DEVELOPMENT AND EVALUATION OF A TRANSDIAGNOSTIC INTERNET-DELIVERED COGNITIVE BEHAVIOURAL THERAPY PROGRAM FOR THREE ANXIETY DISORDERS

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The anxiety disorders are common, costly, chronic and frequently co-occur. Despite the existence of effective treatments many people have difficulty accessing evidence-based treatment. Two innovative strategies that may reduce barriers to treatment include internet-delivered cognitive-behavioural therapy (iCBT) and transdiagnostic treatments. iCBT treatments are highly structured interventions, comprising systematically presented online lessons, homework, and supplementary resources. Transdiagnostic treatments target core symptoms underlying conditions such as depression and anxiety disorders, and aim to treat comorbid symptoms. An aim of this thesis was to develop and evaluate a transdiagnostic iCBT intervention, the Anxiety Program, for three anxiety disorders. Using a randomised controlled trial (RCT) design, Study 1 found that treatment using the Anxiety Program was associated with improvement across a range of generic and disorder-specific measures, relative to a waitlist control group. Using an enhanced version of the Anxiety Program, a second RCT (Study 2) demonstrated that the intervention was efficacious for all three disorders and also demonstrated that support by a Coach was at least as efficacious as support from a Clinical Psychologist. Study 3 examined the effect of the Anxiety Program on comorbidity, using data from the second RCT. This final study revealed that participants with comorbid anxiety or depressive disorders demonstrated at least the same magnitude of change as participants without comorbid disorders, and that treatment significantly reduced the overall severity of comorbid disorders as well as number and type of comorbid disorders. Overall across the two RCTs, encouraging outcomes were observed for participants with the three target disorders, and participants rated the Anxiety Program as highly acceptable. These results indicate that transdiagnostic iCBT interventions have considerable potential in improving access to evidence-based treatment.

ORIGINALITY STATEMENT

I hereby declare that this submission is my own work and to the best of my knowledge it contains no materials previously published or written by another person, or substantial proportions of material which have been accepted for the award of any other degree or diploma at UNSW or any other educational institution, except where due acknowledgment is made in the thesis. Any contribution made to the research by others, with whom I have worked at UNSW or elsewhere, is explicitly acknowledged in the thesis. I also declare that the intellectual content of this thesis is the product of my own work, except to the extent that assistance from others in the project's design and conception or in style, presentation and linguistic expression is acknowledged.

Luke James Johnston
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I was fortunate to be part of a team that was developing and testing internet-delivered cognitive behavioural therapy programs for the treatment of individual anxiety disorders and depression. Therefore I was able to avail myself with the resources at the Clinical Research Unit for Anxiety and Depression (CRUfAD), University of New South Wales and St Vincent's Hospital, Sydney, Australia. This included graphical images, content management systems, methods of conducting research trials, and the practical skills of Nickolai Titov who was directing the research program. Associate Professor Titov was the lead author on the first paper published from this thesis, which acknowledges the pre-existing resources of CRUFAD which were made available. For each of the studies reported in this thesis I was responsible for the design of the studies, creation of program content, managing recruitment and provision of treatment, data collation, entry, analysis and interpretation.

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A number of the studies reported in this thesis have been published, accepted for publication, or disseminated as conference presentations as outlined below:

Study 1

Titov, N., Andrews, G., Johnston, L., Robinson, E., Spence, J. (2010). Transdiagnostic Internet treatment for anxiety disorders: A randomised controlled trial. *Behaviour Research and Therapy*, 48, 890-899.

Johnston, L. (April, 2010). *Building an Internet-based transdiagnostic treatment for anxiety disorders*. 33rd Annual Australian Association for Cognitive and Behaviour Therapy Conference, Melbourne, Australia.

Johnston, L. (December, 2010). *An RCT of Internet-based transdiagnostic treatment for anxiety disorders*. 10th Annual Australian Society for Psychiatric Research Conference, Sydney, Australia.

Study 2

Johnston L, Titov, N., Andrews, G., Spence, J., & Dear, B.F. (2011) A RCT of a Transdiagnostic Internet-Delivered Treatment for Three Anxiety Disorders: Examination of Support Roles and Disorder-Specific Outcomes. *PLoS ONE* 6(11): e28079. doi:10.1371/journal.pone.0028079.

Johnston, L. (April, 2011). *Transdiagnostic treatment of anxiety disorders: results from two randomised controlled trials*. 5th Annual International Society for Research on Internet Interventions, Sydney, Australia.

Johnston, L. (September, 2011). Transdiagnostic treatment of anxiety over the Internet: Is non-clinician-support as effective as clinician-support? 41*st* European Association for Behavioural and Cognitive Therapies Congress, Reykjavik, Iceland.

Study 3

Johnston, L. (October, 2011). *The role of comorbidity in transdiagnostic internet-delivered treatment of anxiety disorders: The impact of comorbidity on treatment outcome, and impact of treatment on comorbidity*. 34th Annual Australian Association for Cognitive Behavioural Therapy Conference, Sydney, Australia.

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ABSTRACT

The anxiety disorders are common, costly, chronic and frequently co-occur. Despite the existence of effective treatments many people have difficulty accessing evidence-based treatment. Two innovative strategies that may reduce barriers to treatment include internet-delivered cognitive-behavioural therapy (iCBT) and transdiagnostic treatments. iCBT treatments are highly structured interventions, comprising systematically presented online lessons, homework, and supplementary resources. Transdiagnostic treatments target core symptoms underlying conditions such as depression and anxiety disorders, and aim to treat comorbid symptoms. An aim of this thesis was to develop and evaluate a transdiagnostic iCBT intervention, the *Anxiety Program*, for three anxiety disorders. Using a randomised controlled trial (RCT) design, Study 1 found that treatment using the Anxiety Program was associated with improvement across a range of generic and disorder-specific measures, relative to a waitlist control group. Using an enhanced version of the Anxiety Program, a second RCT (Study 2) demonstrated that the intervention was efficacious for all three disorders and also demonstrated that support by a Coach was at least as efficacious as support from a Clinical Psychologist. Study 3 examined the effect of the Anxiety Program on comorbidity, using data from the second RCT. This final study revealed that participants with comorbid anxiety or depressive disorders demonstrated at least the same magnitude of change as participants without comorbid disorders, and that treatment significantly reduced the overall severity of comorbid disorders as well as number and type of comorbid disorders. Overall across the two RCTs, encouraging outcomes were observed for participants with the three target disorders, and participants rated the Anxiety Program as highly acceptable. These results indicate that transdiagnostic iCBT interventions have considerable potential in improving access to evidence-based treatment.

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CHAPTER ONE
A Review of the Literature

1.1 INTRODUCTION

Anxiety disorders are emotional disorders characterized by symptoms of fear and worry. While the construct of an anxiety disorder as described in diagnostic manuals is a relatively new phenomenon, symptoms of what we now identify as social phobia, generalised anxiety disorder, and panic disorder have been documented throughout history. For example, of social phobia, Hippocrates wrote,

> *"He dare not come into company for he should be misused, disgraced, overshoot himself in gestures and speeches or be sick; he thinks every many observeth him." (1)*

Julius Caesar, commenting on t he experience of generalised anxiety and worry, noted,

> *"As a r ule, what is out of sight disturbs men's minds more seriously than what they see." (2)*

In the 1800s, Christian Nevell Bovee wrote of panic disorder, noting,

> *"Panic is a sudden desertion of us, and a going over to the enemy of our imagination." (3)*

Anxiety disorders are identified as the most common of the psychiatric disorders. Importantly, while effective pharmacological and psychological treatments have been developed for these conditions, epidemiological studies indicate that fewer than half of those afflicted seek treatment in a 12-month period, and that many have difficulty accessing evidence-based treatment.

In recent years two innovative approaches have been proposed for improving access to effective treatments for people with anxiety disorders. One approach involves

improving access to treatment by presenting psychological treatment materials via the internet, often supplemented by telephone or email support from a therapist. The second innovation is the use of transdiagnostic or unified treatment protocols, which aim to target common elements of similar disorders in one treatment protocol. This pragmatic approach offers several potential benefits to patients and clinicians including reduced waiting list times and the potential for patients to concurrently learn to manage comorbid disorders.

At the time of preparing the research plan for this thesis there was emerging evidence to support the efficacy of each of these approaches. A review of the respective literatures indicated that combining internet-delivered cognitive behavioural therapy (iCBT) and transdiagnostic treatments could arguably make a significant contribution to health care for people with anxiety disorders by presenting a treatment protocol that could be used to target multiple disorders, delivered in a convenient manner. With these goals in mind, this thesis aimed to answer the following questions: 1) Can a transdiagnostic treatment, developed to target three anxiety disorders, be efficaciously administered via the internet? 2) Is this intervention acceptable to consumers? 3) What is the relative efficacy of clinical and non-clinical support roles for transdiagnostic internet-delivered treatment? 4) Does this intervention reduce symptoms of both principal and comorbid disorders? The studies described in this thesis attempt to answer these questions.

