA (47% vs. 27% in Canada, 20% in Australia and 6% in Europe) and 60% were published in the last 5 years (2013 – 2018). All but one of the studies took place in outpatient clinics, the remaining study took place online (Lorian, Titov, & Grisham, 2012). Sample size ranged from n = 4 – 131, with a mean of n = 58 (standard deviation (SD) = 29.90). Participants were adults and the mean age was 36.43 years (SD = 4.34). The majority of participants were female (mean = 66.39%, SD = 5.98). One study did not report demographic data and one reported data for age but not gender.

CBT was the most frequently researched intervention, examined in eight of the 15 studies; this encompassed individual face-to-face CBT (n = 6; Bomyea et al., 2015; Donegan & Dugas, 2012; Dugas, Francis, & Bouchard, 2009; Dugas & Ladouceur, 2000; Gallagher, Naragon-Gainey, & Brown, 2014; Newman & Fisher, 2013), internet CBT (n = 1; Lorian et al., 2012) and group CBT (n = 1; Torbit & Laposa, 2016). Applied Relaxation (AR) was the next most frequently studied intervention, included in six studies (Beesdo-Baum et al., 2012; Donegan & Dugas, 2012; Dugas et al., 2009; Eustis, Hayes-Skelton, Roemer, & Orsillo, 2016; Hayes-Skelton, Calloway, Roemer, & Orsillo, 2015; Millstein, Orsillo, Hayes-Skelton, & Roemer, 2015), followed by Acceptance-Based Behaviour Therapy (ABBT), examined in four studies (Eustis et al., 2016; Hayes-Skelton et al., 2015; S. A. Hayes, Orsillo, & Roemer, 2010; Millstein et al., 2015). Other interventions included group metacognitive therapy (MCT, n = 2; McEvoy & Erceg-Hurn, 2016; McEvoy, Erceg-Hurn, Anderson, Campbell, & Nathan, 2015), cognitive therapy (CT, n = 1; Newman & Fisher, 2013), self-control

desensitisation (SCD, *n* = 1; Newman & Fisher, 2013) and worry exposure (*n* = 1; Beesdo-Baum et al., 2012). Eight studies examined more than one therapeutic method (Beesdo-Baum et al., 2012; Donegan & Dugas, 2012; Dugas et al., 2009; Eustis et al., 2016; Hayes-Skelton et al., 2015; Lorian et al., 2012; Millstein et al., 2015; Newman & Fisher, 2013).

All studies used clinician administered interviews to assess diagnosis. All studies included self-report measures to measure the mediator and outcome variables and eight studies used both self-report and clinician-rated measures of GAD as an outcome measure. The most commonly used self-report measure of GAD symptom severity was the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990), which was used in 12 of the 15 studies. Clinician-rated measures were the Hamilton Anxiety Rating Scale (HARS; Hamilton, 1959), which was implemented in two studies, and different versions of the Anxiety Disorders Interview Schedule (ADIS), which was used in nine studies, two of which used the revised version based on DSM-III criteria (ADIS-R; Di Nardo & Barlow, 1988), four of which used the ADIS for DSM-IV (ADIS-IV; Brown, DiNardo, & Barlow, 1994), and three of which used the ADIS for DSM-IV - lifetime version (ADIS-IV-L; DiNardo, Brown, & Barlow, 1994).

The studies examined 17 potential mediators. These mediators related to theorised models of GAD including intolerance of uncertainty (intolerance of uncertainty model) which was examined in four studies (Bomyea et al., 2015; Dugas & Ladouceur, 2000; McEvoy & Erceg-Hurn, 2016; Torbit & Laposa, 2016), processes associated with the acceptance-based model including experiential avoidance (*n* = 1; Eustis et al., 2016), decentering (*n* = 1; Hayes-Skelton et al., 2015), acceptance of

internal experiences and engagement in valued action (*n* = 1; S. A. Hayes et al., 2010), and mindfulness (*n* = 1; Millstein et al., 2015). Metacognitive beliefs (metacognitive model) were examined in one study (McEvoy et al., 2015), and processes related to the avoidance model were examined in two studies, including cognitive and behavioural avoidance (*n* = 1; Beesdo-Baum et al., 2012) and interpersonal problems (*n* = 1; Millstein et al., 2015). Other potential mediators were more general cognitive and behavioural processes related to worry and anxiety, including safety behaviours (*n* = 1; Beesdo-Baum et al., 2012), reassurance seeking (*n* = 1; Beesdo-Baum et al., 2012), change in worry and change in somatic anxiety (*n* = 2; Donegan & Dugas, 2012; Dugas et al., 2009), perceived control (*n* = 1; Gallagher et al., 2014), risk taking (*n* = 1; Lorian et al., 2012), repetitive negative thinking (*n* = 1; McEvoy et al., 2015) and flexibility of symptoms of anxiety (*n* = 1; Newman & Fisher, 2013). Five studies examined more than one potential mediator (Beesdo-Baum et al., 2012; Donegan & Dugas, 2012; Dugas et al., 2009; S. A. Hayes et al., 2010; McEvoy et al., 2015).

Table 3

Data extraction: study characteristics and results

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
Beesdo-Baum, Jenjahn, Höfler, Lueken, Becker & Hoyer 2012 Germany	Randomised controlled trial (RCT) Worry exposure vs. applied relaxation vs. waitlist control	*n* = 56 45.5 years (13.3) 71.3% female GAD (DSM-IV)	Cognitive and behavioural avoidance Safety behaviours Reassurance seeking	Worry exposure (*n* = 29) Applied Relaxation (AR; *n* = 27)	**Outcome** ***Clinician rated*** Hamilton Anxiety Rating Scale (HARS) *Pre- and post-treatment* ***Self-report*** Penn State Worry Questionnaire (PSWQ) *Pre- and post-treatment, 6 and 12-month follow up* **Mediator** Behavioural symptoms (9-point Likert scale) *Weekly*	At pre-treatment, the hypothesised mediator variables were unrelated to treatment outcomes.

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
					Diagnosis ***Clinician administered*** DSM-IV Munich Composite International Diagnostic Interview	
Bomyea, Ramsawh, Ball, Taylor, Paulus, Lang & Stein 2015 USA	Cohort study Cognitive Behavioural Therapy	*n* = 28 34.4 years (10.8) 71.4% female GAD (DSM-IV)	Intolerance of uncertainty (IU)	Cognitive Behavioural Therapy (CBT)	**Outcome** ***Self-report*** Abbreviated PSWQ *Pre-treatment and bi-weekly during treatment* **Mediator** Intolerance of Uncertainty Scale (IUS). *Pre-treatment and bi-weekly during treatment* **Diagnosis** ***Clinician administered*** Mini-International Neuropsychiatric Interview (MINI)	Change in IU mediated change in worry. Reductions in IU accounted for 59% of the reductions in worry over treatment. Change in worry did not mediate change in IU. Change in worry accounted for less than 1% of the reduction in IU over treatment.

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
Donegan & Dugas 2012 Canada	RCT CBT vs. AR	*n* = 57 38.4 years (12.38) 66% female GAD (DSM-IV)	Change in worry Change in somatic anxiety	CBT (*n* = 31) AR (*n* = 26)	**Outcome / Mediator** ***Self-report*** Self-monitoring booklet: % of each day spent worrying and experiencing somatic anxiety *Daily* **Symptom severity** ***Self-report*** PSWQ Worry and Anxiety Questionnaire (WAQ) The Beck Depression Inventory-II (BDI-II) *Pre-treatment*	Change in worry accounted for 49.45% of the change in somatic anxiety in CBT and 25.87% of the change in somatic anxiety in AR. Change in somatic anxiety accounted for 57.76% of the change in worry in CBT and 48.57% of the change in worry in AR.

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
					Diagnosis ***Clinician-administered*** MINI, Version 4.4 Anxiety Disorders Interview Schedule (ADIS) for DSM–IV	
Dugas, Francis & Bouchard 2009 Canada	RCT CBT vs. AR	*n* = 20 36.9 years (12.3) 70% female GAD (DSM-IV)	Change in worry Change in somatic anxiety	CBT (*n* = 10) AR (*n* = 10)	**Outcome / Mediator** ***Self-report*** Self-monitoring booklet: % of each day spent worrying, experiencing somatic anxiety and feeling depressed *Daily* **Symptom severity** ***Self-report*** PSWQ WAQ – Somatic subscale *Pre- and post-treatment*	Change in worry predicted change in somatic anxiety. Change in somatic anxiety predicted change in worry. 80% of participants receiving CBT and 70% receiving AR showed a bidirectional relationship between worry and somatic anxiety.

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
					Diagnosis ***Clinician-administered*** MINI ADIS for DSM–IV	
Dugas & Ladouceur 2000 Canada	Multiple baseline single case design	*n* = 4 28.5 years (13.1) 50% female GAD (DSM-IV)	IU	CBT	**Outcome** ***Self-report*** Self-monitoring booklet: time spent worrying on a daily basis (0-100) *Daily* **Mediator** IUS *Pre- and post-treatment, 6-month and 12-month follow-up* Self-monitoring booklet: one item from the IUS *Daily*	Changes in IU were related to treatment outcomes. Changes in IU preceded changes in time spent worrying for 3 of the 4 participants. Changes in time spent worrying never preceded changes in IU.

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
					Symptom severity ***Self-report*** PSWQ Generalised Anxiety Disorder Questionnaire (GAD-Q) Beck Anxiety Inventory (BAI) BDI-II *Pre- and post-treatment, 6-month and 12-month follow-up* **Diagnosis** ***Clinician-administered*** ADIS-Revised	
Eustis, Hayes-Skelton,	RCT ABBT vs. AR	*n* = 64 65.6% female 34.4 years (12.14) GAD (DSM-IV)	Experiential avoidance	Acceptance based behaviour therapy (ABBT; *n* = 40)	**Outcome** ***Self-report*** PSWQ Quality of Life Inventory (QoLI)	Greater change in experiential avoidance across treatment significantly predicted change in

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
Roemer & Orsillo 2016 USA				AR (*n* = 41)	*Pre-treatment and post-treatment* **Mediator** ***Self-report*** Acceptance and Action Questionnaire (AAQ) Experiences Questionnaire (EQ) Decentering Subscale *Per-treatment, mid-treatment (week 4, week 8, week 12), post-treatment* **Diagnosis** ***Clinician-administered*** ADIS for DSM-IV-TR-Lifetime version	worry and quality of life across both ABBT and AR. Experiential avoidance was related to changes in outcomes above and beyond decentering

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
Gallagher, Naragon-Gainey, Brown 2014 USA	Controlled trial People who initiated CBT vs. people who declined treatment	*n* = 131 Demographics for GAD clients not reported GAD (DSM-IV)	Perceived control	CBT	**Outcome** ***Clinician-rated*** Three ADIS for DSM-IV dimensional rating measures **Mediator** ***Self-report*** Revised Anxiety Control Questionnaire – emotion control, threat control and stress control subscales **Diagnosis** ***Clinician-administered*** ADIS for DSM-IV-TR-Lifetime version *All measures: pre-treatment, 12-month follow-up, 24-month follow-up*	Changes in perceived control were significant predictors of changes in symptoms of GAD. Individuals initiating CBT reported increases in perceived control. Changes in perceived control mediated change in symptoms of GAD.

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
Hayes, Orsillo & Roemer 2010 USA	Data used from two studies: a wait-list control trial and open trial Data were only included from participants who received ABBT	*n* = 43 67.4% female 33.7 years (11.97) GAD (DSM-IV)	Acceptance of internal experiences Engagement in valued action	ABBT	**Outcome** ***Clinician-rated*** Clinicians' Severity Rating for GAD - ADIS DSM-IV-TR-Lifetime version *Pre and post-treatment* ***Self-report*** PSWQ Depression Anxiety and Stress Scale (DASS) QoLI *Pre and post-treatment* Weekly Assessment: % of time spent engaged in certain therapy-relevant activities over the preceding week (0 – 100)	**Responder status:** change in acceptance and change in valued action significantly predicted post-treatment responder status. **Quality of life:** change in acceptance, but not change in valued action, significantly predicted post-treatment quality of life while controlling for pre-treatment quality of life scores.

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
					Weekly, prior to each therapy session Treatment responders: demonstrated a 20% or greater reduction from pre- to post-treatment on at least three of four anxiety measure (Clinicians' Severity Rating, PSWQ, the DASS – Anxiety and Stress subscales) **Mediator** AAQ Valued Living Questionnaire (VLQ) *Pre- and post-treatment*	

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
					Diagnosis ***Clinician-administered*** ADIS for DSM-IV-TR-Lifetime version	
Hayes-Skelton, Calloway, Roemer & Orsillo 2015 USA	RCT ABBT vs. AR	*n* = 64 65.6% female 34.4 years (12.14) GAD (DSM-IV)	Decentering	ABBT (*n* = 31) AR (*n* = 33)	**Outcome** ***Self-report*** PSWQ *Pre- and post-treatment* **Mediator** ***Self-report*** EQ-Decentering subscale DASS 21-item version *Pre-treatment, sessions 4, 8 and 12, and post-treatment*	Increases in decentering were associated with decreases in worry symptoms and anxiety. Changes in decentering preceded changes in symptoms in both ABBT and AR General anxiety symptoms were not a significant predictor of change in decentering.

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
					Diagnosis ***Clinician-administered*** ADIS for DSM-IV	
Lorian, Titov & Grisham 2012 Australia	RCT CBT vs. waitlist control	*n* = 44 73% female 44.2 years (12.9) GAD (DSM-IV)	Risk-taking (social and recreational)	Internet CBT (*n* = 24) Control (*n* = 20)	**Outcome** ***Self-report*** PSWQ Generalized Anxiety Disorder 7-Item Scale (GAD-7) Patient Health Questionnaire (PHQ-9) Kessler Psychological Distress scale (K-10) Sheehan Disability Scale *Pre-treatment and post-treatment*	Change in risk-taking was not a significant partial or full mediator between the intervention and outcome variables, except for PHQ-9 scores. Outcomes measures were not significant partial or full mediators between treatment and change in risk-taking.

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
					Mediator ***Self-report*** Domain-Specific Risk-Taking Scale *Pre-treatment and post-treatment* **Diagnosis** ***Clinician-administered*** MINI Version 5.0.0 (GAD section)	
McEvoy & Erceg-Hurn 2016 Australia	Cohort study Group MCT for GAD	n = 62 69% female 36.6 years (12.3) GAD (DSM-IV)	IU	Group Metacognitive therapy (MCT)	**Outcome** ***Self-report*** PSWQ Repetitive thinking questionnaire (RTQ) *Pre-treatment, post-treatment, one-month follow up*	Change in IU was associated with change in PSWQ and RTQ scores over the course of treatment after controlling for change in PANAS scores. Change in Prospective IU was a statistically significant predictor of PSWQ and RTQ scores after

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
					Mediator ***Self-report*** IUS 12-item version Positive and Negative Affect Scale (PANAS-NEG subscale) *Pre-treatment, post-treatment, one-month follow up* **Diagnosis** ***Clinician-administered*** MINI *Pre-treatment*	controlling for PANAS scores. In the same analyses, change in inhibitory IU did not reach statistical significance.
McEvoy, Erceg-Hurn, Anderson, Campbell & Nathan 2015	Cohort study Group MCT	*n* = 52 60% female 38 years (14.3) GAD (DSM-IV)	Metacognitive beliefs Repetitive negative thinking (RNT)	Group MCT	**Outcome** ***Self-report*** K -10 *Assessment, first session, post-treatment (session 6), follow-up (session 7)*	Changes in RNT over treatment were associated with changes in negative metacognitions and changes in distress. Neither positive nor negative

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
Australia					**Mediator** ***Self-report*** RTQ Metacognitions questionnaire-30 *Assessment, first session, post-treatment (session 6), follow-up (session 7)* **Diagnosis** ***Clinician-administered*** MINI *Pre-treatment*	metacognitions were directly associated with change in distress. Reductions in negative metacognitive beliefs were associated with reductions in RNT which were associated with reductions in distress. This was not the case for positive metacognitions. Approximately 25% of the change in distress during treatment was attributed to the indirect effect of negative metacognitions via RNT. Only 4% of the change in distress during treatment was attributed to the indirect effect of positive metacognitions via RNT.

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
Millstein, Orsillo, Hayes-Skelton & Roemer 2015	RCT ABBT vs. AR	*n* = 81 65.4% female 32.9 years GAD (DSM-IV)	Interpersonal problems Mindfulness	ABBT (*n* = 40) AR (*n* = 41)	**Outcome** ***Clinician-rated*** Clinicians' Severity Rating for GAD - ADIS for DSM-IV *Pre-treatment, post-treatment, 6- and 12-month follow-up* **Mediator** ***Self-report*** Inventory of interpersonal problems circumplex scales-short form Five Facet Mindfulness Working Alliance Inventory *Pre-treatment, post-treatment, 6- and 12-month follow-up*	There were no significant effects of pre-treatment interpersonal problems on change in GAD severity over treatment. Post-treatment interpersonal problems predicted GAD symptom severity at 6- but not 12-month follow-up. Post-treatment interpersonal problems explained 9% of the variance in GAD severity at 6-month follow-up. Increases in mindfulness predicted decreases in interpersonal problems at post-treatment, 6- and 12-month follow up, over and above the effects of changes in GAD severity. Change in mindfulness explained 18% of

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
					Diagnosis ***Clinician-administered*** ADIS for DSM-IV	the variance in interpersonal problems at post-treatment, 22% of the variance at 6-month follow-up and 19% of the variance in change in interpersonal problem (above change in GAD) severity at 12-month follow-up.
Newman & Fisher 2013 USA	RCT CBT vs. CT vs. SCD	*n* = 76 68.4% female 36.6 years (11.56) GAD (DSM-IV)	Duration of GAD (moderator) Change in rigidity of anxiety symptoms (mediator)	Combined CBT (*n* = 24) Cognitive therapy (CT; *n* = 25) Self-control desensitisation (SCD; *n* = 27)	**Outcome** ***Clinician-administered*** Clinicians' Severity Rating for GAD - ADIS-Revised HARS *Pre- and post-treatment* ***Self-report*** PSWQ	In the CT and SCD conditions, greater GAD duration predicted greater flexibility of anxious symptoms during treatment, which predicted greater reliable change at posttreatment. In the CBT condition, GAD duration predicted less generation of flexibility in symptoms, which predicted less reliable change at posttreatment.

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
					State trait anxiety inventory (STAI)-trait version *Pre- and post-treatment* **Mediator** ***Self-report*** Client diary: recorded anxiety levels 4 times per day (0-100) *4 times daily* **Diagnosis** ***Clinician-administered*** ADIS–Revised *Assessment, 2-weeks post-assessment*	

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
Torbit & Laposa 2016 Canada	Cohort study Group CBT	*n* = 81 35.5 years (11.29) GAD (DSM-IV)	IU	Group CBT	**Outcome** ***Self-report*** PSWQ Worry Domains Questionnaire DASS *Pre-and post-treatment* **Mediator** ***Self-report*** IUS *Pre-and post-treatment* **Diagnosis** ***Clinician-administered*** Structured Clinical Interview for Axis I Disorders (SCID-I)	Change in IU predicted significant change on worry domains, worry severity and depression, but not anxiety. IU accounted for 54.3% of the variance in change in worry domains, over and above worry severity. IU accounted for 56.1% of the variance in change in worry severity, over and above worry domains. **Mediation analyses** Pre- and post-treatment PSWQ scores were mediated by changes in IU score. Pre- and post-treatment worry domain scores

Authors Year Country	Design	Participant *n* Mean age (SD) Gender Diagnosis	Hypothesised mediator(s)	Intervention	Measures of outcome, mediator and diagnosis *Frequency of measurement*	Key findings
						were mediated by changes in IU score. No mediation effect was detected for change in stress, depression or anxiety.

Note. AAQ = Acceptance and Action Questionnaire; ABBT = Acceptance Based Behaviour Therapy*;* ADIS = Anxiety Disorders Interview Schedule; AR = Applied Relaxation; BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory-II; CBT = Cognitive Behavioural Therapy; DASS = Depression Anxiety and Stress Scale; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders 4th edition; EQ = Experiences Questionnaire; GAD = Generalised Anxiety Disorder; GAD-Q = Generalised Anxiety Disorder Questionnaire; GAD-7 = Generalized Anxiety Disorder 7-Item Scale; HARS = Hamilton Anxiety Rating Scale; IU = Intolerance of Uncertainty; IUS = Intolerance of Uncertainty Scale; K-10 = Kessler Psychological Distress Scale; MCT = Metacognitive Therapy; MINI = Mini-International Neuropsychiatric Interview; PANAS = Positive and Negative Affect Scale; PHQ-9 = Patient Health Questionnaire; PSWQ = Penn State Worry Questionnaire; QoLI = Quality of Life Inventory; RCT = Randomised Controlled Trial; RNT = Repetitive Negative Thinking; RTQ = Repetitive Thinking Questionnaire; STAI = State trait anxiety inventory; VLQ = Valued Living Questionnaire; WAQ = Worry and Anxiety Questionnaire.

Data assessment and critical appraisal.

Requirements for mediation research.

Critical appraisal reviewing the extent to which studies met the recommended criteria for assessing potential mediators is outlined in Table 4.

Eleven of the 15 studies used statistical mediation analysis, using statistical methods outlined by various groups (Baron & Kenny, 1986; Bauer, Preacher, & Gil, 2006; Cole & Maxwell, 2003; A. F. Hayes, 2013; Hedeker & Gibbon, 2006; Hu & Bentler, 1998; Kenny, Korchmaros, & Bolger, 2003; Kraemer et al., 2002; Preacher & Kelley, 2011; Sobel, 1982). Mediational effects were estimated using multilevel mediation procedures, growth curve modelling, hierarchical regression and structural equation modelling.

As recommended by Kazdin (2007), after statistical mediation analysis it should be determined whether studies meet the additional criteria for identifying a potential mediator. Four of the 15 studies met the temporality criterion through assessing both the mediator and outcome variables at three or more time points during the treatment phase (Bomyea et al., 2015; Donegan & Dugas, 2012; Dugas et al., 2009; Dugas & Ladouceur, 2000). Four further studies assessed the hypothesised mediator at three or more time points during the treatment phase, but the outcome variables were measured at pre- and post-treatment only (Beesdo-Baum et al., 2012; Eustis et al., 2016; Hayes-Skelton et al., 2015; Newman & Fisher, 2013). Assessment of both the mediator and outcome variables should occur during the treatment phase in order to meet the temporality criterion (Kazdin, 2007; Laurenceau et al., 2007). The seven remaining studies included only pre-treatment, post-treatment and some included follow-up assessments, with no assessment of either the mediator or outcome variables during the

treatment phase (Gallagher et al., 2014; Hayes et al., 2010; Lorian et al., 2012; McEvoy & Erceg-Hurn, 2016; McEvoy et al., 2015; Millstein et al., 2015; Torbit & Laposa, 2016). Assessing the variables at pre- and post-treatment allows conclusions to be drawn about whether the proposed mediator correlates with outcomes, predicts change in outcome, or explains a portion of the variance in symptom change but does not allow for conclusions to be drawn about causality and whether change in the proposed mediator precedes changes in the outcome variable (Lemmens et al., 2016).

Only one study used an approach where the mediator was experimentally manipulated (Gallagher et al., 2014); the hypothesised mediator was perceived control and participants chose whether to initiate CBT, which modified their perceptions of control. Without experimental manipulation of the hypothesised mediator alternative explanations for associations between the proposed mediator and outcome cannot be ruled out (Kazdin, 2007).

Nine of the 15 studies were designed in such a way that they were able to assess specificity (Beesdo-Baum et al., 2012; Donegan & Dugas, 2012; Dugas et al., 2009; Eustis et al., 2016; Hayes-Skelton et al., 2015; Hayes et al., 2010; McEvoy et al., 2015; Millstein et al., 2015; Newman & Fisher, 2013) either through assessing multiple mediators or using two or more treatments with differing theorised processes (Holmes et al., 2018). All other studies investigated one mediator and one treatment approach.

Ten of the 15 studies used well established, valid and reliable measures that are sensitive to change to assess outcome and mediator variables. Where studies were assessed as not using valid and reliable measures this was where a self-monitoring diary was used to measure the outcome or mediator variables and validity and reliability were not reported (Donegan & Dugas, 2012; Dugas et al., 2009; Dugas & Ladouceur, 2000)

or where the validity and reliability are neither reported in the article nor clearly stated in the published literature (Gallagher et al., 2014; Millstein et al., 2015).

No studies reported a power calculation to determine adequate sample size; however, Hayes et al. (2010) note in their discussion that their analysis had low statistical power. Lemmens et al. (2016) define a sufficient sample size as 40 or greater in each condition, therefore this recommendation was used as a baseline for the assessment of adequacy of sample size. Six of the 15 studies had 40 or more participants per condition (Eustis et al., 2016; Gallagher et al., 2014; McEvoy & Erceg-Hurn, 2016; McEvoy et al., 2015; Millstein et al., 2015; Torbit & Laposa, 2016). However, it should be noted that Dugas and Ladouceur (2000) and Dugas et al. (2009) completed multiple baseline single case designs; therefore, although the sample size would be deemed insufficient for mediation analysis and to generalise the findings, this was appropriate for their aims. All studies concluded that larger sample sizes would be recommended for future research. All studies selected the hypothesised mediators from cognitive behavioural theory or theoretical models of GAD and therefore had a plausible and coherent explanation for how the proposed mediator operates.

Kazdin (2007) recommends that the strength of the argument for a proposed mediator should be based on the combination of these criteria. The total number of criteria met by each study was therefore reviewed. No studies met all the recommended criteria required for assessment of a potential mediator, as can be seen in Table 4. Two studies met five of the seven criteria (Eustis et al., 2016; McEvoy et al., 2015), eight studies met four criteria (Bomyea et al., 2015; Donegan & Dugas, 2012; Dugas et al., 2009; Gallagher et al., 2014; Hayes-Skelton et al., 2015; Hayes et al., 2010; Newman & Fisher, 2013; Torbit & Laposa, 2016), four studies met three of the criteria (Beesdo-

Baum et al., 2012; Lorian et al., 2012; McEvoy & Erceg-Hurn, 2016; Millstein et al., 2015), and one study met two of the criteria (Dugas & Ladouceur, 2000). The number of studies meeting each of the criterion can be found in Table 5. The only criterion that all studies met was a plausible and coherent explanation for the operation of the proposed mediator.

Fidelity to the intervention.