1.2 ANXIETY DISORDERS

Two widely used and internationally adopted classification systems for differentiating anxiety disorders are the revised fourth edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM-IV-TR) (4) and the tenth edition of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) (5). The DSM-IV-TR and ICD-10 recognise similar anxiety-related syndromes as discrete diagnostic entities (6). For example, both DSM-IV-TR and ICD-10 systems describe *panic-disorder with or without agoraphobia (PDA)* as the recurrent experience of panic attacks and persistent worry about consequences of the attacks and *agoraphobia* as anxiety about situations in which escape may be difficult or embarrassing. *Social phobia (SP)* is characterized in the DSM-IV-TR and ICD-10 as a fear and anxiety resulting from the scrutiny of others, which may lead to avoidance of social situations. *Generalised anxiety disorder (GAD)* is described in the ICD-10 as a

free floating anxiety not restricted to a particular circumstance, and in DSM-IV-TR as excessive worry that is difficult to control, with both systems describing a range of somatic complaints that accompany the heightened emotion. There is, however, some disagreement between the systems in, for example, the duration and number of symptoms required to meet diagnostic criteria for individual disorders (6). Additionally, while the DSM-IV-TR recognises anxiety disorders as a unique category, the ICD-10 uses a broader category of *neurotic, stress-related and somatoform disorders*. This broader ICD-10 category includes both the DSM-IV-TR anxiety disorders and other disorders that are not classified as principal anxiety disorders in the DSM-IV-TR, such as somatoform disorders. Nonetheless, the DSM and ICD systems have considerable pragmatic utility for the recognition of anxiety disorders and are often used interchangeably in clinical practice (7).

1.2.1 Prevalence of Anxiety Disorders

The anxiety disorders are the most common of the mental disorders. For example, 14.4% or 2.3 million Australians met criteria for a 12-month diagnosis of an anxiety disorder as reported in the 2007 National Survey of Mental Health and Wellbeing (NSMHWB), while major depression and substance use disorders affected 4.1% and 5.1% of Australians, respectively (8). Specifically, the 12-month prevalence of panic disorder, agoraphobia, social phobia and generalised anxiety disorder was reported as 2.6%, 2.8%, 4.7% and 2.7%, respectively. Nationally representative survey data from the United States indicate that 18.1% of respondents met criteria for a 12-month anxiety disorder, compared with 9.5% with a mood disorder (9). Data collected from European Study of the Epidemiology of Mental Disorders (ESEMeD) indicate a mean of 8.4% of respondents in nationally representative surveys collected from Belgium, France, Germany, Italy, the Netherlands and Spain met criteria for a 12-month anxiety disorder (10). Japanese (11) and Nigerian (12) epidemiological data indicate that 4.8% and 4.1% of respondents met 12-month criteria for an anxiety disorder, respectively, compared with and 2.9% and 1.0% with MDD, respectively. While prevalence rates in epidemiological surveys vary due to differences in survey methodologies, translation and nuances of language, cultural biases and different attitudes to mental health (10, 13, 14), the anxiety disorders are clearly highly prevalent and affect many people both nationally and internationally.

1.2.2 Cost of the Anxiety Disorders to the Individual and Society

The anxiety disorders are associated with significant human burden, or costs to the individual. For example, anxiety and depression are the leading cause of non-fatal burden of disease in Australia (15). Individuals with an anxiety disorder experience an average of four days of the previous 30 out of role due to symptoms (8), higher than individuals with a substance use disorder or those without a mental disorder, who experience an average of three and one days out of role, respectively (8, 16). European epidemiological data indicate that individuals meeting criteria for an anxiety disorder reported that in 19 of the previous 30 days they were unable to work or perform normal activities or cut back on the quality of work due to symptoms, which is higher than chronic diseases such as diabetes and heart disease (10). A meta-analysis examining disability in epidemiological and treatment seeking samples indicated that individuals with anxiety disorders report a significantly poorer quality of life compared to individuals without a mental disorder, but that no one anxiety disorder was associated with significantly poorer quality of life than another (17).

Anxiety disorders also result in considerable economic burden to society (18). Economic costs of mental disorders may be based on direct medical costs, such as medical visits, hospitalisation, or pharmaceuticals, indirect costs such as production losses due to work loss days and production losses in the domestic sphere, and direct-non medical costs such as social services and transportation to and from services (19, 20). The combined total direct and indirect cost of anxiety disorders to the 25 European Union countries in 2004, plus Iceland, Norway and Switzerland, was estimated at €41 billion annually (19). The same study reported an estimated total cost of €700 per case per annum for the anxiety disorders overall. These costs may under-estimate the true cost of anxiety disorders as the indirect costs in that study were calculated on reduction in workdays due to sick leave only. Moreover, data on resource use outside the health care sector were not available for most mental disorders in the study, although was estimated to be high (19), and the cost of sub-threshold anxiety disorders, which has also been argued to be considerable (20, 21) was not included.

1.2.3 Onset and Chronicity of Anxiety Disorders

Anxiety disorders generally have their onset in childhood, adolescence or early adulthood. Nationally representative US data suggest that, overall, the anxiety disorders have a median age of onset of 11 years (22), while the median age of onset for specific

phobias and separation anxiety is earlier (7 years) than SP (13 years), PDA (24 years), and GAD (31 years). Data from 17 c ountries included in the recent World Health Organisation World Mental Health Surveys are generally consistent with this pattern, and indicate that specific phobias and separation anxiety have an earlier median range of age of onset (7-14 years) than GAD and panic disorder (24-50) (23). However, the onset of anxiety is typically subtle and most individuals experience chronic symptoms before meeting full diagnostic criteria for a disorder (24).

Epidemiological data from retrospective estimates of current and lifetime incidence of anxiety indicate that the anxiety disorders are the most chronic of all mental disorders (25), while an eight year prospective study reported low levels of remission amongst individuals with PDA, SP and GAD (26). Overall, the anxiety disorders rarely follow an episodic pattern (24), and are unlikely to spontaneously remit if left untreated (27).

1.2.4 Comorbidity

Epidemiological surveys demonstrate that comorbidity, or the co-occurrence of two or more disorders, is common for anxiety disorders. For example, the 2007 NSMHWB indicated that 25.4% of the Australian population who met criteria for one disorder simultaneously met criteria for at least one other mental disorder (28). Of the 25.4% of individuals who were met criteria for more than one disorder, the highest rates of comorbidity were between anxiety and affective disorders (58.5%). A similar pattern of results was obtained by US epidemiological data from the NCS-R study which indicate that 45% of respondents meeting criteria for one disorder also met criteria for another mental disorder, with the highest rate of comorbidity between the 12-month anxiety disorders and depression (9). Likewise, the ESEMeD data indicate the highest rates of 12-month prevalence of comorbid mental disorders in Europe occurred between anxiety and mood disorders (10).

1.2.5 Summary

The anxiety disorders are the most common mental disorder in many Western and non-Western countries and are associated with high costs to the individual and to society. They have an early onset, chronic course and are frequently comorbid. This makes them an important target for treatment. Before discussing access to treatment and efficacy of recent innovations in the treatment of anxiety, additional characteristics of

the anxiety disorders will be considered, including similarities between the anxiety disorders.

1.3 SIMILARITIES BETWEEN THE ANXIETY DISORDERS

Converging lines of research provide a strong rationale for grouping the anxiety disorders under one classification. This evidence is discussed below, and includes evidence for the heritability of anxiety disorders, similarity in maintaining factors, theoretical models of anxiety disorders, vulnerabilities underlying anxiety disorders, and homogeneity of response to treatment.

1.3.1 Heritability of Anxiety Disorders

Twin studies have revealed genetic factors are associated with an increased risk of developing an anxiety disorder. For example, pioneering research sampling an Australian population-based twin registry reported higher levels of concordance between monozygotic twins and dizygotic twins than would be expected if there were no genetic association (29). The study raised questions about whether or not the genetic risk for anxiety disorders was specific to individual disorders or common to anxiety disorders in general. More recent research supports the latter argument, that there are shared genetic bases common to many anxiety disorders (30). Analyses of a US population-based twin-registry demonstrated a genetic vulnerability that clusters the anxiety disorders together, and distinguishes them from substance use/dependence and conduct disorder (31). More specifically, re-analysis of the data suggest there is a common genetic factor underlying GAD and PDA that is separate from a genetic factor underlying animal and situational phobia (32). While SP fell between these two factors in the study, it was more strongly associated with GAD and PDA. However, it remains unclear if the shared genetic risk underlying the aforementioned anxiety disorders also underlies posttraumatic stress disorder (PTSD) and obsessive-compulsive disorder (OCD).