Seven studies reported on treatment adherence and all reported high levels of adherence to the treatment protocol (Beesdo-Baum et al., 2012; Bomyea et al., 2015; Dugas et al., 2009; Dugas & Ladouceur, 2000; Eustis et al., 2016; Hayes-Skelton et al., 2015; Millstein et al., 2015). Three studies did not report on treatment adherence but highlighted that treatment was delivered by licenced and trained psychologists (Donegan & Dugas, 2012; McEvoy & Erceg-Hurn, 2016; McEvoy et al., 2015). Four studies did not report on treatment adherence or competence of therapists (Gallagher et al., 2014; Hayes et al., 2010; Newman & Fisher, 2013; Torbit & Laposa, 2016). Lorian et al. (2012) examined internet CBT, therefore all participants received the same intervention in the same manner.

Table 4

Extent to which studies met recommended criteria for mediation research

Study	Analysis	Statistical mediation analysis	Temporality	Experimental manipulation of mediator	Specificity	Valid & reliable measures	Adequate sample size	Plausible processes	Number of criteria met
Beesdo-Baum et al. (2012)	Regression analysis	-	- outcome + mediator	-	+	+	-	+	3
Bomyea et al. (2015)	Multilevel mediation models Bauer et al. (2006); Kenny et al. (2003)	+	+	-	-	+	-	+	4
Donegan and Dugas (2012)	Multilevel mediation models Kenny et al. (2003)	+	+	-	+	-	-	+	4
Dugas et al. (2009)	Multivariate time series analysis Tiao and Box (1981)	+	+	-	+	-	-	+	4

Study	Analysis	Statistical mediation analysis	Temporality	Experimental manipulation of mediator	Specificity	Valid & reliable measures	Adequate sample size	Plausible processes	Number of criteria met
Dugas and Ladouceur (2000)	Time-series analysis Box and Jenkins (1970)	-	+	-	-	-	-	+	2
Eustis et al. (2016)	Growth curve modelling Kraemer et al. (2002)	+	- outcome + mediator	-	+	+	+	+	5
Gallagher et al. (2014)	Latent growth curve models Hu and Bentler (1998)	+	-	+	-	-	+	+	4
Hayes et al. (2010)	Latent growth curve modelling Logistic regression	+	-	-	+	+	-	+	4
Hayes-Skelton et al. (2015)	Latent growth curve modelling Bivariate latent difference score model	+	- outcome + mediator	-	+	+	-	+	4
Lorian et al. (2012)	Mediation analyses	+	-	-	-	+	-	+	3

Study	Analysis	Statistical mediation analysis	Temporality	Experimental manipulation of mediator	Specificity	Valid & reliable measures	Adequate sample size	Plausible processes	Number of criteria met
	Baron and Kenny (1986) Sobel (1982)								
McEvoy and Erceg-Hurn (2016)	Mixed-effect regression models Hedeker and Gibbon (2006)	-	-	-	-	+	+	+	3
McEvoy et al. (2015)	Longitudinal modelling A. F. Hayes (2013); Preacher and Kelley (2011)	+	-	-	+	+	+	+	5
Millstein et al. (2015)	Mixed-effect regression models Hedeker and Gibbon (2006)	-	-	-	+	-	+	+	3
Newman and Fisher (2013)	Path models (structural equation modelling)	+	- outcome + mediator	-	+	+	-	+	4

Study	Analysis	Statistical mediation analysis	Temporality	Experimental manipulation of mediator	Specificity	Valid & reliable measures	Adequate sample size	Plausible processes	Number of criteria met
	Baron and Kenny (1986); Cole and Maxwell (2003); Kraemer et al. (2002)								
Torbit and Laposa (2016)	Linear regression analyses Mediation analyses A. F. Hayes (2013)	+	-	-	-	+	+	+	4

Table 5
Number of studies meeting the recommended criteria for mediation research

Requirement	*N* (%)
Statistical mediation analysis	11 (73.3)
Temporality	4 (26.7)
Experimental manipulation of mediator	1 (6.7)
Specificity	9 (60.0)
Valid and reliable measures	10 (66.7)
Adequate sample size	6 (40.0)
Plausible processes	15 (100.0)

Data synthesis.

Of the 15 identified studies, 13 concluded that the hypothesised mediator was associated with change in GAD outcomes following therapy. Two did not find a relation between the proposed mediators and GAD symptoms. Beesdo-Baum et al. (2012) concluded that cognitive and behavioural avoidance, safety behaviours and reassurance-seeking measured weekly during treatment were not associated with GAD symptoms at post-treatment. Lorian et al. (2012) concluded that changes in risk-taking did not mediate change in symptoms of GAD over the course of internet CBT. However, both studies had a small sample size therefore it may be that the studies were not sufficiently powered to detect an effect.

Intolerance of uncertainty model.

The mediators examined were diverse and only intolerance of uncertainty and two other processes were examined in more than one study. Studies suggested that intolerance of uncertainty is a mediator of therapeutic change. It was shown that change

in intolerance of uncertainty statistically mediated change in worry in CBT (Bomyea et al., 2015; Torbit & Laposa, 2016) and that change in intolerance of uncertainty precedes change in worry but change in worry does not precede change in intolerance of uncertainty (Dugas & Ladouceur, 2000). Bomyea et al. (2015) demonstrated that reductions in intolerance of uncertainty accounted for 59% of the reduction in worry over the course of CBT, but that reductions in worry accounted for less than 1% of the change in intolerance of uncertainty. However, the sample size in this study was small which limited the generalisability of these findings. McEvoy and Erceg-Hurn (2016) demonstrated that reduction in intolerance of uncertainty was associated with reductions in GAD symptoms in metacognitive therapy; however, when separating intolerance of uncertainty into prospective and inhibitory intolerance of uncertainty, only prospective intolerance of uncertainty was shown to be a significant predictor of GAD symptomatology. Together, these studies met the criteria for statistical mediation analysis (Bomyea et al., 2015; Torbit & Laposa, 2016), assessment of temporality (Bomyea et al., 2015; Dugas & Ladouceur, 2000), used valid and reliable measures (Bomyea et al., 2015; McEvoy & Erceg-Hurn, 2016; Torbit & Laposa, 2016) and two had an adequate sample size (McEvoy & Erceg-Hurn, 2016; Torbit & Laposa, 2016). However, these studies did not experimentally manipulate intolerance of uncertainty and did not meet the specificity criterion, therefore alternative explanations for the relationship between treatment, GAD symptom severity and intolerance of uncertainty cannot be ruled out, and it is possible that other processes may play a mediational role in the relationship between treatment and outcomes.

This provides support for the intolerance of uncertainty model of GAD and indicates that modifying cognitions, specifically those related to uncertainty, is likely

to be important in cognitive-behavioural treatments for GAD. McEvoy and Erceg-Hurn (2016) provide preliminary evidence that modifying the desire for predictability (prospective intolerance of uncertainty) might lead to greater change in symptoms than modifying uncertainty paralysis (inhibitory intolerance of uncertainty). Prospective intolerance of uncertainty is a more cognitive process than inhibitory intolerance of uncertainty, which reflects more behavioural processes, providing further support for focusing on cognitive processes in cognitive-behavioural treatments for GAD.

Metacognitive model.

In line with the metacognitive model, McEvoy et al. (2015) examined positive and negative metacognitive beliefs and repetitive negative thinking in group metacognitive therapy. It was concluded that positive and negative metacognitions were not directly associated with change in psychological distress, however changes in repetitive negative thinking were associated with changes in positive and negative metacognitions and psychological distress. Repetitive negative thinking was shown to statistically mediate the relationship between negative metacognitions and change in psychological distress over the course of treatment and approximately 25% of the change in distress was attributable to this relationship. There was no significant impact of negative metacognitions on change in distress through any other evaluated mediator and no significant relationship was found between positive metacognitions and distress, even via repetitive negative thinking. This study was one of the higher quality studies, meeting five of the seven criteria recommended for mediation research which strengthens the argument for repetitive negative thinking as a mediator of treatment outcomes. However, the temporality criterion was not met therefore the temporal

relationship between these variables cannot be confirmed and it cannot be excluded that change in psychological distress preceded changes in repetitive negative thinking.

This provides further support for the role of cognitive processes in GAD treatment outcomes. This study suggests that targeting repetitive negative thinking in therapy may be more important than working directly with metacognitions as neither positive nor negative metacognitions were directly associated with change in psychological distress over the course of treatment. However, the authors conclude that by targeting negative metacognitions in treatment this reduces repetitive negative thinking and subsequently psychological distress. However, the temporal relationship between variables was not established and there are likely to be other mediators that also contribute to reductions in psychological distress; change in repetitive negative thinking accounted for 25% of the change in distress.

Acceptance-based model.

Processes from the acceptance-based model of GAD were examined in four studies and were shown to be related to GAD outcomes in ABBT and AR. These processes were experiential avoidance, decentering, acceptance of internal experiences, engagement in valued action and mindfulness.

Eustis et al. (2016) demonstrated that experiential avoidance significantly predicted change in GAD symptoms and quality of life in both ABBT and AR. This was one of the higher quality studies in this review, meeting five of the seven recommendations for identifying a mediator, see Table 4. However, although experiential avoidance is theoretically related to ABBT, its mediational role was not specific to ABBT as this also mediated outcomes in AR. Decentering was also shown to be associated with change in GAD symptoms and it was suggested that changes in

decentering preceded changes in GAD symptoms within both ABBT and AR (Hayes-Skelton et al., 2015). These studies used statistical mediation analyses, however the outcome measures were only administered at pre- and post-treatment, therefore the temporality criterion was not met. It therefore cannot be excluded that changes in the outcome measure preceded changes in the mediator during the treatment phase.

Hayes et al. (2010) demonstrated that change in acceptance of internal experiences and engagement in valued action significantly predicted response to ABBT, but only change in acceptance of internal experiences predicted post-treatment quality of life. Although statistical mediation analysis was completed, both mediator and outcome variables were only measured at pre- and post-treatment. Conclusions can therefore be drawn about the predictive role of the proposed mediators in response to treatment and quality of life, but not whether these mediate changes in symptoms over the course of therapy. Sample size was also small in this study, limiting the generalisability of conclusions.

When looking at mindfulness as a potential mediator of outcomes in ABBT and AR, an increase in mindfulness was shown to explain 18% of the variance in interpersonal problems at post-treatment. Post-treatment interpersonal problems subsequently explained 9% of the variance in GAD severity at 6-months post-treatment (Millstein et al., 2015). The authors conclude that, despite the theoretical links between mindfulness and ABBT, the effects of mindfulness on interpersonal problems was similar in both ABBT and AR. However, in reviewing the results section, there is not a clear differentiation between results from ABBT and those from AR. Statistical mediation analysis was not carried out, therefore conclusions relate to the predictive

value of mindfulness on outcomes, rather than its mediational role over the course of treatment.

These studies concentrated on three key theoretical components of the acceptance-based model of GAD; internal experiences, the relationship with internal experiences and experiential avoidance. This is an emotional and experiential model, which is in contrast to the primarily cognitive intolerance of uncertainty and metacognitive models. Together, these studies provide evidence of an association between change in acceptance-based processes over treatment and treatment outcomes for GAD, where improvement in scores for the mediator variable are related to enhanced therapeutic outcomes, suggesting that these might be important processes to target in treatment. These studies indicate that both AR and ABBT influence change in acceptance-based processes. However, without assessment of the temporal relationship between the mediator and outcome variables, causality cannot be established therefore it is not known whether change in the proposed mediator led to change in symptoms or vice versa.

General cognitive and behavioural processes.

Change in worry and change in somatic anxiety were examined in two studies and were shown to be associated with treatment outcomes. Donegan and Dugas (2012) demonstrated that in CBT change in worry accounted for 49.45% of the change in symptoms of somatic anxiety and change in somatic anxiety accounted for 57.76% of the change in worry. In AR, change in worry accounted for 25.87% of the variance in somatic anxiety and change in somatic anxiety accounted for 48.57% of the change in worry. These results were supported by Dugas et al. (2009) who, in a multiple baseline single case series study, demonstrated that change in worry predicted change in somatic

anxiety and vice versa in both CBT and AR. Both studies examined the mediator and outcome variables weekly during the treatment phase therefore were able to draw conclusions about the temporal relationship between variables. However, both studies used a daily self-monitoring booklet to measure variables, of which the validity and reliability was unclear. The specificity of the proposed mediators were reviewed, however both studies had small sample sizes, limiting the generalisability of these findings.

These findings suggest that treatment strategies targeting worries and/or physical sensations (somatic anxiety) may be important in treatment for GAD. This may also help to explain why both CBT and AR are effective treatments for GAD, as CBT would typically focus on worries and AR on somatic anxiety.

Gallagher et al. (2014) suggested that perceived control was a potential statistical mediator in the relationship between CBT treatment and GAD symptom severity, where changes in perceived control between pre-treatment and post-treatment follow-up predicted changes in GAD symptom severity. Statistical mediation analysis was completed, and this was the only study to experimentally manipulate the proposed mediator. However, similar to other studies, the mediator and outcome variables were only measured at pre- and post-treatment, limiting our understanding of the temporal nature of the relationship between treatment, mediator and outcome.

Newman and Fisher (2013) looked at the interaction between the moderator of GAD duration and the mediator of change in rigidity (or flexibility) of anxiety across CBT, cognitive therapy (CT) and self-control desensitisation (SCD). Changes in rigidity looked at patterns of rigidity and flexibility in symptoms of anxiety. These patterns were assessed through entries in a daily diary where participants recorded their

anxiety levels four times daily. In the component treatments, CT and SCD, greater GAD duration at pre-treatment predicted greater flexibility in anxious symptoms during treatment, which in turn predicted a significantly greater reliable change at post-treatment. In CBT, greater GAD duration predicted less flexibility in anxious symptoms during treatment which, in turn, predicted less reliable change at post-treatment. A strength of this study was in evaluating the specificity of the proposed mediator in CBT and its component treatments (CT and SCD), which highlighted the differential role of flexibility of anxious symptoms in CBT vs. CT and SCD. However, outcomes were only assessed at pre- and post-treatment, therefore assessing these regularly during the treatment phase, alongside the mediator, would strengthen the argument for the role of this mediator in treatment outcomes and allow an understanding of the direction of the relationship between mediator and outcome variables.

Discussion

This review aimed to provide an understanding of the empirical research examining mediators of change in cognitive behavioural therapies for generalised anxiety disorder. It aimed to identify potential mediators examined in empirical research and review the extent to which studies met the recommended criteria for tests of treatment mediation, specified by Kazdin (2007). Fifteen studies were identified in a systematic literature search. These studies examined 17 potential mediators across seven therapeutic approaches. The majority of these studies concluded that the hypothesised mediator was associated with change in outcomes, however studies varied in the specific conclusions they were able to draw, for example whether the proposed mediator was associated with change, its predictive value, or its specific mediational role over the course of treatment.

None of the studies met all the requirements for tests of treatment mediation, primarily because they did not assess the temporal relationship between change in the hypothesised mediator and change in outcomes and did not experimentally manipulate the proposed mediator. However, it is thought that the external validity of studies that are able to experimentally manipulate the proposed mediator, while keeping other processes content, is likely to be limited (Lemmens et al., 2016). Further, sample size was a challenge in the majority of studies, with 60% of studies having less than 40 participants per condition and all studies concluding that future research should include larger sample sizes. These findings are similar to other systematic reviews of mediational research; for example, in a recent review on mechanisms of therapeutic change in depression, Lemmens et al. (2016) concluded that the studies they reviewed

had also been limited in meeting the temporality criterion and none had experimentally manipulated the mediator variable.

The mediators investigated across the studies were heterogenous and only intolerance of uncertainty, change in worry and change in somatic anxiety were examined in more than one study. Considering the *consistency* criterion outlined by Kazdin (2007), these studies provide promising evidence for the mediational role of intolerance of uncertainty, change in worry and change in somatic anxiety in cognitive behavioural treatment outcomes, suggesting it is likely to be important to consider and work to modify these processes in treatment for GAD. However, studies examining change in worry and change in somatic anxiety had small sample sizes, limiting the generalisability of these findings and meaning that replication in larger scale studies is warranted. Studies examining intolerance of uncertainty only examined this process as a potential mediator, therefore it would be helpful in future research to include other potential mediators to examine whether associations between the intervention and outcome are specific to intolerance of uncertainty or whether multiple mediators account for the change. McEvoy and Erceg-Hurn (2016) separated intolerance of uncertainty into prospective and inhibitory intolerance of uncertainty and found differential effects on outcomes. It may therefore be interesting for future research to examine different subscales within the construct of intolerance of uncertainty.

Other processes identified as being associated with treatment outcomes were processes related to the acceptance-based model of GAD (experiential avoidance, decentering, acceptance of internal experiences, engagement in valued action and mindfulness), repetitive negative thinking, perceived control and change in rigidity of anxiety symptoms. Each of these mediators was only investigated in one study, limiting

the general conclusions that can be drawn about the mediational role of these processes in treatment outcomes. Given that associations were found between these hypothesised mediators and outcomes and that they related to theoretical models, these processes warrant further investigation, particularly in larger studies where both the mediator and outcome variables are measured on multiple occasions during the treatment phase.

For the processes related to the acceptance-based model of GAD, three of the four studies reviewed mediators in both ABBT and AR. Although the hypothesised mediators were theoretically related to ABBT, there were no observed differences in the role of the mediator variables across the two treatments. Holmes et al. (2018) suggest that specificity can be demonstrated where there is a stronger mediation via the hypothesised mediator for a theoretically associated treatment than for an intervention that is not theoretically relevant. These findings therefore suggest that these hypothesised mediators do not have a specific, causal role in mediating treatment outcomes. There is preliminary evidence suggesting that these processes are associated with treatment outcomes, however replication in studies assessing temporality and with larger sample sizes is recommended.

There are several theoretical models of GAD, which encompass a range of psychological processes and point towards a number of potential mediators, as outlined in the introduction. When assessing mediators of therapeutic change, it is important to first assess theorised processes (Kazdin, 2007). The mediators examined across the studies in this review were related to four of the theoretical models of GAD and more general cognitive behavioural theory. However, there remain some theorised processes for which the mediational role is yet to be examined empirically, these include negative problem orientation, coping, and those related to the emotion dysregulation model

including emotional hyperarousal, understanding of emotions, cognitive reactions to emotions, and emotion regulation abilities.

All studies examined in this review were carried out in the Western world, which is largely reflective of efficacy studies of psychological interventions. It is therefore possible that differences in mediational processes in psychological treatments may be found if studies were carried out in different settings. The majority of studies were carried out in the context of outpatient clinics within university settings and exclusion criteria typically included suicidal intent, substance use, bipolar disorder or psychotic disorder. Although these are standard exclusion criteria for research trials, this may not reflect the reality of everyday clinical practice, potentially limiting the generalisability of these finding for routine practice.

Limitations.

This review attempted to comprehensively search the published literature, however unpublished research was not included in the review. Publication bias was therefore not accounted for. In addition, a second reviewer was not available for the article selection process and for data assessment and critical appraisal. One reviewer therefore completed these processes, which increases the risk of bias in the selection of studies and critical appraisal process.

This review examined psychological mediators, therefore did not include possible mediators from other categories outlined in the introduction such as biological, social, or those related to the therapist. It is highly likely that other processes play a role in mediating treatment outcomes and indicate additional mechanisms of psychological treatments (Holmes et al., 2018), which it was beyond the scope of this review to assess.

Furthermore, mediators are likely to interact with moderators, which highlight the conditions under which a particular intervention may be more effective. For example, attachment style has been shown to be a moderator of treatment outcome in people with generalised anxiety disorder (Newman, Castonguay, Jacobson, & Moore, 2015). This review was not able to include moderators and develop an understanding of their interaction with mediators of outcome, therefore in future reviews understanding moderators and their interaction with treatment mediators may be important.

Recommendations for future research.

Future research would benefit from refinement of research methodology, in line with criteria required for mediational research, increased homogeneity in theorised processes examined and further understanding of the interactions between potential mediators and moderators.

Future research examining mediators of therapeutic change should focus on establishing the temporal relationship between mediator and outcome variables. This can be achieved through examining both mediator and outcome variables at multiple time points throughout treatment. Recommendations are that this should ideally be every session (Holmes et al., 2018), however this can be difficult in practice, and study design should be balanced with the burden for study participants. Lemmens et al. (2016) suggest that Experience Sampling Methodology might be a promising way to support this approach and with the increasing use of smartphone technology this might be an increasingly accessible method (W. Hofmann & Patel, 2015; Raento, Oulasvirta, & Eagle, 2009). Furthermore, sample size is a limitation in current research, therefore it is important that future research examining treatment mediators is conducted in the context of adequately powered studies (Holmes et al., 2018).

Given the heterogeneity of the current literature, with only intolerance of uncertainty, change in worry and change in somatic anxiety being examined in more than one study, future research would benefit from building on the current evidence-base by examining potential mediators already shown to be associated with treatment outcomes and addressing methodological limitations of previous studies. Where mediators are tested that have not yet been examined in empirical research recommendations emphasise that these should be selected from theory (Kazdin, 2007; Lemmens et al., 2016).

In future research it is also important to understand the specificity of hypothesised mediators and the differential contributions of different mediators across various treatments. Understanding how different variables moderate outcomes and their influence on mediators would also be an interesting development in future research. For example, understanding the role of culture as a potential moderator of outcomes and whether this differentially effects how a treatment works has the potential to enhance understanding of transcultural therapy and inform effective adaptations. This may go some way in addressing the limitation of the majority of studies being carried out in the Western world.

Theoretical implications.

As previously outlined, mediators examined in studies included in this review related to four of the key theoretical models of GAD (the intolerance of uncertainty, metacognitive, acceptance-based and avoidance models) and the more general cognitive behavioural model. Although all focus on cognitive and behavioural processes, each has a varying focus on the key mechanisms contributing to the development and maintenance of GAD, as outlined in the introduction. In addition,

there has been some debate in the broader cognitive-behavioural literature regarding the relative importance of cognitive and behavioural processes in the development, maintenance and treatment of psychiatric disorders (e.g. Hofmann, 2008; Longmore & Worrell, 2007).

The studies included in this review highlighted a mediational role for intolerance of uncertainty in treatment outcomes and a relationship between negative metacognitive beliefs, repetitive negative thinking and treatment outcomes, supporting theories suggesting a key role for cognitive processes in the development, maintenance and treatment of GAD. Furthermore, refinement of our understanding of cognitive processes, such as examining prospective and inhibitory intolerance of uncertainty, within the construct of intolerance of uncertainty (McEvoy & Erceg-Hurn, 2016), was also indicated to be important.

In this review, it was concluded that intolerance of uncertainty, change in worry and change in somatic anxiety were shown to mediate treatment outcomes. These related to more traditional cognitive behavioural theories, providing further support for these theories of GAD. A relatively more recent theoretical model of GAD is the acceptance-based model (Roemer & Orsillo, 2002). Although it could not be concluded in this review that acceptance-based processes mediated treatment outcomes, this was primarily due to methodological limitations of studies, rather than lack of empirical support for the theory. Tentatively, these studies provided preliminary support for third-wave theoretical approaches for GAD and further research may provide further evidence for their role in the development, maintenance and treatment of GAD.

Clinical implications.

The studies included in this review focused on various mediators, including cognitive, emotional and experiential processes and indicated that changes in these processes were associated with treatment outcomes. This indicated several processes that it might be important to target in treatment. Intolerance of uncertainty was found to be a mediator of treatment outcomes, providing further empirical support for the intolerance of uncertainty model of GAD. It is therefore likely to be important to address this in treatment and there is preliminary research indicating that examining different subscales of intolerance of uncertainty is important. However, the specificity of intolerance of uncertainty as a mediator was not tested and other studies indicated that further processes were associated with treatment outcomes. Change in worry and change in somatic anxiety were also shown to mediate treatment outcomes, therefore treatment strategies targeting these processes may also be important in treatment for GAD. However, these studies had small sample sizes which limited their generalisability beyond the study sample. Although further research is required to examine the mediational role of different processes in treatment for GAD, it is likely that a combination of factors mediate outcomes and therefore should be targeted in treatment.

Conclusions.

This review attempted to provide a comprehensive understanding of the current status of empirical research examining psychological mediators of change in cognitive behavioural therapies for generalised anxiety disorder. Intolerance of uncertainty, change in worry and change in somatic anxiety were the only mediators examined in more than one study and the extent to which studies met the recommended requirements

for mediation analysis was variable. One of the biggest challenges in mediation research is demonstrating the causal relation between change in the proposed mediator and change in GAD symptoms and it will therefore be important for future research to address this.

An empirical research base for mechanisms of change in cognitive behavioural treatments is growing, however it is important for future studies to continue to focus on theorised processes while addressing current methodological limitations, including the temporal relationship between change in the proposed mediator and change in outcomes, and the specificity of proposed mediators within adequately powered studies. Improving understanding of processes that mediate outcomes in therapy has considerable potential to refine existing treatments for improved efficacy and inform the development of new treatment approaches.

Empirical Article - Cognitive Predictors of Outcome in Cognitive Behavioural Therapy: the Role of Attitudes and Beliefs

Abstract

Cognitive Behavioural Therapy (CBT) has been shown to be an effective treatment for a range of mental health difficulties. However, there is considerable variation in response to CBT and there remain subgroups of people for whom CBT does not lead to recovery. Factors that predict treatment outcomes are less well understood than the efficacy of treatments and research to date has focused more on demographic and symptom-specific predictors than theorised psychological processes. Understanding predictors of outcome has the potential to identify people at risk of poor prognosis, understand differential responses to treatment, guide case formulation and inform the selection of appropriate treatments and treatment strategies to personalise interventions.

This study examined cognitive predictors of treatment outcomes in CBT for depression and anxiety disorders in the pragmatic context of an Improving Access to Psychological Therapies (IAPT) service. Predictors assessed were depression and anxiety related attitudes and beliefs. Outcomes were depression and anxiety symptom severity, caseness (whether scores were below the clinical cut-off at post-treatment), clinically significant improvement, reliable improvement and reliable and clinically significant improvement.

It was found that pre-treatment attitudes and beliefs did not predict treatment outcomes. Pre-treatment level of maladaptive attitudes and beliefs may have a less important role in predicting outcomes and it might be that change in these processes over treatment is more important. However, there were limitations to this study

including the sample size, which limited the conclusions that could be drawn and the generalisability of findings. There is an ongoing need to develop an understanding of factors that contribute to differential treatment responses to enhance treatment efficacy and it is important that future research continues to examine the predictive role of theorised processes through empirical research.

Introduction

The efficacy of psychotherapy, particularly Cognitive Behavioural Therapy (CBT), for the treatment of depressive and anxiety disorders has largely been supported (Butler, Chapman, Forman, & Beck, 2006; Carpenter et al., 2018; Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012; Hofmann & Smits, 2008; Olatunji, Cisler, & Deacon, 2010). CBT is recommended by national guidelines in the UK as a first-line treatment for depression (National Institute for Health and Care Excellence (NICE), 2009), anxiety disorders including Generalised Anxiety Disorder (GAD; NICE, 2011), Panic Disorder (NICE, 2011) and Social Anxiety Disorder (NICE, 2013), Obsessive Compulsive Disorder (OCD; NICE, 2005a) and Post-Traumatic Stress Disorder (PTSD; NICE, 2005b). However, despite the demonstrated efficacy of cognitive-behavioural interventions, less is understood about the mechanisms that predict or underlie therapeutic change (Holmes et al., 2018; McMain, Newman, Segal, & DeRubeis, 2015), including the extent to which psychological processes or specific components of therapy influence symptom change (Lorenzo-Luaces, German, & DeRubeis, 2015).

Research into the efficacy of CBT has demonstrated considerable variation in response, with response rates ranging from 38% to 82% (Hofmann et al., 2012). A recent meta-analysis examining remission in CBT for anxiety disorders found the overall mean remission rate to be 51% and suggested that there is room for improvement in recovery rates (Springer, Levy, & Tolin, 2018). There is also increasing evidence for negative effects of psychological treatment (Crawford et al., 2016) and research has demonstrated differential treatment responses for subgroups of individuals (Huibers et al., 2015). Findings such as these have stimulated interest in personalised

medicine: using an individual's idiosyncratic characteristics to adapt interventions for optimal efficacy (Schneider, Arch, & Wolitzky-Taylor, 2015).

Understanding moderators or predictors of treatment outcome are a basis for personalising treatment. Treatment moderators identify for whom and under what conditions a treatment is likely to work (Kraemer, Wilson, Fairburn, & Agras, 2002), and can potentially identify people at risk of poor prognosis, guide case formulation, support clinicians in selecting appropriate treatments and treatment strategies for individuals and improve understanding of differential treatment responses (Kraemer et al., 2002; McMain et al., 2015; Wiles et al., 2014). Furthermore, this has the potential to inform the verification and development of theories and facilitate the refinement and improvement of psychological therapies to improve efficacy (Holmes et al., 2018; Lemmens, Müller, Arntz, & Huibers, 2016).

Kyrios, Hordern, and Fassnacht (2015) suggest that predictor variables fall into eight broad categories: demographic variables, symptom characteristics (e.g., severity), comorbidity, cognitive variables, motivational factors (e.g., treatment expectations), treatment factors (e.g., therapeutic relationship, engagement in therapy), biological factors and other (e.g., social factors, personality). Research into predictors of therapeutic outcomes has typically focused on common or more general factors such as demographic or symptom-specific variables but is now increasingly focused on psychological predictors and factors specific to theoretical models, for example cognitive processes such as dysfunctional beliefs (Crits-Christoph, Connolly Gibbons, & Mukherjee, 2013; Knopp, Knowles, Bee, Lovell, & Bower, 2013; Llewelyn, Macdonald, & Aafjes-Van Doorn, 2016). In outlining key requirements for research into moderators and mediators of treatment outcomes, Kraemer et al. (2002) emphasises

the importance of using theory to identify and evaluate potential moderators, mediators and predictors of therapeutic outcome.

Cognitive behavioural theory.

Cognitive behavioural theory suggests that maladaptive attitudes, beliefs, information processing strategies and behaviours contribute to the development and maintenance of symptoms of various psychiatric disorders, including depressive and anxiety disorders (Beck, 1964; Beck, Rush, Shaw, & Emery, 1979; D. A. Clark & Beck, 2010). The cognitive model highlights three levels of thinking; negative automatic thoughts at the surface level, which can be grouped into different attitudes at the intermediate level, and core beliefs and schemas at the deepest level of cognition (Crits-Christoph, Gallop, Diehl, Yin, & Gibbons, 2017). These levels of cognition influence each other and contribute to the maintenance of psychopathology through their impact on feelings and behaviour (Beck et al., 1979; D. A. Clark & Beck, 2010).

Cognitive theory proposes that early experiences influence the development of schemas and core beliefs (which can be functional or maladaptive) about the self, others and the world. Specific events activate certain core beliefs and dysfunctional attitudes, evoking negative automatic thoughts, unhelpful behaviours and unpleasant emotions, which interact and maintain an individual's difficulties (Beck et al., 1979; D. A. Clark & Beck, 2010). The cognitive behavioural model considers unhelpful and maladaptive thinking patterns and behaviours as common to all psychological difficulties and hypothesises that cognitive processes play a key mediational role in symptom change during psychological therapy (Beck, 1963, 1964; D. A. Clark & Beck, 2010; Garratt, Ingram, Rand, & Sawalani, 2007). Cognitive behavioural therapy, therefore, aims to focus on these processes through modifying cognitions, where there are information

processing or cognitive biases, and behaviours, such as avoidance behaviour, with the aim of improving symptoms such as a low mood or anxiety.

Depression.

In line with theoretical hypotheses, the literature exploring factors contributing to symptomatic change in CBT for depressive disorders has primarily focused on the role of cognitive processes (Lemmens et al., 2016; Lorenzo-Luaces et al., 2015; Powers, de Kleine, & Smits, 2017). Lorenzo-Luaces et al. (2015) suggest in their recent review that the current empirical literature indicates that cognitive change contributes to symptom change in cognitive therapy, supporting the cognitive theory of depression (Beck, 1963, 1964). Furthermore, in a recent systematic review exploring the mechanisms of change in psychotherapy for depression, Lemmens et al. (2016) conclude that dysfunctional attitudes and negative automatic thoughts were associated with symptom change in the majority of studies investigating CBT and suggest that these processes warrant further investigation.

Research also highlights the role cognitive processes play in moderating treatment outcomes; lower levels of pre-treatment dysfunctional attitudes have been shown to predict improved response to treatment and lower levels of depressive symptom severity following CBT (Jacobs et al., 2009; Sotsky et al., 1991). Increased levels of pre-treatment negative automatic thoughts also predict a poorer response to CBT and schema therapy (Carter et al., 2018). However, other studies have failed to replicate this association between cognitive predictors and therapy outcomes (Fournier et al., 2009) or have suggested that it is the type of belief that is important. For example, Blatt, Quinlan, Pilkonis, and Shea (1995) found that introjective perfectionism beliefs, but not interpersonally oriented need for approval beliefs, predicted outcomes

following treatment for depression, where higher levels of pre-treatment perfectionist beliefs predicted increased levels of depression symptom severity and more impaired adjustment at post-treatment.

Others have argued that there is limited evidence for the role of cognitive processes as a mechanism predicting or underlying treatment outcomes, questioned the effectiveness of cognitive change procedures in bringing about symptom change (Longmore & Worrell, 2007) and suggested that there is limited need to include cognitive components in therapy (Richards et al., 2016). However, it has also been suggested that change mechanisms may still be cognitive, even when using non-cognitive therapeutic procedures (Hofmann, 2008).

Anxiety disorders.

Models of anxiety-related disorders place differing emphases on the role of cognition in the development and maintenance of psychopathology and in understanding factors predicting and underlying therapeutic outcomes. Some models focus on physiological processes, learning and behaviour (Barlow, 2002; Ledoux, 1989; Mowrer, 1939, 1960) and see the development and maintenance of anxiety-related disorders as involving limited cognitive mediation. However, other models highlight a more central role for thoughts and beliefs in the development and maintenance of psychopathology (D. A. Clark & Beck, 2010); for example Clark's model of panic disorder (1986), models of social anxiety disorder (D. M. Clark & Wells, 1995), OCD (Salkovskis, 1985, 1989), PTSD (Ehlers & Clark, 2000; LoSavio, Dillon, & Resick, 2017), and the metacognitive and intolerance of uncertainty models of GAD (Dugas, Freeston, & Ladouceur, 1997; Dugas, Gagnon, Ladouceur, & Freeston, 1998; Wells, 1995). More recently, there has been an emphasis on both

behavioural and physiological responses and cognitive processes in understanding the development and maintenance of anxiety-related disorders (LeDoux & Pine, 2016).

In line with these models, there are both behavioural and cognitive perspectives in understanding potential predictors of outcome and mechanisms of change in CBT for anxiety-related disorders. Behavioural perspectives highlight fear extinction as a mechanism of therapeutic change (Powers et al., 2017) and cognitive perspectives include conscious (e.g., maladaptive thoughts and beliefs) and unconscious (e.g., attentional biases) processes (Powers et al., 2017). Cognitive models of anxiety suggest that reduction in symptom severity is associated with and preceded by change in maladaptive thoughts and beliefs and that greater levels of maladaptive thoughts and beliefs contribute to increased symptom severity (D. A. Clark & Beck, 2010).

There is currently a limited evidence base investigating the role of cognitive factors in predicting treatment outcomes in anxiety-related disorders and no collective agreement about the predictive utility of cognitive factors in CBT for anxiety disorders. For example, a recent systematic review examining treatment moderators for anxiety disorders, OCD and PTSD identified only four studies (of the 24 included in the review) that examined cognitive moderators (Schneider et al., 2015). These studies focused on cognitive misappraisals and perceived control; however, it was determined that limited conclusions could be drawn from the current literature due to the heterogeneity of findings (Schneider et al., 2015). In addition, Knopp et al. (2013) highlighted that psychological predictors have received relatively little attention in empirical research, with studies often focusing on factors such as demographic or symptom-specific variables.

Results from studies focusing on specific disorders are also variable. For example, a systematic review focusing on OCD concluded that there is limited evidence for an association between OCD-related beliefs and therapeutic outcomes in CBT when examining beliefs as a predictor of outcome (Knopp et al., 2013). However, other studies have highlighted that specific pre-treatment beliefs predict therapy outcomes; Kyrios et al. (2015) demonstrated that pre-treatment perfectionism and intolerance of uncertainty beliefs were a significant predictor of OCD symptom severity at post-treatment where lower levels of perfectionism and intolerance of uncertainty beliefs predicted higher levels of post-treatment OCD symptom severity. Steketee, Siev, Yovel, Lit, and Wilhelm (2018) found a similar pattern of results where stronger responsibility/threat and importance/control of thoughts beliefs predicted clinical improvement.

However, similar to studies of depression, the opposite pattern has been demonstrated in panic disorder; stronger dysfunctional cognitions at pre-treatment predicted poorer outcomes in CBT (Dow et al., 2007b) and lower levels of pre-treatment catastrophic cognitions have been associated with greater improvement in cognitive therapy (Meuret, Hofmann, & Rosenfield, 2010). Although, a systematic review of predictors and moderators of outcomes in CBT for panic disorder did not identify any studies that evaluated the predictive role of beliefs on treatment outcome (Porter & Chambless, 2015). Maladaptive beliefs have also been shown to be a significant predictor of change in social anxiety symptom severity in CBT (Boden et al., 2012; Gregory, Wong, Marker, & Peters, 2018). In PTSD, more severe trauma related cognitions at pre-treatment have been shown to predict worse outcomes in prolonged exposure therapy plus cognitive restructuring (Moser, Cahill, & Foa, 2010).

These findings have been replicated, however only in a delayed (following a period of time on a wait-list) not immediate, treatment condition (Crockett, 2015). The delayed treatment condition is likely to have been a more self-selected group in this study as there was significant attrition in this condition and those who dropped out had significantly higher levels of dissociation and suppression scores than those who went on to engage in treatment (Crockett, 2015). Psychological mediators in CBT for GAD are outlined in the systematic review (pages 18-83), however no studies were identified that examined the predictive role of cognitive processes, such as attitudes and beliefs, in CBT outcomes for GAD.

Current study.

This study aimed to examine cognitive predictors, specifically anxiety and depression related attitudes and beliefs, of treatment outcomes in CBT for depression and anxiety disorders. The study was designed to build on theoretical principles and the existing evidence base and to examine predictors of outcome in a pragmatic context of Improving Access to Psychological Therapies (IAPT) services. IAPT services are primary care mental health services across England providing low and high intensity psychotherapeutic interventions for people with mild to moderate depressive and anxiety disorders. This study was also designed to contribute to the growing evidence base around personalised medicine, which aims to identify variables that predict differential responses to treatment (DeRubeis et al., 2014; Huibers et al., 2015).

Decisions with services, allocation of resources and client pathways through services are often not made in ways that draws on the evidence base concerning predictors of outcome. Furthermore, there is scope for improvement in recovery rates in routine clinical practice; in the 2016-2017 financial year, 49.3% of people who

completed a course of treatment at an IAPT service in England were considered as moved to recovery following treatment (NHS Digital, 2017). Individuals were defined as recovered if their scores on outcome measures for either depression or anxiety were above the clinical threshold before treatment and below the clinical threshold for both depression and anxiety at the end of treatment. For the 2015-2016 year, recovery rates for high intensity CBT were 49.0% for individuals with a primary presenting problem of anxiety and 45.9% for individuals with a primary presenting problem of depression (CBT-specific outcomes were not reported for the 2016-2017 year; NHS Digital, 2016b), suggesting that there is scope to improve recovery rates. In addition, there have been criticisms that findings from larger clinical trials have limited applicability in routine clinical practice, primarily due to strict inclusion criteria limiting ecological validity and implementation in routine clinical practice (McMain et al., 2015). This study therefore took place in the context of routine clinical practice with the aim of increasing clinical relevance of research findings and facilitating implementation of research into clinical practice. In addition, there remains limited empirical evidence understanding the predictive role of cognitive variables on treatment outcomes, particularly in anxiety disorders.

The evidence base for cognitive predictors of outcome in CBT for anxiety disorders is mixed, however findings have been more consistent in studies of depression. Taking these findings into account, it is expected that:

1. there will be a significant relationship between pre-treatment depression-related attitudes and beliefs and post-treatment outcomes, where greater levels of pre-treatment maladaptive beliefs predict poorer outcomes in CBT.

2. there will be a significant relationship between pre-treatment anxiety-related attitudes and beliefs and post-treatment outcomes, where greater levels of pre-treatment maladaptive beliefs predict poorer outcomes in CBT.

Method

Participants.

Data were collected from two IAPT services in London. From one service, data were collected in 2017-2018 and information about both depression and anxiety related attitudes and beliefs was gathered (Service 1). Archival data were used from the second service, this was collected in 2013-2014 and examined anxiety-related attitudes and beliefs only (Service 2).

Participants were those who were attending for high intensity CBT. The high intensity therapy pathway in IAPT services is for people with moderate to severe depression and/or anxiety. Criteria for accepting a referral into IAPT services include a primary presenting problem of depression, mixed anxiety and depression (such as difficulties with low self-esteem), anxiety disorders (defined as PTSD, OCD, Body Dysmorphic Disorder, GAD, specific phobias, health anxiety, social anxiety and panic disorder) or impulse control disorders (such as Trichotillomania or skin picking). Exclusion criteria for accepting referrals are if the primary presenting problem is bipolar affective disorder, psychotic symptoms or a risk of psychotic relapse, deliberate self-harm or suicidal behaviour that is frequent and/or life threatening, dependence on substances (if the individual is using substances to the extent that this impairs their ability to think and/or function), a personality disorder, Complex PTSD resulting from multiple incidents, significant learning difficulties better supported by specialist services, an eating disorder, psychosexual problems that are not related to anxiety or depression, anger that is unrelated to a common mental health problem or if there is also a significant forensic history.

Data were available from a total of 141 individuals; 51 from Service 1 and 90 from Service 2. Participants were aged between 19 and 89 years and the mean age was 36.99 years (SD = 13.57). The majority of participants were female (68.79%) and white British (56.03%).

Power analysis.

A power calculation based on an effect size of .085, $\alpha = .05$, power = .80 and two predictors indicated that 117 participants would be required. It was anticipated that it would be unlikely to detect a large effect size (.35; Cohen, 1992), particularly given that the predictive effects of attitudes and beliefs were being estimated beyond pre-treatment symptoms levels (see 'data analysis' section below). The anticipated effect size was therefore estimated to be between a small (.02; Cohen, 1992) and medium (.15; Cohen, 1992) effect size and set at .085.

Measures.

Predictor variables.

Measures used to assess attitudes and beliefs were the Dysfunctional Attitudes Scale short form (DAS-SF; Beevers, Strong, Meyer, Pilkonis, & Miller, 2007) and a shortened version of the Anxiety Attitude and Beliefs Scale-2 (AABS-2; Brown, Hawkes, Cooper, Jonsdottir, & Tata, 2015), the AABS-18.

Dysfunctional Attitudes Scale.

The DAS-SF is a nine-item self-report questionnaire designed to measure stable and enduring maladaptive beliefs associated with depression, in accordance with cognitive theory. Individuals are asked to rate on a 4-point Likert scale from 1 (totally disagree) to 4 (totally agree) how well each statement describes their attitude. Scores

range from 9-36 with higher scores indicating more maladaptive beliefs. The DAS-SF 1 was used for this study, which is reported to have good internal consistency (α = .84) and is sensitive to change over therapy (Beevers et al., 2007). This is reported to have good concurrent, convergent and predictive validity and is said to provide a valid and accurate assessment of dysfunctional attitudes in people with depression (Beevers et al., 2007). The DAS-SF has two subscales; perfectionism and need for approval.

The Anxiety Attitudes and Beliefs Scale.

The AABS-18 is an 18-item self-report scale measuring enduring maladaptive beliefs related to anxiety disorders. Individuals are asked to rate on a 4-point Likert scale from 1 (totally disagree) to 4 (totally agree) how much they agree with a series of different beliefs. Scores range from 18-72 with higher scores indicating more maladaptive beliefs. Validity and reliability are not reported for the AABS-18; however, the AABS-2 is reported to be a valid measure of attitudes and beliefs associated with anxiety disorders (Brown et al., 2015). The AABS-2 is reported to have good internal consistency (α = .87) and discriminant validity (Chaw, Oei, & Lai, 2014). There is a strong positive correlation between the AABS-2 and AABS-18 (r = .98). The AABS-18 has seven subscales; body vigilance, thought manifestation, risk avoidance, anticipation, evaluation sensitivity, anxiety-based reasoning and catastrophising.

Clinical Outcomes.

Symptoms of depression.

The Patient Health Questionnaire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001) was used to measure symptoms of depression. This is a nine-item self-report questionnaire. Individuals are asked to rate on a 4-point Likert scale from 0 (not at all)

to 3 (nearly every day) how often they experience particular symptoms. Scores range from 0-27 with higher scores indicating increased severity of depression symptoms. The PHQ-9 has been validated in primary care populations (Kroenke, Spitzer, Williams, & Löwe, 2010) and is routinely used in IAPT services across England. It is reported to be a valid measure of depression severity and has adequate sensitivity (88%) and specificity (88%) for the detection of major depressive disorder using a cut-off score of ≥ 10 (Kroenke et al., 2001). The PHQ-9 is reported to have good internal consistency (α = .89) and test-retest reliability (*r* = 0.84; Kroenke et al., 2001) and is sensitive to change over treatment (Cameron, Crawford, Lawton, & Reid, 2008).

Symptoms of anxiety disorders.

The Generalised Anxiety Disorder-7 (GAD-7) questionnaire (Spitzer, Kroenke, Williams, & Löwe, 2006) was used to measure anxiety symptoms. This is a seven-item self-report questionnaire measuring symptoms of generalised anxiety disorder. Individuals are asked to rate on a 4-point Likert scale from 0 (not at all) to 3 (nearly every day) how often they experience particular symptoms. Scores range from 0-21 with higher scores indicating increased severity of anxiety symptoms. The GAD-7 is routinely used in IAPT services and has adequate sensitivity (83%) and specificity (84%) for the detection of generalised anxiety disorder using a cut-off score of ≥ 8 (Plummer, Manea, Trepel, & McMillan, 2016). The GAD-7 has been shown to be a valid and reliable screening tool for a number of anxiety disorders including generalised anxiety disorder, panic disorder and social anxiety disorder (Kroenke, Spitzer, Williams, Monahan, & Lowe, 2007). The GAD-7 is reported to have good internal consistency (α = .85; Hinz et al., 2017) and is sensitive to change over therapy (Beard & Bjorgvinsson, 2014).

Caseness.

Caseness is the term used in IAPT services to define a clinical case of anxiety or depression. Someone is said to be in caseness if their score is ≥ 10 on the PHQ-9 or ≥ 8 on the GAD-7 (NHS Digital, 2016a).

Clinically significant improvement.

Change from pre- to post-treatment is deemed to be a clinically significant improvement (CSI) if pre-treatment scores are considered to be in caseness and post-treatment scores no longer meet the criteria for caseness (NHS England, 2017).

Reliable improvement.

The reliable change index (RCI) specifies the amount of change an individual should show on a psychometric outcome measure between two time points for a change to be deemed reliable and beyond that which could be due to measurement error (Jacobson & Truax, 1991). The RCI is 6 points for the PHQ-9 and 4 points for the GAD-7 (NHS England, 2017); if an individual's score changes by ≥ 6 on the PHQ-9 or ≥ 4 on the GAD-7, this can be deemed to be a statistically reliable improvement (RI).

Reliable and clinically significant improvement.

A person is deemed to have made a reliable and clinically significant improvement (RCSI) when they meet the criteria for both clinically significant improvement and reliable improvement (Delgadillo et al., 2014; NHS Digital, 2016a).

Caseness, CSI, RI and RCSI were included as outcome variables in addition to PHQ-9 and GAD-7 scores to provide additional ways of operationalising change and treatment outcome. These are routinely used as outcome variables in IAPT services therefore use of these variables aimed to enhance the applicability of this research to

routine clinical practice. It has also been suggested that using clinically significant change as an outcome variable may lead to more consistent findings (Kyrios et al., 2015).

Procedures.

As part of routine clinical practice in IAPT services, individuals complete the PHQ-9 and GAD-7, among other outcome measures, at assessment and every therapy session. In Service 1, individuals attending for an assessment for high intensity therapy were also given the DAS-SF and AABS-18 to complete. In Service, 2 individuals were given the AABS-2 at their assessment appointment. During this appointment participants were given an information sheet about this study and therapists took verbal consent to share data for research purposes.

Demographic information, type of therapy, number of therapy sessions and data from the PHQ-9 and GAD-7 at pre- and post-treatment were gathered from client's clinical notes. All therapists were trainee or qualified high intensity CBT therapists or trainee or qualified clinical or counselling psychologists.

Ethical approval.

NHS ethical approval was granted for this research; favourable ethical opinion was granted by the South Central – Berkshire B Research Ethics Committee (REC) for Service 1 and by the London – Queen Square REC for Service 2. Approval was also granted by the NHS Health Research Authority and Research and Development for study sites. Ethical approval was granted by Royal Holloway University of London through the self-certification process as NHS ethical approval had been granted.

Data analytic strategy.

Hypotheses were tested using regression analyses; hierarchical linear regression analyses were completed where the outcome variable was continuous and logistic regression analyses were completed where the outcome variable was categorical. Pearson's correlations were used to explore data prior to regression analyses.

Hierarchical linear regression analyses were carried out to evaluate the extent to which pre-treatment attitudes and beliefs predicted post-treatment symptoms of depression and anxiety, as measured by the PHQ-9 and GAD-7, respectively. Pre-treatment symptom level has been shown to predict post-treatment symptoms (Arch & Ayers, 2013; Dow et al., 2007b; Eskildsen, Hougaard, & Rosenberg, 2010; Kyrios et al., 2015; Vittengl et al., 2016), therefore pre-treatment symptom scores were entered at step 1 and DAS-SF or AABS-18 data were entered at step 2. This allowed examination of the predictive role of attitudes and beliefs on post-treatment symptoms, over and above pre-treatment symptom levels.

Logistic regression analyses were carried out to evaluate whether pre-treatment attitudes and beliefs predicted post-treatment caseness, clinically significant improvement, reliable improvement and reliable and clinically significant improvement. As in the hierarchical linear regression analyses, pre-treatment symptom scores were entered at step 1 and DAS-SF or AABS-18 data were entered at step 2.

Data were analysed using IBM Statistical Package for Social Sciences (SPSS) version 21.

Data screening.

Prior to statistical analysis data were examined for input errors, missing values, normality, and violations of assumptions of regression analyses. Little's Missing Completely at Random (MCAR) test (Little, 1988) was used to identify whether data were MCAR. Normality was investigated by examining z-scores for skewness and kurtosis. Data were considered to be normally distributed if z-scores were less than 2.58 ($p > .01$). Although normal distribution of variables is not a specified assumption for regression analyses, Tabachnick and Fidel (2007) recommend screening for normality.

Pearson's correlations between predictor variables were used to assess multicollinearity alongside variance inflation factors (VIF); correlations among predictor variables should be less than .90 (Tabachnick & Fidel, 2007) and the VIF should be less than 10 (Myers, 1990). Unless otherwise stated, it should be assumed that this and other main assumptions of regression analyses were not violated.

The internal consistency reliability of the DAS-SF and AABS-18 measures were also examined.

Results

Demographic information and descriptive statistics.

In Service 1, a total of 51 patients participated in the study. In Service 2, data from 90 patients were available. There were therefore 51 participants for whom DAS-SF data were available and 139 for whom AABS-18 data were available (two participants in Service 1 did not complete the AABS-18). Data were included from people who received high intensity CBT and had at least two time points for PHQ-9 and GAD-7 data. Demographic information from both samples is included in Table 1.

Due to timing restrictions in the completion of this project, not all participants in Service 1 had completed therapy when results were analysed; 23 (45% of those in Service 1) had not yet completed therapy. Completion of therapy was defined as ending of the course of individual high intensity CBT. Of those who had not completed therapy, treatment was ongoing and 65% had completed over 10 sessions. For those who had not completed therapy, PHQ-9 and GAD-7 data were collected from their most recent session for the Time 2 (post-treatment) assessment.

Table 1.
Demographic data for the two study samples

	Sample (DAS-SF)	Sample (AABS-18)
Variable	*n* = 51	*n* = 139
Age Mean (SD)	33.61 (11.01)	37.20 (13.55)
Gender %		
Female	73.55	68.35
Male	27.45	31.65
Ethnicity %		
White (British)	64.71	56.83
White (any other)	15.69	18.71

Mixed (White and Black Caribbean)	5.88	2.16
Black Caribbean	3.92	2.88
Black African	3.92	3.60
Mixed (any other)	1.96	2.16
Indian	0.00	1.44
Pakistani	0.00	1.44
Chinese	0.00	2.16
Other	1.96	3.60
Not stated	1.96	5.76
Primary diagnosis %		
Depressive episode	25.49	24.46
Generalised anxiety disorder	17.65	15.11
Social anxiety disorder	15.69	6.47
Recurrent depressive disorder	13.73	16.55
Obsessive compulsive disorder	7.84	2.88
Post-traumatic stress disorder	5.88	4.32
Panic disorder	3.92	4.32
Health anxiety	3.92	1.44
Agoraphobia	1.96	1.44
Mixed anxiety and depressive disorder	0.00	5.76
Mental disorder NOS	1.96	2.88
Hypochondriacal disorder	0.00	1.44
Not stated	1.96	13.67
Number of therapy sessions Mean (SD)	9 (4.38)	8 (5.62)

Note. SD = standard deviation.