The argument that anxiety disorders are heritable is also supported by familial studies. These studies show that anxiety disorders occur as a result of family environment as well as common genetics (33). First degree relatives appear to be at high risk of developing the same anxiety disorder as their affected relative, with increased risk for panic disorder, GAD, social phobia, specific phobias and agoraphobia with odds-ratios ranging from 4.1 to 6.1 (34). Comorbidity of anxiety disorders may also be

familial, evidenced by offspring of parents with generalised SP or GAD being at greater risk for developing either disorder, or both disorders, when compared with offspring of parents who did not meet criteria for an anxiety disorder (35). While these studies provide converging lines of evidence for a number of anxiety disorders, the familiality of some anxiety disorders appear somewhat weaker. For example, evidence from individual studies examining the familiality of OCD is inconsistent (36) and the trend towards familiality of OCD emerges only after pooling data (34). Thus, while the evidence regarding OCD is equivocal, there is stronger evidence for the familiality of anxiety disorders such as panic disorder, GAD and social phobia. This has led some authors to argue that some anxiety disorders share a similar origin (37).

1.3.2 Factors Maintaining Anxiety Disorders and Theoretical Models

1.3.2.1 Factors Maintaining Anxiety Disorders

Consistent with arguments that some anxiety disorders share a similar origin (37), it is also argued that some anxiety disorders are maintained by similar factors (38). Commonly reported maintaining factors for the anxiety disorders include cognitive processes, dysfunctional behaviours and physiological arousal. Each of these maintaining factors will be described below, followed by a brief discussion of theoretical models that describe the relationship between these factors.

The notion that anxiety disorders are maintained by similar cognitive factors has origins in pioneering work by Beck (39). Beck proposed that maladaptive beliefs, judgments and memories influence how an individual perceives themselves, their world and future (40). This model was subsequently applied to individual anxiety disorders and the 'disorder specificity' hypothesis posited that each disorder has its own specific cognitive conceptualization (41). However, more recent research suggests there is considerable overlap between cognitive process that maintain anxiety disorders (42). For example, in a study examining specificity of cognitive processes in panic disorder and GAD, participants with either diagnosis were equally affected by positive beliefs about worry, poor problem orientation or cognitive avoidance (43). Intolerance of uncertainty appears to strongly correlate with measures of symptom severity for PDA, SP, GAD a nd OCD (44). Additionally, metacognitions have been argued to be a maintaining factor for GAD and SP (45). These studies suggest that not only do cognitive processes, in general, maintain anxiety disorders, but that anxiety disorders may in fact share common cognitive processes.

The anxiety disorders are also maintained by dysfunctional behaviours. Influential work by Rachman (46) posited that anxiety disorders are maintained by avoidance and escape behaviours. Avoidance behaviours prevent exposure to the feared stimuli. Escape or safety behaviours are physical actions or mental acts (47) that aim to shorten or dilute unavoidable exposure to feared stimuli. As a result of these behaviours the individual fails to learn how to distinguish between stimuli that are dangerous or not, and how to cope appropriately when faced with anxiety and discomfort (46).

Avoidance behaviours may be highly idiosyncratic to an individual, but each disorder is typically associated with a characteristic pattern. Examples include: Refraining from social or performance situations in SP (48); avoidance of places or situations in which escape would be difficult or embarrassing, such as travelling alone in crowded areas in PDA (49); and, overly risk aversive or protective behaviour (50) or thought suppression (51) in GAD. Safety behaviours are also diverse between individuals but similar within disorders and examples of their clinical presentation include: Reducing eye contact, avoiding pauses while talking and monitoring ones' speech in SP (52, 53); holding on to an object or person when experiencing symptoms of panic in PDA (49), and; excessive reassurance-seeking (54) or using worry to distract from more troublesome or distressing thoughts (55) in GAD. Thus, while the specific actions exhibited by individuals may vary based on di agnosis, the behaviours of avoiding anxiety provoking stimuli and engaging in safety behaviours when faced with unavoidable exposure to feared stimuli are common to the maintenance of anxiety disorders (48).

Lastly, the anxiety disorders are also associated with physiological hyperarousal (56). Individuals with anxiety often present with symptoms of physiological arousal such as increased heart rate or palpitations, breathing irregularities, increased sweat gland activity, muscle tension, increased blood pressure and gastrointestinal activity (57). These physical symptoms can culminate in panic attacks, which are not specific to any individual anxiety disorders (4). This physiological hyperarousal has been argued as a largely sympathetic nervous response to prepare an individual *for* exposure to anxiety provoking stimuli, or as a fight or flight *reaction to* the stimuli (58). While the experience of particular symptoms may vary between individuals and anxiety disorders, the experience of physiological hyperarousal appears to be common between anxiety disorders.

1.3.2.2 Theoretical Models of the Anxiety Disorders

There are multiple theoretical models for each of the anxiety disorders that describe the relationship between these maintaining factors. For example, cognitive behavioural therapy (CBT) models of PDA posited by Clark (59), Bandura (60) and Beck (40), propose multi-directional pathways between thoughts, escape and avoidance behaviours and physiological hyperarousal. Principal differences between the theories centre on the role of cognitions, specifically the catastrophic misinterpretation of bodily sensations (59), self-efficacy and the ability to cope with threat (60), and perception of vulnerability (40). Cognitive and behavioural theoretical models of SP often propose a multidirectional relationship between thoughts, escape and avoidance behaviours as well as physical maintaining factors (61-63). Key differences between these models concern the emphasis on cognitive factors, such as dysfunctional beliefs (61), self-focus (63) or discrepancy between ones' mental self-representation and the expectations of others (62). Cognitive and behavioural models of GAD also propose a relationship between cognitions, physical arousal, and escape and avoidance behaviours which often take the form of cognitive avoidance (64) and perfectionism (39). Examples of this include models proposed by Borkovec (55, 65), Dugas (66, 67), and Wells (68, 69). Despite similarities between these models, important differences exist, including the role of cognitive avoidance (55, 65), intolerance of uncertainty and problem orientation (66, 67), as well as positive and negative beliefs about worry, and worry about worry (68, 69).

Barlow and colleagues have proposed a unified approach to psychopathology that emphasises what is common between disorders, rather than what is different (39). Extending this model to treatment, the unified approach targets the common maintaining factors for emotional disorders and comprises three fundamental components: Altering antecedent appraisals; preventing emotional avoidance, and; modifying action tendencies (39, 70). Altering antecedent appraisals involves the use of cognitive strategies to challenge maladaptive thoughts about internal sensations, including physiological sensations and emotions, and perception of external threat (39, 71). While Barlow and colleagues recognise that maladaptive cognitions may occur before or after exposure to anxiety provoking stimuli, they emphasise the importance of targeting appraisal before heightened levels of anxiety as altering antecedent appraisals facilitates the other components of a unified treatment (39). Preventing emotional avoidance is undertaken to reduce and prevent an individual's avoidance of excessive

and unexpected emotions, such as fear and anxiety (39, 71). This takes the form of reducing an individual's reliance on behaviours such as cognitive rituals, distraction or suppression, which individuals might use to avoid exposure to physical experience of anxiety symptoms or distressing emotional states. Lastly, modifying action tendencies is the process of teaching skills and behaviours that are inconsistent with disordered emotional states, and promotes healthy behaviours that strengthen the individual's sense of control and ability to cope with disordered emotions (39, 71). Barlow and colleagues state that this might take the form of approaching the feared situation in the case of phobias such as social phobia, agoraphobia or specific phobias, the prescription of *non-perfect* behaviours in GAD, or behavioural activation to target lower mood.

The rationale underlying the treatment components of Barlow's unified theory is consistent with the aforementioned maintaining factors and disorder-specific theoretical models of treatment including Beck's model of PDA (61), Clark and Well's model of SP (63), and Well's model of GAD (68, 69). Barlow and colleagues also advocate prevention of emotional avoidance, which is consistent with both Rachman's (46) construct of escape behaviours, and the multidirectional relationship between the maintaining factors described in the aforementioned theoretical models of PDA, SP and GAD. Lastly, Barlow and colleagues (39) theorise that facilitating action tendencies are fundamental to treatment to help an individual act in new ways that are inconsistent with disordered emotion. This process is also consistent with Rachman's (46) construct of avoidance behaviours, and with the aforementioned theoretical models of PDA, SP and GAD.

Testing the validity of each of these models with respect to transdiagnostic treatment is beyond the scope of this thesis. However, it is important to note that both disorder-specific and unified CBT models of anxiety propose that the ongoing experience of anxiety is maintained by maladaptive cognitive processes, dysfunctional behaviours, and experience of physiological arousal (45).

1.3.3 Vulnerabilities Underlying the Anxiety Disorders

An early argument to explain the high rates of comorbidity between the anxiety disorders, and depression, was that individual anxiety disorders are alternate expressions of an underlying psychopathological construct (72). Initial evidence for this argument was provided by examining correlations between 10 common mental disorders reported in a longitudinal study of a New Zealand birth cohort (72). Confirmatory factor analyses indicated that the correlations between the anxiety disorders and depression were best explained by a single underlying factor, labelled an 'internalising' factor. Moreover, the correlations between substance use disorders and conduct disorder were best explained by a separate factor, labelled an 'externalising' factor. This internalizing/externalizing factor structure has been replicated using confirmatory factor analyses to examine correlations between common mental disorders reported in epidemiological data from the United States of America (73), the Netherlands (74), Australia (75) and 14 W estern and non-Western countries (76). Structural equation modelling undertaken to examine the factor structure of various mental disorders resulted in the identification of a single internalising factor underlying anxiety and depression that correlated so strongly with neuroticism (r = .98) as to encourage some to argue that "it might be thought that the personality trait of neuroticism is the single characteristic common to anxiety and depression" (77, p. 1131). Unfortunately, a number of anxiety disorders including PTSD, OCD and Anxiety Disorder Not Otherwise Specified were omitted from several of these studies (73, 74, 76), but the existing work provided converging evidence for the argument that several anxiety disorders including GAD, SP, PDA and depression may share an underlying common vulnerability (33).