Means and standard deviations for outcome measures for the two time points are presented in Table 2.

Table 2.
Means and standard deviations for the outcome measures

	DAS-SF sample (n = 51)		AABS-18 sample (n = 139)	
Outcome	Pre-treatment	Post-treatment	Pre-treatment	Post-treatment
DAS-SF Mean (SD)	23.96 (5.02)	-	-	-
AABS-2 Mean (SD)	-	-	49.52 (9.48)	-
PHQ-9 Mean (SD)	10.63 (5.84)	6.57 (5.52)	13.14 (6.11)	8.96 (6.50)
GAD-7 Mean (SD)	10.75 (4.49)	6.51 (4.84)	11.96 (5.16)	8.15 (5.71)
PHQ-9 Caseness %	50.98	19.61	67.63	38.13
GAD-7 Caseness %	76.47	31.37	78.42	43.88
PHQ-9 CSI %	-	61.54	-	45.74
GAD-7 CSI %	-	64.10	-	49.54
PHQ-9 RI %	-	29.41	-	33.09
GAD-7 RI %	-	66.67	-	53.96
PHQ-9 RCSI %	-	25.49	-	25.18
GAD-7 RCSI %	-	47.06	-	35.25

Note. SD = Standard Deviation; CSI = Clinically Significant Improvement; RI = Reliable Improvement; RCSI = Reliable and Clinically Significant Improvement.

Data screening.

Six participants missed a small number of items and there were no variables with 5% or more missing values. Using Little's MCAR test (Little, 1988), it was established that data were MCAR. Mean substitution was therefore used to impute missing values (Tabachnick & Fidel, 2007).

In the DAS-SF sample, Time 2 data for the PHQ-9 and GAD-7 were positively skewed (PHQ-9: $z = 3.58$, $p < .01$; GAD-7: $z = 3.43$, $p < .01$). Square root transformations

were carried out, which resulted in the data being normally distributed (PHQ-9: z = -0.36, p >.01; GAD-7: z = -0.62, p >.01). In the AABS-18 sample, Time 2 data for the PHQ-9 and GAD-7 were also positively skewed (PHQ-9: z = 3.57, p <.01; GAD-7: z = 3.49, p <.01). Square root transformations were carried out, which resulted in the data being normally distributed (PHQ-9: z = -1.12, p >.01; GAD-7: z = -1.14, p >.01).

The assumption of homoscedasticity was violated in the non-transformed samples, however transforming the data corrected for this assumption.

Questionnaire reliability.

Both the DAS-SF and AABS-18 were shown to have good internal consistency (α = .85 and α = .88, respectively). Individual data from each item of the PHQ-9 and GAD-7 were not available from Service 2, therefore internal consistency of the PHQ-9 and GAD-7 could not be established. However, these questionnaires are well validated in primary care populations and routinely used in IAPT services, as outlined above.

Correlations.

To provide an initial understanding of the relationship between DAS-SF, AABS-18, PHQ-9 and GAD-7 data and to assess multicollinearity, Pearson's correlations were conducted between each of these variables, see Table 3. To control for multiple testing and reduce the chance of a Type I error, a Bonferroni correction was applied and the criterion for significance was set at p = .003.

There were significant positive correlations between pre-treatment depression symptoms and pre-treatment anxiety related attitudes and beliefs (r(137) = .25, p = .003), post-treatment depression symptoms (r(137) = .55, p < .001), pre-treatment anxiety symptoms (r(137) = .68, p < .001) and post-treatment anxiety symptoms (r(137)

= .44, $p < .001$). There were significant positive correlations between pre-treatment anxiety symptoms and anxiety related attitudes and beliefs ($r(137) = .41$, $p < .001$), pre-treatment depression symptoms ($r(137) = .68$, $p < .001$), post treatment depression symptoms ($r(137) = .42$, $p < .001$) and post-treatment anxiety symptoms ($r(137) = .47$, $p < .001$).

Table 3.
Correlation matrix showing Pearson's r for DAS-SF, AABS-18, PHQ-9 and GAD-7 data.

Variable	DAS-SF	AABS-18	T1 PHQ-9	T2 PHQ-9	T1 GAD-7	T2 GAD-7
DAS	-					
AABS	.407**	-				
T1 PHQ-9	.154	.254**	-			
T2 PHQ-9	.049	.100	.547***	-		
T1 GAD-7	.307*	.410***	.681***	.420***	-	
T2 GAD-7	.159	.228**	.443***	.843***	.470***	-

Note. ***$p < .001$; **$p < .01$; *$p < .05$

Predicting symptom severity.

Depression related attitudes and beliefs

Anxiety symptoms.

At step 1, pre-treatment anxiety symptoms explained a significant amount of variance in post-treatment anxiety symptom severity ($F(1,49) = 7.10$, $p = .010$; $R^2 = .13$, adjusted $R^2 = .11$). At step 2, attitudes and beliefs did not contribute to a significant increase in variance in post-treatment anxiety symptoms ($p = .699$). In the final

equation, only pre-treatment anxiety symptom severity made a significant unique contribution to explaining post-treatment anxiety symptom severity ($t(48) = 2.40$, $p = .02$, $\beta = .34$), see Table 4.

Depression symptoms.

At step 1, pre-treatment depression symptoms explained a significant amount of variance in post-treatment depression symptom severity ($F(1,49) = 18.09$, $p < .001$; $R^2 = .27$, adjusted $R^2 = .26$). At step 2, attitudes and beliefs did not contribute to a significant increase in variance in post-treatment depression symptom severity ($p = .801$). In the final equation, only pre-treatment depression symptom severity made a significant unique contribution to explaining post-treatment symptom severity ($t(48) = 4.20$, $p < .001$, $\beta = .52$), see Table 4.

Anxiety related attitudes and beliefs

Anxiety symptoms.

At step 1, pre-treatment anxiety symptoms explained a significant amount of variance in post-treatment anxiety symptom severity ($F(1,137) = 38.57$, $p < .001$; $R^2 = .22$, adjusted $R^2 = .21$). At step 2, attitudes and beliefs did not contribute to a significant increase in variance in post-treatment anxiety symptoms ($p = .608$). In the final equation, only pre-treatment anxiety symptom severity made a significant unique contribution to explaining post-treatment symptom severity ($t(136) = 5.44$, $p < .001$, $\beta = .45$), see Table 4.

Depression symptoms.

At step 1, pre-treatment depression symptoms explained a significant amount of variance in post-treatment depression symptom severity ($F(1,137) = 58.04$, $p < .001$; $R^2 = .30$, adjusted $R^2 = .29$). At step 2, attitudes and beliefs did not contribute to a significant increase in variance in post-treatment depression symptoms ($p = .574$). In the final equation, only pre-treatment depression symptom severity made a significant unique contribution to explaining post-treatment symptom severity ($t(136) = 7.49$, $p < .001$, $\beta = .56$), see Table 4.

Table 4.

Summary of hierarchical regression analyses predicting post-treatment symptom severity

Variable	B (SE)	Standardised β	*t*	*p*	R^2 change
Predictor variable DAS-SF (*n* = 51)					
DV: post-treatment GAD-7 score					
Step 1					
Pre-treatment GAD-7	0.51 (0.19)	.36	2.67	.010*	.127
Step 2					
Pre-treatment GAD-7	0.48 (0.20)	.34	2.40	.021*	
Pre-treatment DAS-SF	0.01 (0.03)	.05	0.39	.699	.003
DV: post-treatment PHQ-9 score					
Step 1					
Pre-treatment PHQ-9	0.65 (0.15)	.52	4.25	.000***	.270
Step 2					
Pre-treatment PHQ-9	0.66 (0.16)	.52	4.20	.000***	
Pre-treatment DAS-SF	-0.01 (0.03)	-.03	-0.25	.801	.001
Predictor variable: AABS-18 (*n* = 139)					

Variable	B (SE)	Standardised β	*t*	*p*	R^2 change
DV: post-treatment GAD-7 score					
Step 1					
Pre-treatment GAD-7	0.62 (0.10)	.47	6.21	.000***	.220
Step 2					
Pre-treatment GAD-7	0.60 (0.11)	.45	5.44	.000***	
Pre-treatment AABS-18	0.01 (0.01)	.04	0.51	.608	.002
DV: post-treatment PHQ-9 score					
Step 1					
Pre-treatment PHQ-9	0.72 (0.09)	.55	7.62	.000***	.298
Step 2					
Pre-treatment PHQ-9	0.73 (0.10)	.56	7.49	.000***	
Pre-treatment AABS-18	-0.01 (0.01)	-.04	-0.56	.574	.002

Note. DV = dependent variable. ***$p < .001$; **$p < .01$; *$p < .05$

Predicting caseness.

Depression related attitudes and beliefs

Anxiety symptoms.

A test of the full model with both predictors against a constant-only model was statistically significant ($\chi^2(2) = 14.05$, $p = .001$), indicating that the predictors together reliably predicted caseness. This model correctly predicted caseness status in 78.4% of the cases. According to the Wald criterion, the only successful predictor was pre-treatment anxiety symptom severity ($\chi^2(1) = 9.43$, $p = .002$, Exp(B) = .72), where higher levels of pre-treatment symptom severity meant that participants were more likely to be in caseness at post-treatment. Attitudes and beliefs were not independently predictive of caseness ($p = .301$), see Table 5.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of depression related attitudes and beliefs, after controlling for pre-treatment anxiety symptom severity ($\chi2(1) = 1.11$, p = .292).

Depression symptoms.

A test of the full model with both predictors against a constant-only model was statistically significant ($\chi^2(2) = 22.38$, $p < .001$), indicating that the predictors together reliably predicted caseness. This model correctly classified caseness status in 86.3% of the cases. According to the Wald criterion, the only successful predictor was pre-treatment depression symptom severity ($\chi^2(1) = 9.92$, $p = .002$, Exp(B) = .67), where higher levels of pre-treatment symptom severity meant that participants were more

likely to be in caseness at post-treatment. Attitudes and beliefs were not independently predictive of caseness (p = .891), see Table 5.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of depression related attitudes and beliefs, after controlling for pre-treatment depression symptom severity ($\chi2(1) = .02$, p = .891).

Anxiety related attitudes and beliefs

Anxiety symptoms.

A test of the full model with both predictors against a constant-only model was statistically significant ($\chi^2(2) = 34.99$, $p < .001$), indicating that the predictors together reliably predicted caseness. This model correctly predicted caseness status in 71.9% of the cases. According to the Wald criterion, only pre-treatment anxiety symptom severity significantly predicted post-treatment caseness ($\chi^2(1) = 20.75$, $p < .000$, Exp(B) = .81), where higher levels of pre-treatment symptom severity meant that participants were more likely to be in caseness at post-treatment. Attitudes and beliefs did not add significant predictive power to the model (p = .256), see Table 5.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of anxiety related attitudes and beliefs, after controlling for pre-treatment anxiety symptom severity ($\chi2(1) = 1.30$, p = .255).

Depression symptoms.

A test of the full model with both predictors against a constant-only model was statistically significant ($\chi^2(2) = 46.90$, $p < .001$), indicating that the predictors together reliably predicted caseness. This model correctly classified caseness status in 76.3% of the cases. According to the Wald criterion, only pre-treatment depression symptom severity significantly predicted post-treatment caseness ($\chi^2(1) = 29.15$, $p < .001$, Exp(B) = .79), where higher levels of pre-treatment symptom severity meant that participants were more likely to be in caseness at post-treatment. Attitudes and beliefs were not independently predictive of caseness ($p = .552$), see Table 5.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of anxiety related attitudes and beliefs, after controlling for pre-treatment depression symptom severity ($\chi2(1) = .35$, $p = .552$).

Table 5.

Summary of logistic regression analyses predicting post-treatment caseness

Variable	B (SE)	Wald Chi-Square	*p*	Odds Ratio (ExpB)	95% CI for Odds Ratio	
					Lower	Upper
Predictor variable DAS-SF (*n* = 51)						
DV: post-treatment GAD-7 caseness						
Step 1						
Pre-treatment GAD-7	-0.28 (0.09)	9.51	.002**	0.76	0.63	0.90
Step 2						
Pre-treatment GAD-7	-0.33 (0.11)	9.43	.002**	0.72	0.59	0.89
Pre-treatment DAS-SF	0.08 (0.08)	1.07	.301	1.09	0.93	1.27
DV: post-treatment PHQ-9 caseness						
Step 1						
Pre-treatment PHQ-9	-0.41 (0.13)	9.83	.002**	0.67	0.52	0.86
Step 2						
Pre-treatment PHQ-9	-0.41 (0.13)	9.92	.002**	0.67	0.52	0.86
Pre-treatment DAS-SF	0.01 (0.09)	0.02	.891	1.01	0.84	1.22
Predictor variable: AABS-18 (*n* = 139)						

Variable	B (SE)	Wald Chi-Square	*p*	Odds Ratio (ExpB)	95% CI for Odds Ratio	
					Lower	Upper
DV: post-treatment GAD-7 caseness						
Step 1						
Pre-treatment GAD-7	-0.22 (0.04)	25.49	.000***	0.80	0.73	0.87
Step 2						
Pre-treatment GAD-7	-0.21 (0.05)	20.75	.000***	0.81	0.74	0.89
Pre-treatment AABS-18	-0.03 (0.02)	1.29	.256	0.98	0.93	1.02
DV: post-treatment PHQ-9 caseness						
Step 1						
Pre-treatment PHQ-9	-0.24 (0.04)	31.23	.000***	0.79	0.72	0.86
Step 2						
Pre-treatment PHQ-9	-0.24 (0.04)	29.15	.000***	0.79	0.73	0.86
Pre-treatment AABS-18	-0.01 (0.02)	0.35	.552	0.99	0.95	1.03

Note. DV = dependent variable, CI = confidence interval. ***p < .001; **p < .01; *p < .05

Predicting clinically significant improvement.

Depression related attitudes and beliefs

Anxiety symptoms.

A test of the full model with both predictors against a constant-only model was statistically significant ($\chi^2(2) = 12.04$, $p = .002$), indicating that the predictors together reliably predicted CSI. This model correctly predicted CSI status in 75.7% of the cases. The only successful predictor was pre-treatment anxiety symptom severity ($\chi^2(1) = 7.63$, $p = .006$, Exp(B) = 1.53), where higher levels of pre-treatment symptom severity meant that participants were less likely make a clinically significant improvement. Attitudes and beliefs were not independently predictive of CSI ($p = .258$), see Table 6.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of depression related attitudes and beliefs, after controlling for pre-treatment anxiety symptom severity ($\chi2(1) = 1.37$, p = .241).

Depression symptoms.

A test of the full model with both predictors against a constant-only model was statistically significant ($\chi^2(2) = 6.71$, $p = .035$), indicating that the predictors together reliably predicted CSI. This model correctly predicted CSI status in 72.0% of the cases. Only pre-treatment depression symptom severity significantly predicted CSI ($\chi^2(1) = 4.73$, $p = .030$, Exp(B) = 1.38), where higher levels of pre-treatment symptom severity meant that participants were less likely make a clinically significant improvement. Attitudes and beliefs were not independently predictive of CSI ($p = .843$), see Table 6.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of depression related attitudes and beliefs, after controlling for pre-treatment depression symptom severity ($\chi2(1) = .04$, p = .843).

Anxiety related attitudes and beliefs

Anxiety symptoms.

A test of the full model with both predictors against a constant-only model was statistically significant ($\chi^2(2) = 22.06$, $p < .001$), indicating that the predictors together reliably predicted CSI. This model correctly predicted CSI status in 71.6% of the cases. The only successful predictor was pre-treatment anxiety symptom severity ($\chi^2(1) = 15.34$, $p < .001$, Exp(B) = 1.28), where higher levels of pre-treatment symptom severity meant that participants were less likely make a clinically significant improvement. Attitudes and beliefs were not independently predictive of CSI ($p = .506$), see Table 6.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of anxiety related attitudes and beliefs, after controlling for pre-treatment anxiety symptom severity ($\chi2(1) = .44$, p = .506).

Depression symptoms.

A test of the full model with both predictors against a constant-only model was statistically significant ($\chi^2(2) = 10.99$, $p = .004$), indicating that the predictors together reliably predicted CSI. This model correctly predicted CSI status in 68.1% of the cases. Only pre-treatment depression symptom severity significantly predicted CSI ($\chi^2(1) =$

7.41, p = .007, Exp(B) = 1.17), where higher levels of pre-treatment symptom severity meant that participants were less likely make a clinically significant improvement. Attitudes and beliefs were not independently predictive of CSI (p = .257), see Table 6.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of anxiety related attitudes and beliefs, after controlling for pre-treatment depression symptom severity ($\chi 2(1) = 1.30$, p = .254).

Table 6.

Summary of logistic regression analyses predicting clinically significant improvement

Variable	B (SE)	Wald Chi-Square	p	Odds Ratio (ExpB)	95% CI for Odds Ratio	
					Lower	Upper
Predictor variable DAS (*n* = 51)						
DV: GAD-7 CSI						
Step 1						
Pre-treatment GAD-7	0.35 (0.13)	7.62	.006**	1.41	1.11	1.81
Step 2						
Pre-treatment GAD-7	0.43 (0.16)	7.63	.006**	1.53	1.13	2.08
Pre-treatment DAS	-0.11 (0.09)	1.28	.258	0.90	0.75	1.08
DV: PHQ-9 CSI						
Step 1						
Pre-treatment PHQ-9	0.32 (0.15)	4.70	.030*	1.38	1.03	1.84
Step 2						
Pre-treatment PHQ-9	0.32 (0.15)	4.73	.030*	1.38	1.03	1.84
Pre-treatment DAS	-0.02 (0.09)	0.04	.843	0.98	0.82	1.18
Predictor variable: AABS (*n* = 139)						

Variable	B (SE)	Wald Chi-Square	p	Odds Ratio (ExpB)	95% CI for Odds Ratio	
					Lower	Upper
DV: GAD-7 CSI						
Step 1						
Pre-treatment GAD-7	0.25 (0.06)	17.52	.000***	1.29	1.15	1.45
Step 2						
Pre-treatment GAD-7	0.24 (0.06)	15.34	.000***	1.28	1.13	1.44
Pre-treatment AABS	0.02 (0.02)	0.44	.506	1.02	0.97	1.06
DV: PHQ-9 CSI						
Step 1						
Pre-treatment PHQ-9	0.17 (0.06)	8.62	.003**	1.18	1.06	1.32
Step 2						
Pre-treatment PHQ-9	0.16 (0.06)	7.41	.007**	1.17	1.05	1.31
Pre-treatment AABS	0.03 (0.02)	1.28	.257	1.03	0.98	1.07

Note. DV = dependent variable, CI = confidence interval, CSI = clinically significant improvement. ***p < .001; **p < .01; *p < .05

Predicting reliable improvement.

Depression related attitudes and beliefs

Anxiety symptoms.

A test of the full model with both predictors against a constant-only model was not statistically significant ($\chi^2(2) = 4.40$, $p = .111$). This model correctly predicted RI status in 74.5% of the cases. Only pre-treatment anxiety symptom severity significantly predicted RI ($\chi^2(1) = 3.87$, $p = .049$, Exp(B) = .85), where higher levels of pre-treatment symptom severity meant that participants were less likely make a reliable improvement. Attitudes and beliefs were not independently predictive of RI ($p = .481$), see Table 7.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of depression related attitudes and beliefs, after controlling for pre-treatment anxiety symptom severity ($\chi2(1) = .50$, p = .478).

Depression symptoms.

A test of the full model with both predictors against a constant-only model was statistically significant ($\chi^2(2) = 10.26$, $p = .006$), indicating that the predictors together reliably predicted RI. This model correctly predicted RI status in only 66.7% of the cases. Only pre-treatment depression symptom severity significantly predicted RI ($\chi^2(1) = 7.77$, $p = .005$, Exp(B) = .84), where higher levels of pre-treatment symptom severity meant that participants were less likely make a reliable improvement. Attitudes and beliefs were not independently predictive of RI ($p = .605$), see Table 7.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of depression related attitudes and beliefs, after controlling for pre-treatment depression symptom severity ($\chi2(1) = .27$, p = .605).

Anxiety related attitudes and beliefs

Anxiety symptoms.

A test of the full model with both predictors against a constant-only model was statistically significant ($\chi^2(2) = 13.34$, $p = .001$), indicating that the predictors together reliably predicted RI. This model correctly predicted RI status in only 64.0% of the cases. Only pre-treatment anxiety symptom severity significantly predicted RI ($\chi^2(1) = 12.01$, $p = .001$, Exp(B) = .87), where higher levels of pre-treatment symptom severity meant that participants were less likely make a reliable improvement. Attitudes and beliefs were not independently predictive of RI ($p = .218$), see Table 7.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of anxiety related attitudes and beliefs, after controlling for pre-treatment anxiety symptom severity ($\chi2(1) = 1.56$, p = .212).

Depression symptoms.

A test of the full model with both predictors against a constant-only model was statistically significant ($\chi^2(2) = 22.62$, $p < .001$), indicating that the predictors together reliably predicted RI. This model correctly predicted RI status in only 66.2% of the cases. Only pre-treatment depression symptom severity significantly predicted RI ($\chi^2(1)$

= 18.33, $p < .001$, Exp(B) = .85), where higher levels of pre-treatment symptom severity meant that participants were less likely make a reliable improvement. Attitudes and beliefs were not independently predictive of RI ($p = .514$), see Table 7.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of anxiety related attitudes and beliefs, after controlling for pre-treatment depression symptom severity ($\chi^2(1) = .43$, p = .513).

Table 7.

Summary of logistic regression analyses predicting reliable improvement

Variable	B (SE)	Wald Chi-Square	*p*	Odds Ratio (ExpB)	95% CI for Odds Ratio	
					Lower	Upper
Predictor variable DAS-SF (*n* = 51)						
DV: GAD-7 RI						
Step 1						
Pre-treatment GAD-7	-0.14 (0.08)	3.42	.064	0.87	0.75	1.01
Step 2						
Pre-treatment GAD-7	-0.16 (0.08)	3.87	.049*	0.85	0.73	1.00
Pre-treatment DAS-SF	0.05 (0.07)	0.49	.481	1.05	0.92	1.20
DV: PHQ-9 RI						
Step 1						
Pre-treatment PHQ-9	-0.18 (0.06)	8.06	.005**	0.83	0.74	0.95
Step 2						
Pre-treatment PHQ-9	-0.18 (0.07)	7.77	.005**	0.84	0.74	0.95
Pre-treatment DAS-SF	-0.04 (0.07)	0.27	.605	0.96	0.84	1.11
Predictor variable: AABS-18 (*n* = 139)						

Variable	B (SE)	Wald Chi-Square	*p*	Odds Ratio (ExpB)	95% CI for Odds Ratio	
					Lower	Upper
DV: GAD-7 RI						
Step 1						
Pre-treatment GAD-7	-0.12 (0.04)	10.75	.001**	0.89	0.83	0.95
Step 2						
Pre-treatment GAD-7	-0.14 (0.04)	12.01	.001**	0.87	0.81	0.94
Pre-treatment AABS-18	0.03 (0.02)	1.51	.218	1.03	0.99	1.07
DV: PHQ-9 RI						
Step 1						
Pre-treatment PHQ-9	-0.15 (0.04)	18.31	.000***	0.86	0.80	0.92
Step 2						
Pre-treatment PHQ-9	-0.16 (0.04)	18.33	.000***	0.85	0.79	0.92
Pre-treatment AABS-18	0.01 (0.02)	0.43	.514	1.01	0.97	1.06

Note. DV = dependent variable, CI = confidence interval, RI = reliable improvement. ***p < .001; **p < .01; *p < .05

Predicting reliable and clinically significant improvement.

Depression related attitudes and beliefs

Anxiety symptoms.

A test of the full model with both predictors against a constant-only model was not statistically significant ($\chi^2(2) = .32$, $p = .851$). This model correctly predicted RCSI status in only 45.1% of the cases. Neither pre-treatment anxiety symptom severity significantly ($p = .590$) nor attitudes and beliefs ($p = .730$) were independently predictive of RCSI, see Table 8.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of depression related attitudes and beliefs, after controlling for pre-treatment anxiety symptom severity ($\chi2(1) = .12$, $p = .730$).

Depression symptoms.

A test of the full model with both predictors against a constant-only model was statistically significant ($\chi^2(2) = 8.43$, $p = .015$), indicating that the predictors together reliably predicted RCSI. This model correctly predicted RCSI status in 68.6% of the cases. Only pre-treatment depression symptom severity significantly predicted RCSI ($\chi^2(1) = 6.87$, $p = .009$, Exp(B) = .84), where higher levels of pre-treatment symptom severity meant that participants were less likely make a reliable and clinically significant improvement. Attitudes and beliefs were not independently predictive of RCSI ($p = .890$), see Table 8.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of depression related attitudes and beliefs, after controlling for pre-treatment depression symptom severity ($\chi2(1) = .02$, p = .890).

Anxiety related attitudes and beliefs

Anxiety symptoms.

A test of the full model with both predictors against a constant-only model was not statistically significant ($\chi^2(2) = 1.64$, $p = .440$). This model correctly predicted RCSI status in only 64.7% of the cases. Neither pre-treatment anxiety symptom severity significantly ($p = .218$) nor attitudes and beliefs ($p = .429$) were independently predictive of RCSI, see Table 8.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of anxiety related attitudes and beliefs, after controlling for anxiety symptom severity ($\chi2(1) = .63$, p = .428).

Depression symptoms.

A test of the full model with both predictors against a constant-only model was statistically significant ($\chi^2(2) = 9.77$, $p = .008$), indicating that the predictors together reliably predicted RCSI. This model correctly predicted RCSI status in 74.1% of the cases. Only pre-treatment depression symptom severity significantly predicted RCSI ($\chi^2(1) = 8.88$, $p = .003$, Exp(B) = .90), where higher levels of pre-treatment symptom severity meant that participants were less likely make a reliable and clinically

significant improvement. Attitudes and beliefs were not independently predictive of RCSI (p = .515), see Table 8.

Comparison of log-likelihood ratios to assess change in model fit from step 1 to step 2 indicated that there was no statistically significant improvement in model fit with the addition of the predictor of anxiety related attitudes and beliefs, after controlling for pre-treatment depression symptom severity ($\chi 2(1) = .43$, p = .515).

Table 8.

Summary of logistic regression analyses predicting reliable and clinically significant improvement

Variable	B (SE)	Wald Chi-Square	*p*	Odds Ratio (ExpB)	95% CI for Odds Ratio	
					Lower	Upper
Predictor variable DAS-SF (*n* = 51)						
DV: GAD-7 RCSI						
Step 1						
Pre-treatment GAD-7	-0.03 (0.06)	0.20	.653	0.97	0.86	1.10
Step 2						
Pre-treatment GAD-7	-0.04 (0.07)	0.29	.590	0.96	0.85	1.10
Pre-treatment DAS-SF	0.02 (0.06)	0.12	.730	1.02	0.91	1.15
DV: PHQ-9 RCSI						
Step 1						
Pre-treatment PHQ-9	-0.17 (0.07)	7.00	.008**	0.84	0.74	0.96
Step 2						
Pre-treatment PHQ-9	-0.17 (0.07)	6.87	.009**	0.84	0.74	0.96
Pre-treatment DAS-SF	-0.01 (0.07)	0.02	.890	0.99	0.86	1.14
Predictor variable: AABS-18 (*n* = 139)						

Variable	B (SE)	Wald Chi-Square	*p*	Odds Ratio (ExpB)	95% CI for Odds Ratio	
					Lower	Upper
DV: GAD-7 RCSI						
Step 1						
Pre-treatment GAD-7	-0.04 (0.04)	1.01	.316	0.97	0.90	1.03
Step 2						
Pre-treatment GAD-7	-0.05 (.04)	1.52	.218	0.95	0.89	1.03
Pre-treatment AABS-18	0.02 (0.02)	0.62	.429	1.02	0.98	1.06
DV: PHQ-9 RCSI						
Step 1						
Pre-treatment PHQ-9	-0.10 (0.04)	8.54	.003**	0.90	0.84	0.97
Step 2						
Pre-treatment PHQ-9	-0.11 (0.04)	8.88	.003**	0.90	0.84	0.96
Pre-treatment AABS-18	0.01 (0.02)	0.42	.515	1.10	0.97	1.06

Note. DV = dependent variable, CI = confidence interval, RCSI = reliable and clinically significant improvement. ***p < .001; **p < .01; *p < .05

Summary.

The hypotheses that both depression and anxiety related attitudes and beliefs would predict outcomes in CBT were not supported. Neither depression nor anxiety related attitudes and beliefs significantly predicted post-treatment symptom severity, caseness, clinically significant improvement, reliable improvement or reliable and clinically significant improvement.

Exploratory analyses: predicting symptom severity from DAS and AABS subscales.

Post-hoc exploratory analyses were completed to review whether specific attitudes and beliefs, as measured by the DAS-SF and AABS-18 subscales, predicted post-treatment symptom severity.

Correlations.

Correlations between the subscales of the DAS-SF and AABS-18 and PHQ-9 and GAD-7 data were reviewed, see Table 9. Due to the exploratory nature of these analysis, controls for multiple testing were not implemented to minimise the risk of Type II error.

There were significant positive correlations between pre-treatment depression symptom severity and risk avoidance ($r(137) = .27$, $p = .001$), evaluation sensitivity ($r(137) = .25$, $p = .003$), anxiety-based reasoning ($r(137= .20$, $p = .016$) and catastrophising ($r(137) = .32$, $p < .001$). There were also significant positive correlations between pre-treatment anxiety symptom severity and perfectionism ($r(49) = .31$, $p = .029$), body vigilance ($r(137) = .29$, $p = .001$), risk avoidance ($r(137) = .32$,

$p < .001$), anticipation ($r(137) = .26$, $p = .002$), evaluation sensitivity ($r(137) = .33$, $p < .001$), anxiety based reasoning ($r(137) = .29$, $p = .001$) and catastrophising ($r(137) = .39$, $p < .001$). A significant positive correlation was present between catastrophising and post-treatment depression symptom severity ($r(137) = .19$, $p = .025$). Significant positive correlations were also present between post-treatment anxiety symptom severity and body vigilance ($r(137) = .26$, $p = .002$), anxiety-based reasoning ($r(137) = .19$, $p = .025$), and catastrophising ($r(137) = .214$, $p = .011$).

Table 9.
Correlation matrix showing Pearson's r data for DAS-SF and AABS-18 subscales and PHQ-9 and GAD-7 scores

	Pre-treatment		Post-treatment	
Variable	PHQ-9	GAD-7	PHQ-9	GAD-7
DAS-SF				
Perfectionism	.151	.306*	.071	.109
Need for approval	.077	.270	.003	.177
AABS-18				
Body Vigilance	.131	.285***	.139	.262**
Thought manifestation	.155	.139	.061	.145
Risk Avoidance	.271***	.316***	.048	.148
Anticipation	.158	.264**	.001	.114
Evaluation sensitivity	.245**	.327***	.092	.126
Anxiety-based reasoning	.203*	.289***	.093	.189*
Catastrophising	.318***	.388***	.189*	.214*

Note. ***p < .001; **p < .01; *p < .05

Predicting post-treatment symptom severity.

Hierarchical linear regression analyses were carried out to examine the extent to which subscales of the DAS-SF and AABS-18 predicted post-treatment depression and anxiety symptom severity. Pre-treatment symptom scores were entered at step 1 and subscale data were entered at step 2. Due to the exploratory nature of this analysis, controls for multiple testing were not implemented to minimise the risk of Type II error.

Pre-treatment symptom severity significantly predicted post-treatment symptom severity for all subscales. No subscales of the DAS-SF or AABS-18 significantly predicted post-treatment depression or anxiety symptom severity. A trend towards significance was observed for the 'body vigilance' subscale of the AABS-18 when predicting post-treatment anxiety symptom severity. Pre-treatment anxiety symptoms explained a significant amount of variance in post-treatment anxiety symptom severity ($F(1,137) = 38.57$, $p < .001$; $R^2 = .22$, adjusted $R^2 = .21$). At step 2, AABS-18 body vigilance contributed an increase in variance explained from 22.0% to 23.7%, adjusted $R^2 = .23$, a change that showed a trend towards significance ($F(1,136) = 3.10$, $p = .081$).

Discussion

This study aimed to examine the predictive role of anxiety and depression related attitudes and beliefs in treatment outcomes in CBT for depressive and anxiety-related disorders in the context of routine clinical practice. It was hypothesised that pre-treatment attitudes and beliefs would significantly predict post-treatment outcomes, where greater levels of pre-treatment maladaptive beliefs would be associated with poorer outcomes. These hypotheses were not supported as results demonstrated that neither pre-treatment depression nor anxiety related attitudes and beliefs significantly predicted post-treatment outcomes.

Higher initial symptom severity significantly predicted post-treatment outcomes, where higher initial symptom severity predicted poorer treatment outcomes, except for RCSI in anxiety symptoms where pre-treatment symptom severity did not predict RSCI status. Previous studies have shown that higher initial symptom severity predicts poorer outcomes in CBT in depression (Carter et al., 2018; Vittengl et al., 2016), anxiety disorders as a group (Arch & Ayers, 2013), and specific anxiety disorders such as panic disorder (Dow et al., 2007a, 2007b), social anxiety disorder (Eskildsen et al., 2010) and OCD (Knopp et al., 2013; Kyrios et al., 2015).

Cognitive theory highlights an association between symptoms of mental health difficulties and cognitive variables, such as maladaptive attitudes and beliefs. This study therefore focused on the role of attitudes and beliefs in predicting treatment outcomes. The findings that anxiety and depression related attitudes and beliefs did not predict outcomes in CBT is in contrast to some of the existing research. For example, previous studies have demonstrated that lower levels of pre-treatment depression-related maladaptive attitudes and beliefs predict improved response to treatment

(Jacobs et al., 2009; Sotsky et al., 1991). However, in line with the current study, Fournier et al. (2009) did not find a relationship between cognitive dysfunction and cognitive therapy outcomes. However, Fournier et al. (2009) looked at cognitive dysfunction as a domain comprising of five cognitive variables, of which dysfunctional attitudes and beliefs was one. In the current study the sample size for the analysis examining depression-related attitudes and beliefs was small and did not reach the number required for sufficient statistical power, therefore it is possible that an effect was missed due to this.

Results from the analyses examining anxiety-related attitudes and beliefs are in line with some previous studies, however not others. As previously outlined, the existing literature examining the predictive role of attitudes and beliefs in treatment outcomes for anxiety disorders is mixed, with some studies highlighting that pre-treatment attitudes and beliefs do not significantly predict post-treatment outcomes (Knopp et al., 2013), others highlighting that they do (Dow et al., 2007b; Meuret et al., 2010) and others suggesting that particular beliefs may predict post-treatment symptom severity (Kyrios et al., 2015; Steketee et al., 2018).

This was the first study to use the anxiety attitudes and beliefs scale, which examines attitudes and beliefs across the anxiety disorders, in predicting treatment outcomes; other studies have examined beliefs related to specific disorders and a range of measures have been used to assess attitudes and beliefs. It is possible that this heterogeneity in measures used has contributed to the diversity in conclusions drawn about the predictive role pre-treatment attitudes and beliefs have in understanding differential responses to treatment.

Cognitive behavioural theories for anxiety disorders place differing emphases on the role of cognitions and behaviours in the development and maintenance of anxiety disorders and their role in symptom remission in psychological treatments (Powers et al., 2017). The results of the current study suggest that anxiety-related attitudes and beliefs do not predict outcomes of therapy, potentially indicating that this should not be used to guide treatment decisions at this stage and suggesting that people with more maladaptive attitudes and beliefs are no less likely to recover. It is possible that other factors, such as alternative cognitive variables or behavioural factors, might have a significant predictive role in treatment outcomes. However, due to methodological limitations of this study and that it was the first study using the AABS-18 to examine attitudes and beliefs as predictors of outcome it would be important to replicate these findings before further conclusions can be drawn.

In the current study, the hypotheses and primary analyses were related to the overall level of maladaptive attitudes and beliefs, measured by a total score representing the extent to which individuals held specific maladaptive attitudes and beliefs. However, it might be that specific, rather than overall level of maladaptive attitudes and beliefs are more predictive of treatment outcome and this information may have more clinical utility in personalising treatment. This has been found in a small number of studies, where it has been demonstrated that in depression perfectionism but not need for approval beliefs predict therapeutic outcomes (Blatt et al., 1995), and in OCD that pre-treatment perfectionism and intolerance of uncertainty beliefs (Kyrios et al., 2015), and responsibility/threat and importance/control of thoughts beliefs (Steketee et al., 2018) significantly predict therapeutic outcomes. In the current study this was examined in post-hoc exploratory analyses, however results were non-significant

suggesting that specific attitudes and beliefs, measured by the DAS-SF and AABS-18 subscales, did not predict post-treatment symptom severity. However, the sample examining depression-related attitudes and beliefs was small and underpowered, therefore it is possible that with a larger sample size an effect may be detected. The body vigilance, anxiety-based reasoning and catastrophising AABS-18 subscales were positively correlated with post-treatment GAD symptom severity, where higher levels of these attitudes and beliefs were associated with increased post-treatment symptom severity. These processes may therefore warrant further investigation, particularly as there were some methodological limitations to study, outlined further below.

There is increasing evidence for the utility of transdiagnostic and process-focused cognitive-behavioural treatments for mental health difficulties (Harvey, Watkins, Mansell, & Shafran, 2004; McManus, Shafran, & Cooper, 2010). It has been suggested that process-focused treatments are more able to focus on improving overall wellbeing as opposed to solely the remission of symptoms and that this approach fits with the trend towards personalised treatments (Hayes & Hofmann, 2017). Developing a more in-depth understanding of particular patterns of beliefs individuals hold and if and how this contributes to treatment outcomes could support more process-based treatments and is likely to become increasingly important in personalised medicine (Hofmann & Hayes, in press).

In cognitive therapy the focus is on identifying and modifying maladaptive cognitions including negative automatic thoughts, attitudes and beliefs (Hawton, Salkovskis, Kirk, & Clark, 1989), therefore it is possible that *change* in beliefs might be more important in predicting treatment outcomes than pre-treatment belief level. For example, Kyrios et al. (2015) found that initial OCD-related beliefs did not predict

recovery status but demonstrated that changes in OCD-related beliefs over treatment were significantly correlated with change in symptom severity. Furthermore, Lorenzo-Luaces et al. (2015) suggest in a recent review that empirical research indicates that cognitive change over therapy contributes to symptom change in cognitive therapy for depression. It may therefore be important for future research to examine change in beliefs over the course of treatment and the contribution this has to treatment outcomes. However, this taps into mediators of therapeutic change, rather than factors that can be used to predict outcomes, inform formulations and treatment assignment, for example.

Participants in the current sample had a range of diagnoses and therefore symptom presentations, see Table 1. It is therefore possible that the measures used to examine outcomes did not capture the specific symptoms an individual presented with and were therefore not representative of treatment outcomes or processes that changed during therapy. This may have contributed to the lack of predictive value of attitudes and beliefs in treatment outcomes as the outcomes that changed may not have been accurately measured.

Limitations.

One of the primary limitations of this study was sample size in the sample examining depression-related attitudes and beliefs. Data from 51 participants was collected for these analyses, however the power calculation indicated that 117 participants would be required. These analyses were therefore not sufficiently powered to detect an effect, increasing the probability that a Type II error occurred and an effect was missed.

During recruitment the research questionnaires were not given to everyone eligible to participate. This increased the risk of sampling bias meaning that the sample may not have been representative of the target population. Over the previous year, the percentage of females having an assessment or receiving therapy within Service 1 was 65%, which is in contrast to the 74% who participated in this study, Table 1. Furthermore, the population of white British clients in Service 1 who participated in this study was 65%, whereas this figure was 35% for the whole service, indicating that the sample in this study was not representative of the service. Demographic data for the service was not available for Service 2.

Due to the time scale in needing to complete data collection for this project, all participants had not completed therapy and PHQ-9 and GAD-7 data were collected from their latest, rather than final, therapy session. It is possible this led to a bias in results; for example, participants may have shown a greater improvement in outcomes had they completed therapy.

Although the GAD-7 questionnaire is reported to be a valid and reliable screening tool for various anxiety disorders (Kroenke et al., 2007), it specifically measures symptoms of GAD. The diagnoses in the current sample were diverse (see Table 1), therefore it is possible that the GAD-7 questionnaire did not accurately represent anxiety symptoms individuals presented with. Using data from disorder specific outcome measures may therefore have been preferable, however these are not regularly collected in services.

Recommendations for future research.

This study reviewed outcomes related to depression and anxiety symptom severity. Looking at treatment outcomes related to disorder specific measures could be important to ensure that the outcomes being measured are those that are being treated in therapy. However, Powers et al. (2017) suggest that the focus on reducing symptoms as a primary outcome in CBT is shifting to a focus on looking at functional outcomes or changes in values-guided behaviour as therapeutic outcomes, regardless of symptom severity. Future research could therefore review outcomes that are less symptom focused and are more focused on functional outcomes such as quality of life or wellbeing, or those related to values-guided or goal-directed behaviour. Future research could also focus on specific attitudes and beliefs, rather than overall level of maladaptive attitudes and beliefs.

In consultation with a service user group, it was suggested that future research could take a qualitative focus to form a data driven approach to examining which factors participants understand to be most important in predicting therapeutic outcomes. An interview schedule such as the Elliot change interview (Elliott, 1999) could be used for this purpose.

A further method of understanding predictors of therapeutic outcome could be to relate pre-treatment attitudes and beliefs to different trajectories of change over therapy such as sudden gains, early response, late response, gradual improvement and gradual decline.

Due to challenges with data collection it was not possible to give participants the DAS-SF and AABS-18 at time points beyond the assessment session in the current

study. It was therefore not possible to look at change in attitudes and beliefs over the course of therapy and whether this change predicts therapeutic outcomes. As previously outlined, change in attitudes and beliefs may have more influence on treatment outcomes than pre-treatment symptom levels, and potentially increased clinical utility in understanding the importance of modifying attitudes and beliefs during therapy.

This study only reviewed clinically significant, reliable, and reliable and clinically significant improvement. There is increasing evidence for possible negative effects of psychological therapy (Crawford et al., 2016), therefore in future research it may also be important to examine the impact of predictors of outcome on deterioration in therapy.

Conclusion.

This study examined the role of pre-treatment attitudes and beliefs in predicting outcomes following CBT. It was shown that pre-treatment symptom severity significantly predicted treatment outcomes, but attitudes and beliefs did not. This is a complex area with potential predictors falling into various categories including demographic, symptom/disorder, cognitive, motivational, biological or social and outcomes are likely to depend on a combination of these factors. Currently, the treatment outcome prediction literature presents mixed findings about factors that predict outcomes in therapy. There is an ongoing need to develop understanding of factors that identify people at risk of poorer therapeutic outcomes to be able to support personalising treatment, appropriate treatment assignment, formulation and the development of therapies with increased efficacy. It will be important for future research to consider the existing literature base to address current methodological

limitations and refine the factors that contribute to improved or poorer treatment outcomes.

Integration, Impact and Dissemination

Integration

The overall aim of this project was to develop an understanding of and review potential predictors of outcome and mechanisms of change in cognitive behavioural therapies for depression and anxiety disorders.

There are a number of cognitive-behavioural theories and models to understand different psychiatric disorders (e.g., Beck, 1963, 1964; Clark, 1996; Clark & Wells, 1995; Ehlers & Clark, 2000; Salkovskis, 1996). These have informed our understanding of the onset and maintenance of these disorders and an established body of empirical research supports these theoretical frameworks. Cognitive-behavioural theories and models have led to the development of a range of treatments for various psychiatric diagnoses, which have well-established empirical support for their efficacy (Carpenter et al., 2018; Hofmann, Asnaani, Vonk, Sawyer, & Fang, 2012). However, factors that predict response to therapy, particularly theorised processes such as cognitive variables, and potential mechanisms through which interventions work have received relatively less attention in the literature to date (Holmes et al., 2018). Research into this area aims to develop our understanding of the reasons why treatment is more effective for some but not others, the processes that change during therapy and how change in these processes contributes to different outcomes. This has the potential to guide individual formulation, enhance personalised medicine to improve precision in matching treatments to individuals, inform pathways within clinical services and allocation of resources, and inform treatment development to directly target the processes responsible for change, which could enhance the efficacy and efficiency of treatments (Holmes et al., 2018).

Research into personalised medicine, factors that predict treatment outcomes, and mechanisms of psychological treatments has been gaining increased attention over recent years. For example, a recent commission by the Lancet Psychiatry made ten recommendations for priorities in advancing psychological treatment research, of which understanding how existing treatments work, the mechanisms of psychological treatments, "who should be treated, for what and with what", and personalised treatment approaches formed two of the recommendations (Holmes et al., 2018). In addition, the mental health research charity 'MQ' have highlighted research priorities in understanding predictors of treatment outcome, personalised medicine and understanding how psychological treatments work, and this area of research forms a part of their key research programmes (MQ, 2018).

This project aimed to contribute to this growing field of research and take a specific focus on cognitive-behavioural therapies.

There are several categories potential mechanisms of therapy might fall into including psychological, therapeutic, biological and neuropsychological, therapist, demographic, disorder specific and social factors. To establish a focus for the systematic review, it was decided that this would concentrate on psychological mechanisms. Kazdin (2007) highlighted that a first step in understanding mechanisms of psychological treatments is to identify mediators. With this in mind, the systematic review focused on psychological mediators in cognitive behavioural therapies. Since there have been recent reviews in this area for depression (Lemmens, Müller, Arntz, & Huibers, 2016; Lorenzo-Luaces, German, & DeRubeis, 2015) it was determined that the review should focus on an anxiety disorder, and generalised anxiety disorder (GAD) was selected. This was designed to tie in with the empirical study, which was taking

place in an Improving Access to Psychological Therapies (IAPT) service and reviewing GAD and depression symptoms as the primary outcomes. In addition, there were no published systematic reviews on mediators of outcome in cognitive-behavioural therapies for GAD.

The empirical study examined predictors of outcome in cognitive behavioural therapy (CBT) for depression and anxiety disorders, so in this sense had a broader remit than the systematic review through including a range of diagnoses. However, the empirical study narrowed the mechanism category further to focus on cognitive factors (specifically attitudes and beliefs), rather than taking a broader focus on psychological factors, as in the systematic review.

It was initially planned that the empirical study would examine cognitive mediators in CBT for depressive and anxiety disorders, rather than cognitive predictors of outcome, therefore both the empirical study and systematic review would have focused on mediators of change over the course of therapy. This was planned to have the benefit of the empirical study following from the systematic review both conceptually and methodologically. The systematic review highlighted three key methodological limitations to previous studies; that the temporal relationship between mediator and outcome variables was not examined in the majority of studies, that studies did not experimentally manipulate the proposed mediator, and studies were not adequately powered. It was hoped that the empirical study would be able to address two of these limitations through examining the temporal relationship between mediator and outcome variables and through having a sufficient sample size by collecting data from routine clinical practice in an IAPT service.

It was planned and agreed with the recruitment site that the measures of attitudes and beliefs, the Dysfunctional Attitudes Scale-Short Form (DAS-SF) and Anxiety Attitudes and Beliefs Scale-18 (AABS-18) would be introduced into the service as routinely collected outcome measures, alongside those already collected in IAPT services. This meant that they would be given to all people attending the service for assessment and therapy at every second session. This would address the methodological limitations of previous studies, where the temporal relationship between mediator and outcome variables has not been examined, through collecting mediator and outcome variable data at multiple time points throughout therapy (Kazdin, 2007). The service in which recruitment was taking place saw a total of 2,873 people for therapy in the 2015-2016 year and the required sample size for this study was 200, therefore it was agreed that this would be an achievable target given that the questionnaires were planned to be given routinely to all those attending the service for assessment and therapy.

However, recruitment was one of the most significant challenges in carrying out this project, the specifics of which are discussed further below. Due to the recruitment challenges, this made it necessary to modify the design of the study as what had previously been understood to be realistic goals were deemed to no longer be achievable. It was observed that it was no longer possible for the service to give questionnaires to clients during therapy and that we could not reach the recruitment target in the time available. The design was therefore changed to examine the predictive role of attitudes and beliefs in CBT outcomes, rather than examining their mediational role over the course of treatment. Following a literature search it was established that predictors of therapeutic outcome examined in the literature had predominantly focused on factors such as symptom specific or demographic variables, with less research on

processes outlined in cognitive-behavioural models (Crits-Christoph, Connolly Gibbons, & Mukherjee, 2013; Knopp, Knowles, Bee, Lovell, & Bower, 2013). There were some studies in the depression literature, but fewer in the anxiety literature, often with mixed findings.

The consequence of this modification in design was that the whole project did not focus on mediators of change and the methodological limitations outlined in the systematic review could not be addressed in the empirical study. However, the empirical article was able to examine attitudes and beliefs as predictors of therapeutic outcome which aimed to contribute to the growing evidence base around personalised medicine. This had not yet been examined in a pragmatic context of routine clinical practice in the UK. It also enabled key learning around why the methodological limitations of previous studies are as they are and possible ways in which to address these limitations.

Recruitment.

As previously outlined, during recruitment it became clear that the recruitment target was not going to be reached in the time available. It was initially determined with the service manager and clinical lead that it would be possible for therapists to give the research questionnaires to clients, alongside routinely collected IAPT measures. I spent one day a week in the service to attend the team meeting, answer questions about the study and support the team in giving out questionnaires. Due to confidentiality limitations I was unable to identify clients attending for an assessment but was able to support this administratively and to speak to and remind clinicians. Following feedback from therapists and reviewing recruitment figures it became clear that it was not possible for therapists to continue giving out the questionnaires routinely. Alongside

the clinical lead, service manager and admin manager it was decided that questionnaires and an information sheet would be sent to clients with their initial appointment letter. Therapists would therefore only be required to collect the pre-completed questionnaires from clients, go through the information sheet and obtain consent. If clients consented to their data being shared for research purposes the questionnaires would be handed to the research team, otherwise they would be used clinically and in routine outcome monitoring for the service. However, only a limited number of questionnaires were returned through this process.

Alongside therapists, the service manager, clinical lead, admin manager and a service user involvement group it was determined that an appropriate method of distributing questionnaires would be for the administration team the give questionnaires to clients attending for an assessment when they arrived for their appointment. Clients would complete the questionnaires in the waiting room then return them to therapists in their session. At this point, therapists would go through an information sheet and ask for consent to share data for research purposes.

Ideally, I would have identified clients attending for an assessment appointment and prepared a list for reception staff and questionnaires for each client to support the administrative process, however this was not permitted under ethical approval. In consultation with a service user involvement group, two people stated that it would not be acceptable to them for the research team to access data prior to consent, one person stated this would be acceptable to them and two were more ambivalent, although were inclined to think this would be acceptable given the specific circumstances under which this would occur. Accessing data prior to consent required an additional application to the Confidentiality Advisory Group (CAG). This application was completed however

was not processed in sufficient time for data collection for this study. For future research it would be beneficial for this application to be submitted at the time of ethical approval.

Due to the increased burden on the administrative team by giving out questionnaires at assessment it was agreed that this would be completed for a limited period of one-month. There were approximately 30 high intensity assessments completed per week, however questionnaires were not given to all clients due to various factors, including changes in reception staff during the day and the reception area becoming busy. During this period feedback was given to therapists regarding the patterns of attitudes and beliefs clients presented with. This was given to therapists in graph format with a written summary to explain the pattern of results and scores on different DAS-SF and AABS-18 subscales to inform their formulations. The aim was to ensure the questionnaires were clinically useful for therapists and clients.

Ethical amendments were made, submitted and approved by the NHS Research Ethics Committee, Health Research Authority and Research and Development to reflect these changes.

Reflections.

Although recruitment was a challenge and led to the need to change the design and hypotheses of the empirical study, I learnt a considerable amount from this process, particularly in understanding the application of research in clinical practice. The service manager and clinical lead were on board with the project from the beginning and agreed to the research questionnaires being integrated into routine outcome monitoring. However, it was difficult to translate this into day-to-day practice, as previously outlined. Close consultation with therapists, the administration team and the service

user group were helpful and for future studies it would be important to involve these groups in the initial set-up and design, rather than at the point of implementation or later.

Even where therapists and administrative staff were interested in and willing to support the study this often did not lead to enhanced data collection. IAPT therapists are facing increasing pressures with high caseloads (Steel, Macdonald, Schröder, & Mellor-Clark, 2015; Westwood, Morison, Allt, & Holmes, 2017) therefore it is difficult for staff to have the capacity to include additional work into their practice. Finding ways to reduce the burden on therapists was crucial, alongside making the research relevant to their clinical practice and being present in the service to support and remind the team.

In speaking to a clinician within the team, they suggested that therapists might be concerned about scrutiny of their work and recovery rates. Individual therapist recovery rates are tracked in the service, however giving questionnaires to a researcher might have presented a barrier. It was emphasised that data were anonymised and participants were not matched with therapists in data analysis, however in future research it would be important to emphasise this from the outset.

Impact

Service level.