1.3.4 Response to Treatment

Another important area of similarity between the anxiety disorders is response to treatment, including pharmacological and psychological treatments.

A wide range of pharmacotherapies are used for treating anxiety disorders including selective serotonin reuptake inhibitors (SSRIs), serotonin/norepinephrine reuptake inhibitors, tri-cyclic antidepressants and monoamine oxidase inhibitors, benzodiazepines, anti-convulsants and anti-psychotics (78). SSRIs are a recommended medication for the treatment of anxiety (79), and are generally preferred over other pharmacotherapies due to their favourable side-effect profile, tolerability to consumers,

and superior efficacy (80). Meta-analyses of placebo-controlled trials for the treatment of SP using SSRIs demonstrate the superiority of SSRIs to placebo-control in the short term (Hedge's *g* = .65) (81). Consistent with this, effect size analyses of double-blind placebo-controlled trials for PDA (82) and GAD (83) have demonstrated significant improvement in response to SSRI treatment (Cohen's *d* = .55 and *d* = .36, respectively). This similarity in response to treatment has led some authors to argue that the serotonergic pathways targeted by SSRI medications are a common vulnerability shared between the anxiety disorders (84). Given that pharmacotherapies are not the focus of this thesis they will not be discussed further.

Several psychological treatments have been developed for the treatment of anxiety disorders, with CBT having been the focus of the most research (85). CBT manuals have been developed for each of the anxiety disorders (86-89), and are based on similar principles and techniques (90). For example, cognitive symptoms of anxiety are targeted with techniques such as identifying maladaptive thoughts, challenging negative thinking, cognitive reframing, and challenging beliefs, while behavioural symptoms are often targeted with techniques such as exposure, behavioural experiments, and social skills training (91). Physical symptoms are often targeted with relaxation strategies such as progressive or passive muscle relaxation, breathing retraining or biofeedback (92). The inclusion of relaxation strategies in CBT is somewhat contentious as some authors argue that the techniques may attenuate treatment for some disorders, such as PDA (93). Nonetheless, CBT has been demonstrated as superior to no-treatment/waitlist control conditions. For example, meta-analyses demonstrate moderate effect sizes for the treatment of GAD (Hedge's *g* = .64) (94) and SP (Cohen's *d* = .70) (95), and large effect sizes for the treatment of PDA (Hedge's *g* = .87) (96). Significant, yet lower effect sizes are reported in studies comparing CBT with placebo controls. Meta-analyses demonstrate significant effects of CBT for GAD (Hedge's *g*s = .44 - .57), PDA (Hedge's *g*s = .23 -.49) and SP (Hedge's *g*s = .43 - .94) (91). These studies show that CBT treatments for anxiety disorders result in similar clinical outcomes, suggesting they may be addressing non-specific cognitive and behavioural factors across disorders.

1.3.5 Summary

Several lines of evidence indicate important similarities between anxiety disorders, including heritability of the disorders, symptomatology, and response to treatment. The strength of data regarding OCD, PTSD and specific phobias and their similarity to the other anxiety disorders is less well established due to their omission in a number of key studies. These conclusions do not indicate that the anxiety disorders are the same; rather they provide evidence for the assertion that what is common between the anxiety disorders may outweigh what is different (33). This approach has important implications for nosology, epidemiology and assessment. Focussing on the similarities, rather than differences, between anxiety disorders, also has important implications for the development for new psychological treatments, which will be the focus of Section 1.6. However, before discussing the efficacy of recent innovations in the treatment of anxiety, it is important to discuss access and barriers to effective care for the anxiety disorders.

1.4 ACCESS AND BARRIERS TO EFFECTIVE TREATMENT FOR ANXIETY DISORDERS

1.4.1 Access to Effective Care

Although effective treatments exist, many consumers do not receive evidence-based treatments (97). The treatment gap, that is, the difference between the proportion of people who require care and the proportion of those who receive treatment (98), is considerable, and is influenced by a number of factors including the delay of treatment seeking, the availability of evidence-based treatment, and barriers to treatment (98).

Many individuals with an anxiety disorder delay seeking treatment following initial onset of symptoms. For example, data from the United States, United Kingdom, Italy, South Africa, Switzerland, Austria, Sweden, France, Argentina, Belgium and Venezuela indicate that the average delay before seeking treatment for consumers is eight years (99). This delay in treatment seeking is an important health issue given that untreated illnesses become more severe, more treatment resistant and are associated with increased likelihood of developing comorbidity (100).

Unfortunately, many individuals who do seek treatment do not subsequently receive evidence-based care. For example, data reported in a n ationally representative Australian survey indicate that 39.1% of individuals with PDA, 20.8% with SP, and 39.6% with GAD were engaged with any health service over the past 12-months (101).

Of the individuals engaged with a health service, 60.8% of individuals with principal PDA, 32.2% with SP, and 54.5% with GAD received an evidenced-based intervention, defined as medication or CBT. Expressed differently, one in three to four individuals with PDA or GAD, and one in 15 with SP, were categorised as receiving evidence-based treatment. Low rates of access to adequate mental health services were also reported in a survey of six European countries participating in the ESEMeD study (102), while low rates of access to evidence-based care are also reported in lower-income non-Western countries (103). These studies provide evidence of a high level of unmet need for anxiety disorders nationally and internationally.

1.4.2 Barriers to Effective Care

Several factors have been identified as barriers to receiving evidence-based treatments. These include: Financial barriers, which affect affordability of treatment (104); geographic barriers of distance to services (105), especially in rural areas where consumers have to travel considerable distances to access effective mental health care (106); public and self-stigma surrounding mental health (107, 108); and minimising or not recognising a need for treatment (109). A further difficulty in providing effective care for service providers is that the fidelity of treatment can be compromised by deviating from the treatment protocols or adapting it to untested treatment settings (110). Even in the event of offering a manualised treatment in a tested population, the cost of disseminating effective treatments is high (111) and there are often workforce shortages and limited number of adequately trained professionals to sufficiently implement the treatment (105). Consequently, there is considerable interest in innovative treatments that have the potential to overcome barriers to treatment. Two recent approaches that have considerable potential for improving access to evidence-based care are internet-delivered cognitive behavioural therapy (iCBT) and transdiagnostic treatments. iCBT for anxiety disorders will be discussed in Section 1.5. Transdiagnostic treatments for anxiety disorders will be discussed in Section 1.6.

1.5 INTERNET-DELIVERED COGNITIVE BEHAVIOURAL THERAPY FOR ANXIETY DISORDERS

1.5.1 Definitions

For the purpose of this thesis, iCBT treatments are defined as "highly structured interventions, comprising systematically presented online lessons, homework, and supplementary resources" (112, p. 18). iCBT can be administered as guided, self-guided or purely self-guided treatments. Guided iCBT treatments include contact between participants and clinicians throughout treatment, during which clinicians provide support and encouragement, answer questions, and provide feedback and direct therapeutic activities (113). Contact may occur via several media such as email, telephone, and online forums. Guided iCBT treatments typically provide clinician-support (114-118), although there is emerging evidence for the efficacy of non-clinical or Coach-support roles which provide encouragement and support without offering clinical advice (119, 120). Self-guided, or self-help treatments, include contact with clinicians before or after treatment for the purposes of diagnostic interviews, but not during treatment (121). Purely self-guided, or pure self-help treatments, are those typically used in open-access websites, where consumers can register and complete a program with no contact with clinicians or service providers before, during or after treatment.

1.5.2 Advantages of iCBT

While not without limitations, iCBT appears to offer several advantages over traditional treatment modalities. First, iCBT has the capacity to increase access to effective care where specialist psychological services might not be available, especially in rural and remote areas (122). Second, iCBT may increase convenience for consumers by reducing need to travel to and from appointments, and allow them to work through treatment in their own time independently of appointments with a therapist (123). Third, iCBT has the capacity to result in comparable outcomes to face-to-face treatment while requiring considerably less therapist time (124, 125). Fourth, iCBT may be associated with lower direct, indirect, and total costs, than face-to-face treatment (126). Fifth, iCBT has the potential to maintain a high level of treatment fidelity (112). Sixth, iCBT may afford anonymity to consumers who experience stigma or shame as a barrier to treatment (127). Given these potential advantages, there is increased interest in the use

of the internet to provide healthcare for the treatment of many disorders, including the anxiety disorders, which is the focus of the next section.