The main impact at a service level has been in relation to the implementation of research into clinical practice and supporting ongoing research in the service. Despite the recruitment challenges and problems encountered, different solutions were generated and tested which allowed the data collection process to be refined and an understanding of what works best within this service to be developed.

A research group of therapists is in the process of being established within the service. This aims to enable therapists with an interest in research to be more actively involved, including in the design and implementation of studies and possible authorship on publications. The impact of this is in relation to professional development of therapists and supporting their interests, supporting ongoing research within the service and in developing partnerships between clinical services and research institutions. It is suggested that treatments developed in research trials may not translate into routine clinical practice and that there are often greater variations in outcomes from routine practice than in research trials (Lambert, Hansen, & Harmon, 2010; Richards & Borglin, 2011). Therefore, conducting research within clinical services may have the advantage of developing a more depth understanding of treatment and recovery rates in clinical practice but also support services to refine their practice. In the initial stages of the development of this project the clinical lead highlighted that the service was looking to improve their recovery rates and had hoped that active research in the service would support this aim.

Through attending some service user group meetings, a research item has been introduced onto the agenda for these meetings. In the meetings I attended I found the service user group to be willing to talk about research and a number of ideas for future studies and their implementation were generated and discussed. Various potential benefits have been identified in conducting research alongside service users including both personal, such as enhancement of knowledge and experience, and service level benefits, such a broadening the service perspective and making services more responsive to user needs (Minogue, Boness, Brown, & Girdlestone, 2005; Omeni, Barnes, MacDonald, Crawford, & Rose, 2014). Furthermore, recent recommendations

for the advancement of psychological treatments research emphasise that patient and public involvement has significant potential to improve this research (Holmes et al., 2018).

In this study feedback was given to therapists about the pattern of attitudes and beliefs their clients presented with. This aimed to increase the clinical utility of these questionnaires and support clinicians in formulation and treatment planning. Feedback was received from therapists that this had been a helpful process. In addition, an email was received by the supervisor of this project from a therapist asking for advice about the results of the DAS-SF and AABS-18 and how this could inform the treatment for a client they were feeling stuck with. The introduction of these questionnaires into the service therefore had a direct impact on the day-to-day clinical practice of therapists within the service.

Two clinical psychology trainees at Royal Holloway University of London are extending this project over the coming year. It is therefore planned that they will support the further development of these changes within the service, which I hope will also support them in their research.

Clinical implications.

The systematic review highlighted that change in intolerance of uncertainty, change in worry and change in somatic anxiety mediate outcomes in CBT for GAD, suggesting it is important to consider and work to modify these processes in therapy. This may influence how therapy is delivered, however, it is likely that other mediators also play a role in treatment outcomes therefore these processes should be assessed in line with individual case formulation and not focused on exclusively.

The empirical article found that pre-treatment attitudes and beliefs did not significantly predict outcomes in CBT. This indicates that level of maladaptive beliefs should not be used to guide treatment decisions at this stage and suggests that people with more maladaptive attitudes and beliefs are no less likely to recover. However, given the methodological limitations of this study, for example the size of the sample examining depression-related attitudes and beliefs, and that it was the first study using the AABS-18 to examine the predictive role of attitudes and beliefs in treatment outcomes, it would be premature to draw conclusions that directly influence clinical practice. It is possible that this study indicated that some theorised processes, attitudes and beliefs in this case, measured at pre-treatment do not directly predict therapeutic outcomes, however more research is required to establish whether this is the case. This research therefore provided a starting point for understanding predictive roles of attitudes and beliefs in treatment outcomes.

Understanding predictors of outcome and mechanisms underlying therapeutic change involves monitoring processes and outcomes beyond symptom severity. Currently, routine outcome monitoring in services is typically focused on symptom severity, however to enhance understanding of predictors, moderators and mediators of treatment outcomes and to utilise evidence around personalised medicine and treatment matching it is likely to be important for services to include additional measures in routine practice. This might include measures assessing theorised processes important for change in therapy, such as intolerance of uncertainty. This research took place in the pragmatic context of an IAPT service and introduced the possibility of including additional measures within routine data collection, initiating the application of evidence into clinical practice.

On a personal level, this research has drawn my attention to the importance of understanding what predicts treatment outcomes, the processes responsible for change in therapy and how the current literature can inform clinical practice. I've understood more of the range of factors that can influence differential treatment outcomes which has led me to develop my stance in realising the importance of idiosyncratic formulations and understanding factors contributing to treatment outcomes, so I can hold these in mind and address these during therapy. This has led to some changes in my clinical practice and I have noticed changes in the way I formulate with clients, monitor outcomes during therapy, reformulate and deliver therapy. I have developed a further interest in process-based therapy and how this can be informed by personalised medicine approaches and look forward to further developments in the evidence-base in this field.

Future research.

The systematic review summarised the literature evaluating psychological mediators of change in cognitive-behavioural therapies for GAD and made recommendations for future research. It is planned that this review will be submitted for publication which, if accepted, would increase the dissemination and possible impact of these findings. It is hoped that the recommendations made in this review will inform the design and areas of focus of future research. The systematic review supported findings from other reviews of mechanisms of change in cognitive behavioural therapies that key methodological limitations of current studies are in examining the temporal relationship between variables, sample size, and experimentally manipulating the proposed mediator (Lemmens et al., 2016; Lorenzo-Luaces et al., 2015). With different reviews agreeing on and highlighting these

limitations this may influence the direction of future research to address these limitations.

There are criticisms in the literature that findings from larger clinical trials have limited applicability in routine clinical practice, often due to strict inclusion criteria limiting ecological validity (McMain, Newman, Segal, & DeRubeis, 2015). In addition, the Medical Research Council highlight that the element of the research-practice cycle that is least well performed is the implementation stage (Medical Research Council, 2000, 2008). Further impact this thesis may have is in informing future research in pragmatic contexts and implementation of the evidence base into clinical practice. The learning points from this project have been discussed with clinical psychology trainees continuing and expanding this project over the coming year, the project supervisor, and were discussed with the service during the running of this project. Future meetings will also be held with the service user and the therapist research groups to further develop the partnership between the clinical service and research team. It is hoped that these learning points will influence future research within the pragmatic context of routine clinical practice, particularly around the practical and logistical applications.

Addition reflections.

This project has also led me to reflect on the role of clinical psychologists as clinicians and researchers and has informed my understanding of the importance of and opportunities for research in clinical practice. Throughout clinical psychology training and in carrying out this research project I've observed and practiced the potential dual role of a clinical psychologist both as a clinician and researcher implementing evidence-based practice, generating practice-based evidence and carrying out more formal research. There are often several perceived barriers to research within clinical roles, one

I have encountered in my clinical roles being applying for NHS research ethics approval, and others being some of the barriers to carrying out research that were encountered in this study. This research has given me confidence and knowledge to understand and navigate the processes in clinically applied research, which I hope will influence my future career, particularly in relation to service development.

Dissemination

It is planned that the systematic review will be submitted for publication. It is also hoped that the empirical article will be submitted for publication, however it is likely that this will focus on outcomes for anxiety-related attitudes and beliefs as the analyses for depression-related attitudes and beliefs were underpowered. A potential journal that the systematic review and empirical article might be suitable for publication in is *Behaviour Research and Therapy.*

I plan to attend the service in which data was collected to feedback and present the results to the team and discuss them further with the service user involvement group. Results were also presented at the Royal Holloway University of London research day.

References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington: American Psychiatric Association.

Arch, J. J., & Ayers, C. R. (2013). Which treatment worked better for whom? Moderators of group cognitive behavioral therapy versus adapted mindfulness based stress reduction for anxiety disorders. *Behav Res Ther, 51*(8), 434-442. doi:10.1016/j.brat.2013.04.004

Arch, J. J., & Craske, M. G. (2008). Acceptance and commitment therapy and cognitive behavioral therapy for anxiety disorders: Different treatments, similar mechanisms? *Clinical Psychology: Science and Practice, 15*(4), 263-279.

Arntz, A. (2003). Cognitive therapy versus applied relaxation as treatment of generalized anxiety disorder. *Behav Res Ther, 41*(6), 633-646.

Barlow, D. H. (2002). *Anxiety and its disorders: The nature and treatment of anxiety and panic* (2nd ed.). New York: The Guilford Press.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology, 51*(6), 1173.

Bauer, D. J., Preacher, K. J., & Gil, K. M. (2006). Conceptualizing and testing random indirect effects and moderated mediation in multilevel models: new procedures and recommendations. *Psychological methods, 11*(2), 142.

Beard, C., & Bjorgvinsson, T. (2014). Beyond generalized anxiety disorder: Psychometric properties of the GAD-7 in a heterogeneous psychiatric sample. *Journal of Anxiety Disorders, 28*(6), 547-552. doi:10.1016/j.janxdis.2014.06.002

Beck, A. T. (1963). Thinking and depression: I. Idiosyncratic content and cognitive distortions. *Archives of general psychiatry, 9*(4), 324-333.

Beck, A. T. (1964). Thinking and depression: II. Theory and therapy. *Archives of general psychiatry, 10*(6), 561-571.

Beck, A. T., Rush, A. J., Shaw, B. F., & Emery, G. (1979). *Cognitive Therapy of Depression*. New York: Guilford Press.

Beesdo-Baum, K., Jenjahn, E., Hofler, M., Lueken, U., Becker, E. S., & Hoyer, J. (2012). Avoidance, safety behavior, and reassurance seeking in generalized anxiety disorder. *Depress Anxiety, 29*(11), 948-957. doi:10.1002/da.21955

Beevers, C. G., Strong, D. R., Meyer, B., Pilkonis, P. A., & Miller, I. W. (2007). Efficiently assessing negative cognition in depression: an item response theory analysis of the Dysfunctional Attitude Scale. *Psychological assessment, 19*(2), 199.

Behar, E., DiMarco, I. D., Hekler, E. B., Mohlman, J., & Staples, A. M. (2009). Current theoretical models of generalized anxiety disorder (GAD): conceptual review and treatment implications. *J Anxiety Disord, 23*(8), 1011-1023. doi:10.1016/j.janxdis.2009.07.006

Bisson, J. I., Roberts, N. P., Andrew, M., Cooper, R., & Lewis, C. (2013). Psychological therapies for chronic post-traumatic stress disorder (PTSD) in adults. *Cochrane Database Syst Rev*(12), Cd003388. doi:10.1002/14651858.CD003388.pub4

Blatt, S. J., Quinlan, D. M., Pilkonis, P. A., & Shea, M. T. (1995). Impact of perfectionism and need for approval on the brief treatment of depression: the National Institute of Mental Health Treatment of Depression Collaborative Research Program revisited. *J Consult Clin Psychol, 63*(1), 125-132.

Boden, M. T., John, O. P., Goldin, P. R., Werner, K., Heimberg, R. G., & Gross, J. J. (2012). The Role of Maladaptive Beliefs in Cognitive Behavioral Therapy: Evidence from Social Anxiety Disorder. *Behav Res Ther, 50*(5), 287-291. doi:10.1016/j.brat.2012.02.007

Bomyea, J., Ramsawh, H., Ball, T. M., Taylor, C. T., Paulus, M. P., Lang, A. J., & Stein, M. B. (2015). Intolerance of uncertainty as a mediator of reductions in worry in a cognitive behavioral treatment program for generalized anxiety disorder. *J Anxiety Disord, 33*, 90-94. doi:10.1016/j.janxdis.2015.05.004

Borkovec, T. D. (1994). The nature, functions, and origins of worry. In G. C. Davey & F. Tallis (Eds.), *Worrying: perspectives on theory assessment and treatment* (pp. 5-33). Sussex, UK: Wiley & Sons.

Borkovec, T. D., Alcaine, O. M., & Behar, E. (2004). Avoidance Theory of Worry and Generalized Anxiety Disorder. In R. G. Heimberg, C. L. Turk, & D. S. Mennin (Eds.), *Generalized anxiety disorder: Advances in research and practice* (Vol. 2004). New York: The Guilford Press.

Borkovec, T. D., Ray, W. J., & Stober, J. (1998). Worry: A cognitive phenomenon intimately linked to affective, physiological, and interpersonal behavioral processes. *Cognitive Therapy and Research, 22*, 561-576.

Box, G. E. P., & Jenkins, G. M. (1970). *Time series analysis, forecasting and control*. San Francisco: Holden-Day.

Brown, G. P., Hawkes, N., Cooper, A., Jonsdottir, S., & Tata, P. (2015). The Anxiety Attitude and Belief Scale-2: Development, Measurement Model, and Initial Validity. *Clinical Psychology & Psychotherapy, 22*(6), 687-697.

Brown, T. A., DiNardo, P. A., & Barlow, D. H. (1994). *Anxiety Disorders Interview Schedule for DSM-IV*. New York: Oxford University Press.

Butler, A. C., Chapman, J. E., Forman, E. M., & Beck, A. T. (2006). The empirical status of cognitive-behavioral therapy: a review of meta-analyses. *Clinical psychology review, 26*(1), 17-31.

Cameron, I. M., Crawford, J. R., Lawton, K., & Reid, I. C. (2008). Psychometric comparison of PHQ-9 and HADS for measuring depression severity in primary care. *Br J Gen Pract, 58*(546), 32-36.

Carpenter, J. K., Andrews, L., Witcraft, S. M., Powers, M. B., Smits, J. A. J., & Hofmann, S. G. (2018). Cognitive behavioral therapy for anxiety and related disorders: A meta-analysis of randomized placebo-controlled trials. *Depress Anxiety*, 1-13.

Carter, J. D., McIntosh, V. V., Jordan, J., Porter, R. J., Douglas, K., Frampton, C. M., & Joyce, P. R. (2018). Patient predictors of response to cognitive behaviour therapy and schema therapy for depression. *Australian & New Zealand Journal of Psychiatry, 00*(0), 1-11.

Chaw, Y., Oei, T., & Lai, W. (2014). Psychometric properties of the Anxiety Attitude and Belief Questionnaire in an Asian community group. *Austin Journal of Psychiatry and Behavioral Science, 1*(4), 1-7.

Clark, D. A., & Beck, A. T. (2010). *Cognitive therapy of anxiety disorders: Science and practice*. New York: Guilford Press.

Clark, D. M. (1986). A cognitive approach to panic. *Behav Res Ther, 24*(4), 461-470.

Clark, D. M. (1996). Panic disorder: from theory to therapy. In P. Salkovskis (Ed.), *Frontiers of Cognitive Therapy* (pp. 318-344). New York: Guilford Press.

Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. In R. Heimberg, M. R. Liebowitz, D. A. Hope, F. Schneier, R. Heimberg, M. R. Liebowitz, & F.

Schneier (Eds.), *Social phobia: Diagnosis, assessment, and treatment*. New York: Guilford Press.

Cohen, J. (1992). A power primer. *Psychological bulletin, 112*(1), 155-159.

Cole, D. A., & Maxwell, S. E. (2003). Testing mediational models with longitudinal data: questions and tips in the use of structural equation modeling. *Journal of abnormal psychology, 112*(4), 558-577.

Crawford, M. J., Thana, L., Farquharson, L., Palmer, L., Hancock, E., Bassett, P., . . . Parry, G. D. (2016). Patient experience of negative effects of psychological treatment: results of a national survey. *British Journal of Psychiatry*, *208*(3), 260-265.

Crits-Christoph, P., Connolly Gibbons, M. B., & Mukherjee, D. (2013). Psychotherapy Process-Outcome Research. In M. J. Lambert (Ed.), *Bergin and Garfield's Handbook of Psychotherapy and Behaviour Change*. New Jersey: John Wiley & Sons, Inc.

Crits-Christoph, P., Gallop, R., Diehl, C. K., Yin, S., & Gibbons, M. B. C. (2017). Mechanisms of change in cognitive therapy for major depressive disorder in the community mental health setting. *Journal of Consulting and Clinical Psychology*, *85*(6), 550.

Crockett, S. R. (2015). *Emotional and cognitive predictors of treatment outcome in Prolonged Exposure therapy for PTSD.* (Doctor of Psychology), Palo Alto University, Palo Alto, California. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=psyh&AN=2017-43828-099&site=ehost-live.

Cuijpers, P., Sijbrandij, M., Koole, S., Huibers, M., Berking, M., & Andersson, G. (2014). Psychological treatment of generalized anxiety disorder: a meta-analysis. *Clinical psychology review, 34*(2), 130-140.

Delgadillo, J., McMillan, D., Lucock, M., Leach, C., Ali, S., & Gilbody, S. (2014). Early changes, attrition, and dose-response in low intensity psychological interventions. *Br J Clin Psychol, 53*(1), 114-130. doi:10.1111/bjc.12031

DeRubeis, R. J., Cohen, Z. D., Forand, N. R., Fournier, J. C., Gelfand, L. A., & Lorenzo-Luaces, L. (2014). The Personalized Advantage Index: Translating Research on Prediction into Individualized Treatment Recommendations. A Demonstration. *PLoS One, 9*(1), e83875. doi:10.1371/journal.pone.0083875

Di Nardo, P. A., & Barlow, D. H. (1988). *Anxiety disorders interview schedule--revised (ADIS-R)*. Albany: Center for Stress and Anxiety Disorders, State University of NewYork.

DiNardo, P. A., Brown, T. A., & Barlow, D. H. (1994). *Anxiety Disorders Interview Schedule for DSM-IV: Lifetime Version (ADIS-IV-L)*. New York: Oxford University Press.

Donegan, E., & Dugas, M. J. (2012). Generalized anxiety disorder: a comparison of symptom change in adults receiving cognitive-behavioral therapy or applied relaxation. *J Consult Clin Psychol, 80*(3), 490-496. doi:10.1037/a0028132

Dow, M. G. T., Kenardy, J. A., Johnston, D. W., Newman, M. G., Taylor, C. B., & Thomson, A. (2007a). Prognostic indices with brief and standard CBT for panic disorder: I. Predictors of outcome. *Psychol Med, 37*(10), 1493-1502. doi:10.1017/s0033291707000670

Dow, M. G. T., Kenardy, J. A., Johnston, D. W., Newman, M. G., Taylor, C. B., & Thomson, A. (2007b). Prognostic indices with brief and standard CBT for panic

disorder: II. Moderators of outcome. *Psychol Med, 37*(10), 1503-1509. doi:10.1017/s0033291707000682

Dugas, M. J., Francis, K., & Bouchard, S. (2009). Cognitive behavioural therapy and applied relaxation for generalized anxiety disorder: a time series analysis of change in worry and somatic anxiety. *Cogn Behav Ther, 38*(1), 29-41. doi:10.1080/16506070902980745

Dugas, M. J., Freeston, M. H., & Ladouceur, R. (1997). Intolerance of uncertainty and problem orientation in worry. *Cognitive Therapy and Research, 21*(6), 593-606.

Dugas, M. J., Gagnon, F., Ladouceur, R., & Freeston, M. H. (1998). Generalized anxiety disorder: A preliminary test of a conceptual model. *Behav Res Ther, 36*(2), 215-226.

Dugas, M. J., & Ladouceur, R. (2000). Treatment of GAD. Targeting intolerance of uncertainty in two types of worry. *Behav Modif, 24*(5), 635-657. doi:10.1177/0145445500245002

Dugas, M. J., Letarte, H., Rheaume, J., Freeston, M. H., & Ladouceur, R. (1995). Worry and problem solving: evidence of a specific relationship. *Cognitive Therapy and Research, 19*, 109-120.

Ehlers, A., Bisson, J., Clark, D. M., Creamer, M., Pilling, S., Richards, D., . . . Yule, W. (2010). Do all psychological treatments really work the same in posttraumatic stress disorder? *Clin Psychol Rev, 30*(2), 269-276. doi:10.1016/j.cpr.2009.12.001

Ehlers, A., & Clark, D. M. (2000). A cognitive model of posttraumatic stress disorder. *Behav Res Ther, 38*(4), 319-345.

Elliott, R. (1999). Client change interview protocol. *Network for Research on Experiential Therapies*.

Eskildsen, A., Hougaard, E., & Rosenberg, N. K. (2010). Pre-treatment patient variables as predictors of drop-out and treatment outcome in cognitive behavioural therapy for social phobia: A systematic review. *Nord J Psychiatry, 64*(2), 94-105. doi:10.3109/08039480903426929

Eustis, E. H., Hayes-Skelton, S. A., Roemer, L., & Orsillo, S. M. (2016). Reductions in experiential avoidance as a mediator of change in symptom outcome and quality of life in acceptance-based behavior therapy and applied relaxation for generalized anxiety disorder. *Behav Res Ther, 87*, 188-195. doi:10.1016/j.brat.2016.09.012

Fentz, H. N., Arendt, M., O'Toole, M. S., Hoffart, A., & Hougaard, E. (2014). The mediational role of panic self-efficacy in cognitive behavioral therapy for panic disorder: a systematic review and meta-analysis. *Behav Res Ther, 60*, 23-33. doi:10.1016/j.brat.2014.06.003

Forster, C., Berthollier, N., & Rawlinson, D. (2014). A Systematic Review of Potential Mechanisms of Change in Psychotherapeutic Interventions for Personality Disorder. *Journal of Psychology & Psychotherapy, 4*(1), 133.

Fournier, J. C., DeRubeis, R. J., Shelton, R. C., Hollon, S. D., Amsterdam, J. D., & Gallop, R. (2009). Prediction of response to medication and cognitive therapy in the treatment of moderate to severe depression. *J Consult Clin Psychol, 77*(4), 775-787. doi:10.1037/a0015401

Freeston, M. H., Rheaume, J., Letarte, H., Dugas, M. J., & Ladouceur, R. (1994). Why do people worry? . *Personality and Individual Differences, 17*, 791-802.

Gallagher, M. W., Naragon-Gainey, K., & Brown, T. A. (2014). Perceived control is a transdiagnostic predictor of cognitive–behavior therapy outcome for anxiety

disorders. *Cognitive Therapy and Research, 38*(1), 10-22. doi:10.1007/s10608-013-9587-3

Garratt, G., Ingram, R. E., Rand, K. L., & Sawalani, G. (2007). Cognitive Processes in Cognitive Therapy: Evaluation of the Mechanisms of Change in the Treatment of Depression. *Clinical Psychology: Science and Practice, 14*(3), 224-239. doi:10.1111/j.1468-2850.2007.00081.x

Gaudiano, B. A. (2008). Cognitive-behavioral therapies: Achievements and challenges. *Evidence-Based Mental Health, 11*(1), 5-7.

Gregory, B., Wong, Q. J. J., Marker, C. D., & Peters, L. (2018). Maladaptive Self-Beliefs During Cognitive Behavioural Therapy for Social Anxiety Disorder: A Test of Temporal Precedence. *Cognitive Therapy and Research*. doi:10.1007/s10608-017-9882-5

Hamilton, M. (1959). The assessment of anxiety states by rating. *Psychology and Psychotherapy: Theory, Research and Practice, 32*(1), 50-55.

Harvey, A. G., Watkins, E., Mansell, W., & Shafran, R. (2004). *Cognitive behavioural processes across psychological disorders: A transdiagnostic approach to research and treatment*: Oxford University Press.

Hawton, K., Salkovskis, P., Kirk, J., & Clark, D. M. (1989). *Cognitive Behaviour Therapy for Psychiatric Problems* Oxford: Oxford University Press.

Hayes-Skelton, S. A., Calloway, A., Roemer, L., & Orsillo, S. M. (2015). Decentering as a potential common mechanism across two therapies for generalized anxiety disorder. *J Consult Clin Psychol, 83*(2), 395-404. doi:10.1037/a0038305

Hayes-Skelton, S. A., Roemer, L., & Orsillo, S. M. (2013). A randomized clinical trial comparing an acceptance-based behavior therapy to applied relaxation for

generalized anxiety disorder. *J Consult Clin Psychol, 81*(5), 761-773. doi:10.1037/a0032871

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis*. New York: The Guilford Press.

Hayes, S. A., Orsillo, S. M., & Roemer, L. (2010). Changes in proposed mechanisms of action during an acceptance-based behavior therapy for generalized anxiety disorder. *Behav Res Ther, 48*(3), 238-245. doi:10.1016/j.brat.2009.11.006

Hayes, S. C., & Hofmann, S. G. (2017). The third wave of cognitive behavioral therapy and the rise of process-based care. *World Psychiatry, 16*(3), 245-246. doi:10.1002/wps.20442

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behav Res Ther, 44*(1), 1-25.

Hedeker, D., & Gibbon, R. D. (2006). *Longitudinal data anaysis*. Hoboken, NJ: John Wiley and Sons.

Hinz, A., Klein, A. M., Brahler, E., Glaesmer, H., Luck, T., Riedel-Heller, S. G., . . . Hilbert, A. (2017). Psychometric evaluation of the Generalized Anxiety Disorder Screener GAD-7, based on a large German general population sample. *J Affect Disord, 210*, 338-344. doi:10.1016/j.jad.2016.12.012

Hofmann, S. G. (2008). Common misconceptions about cognitive mediation of treatment change: A commentary to Longmore and Worrell (2007). *Clinical psychology review, 28*(1), 67-70.

Hofmann, S. G., Asnaani, A., Vonk, I. J., Sawyer, A. T., & Fang, A. (2012). The efficacy of cognitive behavioral therapy: a review of meta-analyses. *Cognitive Therapy and Research, 36*(5), 427-440.

Hofmann, S. G., & Hayes, S. C. (in press). The Future of Intervention Science: Process-Based Therapy *Clinical Psychological Science*.

Hofmann, S. G., Sawyer, A. T., & Fang, A. (2010). The Empirical Status of the "New Wave" of Cognitive Behavioral Therapy. *Psychiatric Clinics of North America, 33*(3), 701-+. doi:10.1016/j.psc.2010.04.006

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*(2), 169.

Hofmann, S. G., & Smits, J. A. (2008). Cognitive-behavioral therapy for adult anxiety disorders: a meta-analysis of randomized placebo-controlled trials. *J Clin Psychiatry, 69*(4), 621.

Hofmann, W., & Patel, P. V. (2015). SurveySignal: A convenient solution for experience sampling research using participants' own smartphones. *Social Science Computer Review, 33*(2), 235-253.

Holaway, R. M., Rodebaugh, T. L., & Heimberg, R. (2006). The epidemiology of worry and generalized anxiety disorder. In G. C. Davey & A. Wells (Eds.), *Worry and its Psychological Disorders: Theory, Assessment and Treatment* (pp. 3-20). West Sussex, UK: John Wiley & Sons.

Holmes, E. A., Ghaderi, A., Harmer, C. J., Ramchandani, P. G., Cuijpers, P., Morrison, A., . . . Craske, M. G. (2018). The Lancet Psychiatry Commission on psychological treatments research in tomorrow's science. *The Lancet Psychiatry, 5*(3), 237–286.

Hu, L. T., & Bentler, P. M. (1998). Cutoff criteria for fit indexes in covariance structure modeling: Sensitivity to underparameterized model misspecification. *Psychological methods, 3*, 424–453.