1.5.3 Efficacy of iCBT Treatments for Social Phobia, Panic Disorder With or Without Agoraphobia and Generalised Anxiety Disorder

The efficacy of iCBT treatments has been examined using several research designs including RCTs, open trials and case studies. To date, the efficacy of iCBT for SP has been examined in one open trial (128) and four case studies (129-132). The efficacy of iCBT for PDA has been examined in one naturalistic observation (133) and six open trials (127, 134-138). The efficacy of iCBT for GAD has been examined in one report of three case studies (139). In addition to open trials and case studies, several meta-analyses (123, 140, 141) have supported the efficacy of guided iCBT interventions for the anxiety disorders, but for purposes of discussion, the following sections will review the results of RCTs only[1].

1.5.3.1 iCBT for Social Phobia

The efficacy of iCBT for SP has been examined in 13 RCTs, representing four independent research groups, and are summarised in Table 1.1. As indicated in Table 1.1, a wide range of research designs have been evaluated, including examination of the efficacy of therapist-guided iCBT treatment relative to waitlist control conditions, the relative efficacy of guided and self-guided treatments, the relative efficacy of different support roles in guided iCBT, and the efficacy of iCBT relative to other treatments. The studies examining these empirical questions will be discussed below.

1.5.3.1.1 iCBT for Social Phobia vs. Waitlist Control Studies

Results from RCTs examining the efficacy of iCBT for SP consistently support the superiority of guided iCBT relative to waitlist control conditions. For example, the first RCT to examine iCBT treatment for SP demonstrated that participants completing a nine-module treatment over nine weeks who received email contact with a clinician throughout treatment, significantly improved from pre- to post-treatment (d = 1.16) and

[1] Estimates of effect size provided throughout this section are reported as per the original published article. Where estimates of effect size were not published for treatment and/or comparison groups, but able to be computed based upon the reported data, Cohen's d was calculated based on the pooled standard deviation. Within-group effects were independently calculated for nine studies (114, 115, 123, 141, 156, 157, 159, 161, 164). Between-group effects were calculated for the ten studies (114, 115, 120, 123, 148, 157, 160-162, 164).

reported significantly lower symptom severity (d = .47) when compared with a waitlist control group on the Social Interaction Anxiety Scale (SIAS) (142). Using the same design, but modifying the protocol to consist of five modules and adding once-weekly telephone calls, the same research group reported that treatment resulted in significant and large within-group effects (d = 1.16) and between-group effects (d = 1.31) when compared to waitlist controls on the SIAS (143). Similar results have been reported in studies by other research teams using a similar research design. For example, Swiss researchers reported that guided iCBT results in large within-group (d = .82) and between-group (d = .89) effects on the Liebowitz Social Anxiety Scale (144). Australian researchers have similarly reported that iCBT is associated with large within-group (d = 1.21 – 1.24) and between-group (d = .86 – 1.29) effects, as measured by the SIAS (145, 146). Importantly, post-treatment gains are reported as extending beyond the end of treatment and have been reported as stable at six months (147, 148), 12 months (142, 143, 149), 30 months (150), and five years (151).

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Table 1.1

Summary of Published Randomised Controlled Trials Examining the Efficacy of Internet-Delivered Cognitive Behavioural Therapy Treatments for Social Phobia

Study	Condition	*n*	Measure	Effect size		Follow-up	Contact time
				Within	Between		
Andersson et al (2006)	iCBT	32	SIAS	*d* =1.16	*d* =.47	6 months	180 min
	Waitlist	32		*d* =.87†	-	-	-
Carlbring (2007)	iCBT	29	SIAS	*d* = 1.16	*d* =1.31	30 months	150 min
	Waitlist	28		*d* = -.05	-	-	-
Titov et al (2008a)	iCBT	50	SIAS	*d* = 1.24	*d* =.86	-	125 min
	Waitlist	55		*d* = .31	-	-	-
Titov et al (2008b)	iCBT	41	SIAS	*d* = 1.21	*d* = 1.29	-	127 min
	Waitlist	40		*d* = .10	-		
Titov et al (2008c)	iCBT	31	SIAS	*d* = 1.47	*d* = 1.16 (Waitlist) *d* = .64 (SGiCBT)	-	168 min
	SGiCBT	30		*d* = .38	*d* = .34 (Waitlist)	-	-
	Waitlist	34		*d* = -.07	-	-	-
Titov et al (2009a)	iCBT	42	SIAS	*d* = 1.56	*d* = -.18	-	38 min
	iCBT+CO	43		*d* = 1.47		-	37 min
Titov et al (2009b)	iCBT+CO	42	SIAS	*d* = 1.41	*d* = .30	-	38 min
	SGiCBT	43		*d* = .98			-
Berger et al (2009)	iCBT	31	SIAS	*d* = .76	*d* = .84	-	^
	Waitlist	21		*d* = .32	-		
Furmark et al (2009) Study 1	iCBT	40	SIAS	*d* = .85	*d* = .47 (Waitlist)† *d* = -.05 (BiB)†	12 months	^
	BiB	40		*d* = .67	*d* = .45†	12 months	^
	Waitlist	40		*d* = -.01	-	-	-

Furmark et al (2009) Study 2	iCBT	29	SIAS	*d* = 1.03	*d* = .03 (BiB)† *d* = -.14 (SGBiB)† *d* = .23 (AR)†	12 months	^
	BiB	29		*d* = 1.06		12 months	^
	SGBiB	28		*d* = .65		12 months	^
	AR	29		*d* = .82		12 months	^
Titov et al (2010)	SGiCBT	55	SIAS	*d* = 1.16	*d* = .15†	-	-
	SGiCBT MI	53		*d* = 1.15		-	-
Hedman et al (2011)	iCBT	64	LSAS	*d* = 1.42	*d* = .41	6 months	82 min
	GCBT	62		*d* = .97		6 months	750 min
Andrews et al (2011)	iCBT	17	SIAS	*d* = .76†	*d* = -.01†	-	18 min
	GCBT	14		*d* = .91†		-	240 min
Berger et al (2011)	iCBT	27	SIAS	*d* = 1.51	*d* = .13 (iCBT!) *d* = .12 (SGiCBT)	6 months	^
	iCBT!	27		*d* = 1.44		6 months	^
	SGiCBT	27		*d* = 1.64		6 months	^

Note. † Denotes no effect size reported in published study. Where estimates of effect size were not published for treatment and/or comparison groups, but able to be computed based upon the reported data, Cohen's *d* was calculated based on the pooled standard deviation. ^ Denotes insufficient data. ! Denotes internet-delivered cognitive behavioural therapy with the option to 'step up' level of contact with researchers. iCBT: Clinician-supported iCBT. iCBT+CO: Coach-supported iCBT. SGiCBT: self-guided iCBT. BiB: Guided bibliotherapy. SGBiB: Self-guided bibliotherapy. MI: motivational interviewing techniques. GCBT: Group-delivered cognitive behavioural therapy. AR: Applied relaxation. SIAS: Social Interaction Anxiety Scale. LSAS: Liebowitz Social Anxiety Scale.

1.5.3.1.2 Self-Guided iCBT for Social Phobia

Studies examining the efficacy of self-guided iCBT have produced mixed results. Two studies found that self-guided iCBT yielded results that were not statistically different to those reported by waitlist controls. For example, one study reported that guided iCBT was associated with significant between-group effects when compared with self-guided iCBT (d = .64) and waitlist controls (d = .99) on the SIAS, but that the difference between self-guided iCBT and waitlist controls was not significantly different (152). Similarly, another study reported that self-guided iCBT was associated with small within-group improvements (d = .29) that were not significantly different to those achieved by the waitlist control comparison group on the Brief version of the Fear of Negative Evaluation scale (153). It should be noted, however, this latter protocol was specifically designed for the treatment of fear of public speaking, rather than treatment of SP in general, and the protocol did not encourage in vivo exposure exercises between treatment sessions (130).

Four studies have, however, reported that self-guided iCBT resulted in significant reductions in SP symptoms. For example, one study attempted to improve the efficacy of the aforementioned self-guided protocol (152) by using automatically generated emails that encouraged participants to engage in the online treatment (154). This new protocol was then compared with guided iCBT. While the new self-guided treatment appeared less efficacious than guided iCBT, participants in both the guided and self-guided conditions achieved significant and large within-group effects (d = 1.41 and d = .98, respectively), although the guided group obtained significantly lower SIAS scores at post-treatment than the self-guided group (d = .30). This modified self-guided protocol was subsequently used in a study examining the relative efficacy of self-guided iCBT with and without additional motivational interviewing (121). At post-treatment, within-group analyses showed that self-guided iCBT with and without motivational interviewing was associated with significant and large within-group effects (d = 1.15 and d = 1.16, respectively), and non-significant between-group effects (d = .15).

Offering peer-to-peer contact is another method of supplementing self-guided treatments without requiring any clinician time. In one study, three treatment groups were offered iCBT with access to an online forum that was not moderated by a clinician and as such did not require any clinician time (148). One group received this treatment only. Another group was additionally offered email contact with a therapist throughout treatment, and the remaining group received optional email and telephone contact with a

therapist throughout treatment. Post-treatment analyses demonstrated significant and large within-group effects for each of the treatment groups (d = 1.44 - 1.64) and non-significant between-group effects for the treatment groups as measured by the SIAS (d range = .01 - .08).

1.5.3.1.3 Coach-Supported iCBT for Social Phobia

The efficacy of coaching (non-clinical) support roles in guided iCBT has been supported by results of two studies. One study examined the relative efficacy of Clinician-supported iCBT, offered as access to a clinician moderated forum, and Coach-supported iCBT, offered as once weekly telephone contact (155). Post-treatment analyses indicated significant and large within-group effects for both Clinician-supported (d = 1.56) and Coach-supported (d = 1.47) iCBT. Importantly, the study found no significant difference between Clinician- or Coach-supported groups in post-treatment outcomes (d = .18), or mean contact time per participant. The efficacy of the Coach-supported condition was replicated in a later study which reported significant within-group effects (d = 1.41), and between-group effects (d = .30) when compared to the aforementioned self-guided treatment supplemented with automatically generated emails (154).

1.5.3.1.4 Relative Efficacy of iCBT, Self-Help, and Face-to-Face Treatments for Social Phobia

Several RCTs have examined the efficacy of guided iCBT for SP relative to other treatments including other forms of guided and self-guided self-help, and face-to-face CBT treatments. These studies will be discussed below.

Results from two RCTs indicate that iCBT is as at least as efficacious as other forms of guided and self-guided self-help. In one RCT with three parallel groups, post-treatment analyses indicated that guided iCBT was associated with significant and large within-group effects (d = .85), self-guided bibliotherapy resulted in significant moderate effects (d = .67), and a waitlist control condition resulted in non-significant and small effects (d = .01) (149). Between-group post-treatment analyses revealed significantly greater symptom reduction for both guided-iCBT and self-guided bibliotherapy when compared with waitlist control (d = .47 and d = .45, respectively), and a non-significant difference between guided iCBT and self-guided bibliotherapy conditions (d = .05). These findings were replicated in an extension of the trial, whereby guided iCBT was

associated with significant and large within-group effects (d = 1.03), and small non-significant between-group effects when compared with guided bibliotherapy (d = -.03), self-guided bibliotherapy (d = .14) and applied relaxation (d = .23) (149).

Results of two RCTs indicated that guided-iCBT may be as efficacious as group face-to-face CBT in treating SP. One study demonstrated that participants completing guided iCBT or group CBT, which comprised 15 weeks of group face-to-face CBT, was associated with significant and large within-group effects (d =1.42 and d = .97, respectively) and non-significant small between-group effects favouring iCBT treatment (d = .41) on the Liebowitz Social Anxiety Scale (125). Positive outcomes were reported in another study in which participants completed a six-lesson iCBT treatment over eight weeks or a seven week face-to-face group-CBT treatment (124). Both treatment groups significantly improved from pre- to post-treatment, with moderate and large effects for the iCBT and group CBT conditions (d = .76 and d = .91, respectively), and post-treatment analyses demonstrated a non-significant difference between groups (d = .01) on the SIAS. The iCBT and comparison face-to-face conditions in each of the RCTs did not contain identical treatment, limiting conclusions about the relative efficacy of iCBT and face-to-face delivery of the one treatment protocol. Nonetheless, these studies provide support for the argument that guided-iCBT compares favourably to group face-to-face CBT.

1.5.3.1.5 Summary of iCBT for Social Phobia

There is strong evidence that iCBT is efficacious for the treatment of SP (142-146), and that gains made at post-treatment are maintained following the end of treatment (142, 143, 147-151). Initial attempts to create self-guided treatments had limited success (152, 153), but more recent attempts that provided contact in the form of automatically generated emails (121, 154) or peer-to-peer contact (148) are associated with considerable symptom reduction. There is emerging evidence that Coach-supported and Clinician-supported iCBT results in similar outcomes, raising the prospect of future exploration of different dissemination models of iCBT (154, 155). Lastly, there is encouraging evidence that guided iCBT results in reductions of symptoms that are at least as efficacious as those achieved by other forms of guided and self-guided self-help (149) or group face-to-face CBT (124, 125).

As seen in Table 1.1, RCTs examining the efficacy of iCBT for SP show that guided iCBT is consistently associated with large (d = .85 – 1.56) within-group effects,

moderate to large between-group effects relative to controls, and small to moderate between-group effects relative to active treatments on measures of SP. Follow-up data indicate that post-treatment gains are generally sustained in the short- and long-term. The amount of contact time in earlier iterations of iCBT treatments is longer than in later iterations, although there does not appear to be a clear relationship with outcome.

1.5.3.2 iCBT for Panic Disorder With or Without Agoraphobia

The efficacy of iCBT for PDA has been examined in 12 RCTs, conducted by four different research groups, and are summarised in Table 1.2. As shown in Table 1.2, a number of research designs have been assessed, including examination of the efficacy of therapist-guided iCBT treatment of relative to waitlist control conditions, the efficacy of guided treatment when different levels of contact are provided, and the efficacy of iCBT when supplemented with stress-management techniques. They have also examined the efficacy of iCBT relative to guided self-help and face-to-face treatments.

1.5.3.2.1 iCBT for Panic Disorder With or Without Agoraphobia vs. Waitlist Control Studies

RCTs comparing guided iCBT with a waitlist control group have consistently indicated that online treatment of PDA is efficacious. In one of the first RCTs examining iCBT treatment for PDA, Australian researchers reported that participants completing a two-module treatment over two weeks, significantly improved from pre- to post-treatment and reported significantly lower scores on the Body Vigilance Scale when compared with a waitlist control group (156). This protocol was then extended to a six module treatment and tested in two RCTs with treatment delivered over six (116) and eight weeks (157), both of which reported significant and large within-group effects (d = 1.46 – 3.00) and between-group effects (d = 1.43 – 2.59) when compared to control groups on the Panic Disorder Severity Scale (PDSS) at post-treatment. Other research teams have achieved similar results. For example, an iCBT treatment for PDA developed by Swedish researchers yielded significant and large within-group effects (d = 1.81 – 1.97) and between-group effects (d = 1.43 - 2.00) when compared to waitlist control groups on the Body Sensations Questionnaire (BSQ) at post-treatment (115, 158).

Table 1.2

Summary of Published Randomised Controlled Trials Examining the Efficacy of Internet-Delivered Cognitive Behavioural Therapy Treatments for Panic Disorder With or Without Agoraphobia:

Study	Condition	*n*	Measure	Effect size		Follow-up	Contact time
				Within	Between		
Carlbring et al. (2001)	iCBT	41	BSQ	$d = 1.81^{\dagger}$	$d = 1.43^{\dagger}$	-	90 min
	Waitlist	41		$d = .12^{\dagger}$	-	-	-
Klein et al. (2001)	iCBT	11	BVS	^	^	-	^
	Waitlist	11		^			
Carlbring et al. (2003)	iCBT	11	BSQ	$d = .79$	$d = .16^{\dagger}$	-	30 min
	AR	11		$d = .93$		-	30 min
Carlbring et al. (2005)	iCBT	30	BSQ	$d = 1.45$	$d = .05^{\dagger}$	12 months	150 min
	CBT	30		$d = 2.14$			^
Carlbring et al. (2006)	iCBT	30	BSQ	$d = 1.97$	$d = 2.00^{\dagger}$	9 months	234 min
	Waitlist	30		$d = .20^{\dagger}$			
Klein et al. (2006)	iCBT	19	PDSS	$d = 3.00^{\dagger}$	$d = .48$ (BiB)† $d = 2.59$ (IC)†	3 months	333 min
	BiB	18		$d = 1.96^{\dagger}$	$d = 1.66$ (IC)†		245 min
	IC	18		$d = -.15^{\dagger}$	-		64 min
Richards et al. (2006)	iCBT SM	11	PDSS	$d = 3.21^{\dagger}$	$d = .58$ (iCBT)† $d = 2.41$ (IC)†	3 months	309 min
	iCBT	12		$d = 1.46^{\dagger}$	$d = 1.43^{\dagger}$	3 months	376 min
	IC	9		$d = .05^{\dagger}$		-	^
Kiropoulos et al. (2008)	iCBT	46	PDSS	$d = .96^{\dagger}$	$d = -.12^{\dagger}$	-	352 min
	CBT	40		$d = 1.05^{\dagger}$		-	568 min
Klein et al. (2009)	iCBT	28	PDSS	$d = .70^{\dagger}$	$d = -.09^{\dagger}$	-	308 min
	iCBT-	29		$d = .60^{\dagger}$		-	205 min

Bergstrom et al. (2010)	iCBT	53	PDSS	$d = 1.73$	$d = .00$	6 months	^
	GCBT	60		$d = 1.62$		6 months	^
Wims et al. (2010)	iCBT	32	PDSS	$d = .93$	$d = .59$	1 month	75 min
	Waitlist	27		$d = .01$			
Ruwaard et al. (2010)	iCBT	27	PDSS-SR	$d = .63^{\dagger}$	$d = .40$	36 months	^
	Waitlist	31		$d = .20^{\dagger}$			-

Note. † Denotes no effect size reported in published study. Where estimates of effect size were not published for treatment and/or comparison groups, but able to be computed based upon the reported data, Cohen's *d* was calculated based on the pooled standard deviation. ^ Denotes insufficient data. iCBT: Clinician-supported iCBT. AR: Applied relaxation. BiB: Guided bibliotherapy. IC: information only control. iCBT SM: iCBT plus stress management techniques. SGiCBT: self-guided iCBT. SGBiB: Self-guided bibliotherapy. CBT: Individually-delivered cognitive behavioural therapy. GCBT: Group-delivered cognitive behavioural therapy. iCBT-: iCBT, with support limited to one email per week. BSQ: Body Sensations Questionnaire. BVS: Body Vigilance Scale. PDSS: Panic Disorder Severity Scale. PDSS-SR: Panic Disorder Severity Scale – Self-Rating.