Huibers, M. J., Cohen, Z. D., Lemmens, L. H., Arntz, A., Peeters, F. P., Cuijpers, P., & DeRubeis, R. J. (2015). Predicting Optimal Outcomes in Cognitive Therapy or Interpersonal Psychotherapy for Depressed Individuals Using the Personalized Advantage Index Approach. *PLoS One, 10*(11), e0140771. doi:10.1371/journal.pone.0140771

Hunot, V., Churchill, R., Teixeira, V., & de Lima, M. (2007). Psychological therapies for generalised anxiety disorder. *Cochrane Database of Systematic Reviews*(1).

Jacobs, R. H., Silva, S. G., Reinecke, M. A., Curry, J. F., Ginsburg, G. S., Kratochvil, C. J., & March, J. S. (2009). Dysfunctional Attitudes Scale Perfectionism: A Predictor and Partial Mediator of Acute Treatment Outcome among Clinically Depressed Adolescents. *Journal of clinical child and adolescent psychology, 38*(6), 803-813. doi:10.1080/15374410903259031

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.

Johansson, P., & Høglend, P. (2007). Identifying mechanisms of change in psychotherapy: Mediators of treatment outcome. *Clinical Psychology & Psychotherapy, 14*(1), 1-9.

Kazdin, A. E. (2007). Mediators and mechanisms of change in psychotherapy research. *Annu Rev Clin Psychol, 3*, 1-27. doi:10.1146/annurev.clinpsy.3.022806.091432

Kazdin, A. E. (2009). Understanding how and why psychotherapy leads to change. *Psychother Res, 19*(4-5), 418-428. doi:10.1080/10503300802448899

Kazdin, A. E., & Nock, M. K. (2003). Delineating mechanisms of change in child and adolescent therapy: methodological issues and research recommendations. *J Child Psychol Psychiatry, 44*(8), 1116-1129.

Kenny, D. A., Korchmaros, J. D., & Bolger, N. (2003). Lower level mediation in multilevel models. *Psychological methods, 8*(2), 115.

Knopp, J., Knowles, S., Bee, P., Lovell, K., & Bower, P. (2013). A systematic review of predictors and moderators of response to psychological therapies in OCD: Do we have enough empirical evidence to target treatment? *Clinical psychology review, 33*(8), 1067-1081. doi:https://doi.org/10.1016/j.cpr.2013.08.008

Kozak, M. J., & Cuthbert, B. N. (2016). The NIMH Research Domain Criteria Initiative: Background, Issues, and Pragmatics. *Psychophysiology, 53*(3), 286-297. doi:10.1111/psyp.12518

Kraemer, H. C., Stice, E., Kazdin, A., Offord, D., & Kupfer, D. (2001). How do risk factors work together? Mediators, moderators, and independent, overlapping, and proxy risk factors. *Am J Psychiatry, 158*(6), 848-856. doi:10.1176/appi.ajp.158.6.848

Kraemer, H. C., Wilson, C., Fairburn, C. G., & Agras, W. S. (2002). Mediators and moderators of treatment effects in randomized clinical trials. *Arch Gen Psychiatry, 59*(10), 877-883.

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of general internal medicine, 16*(9), 606-613.

Kroenke, K., Spitzer, R. L., Williams, J. B., Monahan, P. O., & Lowe, B. (2007). Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Ann Intern Med, 146*(5), 317-325.

Kroenke, K., Spitzer, R. L., Williams, J. B. W., & Löwe, B. (2010). The Patient Health Questionnaire somatic, anxiety, and depressive symptom scales: A systematic

review. *Gen Hosp Psychiatry, 32*(4), 345-359. doi:10.1016/j.genhosppsych.2010.03.006

Kyrios, M., Hordern, C., & Fassnacht, D. B. (2015). Predictors of response to cognitive behaviour therapy for obsessive-compulsive disorder. *International Journal of Clinical and Health Psychology, 15*(3), 181-190. doi:https://doi.org/10.1016/j.ijchp.2015.07.003

Lambert, M. J., Hansen, N. B., & Harmon, S. C. (2010). Outcome Questionnaire System (The OQ System): Development and Practical Applications in Healthcare Settings. In M. Barkham, G. E. Hardy, & J. Mellor-Clark (Eds.), *Developing and Delivering Practice-Based Evidence*. Chichester: John Wiley & Sons Ltd

Laurenceau, J.-P., Hayes, A. M., & Feldman, G. C. (2007). Some methodological and statistical issues in the study of change processes in psychotherapy. *Clinical psychology review, 27*(6), 682-695.

Ledoux, J. E. (1989). Cognitive-Emotional Interactions in the Brain. *Cognition & Emotion, 3*, 267-289.

LeDoux, J. E., & Pine, D. S. (2016). Using Neuroscience to Help Understand Fear and Anxiety: A Two-System Framework. *American Journal of Psychiatry, 173*(11), 1083-1093. doi:10.1176/appi.ajp.2016.16030353

Lemmens, L. H. J. M., Galindo-Garre, F., Arntz, A., Peeters, F., Hollon, S. D., DeRubeis, R. J., & Huibers, M. J. (2017). Exploring mechanisms of change in cognitive therapy and interpersonal psychotherapy for adult depression. *Behav Res Ther*.

Lemmens, L. H. J. M., Müller, V. N. L. S., Arntz, A., & Huibers, M. J. H. (2016). Mechanisms of change in psychotherapy for depression: An empirical update

and evaluation of research aimed at identifying psychological mediators. *Clinical psychology review, 50*, 95-107. doi:http://dx.doi.org/10.1016/j.cpr.2016.09.004

Little, R. J. (1988). A test of missing completely at random for multivariate data with missing values. *journal of the American Statistical Association, 83*(404), 1198-1202.

Llewelyn, S., Macdonald, J., & Aafjes-Van Doorn, K. (2016). Process-outcome studies. In J. C. Norcross, G. R. VandenBos, & D. K. Freedheim (Eds.), *APA Handbook of Clinical Psychology: Vol. 2. Theory and Research*: American Psychological Association.

Longmore, R. J., & Worrell, M. (2007). Do we need to challenge thoughts in cognitive behavior therapy? *Clin Psychol Rev, 27*(2), 173-187. doi:10.1016/j.cpr.2006.08.001

Lorenzo-Luaces, L., German, R. E., & DeRubeis, R. J. (2015). It's complicated: The relation between cognitive change procedures, cognitive change, and symptom change in cognitive therapy for depression. *Clinical psychology review, 41*, 3-15. doi:http://dx.doi.org/10.1016/j.cpr.2014.12.003

Lorian, C. N., Titov, N., & Grisham, J. R. (2012). Changes in risk-taking over the course of an internet-delivered cognitive behavioral therapy treatment for generalized anxiety disorder. *J Anxiety Disord, 26*(1), 140-149. doi:10.1016/j.janxdis.2011.10.003

LoSavio, S. T., Dillon, K. H., & Resick, P. A. (2017). Cognitive factors in the development, maintenance, and treatment of post-traumatic stress disorder. *Curr Opin Psychol, 14*, 18-22. doi:10.1016/j.copsyc.2016.09.006

Mayo-Wilson, E., Dias, S., Mavranezouli, I., Kew, K., Clark, D. M., Ades, A. E., & Pilling, S. (2014). Psychological and pharmacological interventions for social anxiety disorder in adults: a systematic review and network meta-analysis. *Lancet Psychiatry, 1*(5), 368-376. doi:10.1016/s2215-0366(14)70329-3

McEvoy, P. M., & Erceg-Hurn, D. M. (2016). The search for universal transdiagnostic and trans-therapy change processes: Evidence for intolerance of uncertainty. *J Anxiety Disord, 41*, 96-107. doi:10.1016/j.janxdis.2016.02.002

McEvoy, P. M., Erceg-Hurn, D. M., Anderson, R. A., Campbell, B. N., & Nathan, P. R. (2015). Mechanisms of change during group metacognitive therapy for repetitive negative thinking in primary and non-primary generalized anxiety disorder. *J Anxiety Disord, 35*, 19-26. doi:10.1016/j.janxdis.2015.07.003

McMain, S., Newman, M. G., Segal, Z. V., & DeRubeis, R. J. (2015). Cognitive behavioral therapy: Current status and future research directions. *Psychotherapy Research, 25*(3), 321-329.

McManus, F., Shafran, R., & Cooper, Z. (2010). What does a transdiagnostic approach have to offer the treatment of anxiety disorders? *Br J Clin Psychol, 49*(Pt 4), 491-505. doi:10.1348/014466509x476567

McManus, S., Bebbington, P., Jenkins, R., & Brugha, T. (2016). *Mental health and wellbeing in England: Adult Psychiatric Morbidity Survey 2014*. Retrieved from Leeds:

Medical Research Council. (2000). A framework for the development and evaluation of RCTs for complex interventions to improve health. London: Medical Research Council.

Medical Research Council. (2008). Developing and evaluating complex interventions: new guidance. London: Medical Research Council.

Mennin, D. S., Heimberg, R. G., Turk, C. L., & Fresco, D. M. (2002). Applying an emotion regulation framework to integrative approaches to generalized anxiety disorder. *Clinical Psychology: Science and Practice, 9*(1), 85-90.

Meuret, A. E., Hofmann, S. G., & Rosenfield, D. (2010). Catastrophic Appraisal and Perceived Control as Moderators of Treatment Response in Panic Disorder. *International Journal of Cognitive Therapy, 3*, 262-277. doi:10.1521/ijct.2010.3.3.262

Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behav Res Ther, 28*(6), 487-495.

Millstein, D. J., Orsillo, S. M., Hayes-Skelton, S. A., & Roemer, L. (2015). Interpersonal Problems, Mindfulness, and Therapy Outcome in an Acceptance-Based Behavior Therapy for Generalized Anxiety Disorder. *Cogn Behav Ther, 44*(6), 491-501. doi:10.1080/16506073.2015.1060255

Minogue, V., Boness, J., Brown, A., & Girdlestone, J. (2005). The impact of service user involvement in research. *Int J Health Care Qual Assur Inc Leadersh Health Serv, 18*(2-3), 103-112.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS medicine, 6*(7), e1000097.

Moser, J. S., Cahill, S. P., & Foa, E. B. (2010). Evidence for poorer outcome in patients with severe negative trauma-related cognitions receiving prolonged exposure plus cognitive restructuring: implications for treatment matching in posttraumatic stress disorder. *J Nerv Ment Dis, 198*(1), 72-75. doi:10.1097/NMD.0b013e3181c81fac

Mowrer, O. H. (1939). A stimulus-response analysis of anxiety and its role as a reinforcing agent. *Psychological review, 46*(6), 553.

Mowrer, O. H. (1960). *Learning theory and behavior*. New York: Wiley.

MQ. (2018). The right treatment at the right time. Retrieved from https://www.mqmentalhealth.org/research/profiles/the-right-treatment-at-the-right-time

Myers, R. (1990). *Classical and modern regression with applications* (2nd ed.). Boston, MA: Duxbury.

National Institute for Health and Care Excellence. (2005a). *Obsessive-compulsive disorder and body dysmorphic disorder: treatment. Clinical guideline 31.*

National Institute for Health and Care Excellence. (2005b). *Post-traumatic stress disorder: management. Clinical guideline 26.*

National Institute for Health and Care Excellence. (2009). *Depression in adults: recognition and management. Clinical guideline 90.*

National Institute for Health and Care Excellence. (2011). *Generalised anxiety disorder and panic disorder in adults. Clinical guideline 113.*

National Institute for Health and Care Excellence. (2013). *Social anxiety disorder: recognition, assessment and treatment. Clinical guideline 159.*

Newman, M. G., Castonguay, L. G., Jacobson, N. C., & Moore, G. A. (2015). Adult attachment as a moderator of treatment outcome for generalized anxiety disorder: Comparison between cognitive-behavioral therapy (CBT) plus supportive listening and CBT plus interpersonal and emotional processing therapy. *J Consult Clin Psychol, 83*(5), 915-925. doi:10.1037/a0039359

Newman, M. G., & Fisher, A. J. (2013). Mediated moderation in combined cognitive behavioral therapy versus component treatments for generalized anxiety disorder. *J Consult Clin Psychol, 81*(3), 405-414. doi:10.1037/a0031690

NHS Digital. (2016a). *Improving Access to Psychological Therapies (IAPT): Executive Summary*. UK: NHS Digital, Government Statistical Service Retrieved from http://content.digital.nhs.uk/catalogue/PUB22110/psych-ther-ann-rep-2015-16.pdf.

NHS Digital. (2016b). *Psychological Therapies: Annual report on the use of IAPT services. England, 2015-2016.* UK: NHS Digital Retrieved from http://content.digital.nhs.uk/catalogue/PUB22110/psych-ther-ann-rep-2015-16.pdf.

NHS Digital. (2017). *Psychological Therapies: Annual report on the use of IAPT services. England 2016-2017.* UK: NHS Digital Retrieved from http://content.digital.nhs.uk/catalogue/PUB22110/psych-ther-ann-rep-2015-16.pdf.

NHS England. (2017). *Developing an outcomes-based payment approach for IAPT services*. London, England: NHS England and NHS Improvement.

Normann, N., van Emmerik, A. A., & Morina, N. (2014). The efficacy of metacognitive therapy for anxiety and depression: a meta-analytic review. *Depress Anxiety, 31*(5), 402-411. doi:10.1002/da.22273

Olatunji, B. O., Cisler, J. M., & Deacon, B. J. (2010). Efficacy of cognitive behavioral therapy for anxiety disorders: a review of meta-analytic findings. *Psychiatric Clinics of North America, 33*(3), 557-577.

Omeni, E., Barnes, M., MacDonald, D., Crawford, M., & Rose, D. (2014). Service user involvement: impact and participation: a survey of service user and staff perspectives. *BMC Health Serv Res, 14*, 491. doi:10.1186/s12913-014-0491-7

Ost, L. G., & Breitholtz, E. (2000). Applied relaxation vs. cognitive therapy in the treatment of generalized anxiety disorder. *Behav Res Ther, 38*(8), 777-790. doi:10.1016/s0005-7967(99)00095-9

Ost, 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. *Clin Psychol Rev, 40*, 156-169. doi:10.1016/j.cpr.2015.06.003

Piet, J., & Hougaard, E. (2011). The effect of mindfulness-based cognitive therapy for prevention of relapse in recurrent major depressive disorder: a systematic review and meta-analysis. *Clinical psychology review, 31*(6), 1032-1040.

Plummer, F., Manea, L., Trepel, D., & McMillan, D. (2016). Screening for anxiety disorders with the GAD-7 and GAD-2: a systematic review and diagnostic metaanalysis. *Gen Hosp Psychiatry, 39*, 24-31. doi:10.1016/j.genhosppsych.2015.11.005

Polman, A., Bouman, T. K., van Hout, W. J., de Jong, P. J., & den Boer, J. A. (2010). Processes of change in cognitive-behavioural treatment of obsessive-compulsive disorder: Current status and some future directions. *Clin Psychol Psychother, 17*(1), 1-12. doi:10.1002/cpp.638

Pompoli, A., Furukawa, T. A., Imai, H., Tajika, A., Efthimiou, O., & Salanti, G. (2016). Psychological therapies for panic disorder with or without agoraphobia in adults: a networkmeta-analysis. *Cochrane Database of Systematic Reviews*(4). doi:10.1002/14651858.CD011004.pub2

Porter, E., & Chambless, D. L. (2015). A systematic review of predictors and moderators of improvement in cognitive-behavioral therapy for panic disorder and agoraphobia. *Clin Psychol Rev, 42*, 179-192. doi:10.1016/j.cpr.2015.09.004

Powers, M. B., de Kleine, R. A., & Smits, J. A. (2017). Core mechanisms of cognitive behavioral therapy for anxiety and depression: a review. *Psychiatric Clinics of North America*.

Preacher, K. J., & Kelley, K. (2011). Effect size measures for mediation models: quantitative strategies for communicating indirect effects. *Psychological methods, 16*(2), 93.

Raento, M., Oulasvirta, A., & Eagle, N. (2009). Smartphones: An emerging tool for social scientists. *Sociological methods & research, 37*(3), 426-454.

Remes, O., Brayne, C., Linde, R., & Lafortune, L. (2016). A systematic review of reviews on the prevalence of anxiety disorders in adult populations. *Brain and Behavior, 6*(7).

Richards, D. A., & Borglin, G. (2011). Implementation of psychological therapies for anxiety and depression in routine practice: two year prospective cohort study. *J Affect Disord, 133*(1-2), 51-60. doi:10.1016/j.jad.2011.03.024

Richards, D. A., Ekers, D., McMillan, D., Taylor, R. S., Byford, S., Warren, F. C., . . . Kuyken, W. (2016). Cost and Outcome of Behavioural Activation versus Cognitive Behavioural Therapy for Depression (COBRA): a randomised, controlled, non-inferiority trial. *The Lancet, 388*(10047), 871-880.

Roemer, L., & Orsillo, S. M. (2002). Expanding our conceptualization of and treatment for generalized anxiety disorder: Integrating mindfulness/acceptance-based approaches with existing cognitive-behavioral models. *Clinical Psychology: Science and Practice, 9*(1), 54-68.

Salkovskis, P. (1985). Obsessional-compulsive problems: A cognitive-behavioural analysis. *Behav Res Ther, 23*(5), 571-583.

Salkovskis, P. (1989). Cognitive-behavioural factors and the persistence of intrusive thoughts in obsessional problems. *Behav Res Ther, 27*(6), 677-682.

Salkovskis, P. (1996). Cognitive-behavioural approaches to the understanding of obsessional problems. In R. M. Rapee (Ed.), *Current controversies in the anxiety disorders* (pp. 103-133). New York: Guilford Press.

Schneider, R. L., Arch, J. J., & Wolitzky-Taylor, K. B. (2015). The state of personalized treatment for anxiety disorders: a systematic review of treatment moderators. *Clinical psychology review, 38*, 39-54.

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002). *Mindfulness-based cognitive therapy for depression: a new approach to preventing relapse*. New York: Guilford Press.

Smits, J. A. J., Julian, K., Rosenfield, D., & Powers, M. B. (2012). Threat Reappraisal as a Mediator of Symptom Change in Cognitive-Behavioral Treatment of Anxiety Disorders: A Systematic Review. *Journal of Consulting and Clinical Psychology, 80*(4), 624-635. doi:10.1037/a0028957

Sobel, M. E. (1982). *Asymptotic confidence intervals for indirect effects in structural equation models*. Washington: American Sociological Association.

Sotsky, S. M., Glass, D. R., Shea, M. T., Pilkonis, P. A., Collins, J. F., Elkin, I., . . . et al. (1991). Patient predictors of response to psychotherapy and pharmacotherapy: findings in the NIMH Treatment of Depression Collaborative Research Program. *Am J Psychiatry, 148*(8), 997-1008. doi:10.1176/ajp.148.8.997

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of internal medicine, 166*(10), 1092-1097.

Springer, K. S., Levy, H. C., & Tolin, D. F. (2018). Remission in CBT for adult anxiety disorders: A meta-analysis. *Clinical psychology review*. doi:https://doi.org/10.1016/j.cpr.2018.03.002

Steel, C., Macdonald, J., Schröder, T., & Mellor-Clark, J. (2015). Exhausted but not cynical: burnout in therapists working within Improving Access to Psychological Therapy Services. *Journal of Mental Health, 24*(1), 33-37.

Steketee, G., Siev, J., Yovel, I., Lit, K., & Wilhelm, S. (2018). Predictors and Moderators of Cognitive and Behavioral Therapy Outcomes for OCD: A Patient-Level Mega-Analysis of Eight Sites. *Behavior therapy*. doi:https://doi.org/10.1016/j.beth.2018.04.004

Tabachnick, B. G., & Fidel, L. S. (2007). *Using Multivariate Statistics* (5th ed.). Boston, MA: Pearson Education.

Tiao, G. C., & Box, G. E. (1981). Modeling multiple time series with applications. *journal of the American Statistical Association, 76*(376), 802-816.

Torbit, L., & Laposa, J. M. (2016). Group CBT for GAD: The role of change in intolerance of uncertainty in treatment outcomes. *International Journal of Cognitive Therapy, 9*(4), 356-368. doi:10.1521/ijct_2016_09_17

van der Heiden, C., Muris, P., & van der Molen, H. T. (2012). Randomized controlled trial on the effectiveness of metacognitive therapy and intolerance-of-uncertainty therapy for generalized anxiety disorder. *Behav Res Ther, 50*(2), 100-109. doi:10.1016/j.brat.2011.12.005

van der Velden, A. M., Kuyken, W., Wattar, U., Crane, C., Pallesen, K. J., Dahlgaard, J., . . . Piet, J. (2015). A systematic review of mechanisms of change in mindfulness-based cognitive therapy in the treatment of recurrent major depressive disorder. *Clin Psychol Rev, 37*, 26-39. doi:10.1016/j.cpr.2015.02.001

Vittengl, J. R., Jarrett, R. B., Weitz, E., Hollon, S. D., Twisk, J., Cristea, I., . . . Cuijpers, P. (2016). Divergent Outcomes in Cognitive Behavioral Therapy and Pharmacotherapy for Adult Depression. *Am J Psychiatry, 173*(5), 481-490. doi:10.1176/appi.ajp.2015.15040492

Wells, A. (1995). Meta-cognition and worry: A cognitive model of generalized anxiety disorder. *Behavioural and Cognitive Psychotherapy, 23*(03), 301-320.

Wells, A., & King, P. (2006). Metacognitive therapy for generalized anxiety disorder: An open trial. *Journal of Behavior Therapy and Experimental Psychiatry, 37*(3), 206-212. doi:10.1016/j.jbtep.2005.07.002

Wells, A., Welford, M., King, P., Papageorgiou, C., Wisely, J., & Mendel, E. (2010). A pilot randomized trial of metacognitive therapy vs applied relaxation in the treatment of adults with generalized anxiety disorder. *Behav Res Ther, 48*(5), 429-434.

Westwood, S., Morison, L., Allt, J., & Holmes, N. (2017). Predictors of emotional exhaustion, disengagement and burnout among improving access to psychological therapies (IAPT) practitioners. *Journal of Mental Health, 26*(2), 172-179.

Wiles, N., Thomas, L., Abel, A., Barnes, M., Carroll, F., Ridgway, N., . . . Lewis, G. (2014). Clinical effectiveness and cost-effectiveness of cognitive behavioural therapy as an adjunct to pharmacotherapy for treatment-resistant depression in

primary care: the CoBalT randomised controlled trial. *Health Technology Assessment, 18*(31).

Wittchen, H. U. (2002). Generalized anxiety disorder: prevalence, burden, and cost to society. *Depress Anxiety, 16*(4), 162-171.

Yonkers, K. A., Dyck, I. R., Warshaw, M., & Keller, M. B. (2000). Factors predicting the clinical course of generalised anxiety disorder. *The British Journal of Psychiatry, 176*(6), 544-549.

Zhang, Z., Zhang, L., Zhang, G., Jin, J., & Zheng, Z. (2018). The effect of CBT and its modifications for relapse prevention in major depressive disorder: a systematic review and meta-analysis. *BMC Psychiatry, 18*(1), 50. doi:10.1186/s12888-018-1610-5

Appendices

Appendix 1 – Dysfunctional Attitudes Scale – Short Form 1 (DAS-SF; Beevers, Strong, Meyer, Pilkonis, & Miller, 2007)

DAS-SF1

The sentences below describe people's attitudes. Circle the number which best describes how much each sentence describes your attitude. Your answer should describe the way you think most of the time.

		Totally Agree	Agree	Disagree	Totally Disagree
1.	If I don't set the highest standards for myself, I am likely to end up a second-rate person.	1	2	3	4
2.	My value as a person depends greatly on what others think of me.	1	2	3	4
3.	People will probably think less of me if I make a mistake.	1	2	3	4
4.	I am nothing if a person I love doesn't love me.	1	2	3	4
5.	If other people know what you are really like, they will think less of you.	1	2	3	4
6.	If I fail at my work, then I am a failure as a person.	1	2	3	4
7.	My happiness depends more on other people than it does me.	1	2	3	4
8.	I cannot be happy unless most people I know admire me.	1	2	3	4
9.	It is best to give up your own interests in order to please other people.	1	2	3	4

Note. For the empirical study, the numbers were reversed to be in line with the Anxiety Attitudes and Beliefs Scale and in order that higher scores represented more maladaptive beliefs. This meant 1 = totally disagree, 2 = disagree, 3 = agree, 4 = totally agree.

Appendix 2 – Anxiety Attitudes and Beliefs Scale-18 (AABS-18; Brown, Hawkes, Cooper, Jonsdottir, & Tata, 2015)

INSTRUCTIONS: This inventory lists different beliefs that people sometimes hold. Please read each statement carefully, decide how much you believe what is stated, and circle the number corresponding to how much you agree. Please try not to think too much about each item--people are different, so there is no right or wrong answer. To decide how much you agree with a statement, simply keep in mind what you are like **most of the time** using the following key**:**

1 = Totally Disagree 2 = Disagree 3 = Agree 4 = Totally Agree

EXAMPLE				
You should not put off until tomorrow what you can do today.	1	2	(3)	4

In the example, the number "3" has been circled indicating agreement but not total agreement.

1. The way to avoid problems is not to take any risks.	1	2	3	4
2. Even with small problems, one thing can lead to another and quickly turn into something huge.	1	2	3	4
3. If you imagine something bad happening, it can help make that thing come true.	1	2	3	4
4. It is better not to rock the boat than to make changes.	1	2	3	4
5. People will make negative judgments if they think something is wrong with you.	1	2	3	4
6. Anticipating the worst outcome prepares you for the worst.	1	2	3	4
7. Planning every detail in advance is the only way to avoid unpleasant surprises.	1	2	3	4

8.	It is important to be on the lookout for the first, small signs of an illness.	1	2	3	4
9.	Anxiety is generally a sign that something is wrong.	1	2	3	4
10.	Picturing something happening might cause it to really happen.	1	2	3	4
11.	It is best not to let on if you are in public and feel that something is wrong with you.	1	2	3	4
12.	Minor difficulties can easily get out of control and grow into major ones.	1	2	3	4
13.	There is no such thing as being too careful when it comes to your health.	1	2	3	4
14.	An unusual physical sensation in your body is likely to be a sign that something is seriously wrong with you.	1	2	3	4
15.	In general, it is better to keep things the way they are than to take the risk of making things worse.	1	2	3	4
16.	You should not allow yourself to be seen losing control of yourself in any way	1	2	3	4
17.	It is crucial to anticipate potential difficulties so that you have a better chance of avoiding them.	1	2	3	4
18.	If someone is feeling anxious, there must be something for them to be concerned about.	1	2	3	4

Appendix 3 – Patient Health Questionanire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001)

Nine-symptom Checklist

Name _____ Date _____

Over the *last 2 weeks*, how often have you been bothered by any of the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

(For office coding: Total Score _____ = _____ + _____ + _____)

Appendix 4 – Generalised Anxiety Disorder-7 Questionnaire (GAD-7; Spitzer, Kroenke, Williams, & Löwe, 2006)

GAD-7

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3

Total Score ___ = Add Columns ___ + ___ + ___

Appendix 5 – Participant Information sheet

Mechanisms of change in psychological therapy

Participant Information Sheet

You are being asked to allow information from questionnaires you complete during therapy to be used in a research study. This study is being run at [service name] Improving Access to Psychological Therapies (IAPT) service and Royal Holloway University of London.