An online treatment developed by another Australian research team also showed significant and large within-group effects (d = .93), and moderate between-group effects when compared to a waitlist control condition (d = .59) on the Panic Disorder Severity Scale (PDSS) at post-treatment (159). Lower treatment effects were reported in a Dutch study examining a seven-module treatment completed over 11 weeks (160). The study reported significant, yet moderate within-group effects for treatment-group participants (d = .63), and between-group effects when compared with participants receiving no treatment (d = .40) on the Panic Disorder Severity Scale Self-Rating (PDSS-SR). The lower effect-sizes reported in this study may reflect floor-effects associated with including of participants with sub-syndromal PDA, while the other studies included only participants meeting full criteria for PDA only. Nonetheless, results of trials of iCBT for PDA have indicated that the treatment gains were maintained following the end of treatment at one month (159), three months (116, 157), nine months (115) and three years (160). These studies provide strong evidence that guided iCBT is an efficacious treatment for PDA and results in enduring longer-term effects. These studies were logical precursors to subsequent investigations of iCBT treatments that explored the relative benefits of different levels of contact.

1.5.3.2.2 iCBT for Panic Disorder With or Without Agoraphobia and Different Levels of Contact

Two RCTs have examined the impact of increased frequency of contact between researchers and participants on treatment outcomes. In one study participants completing a 10 module treatment over 10 weeks received email contact and short weekly telephone contact from a therapist, and achieved significant and large within (d = 1.97) and between (d = 2.00) group effects compared to a waitlist control group on the BSQ (115). Importantly, 80% of participants in the treatment group completed the 10 modules in the allotted time. Although the RCT did not directly compare the one protocol with and without telephone reminders, the low attrition rate reported in the study was an improvement from an earlier RCT in which the treatment was administered without telephone reminders and only 28% of participants completed the 10 treatment modules within 10 weeks (161). The amount of contact required for good clinical outcomes, however, is unclear. One RCT compared outcomes of a nine module iCBT treatment completed over eight weeks with therapist support provided as either once weekly or unlimited email contact (162). Post-treatment analyses indicated

significant within-group improvement for both treatment groups (*d*s= .68 - .70), and a non-significant and small difference between groups (*d* = .09) on the PDSS.

1.5.3.2.3 Supplementing iCBT With Stress-Management Techniques for Panic Disorder With or Without Agoraphobia

Results from one RCT suggest that supplementing standard iCBT with stress-management techniques improves PDA symptom severity in the short-term, but does not confer longer-term benefits (157). The study compared an eight week iCBT treatment delivered with and without additional stress-management techniques. Post-treatment analyses suggested that iCBT delivered with stress management techniques was associated with significant between-group effects compared with both standard iCBT (*d* = .58) and controls (*d* = 2.41) on t he PDSS. By three-month follow-up, however, the difference between the treatment conditions was non-significant, suggesting that the inclusion of additional stress-management techniques did not improve symptom severity in the longer term.

1.5.3.2.4 Relative Efficacy of Guided iCBT, Guided Self-Help and F ace-to-Face Treatments for Panic Disorder With or Without Agoraphobia

Several RCTs have examined the relative efficacy of guided iCBT and other forms of treatment including guided self-help and face-to-face CBT treatments. These studies will be discussed below.

Two RCTs have reported that iCBT compares favourably with other forms of guided self-help. For example, one study compared guided iCBT and computer-delivered guided applied relaxation, both supported by a therapist via email contact (163). Post-treatment analyses indicated that iCBT and applied relaxation treatments resulted in significant and large within-group effects (*d* = .79 and *d* = .93, respectively), and non-significant and small between-group effects (*d* = .16) on the BSQ. Similar results were reported by a separate research group which compared guided-iCBT, guided bibliotherapy, and an information-only control group (116). The iCBT treatment was delivered as six online modules over six weeks and the bibliotherapy treatment was delivered as one treatment manual to be completed over six weeks. While the material in the treatment conditions was the same, therapist support was provided via email contact in the iCBT condition, and via weekly telephone contact in the bibliotherapy condition. Post-treatment analyses indicated significant and large within-group effects

for iCBT treatment (d = 3.00) and guided bibliotherapy (d = 1.96), and a non-significant partial deterioration for the information control condition (d = -.15) on the PDSS. Between-group analyses indicated both iCBT and bibliotherapy conditions significantly improved relative to the information-only condition (d = 2.59 and d =1.66, respectively), and a non-significant difference between iCBT and guided bibliotherapy (d = .48).

Three RCTs have reported that iCBT appears be as efficacious as face-to-face CBT. For example, one study reported that participants receiving the same treatment materials either via an iCBT treatment or weekly individual face-to-face CBT sessions both achieved significant and large treatment effects (d = 1.45 and d = 2.14, respectively), and that post-treatment analyses indicated a small, non-significant difference between groups (d = .05) on the BSQ (161). These findings were replicated by the same research team who compared iCBT and group face-to-face CBT, and found large-within-group effects (d = 1.73 and d = 1.62, respectively) and no detectable between-group effects (d = .00) on the BSQ (164). Similar results were reported by an Australian research team that indicated that both iCBT and face-to-face treatment results in significant and large treatment effects (d = .96 and d = 1.05, respectively), and non-significant and small between-groups effects (d = -.12) as measured by the PDSS (165).

1.5.3.2.5 Summary of iCBT for Panic Disorder With or Without Agoraphobia

There is considerable evidence that iCBT is efficacious for the treatment of PDA (115, 116, 157-160), and that post-treatment gains are maintained following the end of treatment (115, 116, 159, 160). Some contact between researchers and participants facilitates good clinical outcomes, but the offer of more contact does not necessarily confer better outcomes (161, 162). Preliminary research suggests that iCBT supplemented with stress-management techniques provides only a short-term benefit over standard iCBT (157). Lastly, iCBT for PDA appears at least as efficacious as computer-delivered applied relaxation (163) and guided-bibliotherapy (116), and there is encouraging evidence that delivery of the same materials either via iCBT or face-to-face treatment results in similarly efficacious outcomes (161, 164, 165).

As shown in Table 1.2 RCTs examining the efficacy of iCBT for PDA indicate that guided iCBT is associated with moderate to large within-group effects (d = .63 – 3.21), moderate to large between-group effects relative to controls, and small to moderate between-group effects relative to active treatments on measures of PDA. Importantly,

follow-up data indicate that post-treatment gains are generally sustained in the short- and long-term. As with studies of iCBT for social phobia, and as indicated in Table 1.2, contact time varies considerably across the studies, and does not appear to have a clear relationship with outcome.

1.5.3.3 iCBT for Generalised Anxiety Disorder

The efficacy of iCBT for GAD has been assessed in three RCTs representing two research groups, as shown in Table 1.3. These studies have examined the efficacy of treatment relative to waitlist control conditions for guided iCBT treatment of GAD, and one study has examined the relative efficacy of non-clinician support roles for guided iCBT treatment.

1.5.3.3.1 iCBT for Generalised Anxiety Disorder vs. Waitlist Control Studies

The three RCTs comparing guided iCBT with a waitlist control group have consistently supported the efficacy of online treatment of GAD. One study reported that participants completing a six-lesson guided iCBT achieved significant and large within-group (d = .98) effects, and between-group (d = .96) effects when compared to a waitlist control group on the Penn State Worry Questionnaire (PSWQ) (166). The same research team replicated this design in a later RCT which resulted in significant and large within-group (d = 1.16) effects, and significant and large between-groups effects when compared to a waitlist control condition (d = 1.06) on the PSWQ (119). Similar results were found by a Swedish research team who reported participants completing iCBT achieved significant and large within-group effects (d = 1.08), between-group effects when compared to waitlist controls (d = 1.11) (118). Gains made by the treatment groups in these studies were maintained at three-month follow-up (119, 166), and in the Swedish study further improved from post-treatment to one–year follow-up, remaining stable until three-year follow-up (118).