Why have I been invited to take part?

You have been invited to take part as you have attended an assessment appointment or are receiving psychological therapy from [service name] IAPT service.

It is known that psychological therapy helps to improve symptoms for a number of different mental health difficulties. However, we want to look in more detail at factors that might predict outcomes in psychological therapy.

What will I have to do?

During therapy, your therapist will ask you to complete some questionnaires. Everyone who has an assessment or receives treatment from an IAPT service is asked to complete questionnaires to help understand how they are feeling and to look at changes during therapy.

Information from your questionnaires will be anonymised and this information will then be used in the research study. Other anonymous information will also be used in the research such as the number of therapy sessions you attended and basic demographic information.

Do I have to take part?

No, it is completely up to you.

If you do decide to allow your information to be used in this research but later change your mind, you are free to withdraw your data from the research, without giving a reason.

Your decision will not affect the healthcare you receive in any way.

Are there any benefits for me?

There are unlikely to be any direct benefits to you from taking part in the study. You are currently receiving treatment from an NHS service, and there won't be any changes to the treatment you receive through taking part in this study. We hope that this study will help us to understand more about psychological therapy and how it works and be of benefit in the future.

Are there any risks for me?

There are no risks involved in taking part in this study as we are using information collected as part of routine practice. If you feel uncomfortable or concerned about any of the questionnaires, your therapist will be able to talk about this with you and will only continue if you are happy to do so.

What will happen to my information?

We will keep all information confidential and protect your privacy at all times. The data used for the research will be stored using a unique, anonymous 'participant number', so it will not include any personal identifying details. This information will be kept for 5 years following completion of the study, after which it will be destroyed. One member of the research team, who works for the NHS, will have access to NHS records.

Who has approved the study?

All research in the NHS is reviewed by an independent group of people, called a Research Ethics Committee, which is there to protect your safety, wellbeing, rights and dignity. This project has been reviewed and was given a favourable review by the South Central – Berkshire B Research Ethics Committee on 24th April 2017.

What happens next?

If you are willing for your data to be used for this research study, please let your therapist know.

Further information and contact details

If you would like any further information please contact Dorothy King on dorothy.king1@nhs.net.

Thank you for taking the time to read this information and for your interest in our research.

Appendix 6 – Ethical Approval from NHS REC: Favourable ethical opinion (Service 1)

NHS
Health Research Authority
South Central - Berkshire B Research Ethics Committee
Whitefriars
Level 3, Block B
Lewins Mead
Bristol
BS1 2NT

Please note: This is the favourable opinion of the REC only and does not allow you to start your study at NHS sites in England until you receive HRA Approval

20 April 2017

Dorothy King
Trainee Clinical Psychologist
Camden and Islington NHS Foundation Trust

Dear Dorothy King

Study title:	**Predicting patterns of exacerbation and improvement in psychological therapies**
REC reference:	**17/SC/0204**
IRAS project ID:	**225649**

The Proportionate Review Sub-committee of the South Central - Berkshire B Research Ethics Committee reviewed the above application on 24 April 2017.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this favourable opinion letter. The expectation is that this information will be published for all studies that receive an ethical opinion but should you wish to provide a substitute contact point, wish to make a request to defer, or require further information, please contact hra.studyregistration@nhs.net outlining the reasons for your request. Under very limited circumstances (e.g. for student research which has received an unfavourable opinion), it may be possible to grant an exemption to the publication of the study.

Ethical opinion

On behalf of the Committee, the sub-committee gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Conditions of the favourable opinion

The REC favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise).

Guidance on applying for HRA Approval (England)/ NHS permission for research is available in the Integrated Research Application System, www.hra.nhs.uk or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of management permissions from host organisations.

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database. This should be before the first participant is recruited but no later than 6 weeks after recruitment of the first participant.

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to request a deferral for study registration within the required timeframe, they should contact hra.studyregistration@nhs.net. The expectation is that all clinical trials will be registered, however, in exceptional circumstances non registration may be permissible with prior agreement from the HRA. Guidance on where to register is provided on the HRA website.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion").

Approved documents

The documents reviewed and approved were:

Document	*Version*	*Date*
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Royal Holloway Indemnity Insurance]	1.1	01 August 2016
IRAS Application Form [IRAS_Form_05042017]		05 April 2017
IRAS Application Form XML file [IRAS_Form_05042017]		05 April 2017
IRAS Checklist XML [Checklist_08042017]		08 April 2017
Participant information sheet (PIS) [Participant information sheet]	1.1	16 March 2017
Referee's report or other scientific critique report [Critique of proposal (1)]		09 December 2016
Referee's report or other scientific critique report [Response to proposal critique (1)]		19 January 2017
Referee's report or other scientific critique report [Critique of proposal (2)]		30 January 2017
Referee's report or other scientific critique report [Response to proposal critique (2)]		23 February 2017
Research protocol or project proposal [Research Proposal]	1.1	24 February 2017
Summary CV for Chief Investigator (CI) [CI_CV_Dorothy King]	1.1	28 March 2017
Summary CV for supervisor (student research) [CV_Dr Gary Brown]	1.1	28 March 2017
Summary CV for supervisor (student research) [CV_Dr Jon Wheatley]	1.1	21 April 2016
Validated questionnaire [The Anxiety Attitude and Belief Scale (AABS-2)]		
Validated questionnaire [Dysfunctional Attitudes Scale-Short Form (DAS-SF)]		
Validated questionnaire [Generalised Anxiety Disorder Scale-7 (GAD-7)]		
Validated questionnaire [Patient Health Questionnaire-9 (PHQ-9)]		
Validated questionnaire [Work and Social Adjustment Scale (WSAS)]		
Validated questionnaire [Ways of Responding Scale]		

Membership of the Proportionate Review Sub-Committee

The members of the Sub-Committee who took part in the review are listed on the attached sheet.

There were no declarations of interest.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research

Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website:
http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/

HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at http://www.hra.nhs.uk/hra-training/

With the Committee's best wishes for the success of this project.

17/SC/0204	**Please quote this number on all correspondence**

Yours sincerely

pp. L Roberts.

Dr John Sheridan
Chair

Email: nrescommittee.southcentral-berkshireb@nhs.net

Enclosures: *List of names and professions of members who took part in the review*

"After ethical review – guidance for researchers" [SL-AR2]

Copy to: *Annette Lock* [redacted]

South Central - Berkshire B Research Ethics Committee

Attendance at PRS Sub-Committee of the REC meeting via correspondence

Committee Members:

Name	*Profession*	*Present*	*Notes*
Dr Joseph Chiesa		Yes	
Dr John Sheridan	Consultant Toxicologist and Chemist	Yes	
Miss Elena Villarreal	Clinical Trial Manager	Yes	

Also in attendance:

Name	*Position (or reason for attending)*
Miss Lucy Roberts	REC Manager

Appendix 7 – Health Research Authority (HRA) approval confirmation

(Service 1)

NHS
Health Research Authority

Dorothy King
Trainee Clinical Psychologist
Camden and Islington NHS Foundation Trust
Dorothy.King.2015@live.rhul.ac.uk

Email: hra.approval@nhs.net

08 May 2017

Dear Dorothy,

Letter of HRA Approval

Study title:	**Predicting patterns of exacerbation and improvement in psychological therapies**
IRAS project ID:	**225649**
REC reference:	**17/SC/0204**
Sponsor	**Royal Holloway University of London**

I am pleased to confirm that **HRA Approval** has been given for the above referenced study, on the basis described in the application form, protocol, supporting documentation and any clarifications noted in this letter.

Participation of NHS Organisations in England

The sponsor should now provide a copy of this letter to all participating NHS organisations in England.

Appendix B provides important information for sponsors and participating NHS organisations in England for arranging and confirming capacity and capability. **Please read *Appendix B* carefully**, in particular the following sections:

- *Participating NHS organisations in England* – this clarifies the types of participating organisations in the study and whether or not all organisations will be undertaking the same activities
- *Confirmation of capacity and capability* - this confirms whether or not each type of participating NHS organisation in England is expected to give formal confirmation of capacity and capability. Where formal confirmation is not expected, the section also provides details on the time limit given to participating organisations to opt out of the study, or request additional time, before their participation is assumed.
- *Allocation of responsibilities and rights are agreed and documented (4.1 of HRA assessment criteria)* - this provides detail on the form of agreement to be used in the study to confirm capacity and capability, where applicable.

Further information on funding, HR processes, and compliance with HRA criteria and standards is also provided.

It is critical that you involve both the research management function (e.g. R&D office) supporting each organisation and the local research team (where there is one) in setting up your study. Contact details

and further information about working with the research management function for each organisation can be accessed from www.hra.nhs.uk/hra-approval.

Appendices

The HRA Approval letter contains the following appendices:

- A – List of documents reviewed during HRA assessment
- B – Summary of HRA assessment

After HRA Approval

The document *"After Ethical Review – guidance for sponsors and investigators"*, issued with your REC favourable opinion, gives detailed guidance on reporting expectations for studies, including:

- Registration of research
- Notifying amendments
- Notifying the end of the study

The HRA website also provides guidance on these topics, and is updated in the light of changes in reporting expectations or procedures.

In addition to the guidance in the above, please note the following:

- HRA Approval applies for the duration of your REC favourable opinion, unless otherwise notified in writing by the HRA.
- Substantial amendments should be submitted directly to the Research Ethics Committee, as detailed in the *After Ethical Review* document. Non-substantial amendments should be submitted for review by the HRA using the form provided on the HRA website, and emailed to hra.amendments@nhs.net.
- The HRA will categorise amendments (substantial and non-substantial) and issue confirmation of continued HRA Approval. Further details can be found on the HRA website.

Scope

HRA Approval provides an approval for research involving patients or staff in NHS organisations in England.

If your study involves NHS organisations in other countries in the UK, please contact the relevant national coordinating functions for support and advice. Further information can be found at http://www.hra.nhs.uk/resources/applying-for-reviews/nhs-hsc-rd-review/.

If there are participating non-NHS organisations, local agreement should be obtained in accordance with the procedures of the local participating non-NHS organisation.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website: http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/.

IRAS project ID	225649

HRA Training

We are pleased to welcome researchers and research management staff at our training days – see details at http://www.hra.nhs.uk/hra-training/

Your IRAS project ID is **225649**. Please quote this on all correspondence.

Yours sincerely

Gemma Oakes
Assessor

Email: hra.approval@nhs.net

Copy to: *Annette Lock, Royal Holloway University of London [Sponsor Contact]*
annette.lock@rhul.ac.uk

[redacted]

Dr Gary Brown, royal Holloway University of London [Academic Supervisor]
Gary.Brown@rhul.ac.uk

[redacted]

IRAS project ID	225649

Appendix A - List of Documents

The final document set assessed and approved by HRA Approval is listed below.

Document	*Version*	*Date*
Contract/Study Agreement [Statement of Activities]	1	27 April 2017
Contract/Study Agreement [Schedule of Events]	1	27 April 2017
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Royal Holloway Indemnity Insurance]	1.1	01 August 2016
IRAS Application Form [IRAS_Form_05042017]		05 April 2017
IRAS Application Form XML file [IRAS_Form_05042017]		05 April 2017
IRAS Checklist XML [Checklist_08042017]		08 April 2017
Participant information sheet (PIS) [Participant Information Sheet (Clean Copy)]	2.1	27 April 2017
Participant information sheet (PIS) [Participant Information Sheet (Tracked Copy)]	2.1	27 April 2017
Referee's report or other scientific critique report [Critique of proposal (1)]		09 December 2016
Referee's report or other scientific critique report [Response to proposal critique (1)]		19 January 2017
Referee's report or other scientific critique report [Critique of proposal (2)]		30 January 2017
Referee's report or other scientific critique report [Response to proposal critique (2)]		23 February 2017
Research protocol or project proposal [Research Proposal]	1.1	24 February 2017
Summary CV for Chief Investigator (CI) [CI_CV_Dorothy King]	1.1	28 March 2017
Summary CV for supervisor (student research) [CV_Dr Gary Brown]	1.1	28 March 2017
Summary CV for supervisor (student research) [CV_Dr Jon Wheatley]	1.1	21 April 2016
Validated questionnaire [Ways of Responding Scale]		
Validated questionnaire [Work and Social Adjustment Scale (WSAS)]		
Validated questionnaire [The Anxiety Attitude and Belief Scale (AABS-2)]		
Validated questionnaire [Dysfunctional Attitudes Scale-Short Form (DAS-SF)]		
Validated questionnaire [Generalised Anxiety Disorder Scale-7 (GAD-7)]		
Validated questionnaire [Patient Health Questionnaire-9 (PHQ-9)]		

IRAS project ID	225649

Appendix B - Summary of HRA Assessment

This appendix provides assurance to you, the sponsor and the NHS in England that the study, as reviewed for HRA Approval, is compliant with relevant standards. It also provides information and clarification, where appropriate, to participating NHS organisations in England to assist in assessing and arranging capacity and capability.

For information on how the sponsor should be working with participating NHS organisations in England, please refer to the, *participating NHS organisations, capacity and capability* and *Allocation of responsibilities and rights are agreed and documented (4.1 of HRA assessment criteria)* sections in this appendix.

The following person is the sponsor contact for the purpose of addressing participating organisation questions relating to the study:

Name: Annette Lock
Tel: 01784 414 388
Email: Annette.lock@rhul.ac.uk

HRA assessment criteria

Section	HRA Assessment Criteria	Compliant with Standards	Comments
1.1	IRAS application completed correctly	Yes	No comments
2.1	Participant information/consent documents and consent process	Yes	No comments
3.1	Protocol assessment	Yes	No comments
4.1	Allocation of responsibilities and rights are agreed and documented	Yes	The sponsor has provided statement of activities and schedule of events. No other form of agreement is required, or will be used.
4.2	Insurance/indemnity arrangements assessed	Yes	Where applicable, independent contractors (e.g. General Practitioners) should ensure that the professional indemnity provided by their medical defence organisation covers the activities expected of them for this

IRAS project ID	225649

Section	HRA Assessment Criteria	Compliant with Standards	Comments
			research study.
4.3	Financial arrangements assessed	Yes	The study is not externally funded.
5.1	Compliance with the Data Protection Act and data security issues assessed	Yes	The applicant has confirmed that data will be anonymised by herself prior to being provided to the research team.
5.2	CTIMPS – Arrangements for compliance with the Clinical Trials Regulations assessed	Not Applicable	No comments
5.3	Compliance with any applicable laws or regulations	Yes	No comments
6.1	NHS Research Ethics Committee favourable opinion received for applicable studies	Yes	Following REC review, submission of updated documentation was made to bring the study in line with HRA Standards, these changes were deemed as non-substantial and did not require review by the REC.
6.2	CTIMPS – Clinical Trials Authorisation (CTA) letter received	Not Applicable	No comments
6.3	Devices – MHRA notice of no objection received	Not Applicable	No comments
6.4	Other regulatory approvals and authorisations received	Not Applicable	No comments

Participating NHS Organisations in England

This provides detail on the types of participating NHS organisations in the study and a statement as to whether the activities at all organisations are the same or different.
There is one site type participating in this study. All research activity is the same at all participating NHS sites as detailed in the study protocol. The Chief Investigator or sponsor should share relevant study documents with participating NHS organisations in England in order to put arrangements in place to deliver the study. The documents should be sent to both the local study team, where applicable, and the office providing the research management function at the participating organisation. For NIHR CRN Portfolio studies, the Local

LCRN contact should also be copied into this correspondence. For further guidance on working with participating NHS organisations please see the HRA website.

If chief investigators, sponsors or principal investigators are asked to complete site level forms for participating NHS organisations in England which are not provided in IRAS or on the HRA website, the chief investigator, sponsor or principal investigator should notify the HRA immediately at hra.approval@nhs.net. The HRA will work with these organisations to achieve a consistent approach to information provision.

Confirmation of Capacity and Capability

This describes whether formal confirmation of capacity and capability is expected from participating NHS organisations in England.

Participating NHS organisations in England **will be expected to formally confirm their capacity and capability to host this research**.

- Following issue of this letter, participating NHS organisations in England may now confirm to the sponsor their capacity and capability to host this research, when ready to do so. How capacity and capacity will be confirmed is detailed in the *Allocation of responsibilities and rights are agreed and documented (4.1 of HRA assessment criteria)* section of this appendix.
- The Assessing, Arranging, and Confirming document on the HRA website provides further information for the sponsor and NHS organisations on assessing, arranging and confirming capacity and capability.

Principal Investigator Suitability

This confirms whether the sponsor position on whether a PI, LC or neither should be in place is correct for each type of participating NHS organisation in England and the minimum expectations for education, training and experience that PIs should meet (where applicable).

The sponsor has confirmed that a Local Principal Investigator would be required at each participating site and these have already been identified.

GCP training is not a generic training expectation, in line with the HRA statement on training expectations.

HR Good Practice Resource Pack Expectations

This confirms the HR Good Practice Resource Pack expectations for the study and the pre-engagement checks that should and should not be undertaken

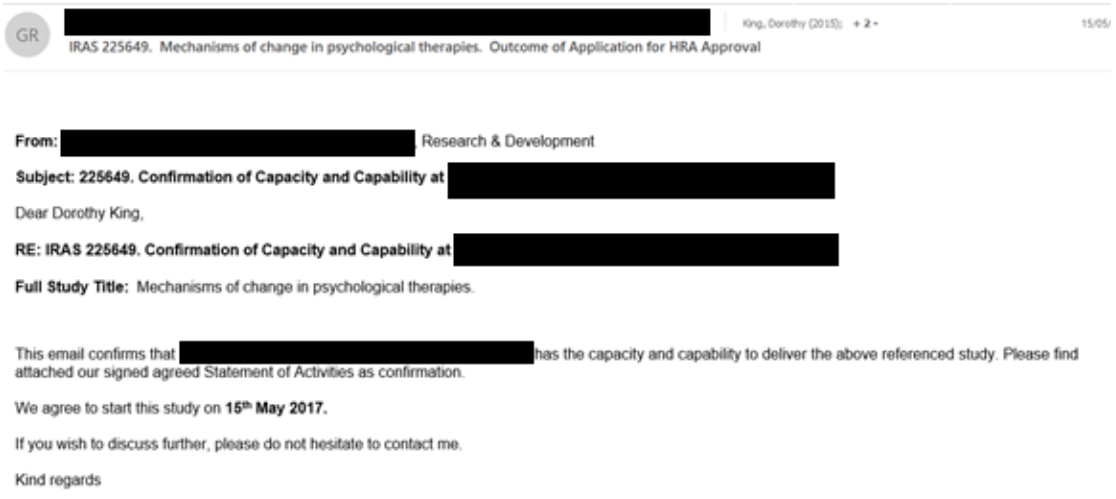
If research staff working on the study do not have an appropriate contract with the research site then they will need a Letter of Access. Disclosure and Barring Service and Occupational Health checks will be needed where a Letter of Access is required.

Other Information to Aid Study Set-up

This details any other information that may be helpful to sponsors and participating NHS organisations in England to aid study set-up.
• The applicant has indicated that they do not intend to apply for inclusion on the NIHR CRN Portfolio. • Following REC review a non-substantial amendment was submitted and the updated documentation has been listed in Appendix A (above).

Appendix 8 – Research and Development Approval

(Service 1)



GR [redacted] King, Dorothy (2015); + 2 - 15/05/

IRAS 225649. Mechanisms of change in psychological therapies. Outcome of Application for HRA Approval

From: [redacted] Research & Development

Subject: 225649. Confirmation of Capacity and Capability at [redacted]

Dear Dorothy King,

RE: IRAS 225649. Confirmation of Capacity and Capability at [redacted]

Full Study Title: Mechanisms of change in psychological therapies.

This email confirms that [redacted] has the capacity and capability to deliver the above referenced study. Please find attached our signed agreed Statement of Activities as confirmation.

We agree to start this study on **15th May 2017.**

If you wish to discuss further, please do not hesitate to contact me.

Kind regards

Appendix 9 – Ethical Approval from NHS REC: Favourable ethical opinion (Service 2)

NHS
Health Research Authority

NRES Committee London - Queen Square
HRA Head Office
Skipton House
80 London Road
London, SE1 6LH

Telephone: 020 7972 2556

23 April 2013

Dr Gary Brown
Senior Lecturer
Royal Holloway University of London
Psychology Department
Egham, Surrey
TW20 0EX

Dear Dr Brown

Study title:	**Identifying anxiety-related attitudes and beliefs: Psychometric properties of the Anxiety Attitude and Belief Scale-2 in a clinical population**
REC reference:	**13/LO/0370**
IRAS project ID:	**124010**

Thank you for your letter of 10th April, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Vice-Chair.

We plan to publish your research summary wording for the above study on the NRES website, together with your contact details, unless you expressly withhold permission to do so. Publication will be no earlier than three months from the date of this favourable opinion letter. Should you wish to provide a substitute contact point, require further information, or wish to withhold permission to publish, please contact the Co-ordinator Mr Thomas McQuillan, thomas.mcquillan@nhs.net.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see

"Conditions of the favourable opinion" below).

Non-NHS sites

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.

Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of approvals from host organisations

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	*Version*	*Date*
Evidence of insurance or indemnity	1	05 February 2013
Investigator CV	Gary Brown	05 February 2013
Letter from Sponsor		25 March 2010
Other: E-mail Confirmation of Sponsor Signatory	1	08 February 2013
Other: Reponses to Points Raised by Solihull Committee		01 March 2013
Other: Interview Schedule	2	10 April 2013
Other: Therapist Interview Schedule	2	10 April 2013
Participant Information Sheet: CI	3	08 February 2013
Participant Information Sheet	4	10 April 2013
Participant Information Sheet: AABS	4	10 April 2013
Participant Information Sheet: Therapists	2	10 April 2013
Protocol	1	06 February 2013
Questionnaire: AABS 48 Item Version	1	05 February 2013

REC application	124010/411093/1/903	04 February 2013
Response to Request for Further Information		
Summary/Synopsis	1	05 February 2013

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document *"After ethical review – guidance for researchers"* gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

Feedback

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

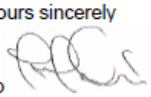
Further information is available at National Research Ethics Service website > After Review

13/LO/0370	**Please quote this number on all correspondence**

We are pleased to welcome researchers and R & D staff at our NRES committee members' training days – see details at http://www.hra.nhs.uk/hra-training/

With the Committee's best wishes for the success of this project.

Yours sincerely



pp
Dr Yogi Amin
Chair
Email:NRESCommittee.London-QueenSquare@nhs.net

Appendix 10 – Research and Development Approval
(Service 2)

noclor NHS

Bedford House, 3rd Floor
125-133 Camden High Street
London, NW1 7JR

Tel: 020 3317 3045
Fax: 020 7685 5830/5788
www.noclor.nhs.uk

29 April 2013

Dr Gary Brown
Senior Lecturer
Royal Holloway University of London
Psychology Department
Egham Surrey
TW20 0EX

Dear Dr Brown,

I am pleased to confirm that the following study has now received R&D approval, and you may now start your research in **the trust(s) identified below**:

Study Title: Identifying Anxiety-related attitude and beliefs: Psychometric properties of the Anxiety Attitude and Belief scale-2 in a clinical population.
R&D reference: 13MHS19
REC reference: 13/LO/0370
Amendment: N/A

This NHS Permission is based on the REC favourable opinion given on **23 April 2013**.

Name of the trust	Name of current PI/LC	Date of permission issue(d)
[redacted]	Dr Geraint Price	29 April 2013

If any information on this document is altered after the date of issue, this document will be deemed INVALID

Specific Conditions of Permission (if applicable)
Site: [redacted]

If any information on this document is altered after the date of issue, this document will be deemed INVALID

Yours sincerely,

Mabel Saili
Senior Research Governance Officer

Cc: Principle Investigator(s)/Local Collaborator(s), Sponsor Contact

noclor NHS
Bedford House, 3rd Floor
125-133 Camden High Street
London, NW1 7JR

Tel: 020 3317 3045
Fax: 020 7685 5830/5788
www.noclor.nhs.uk

May I take this opportunity to remind you that during the course of your research you will be expected to ensure the following:

- **Patient contact:** only trained or supervised researchers who hold the appropriate Trust/NHS contract (honorary or full) with each Trust are allowed contact with that Trust's patients. If any researcher on the study does not hold a contract please contact the R&D office as soon as possible.
- **Informed consent:** original signed consent forms must be kept on file. A copy of the consent form must also be placed in the patient's notes. Research projects are subject to random audit by a member of the R&D office who will ask to see all original signed consent forms.
- **Data protection:** measures must be taken to ensure that patient data is kept confidential in accordance with the Data Protection Act 1998
- **Health & safety:** all local health & safety regulations where the research is being conducted must be adhered to.
- **Serious Adverse events:** adverse events or suspected misconduct should be reported to the R&D office and the Research Ethics Committee.
- **Project update:** you will be sent a project update form at regular intervals. Please complete the form and return it to the R&D office.
- **Publications:** it is essential that you inform the R&D office about any publications which result from your research.
- **Ethics:** R&D approval is based on the conditions set out in the favourable opinion letter from the Research Ethics Committee. If during the lifetime of your research project, you wish to make a revision or amendment to your original submission, please contact both the Research Ethics Committee and R&D Office as soon as possible.
- **Monthly / Annually Progress report:** you are required to provide us and the Research Ethics Committee with a progress report and end of project report as part of the research governance guidance.
- **Recruitment data:** if your study is a portfolio study, you are required to upload the recruitment data on a monthly basis in the website: http://www.crncc.nihr.ac.uk/about_us/processes/portfolio/p_recruitment/
- **Amendments:** if your study requires an amendment, you will need to contact the Research Ethics Committee. Once they have responded, and confirmed what kind of amendment it will be defined as, please contact the R&D office and we will arrange R&D approval for the amendment.
- **Audits:** each year, noclor select 10% of the studies from each service we have approved to be audited. You will be contacted by the R&D office if your study is selected for audit. A member of the governance team will request you complete an audit monitoring form before arranging a meeting to discuss your study.