Table 1.3

Summary of Published Randomised Controlled Trials Examining the Efficacy of Internet-Delivered Cognitive Behavioural Therapy Treatments for Generalised Anxiety Disorder

Study	Condition	*n*	Measure	Effect size		Follow-up	Contact time
				Within	Between		
Titov et al. (2009)	iCBT	25	PSWQ	*d* = .98	*d* = .96	-	130 min
	Waitlist	21		*d* = .02			
Robinson et al. (2010)	iCBT	47	PSWQ	*d* = 1.16	*d* = .07 (iCBT+CO) *d* = 1.06 (Waitlist)	3 months	81 min
	iCBT+CO	50		*d* = 1.07	*d* = 1.06	3 months	75 min
	Waitlist	48		*d* = .14			
Paxling et al. (2011)	iCBT	89	PSWQ	*d* = 1.08	*d* = 1.11	12 - 36 months	97 min
	Waitlist	89		*d* = -.01†			

Note. † Denotes no effect size reported in published study. Where estimates of effect size were not published for treatment and/or comparison groups, but able to be computed based upon the reported data, Cohen's *d* was calculated based on the pooled standard deviation. iCBT: Clinician-supported iCBT. iCBT+CO: Coach-supported iCBT. PSWQ: Penn State Worry Questionnaire.

1.5.3.3.2 Coach-supported iCBT for Generalised Anxiety Disorder

The relative efficacy of Coach- and Clinician-supported iCBT has been examined in one RCT (119). Post-treatment analyses indicated significant and large within-group effects for both clinician- (d = 1.16) and Coach-supported (d = 1.07) iCBT, and non-significant and small within-group effects for waitlist controls (d = .14) on the PSWQ. Post-treatment analyses indicated significant and large between-group effects in comparisons between Clinician- and Coach-supported treatments with waitlist controls (both d = 1.06), and no significant difference between Clinician- or Coach-supported iCBT treatments (d = .07).

1.5.3.3.3 Summary of Internet-delivered Cognitive Behaviour Therapy Treatments for Generalised Anxiety Disorder

There are encouraging studies that suggest iCBT is efficacious for the treatment of GAD (166), with gains sustained following the end of treatment (118, 119). One study examining the efficacy of different support roles indicates that Clinician- and Coach-supported iCBT results in similar outcomes (119).

Table 1.3 provides a summary of published RCTs examining the efficacy of iCBT for GAD. Data from all three trials indicate that guided iCBT is associated with large within-group effects (d = .98 – 1.16) and between-group effects relative to controls (d = .96 – 1.11), while follow-up data indicate that post-treatment gains are sustained in the short- and long-term. The amount of contact time in the first RCT examining the efficacy of iCBT for GAD is longer than later iterations, although this does not appear to be associated with a difference in outcome.

1.5.4 Summary

There is considerable evidence for the efficacy of iCBT for treating SP, PDA and emerging evidence in the treatment of GAD. Evidence from RCTs consistently indicates significant symptom reduction in response to treatment, with gains maintained post-treatment. The evidence indicates that iCBT for SP and PDA is comparable in efficacy to face-to-face CBT treatments. Moreover, there is preliminary evidence that Coach-supported iCBT results in similar outcomes to Clinician-supported iCBT for the treatment of SP and GAD.

Internet-delivered treatments represent one innovative strategy for treating anxiety disorders. Another innovative approach, transdiagnostic treatments, is the focus of the next section.

1.6 TRANSDIAGNOSTIC TREATMENT OF ANXIETY DISORDERS

1.6.1 Definition

Transdiagnostic or *unified* treatments are protocols that treat "a range of cognitive and / or behavioural maintenance processes shared across psychological disorders" (167, p. 7). Importantly, transdiagnostic treatments reflect the perspective "that the commonalities across disorders outweigh the differences" (38, p. 21). Transdiagnostic treatments are a specific example of a broader approach to psychopathology. This approach argues that there are cognitive and behavioural transdiagnostic *processes* that have implications for the classification of different mental disorders (168) including, for example, the role of explicit selective memory biases that maintain anxiety, mood, somatoform, eating and substance use disorders (42). For the purposes of this thesis, however, the focus will be restricted to transdiagnostic treatments for anxiety disorders.

1.6.2 Advantages of Transdiagnostic Treatment

Transdiagnostic treatments offer several potential advantages over disorder-specific treatments. Foremost among these is that a single protocol may treat several target disorders rather than multiple disorder-specific protocols, which may make the dissemination of efficacious treatment easier and decrease the burden and costs of training service providers (38, 169, 170). Moreover, a transdiagnostic approach may simplify decision making for clinicians regarding sequence of treatment when faced with comorbidity. Additionally, a consumer presenting with comorbidity may have their needs more directly met via a single protocol, rather than having to complete multiple protocols (169, 170). Efficiency of service providers may be increased by offering group treatment to consumers with a homogenous range of disorders, rather than waiting for sufficient numbers to run disorder-specific group therapy (169, 170). Lastly, there is encouraging evidence that the treatment effects of disorder-specific protocols can generalize and reduce the symptom severity of non-targeted disorders, raising the possibility that a transdiagnostic approach may demonstrate even greater potential to generalise across symptoms (38). There is a small, but growing, body of evidence

examining the efficacy of transdiagnostic treatments for anxiety disorders, which is reviewed in the following section.

1.6.3 Evidence for the Efficacy of Transdiagnostic Treatment of Anxiety

The efficacy of transdiagnostic treatments for emotional disorders has been examined using several research designs including RCTs, open trials, naturalistic observations, and case studies. Additionally, two reviews have examined the efficacy of transdiagnostic treatments for emotional disorders, both of which supported the efficacy of transdiagnostic treatments. One review examined outcomes from published protocols aimed at the treatment of anxiety disorders and depression (38), while the other examined published and unpublished efficacy data of transdiagnostic protocols for the treatment of anxiety disorders (171). The following discussion will focus on published data only, firstly focussing each the RCTs in this field and then the results from naturalistic observations and open trials[1], as summarised in Table 1.4.

1.6.3.1 Randomised Controlled Trials Examining the Efficacy of Transdiagnostic Treatments

Two RCTs have compared the relative efficacy of group transdiagnostic treatment against no treatment, but have produced mixed results. One RCT comparing treatment (n = 73) and control (n = 79) conditions reported significant improvement on the BAI over time for the treatment group, relative to control at post-treatment (172). These improvements were associated with moderate within-group effects (d = .50) for the treatment group, and large between-group effects (partial η^2 = .44) favouring treatment over the waitlist control condition. The second RCT comparing treatment (n = 12) and waitlist control (n = 11) groups reported significant and large within-group effects on the Depression Anxiety Stress Scale – Anxiety subscale (DASS-A) for the treatment group only (d = 1.70) (173), but post-treatment scores on the DASS-A for the treatment group were not significantly superior to the waitlist control.

[1] Estimates of effect size provided throughout this section are reported as per the original published article. Where estimates of effect size were not published for treatment groups but able to be computed based upon the reported data, Cohen's d was calculated based on the pooled standard deviation. Within-group effects were independently calculated for five studies (171, 172, 177-179).

Table 1.4
Summary of Published Studies Examining the Efficacy of Transdiagnostic Treatments

Study	Condition	*n*	Measure	Effect size		Follow-up
				Within	Between	
Manning et al. (1994)	GCBT	561	STAI-S	$d = 1.52^{\dagger\infty}$	-	6 month
Hooke et al. (2002)	GCBT	348	DASS-42-A	$\eta^2 = .38^{\infty}$	-	6 week
Page et al. (2003)	GCBT	340	DASS-42-A	^	-	3 month
Erickson (2003)	GCBT	116	BSI-GA	$d = .75^{\dagger\infty}$	-	6 month
Garcia (2004)	GCBT Control[α]	19 25	STAI-S	$d = 1.00^{\dagger\infty}$ ^	^	-
Norton et al. (2005)	GCBT Control	12 11	DASS-42-A	$d = 1.70^{\dagger\infty}$ $d = .29^{\dagger\infty}$	^	- -
McEvoy et al. (2007)	GCBT	241	BAI	$d = .40^{\infty}$	-	1 month
Erickson et al. (2007)	GCBT Control	73 79	BAI	$d = .50^{\dagger\infty}$ $d = .09^{\dagger\infty}$	$\eta^2 = .44^{\infty}$	6 month
Oei et al. (2009)	GCBT	396	BAI	$d = .64$	-	-
Craigie et al. (2009)	CBT GCBT	116 240	BAI	$d = .67$ $d = .41$	-	- -
Ellard et al. (2010)a	CBT	24	BAI	$\eta^2 = .38$	-	-
Ellard et al. (2010)b	CBT	18	BAI	$\eta^2 = .42$	-	6 month[↓]
Norton et al. (2011)	GCBT AR	65 22	STAI-S	$d = 1.43$ ^	^	- -

Note. † Denotes no effect size reported in published study. Where estimates of effect size were not published for treatment and/or comparison groups, but able to be computed based upon the reported data, Cohen's *d* was calculated based on the pooled standard deviation. ∞ Denotes completer analyses used in study. ^ Denotes insufficient data to calculate. Ω Denotes calculation based on total sample. α The control group in this study comprised participants who refused allocation to treatment comparison. ↓ Denotes pre- to follow-up results non-significant. GCBT: Group-delivered cognitive behavioural therapy. CBT: Individually-delivered CBT. STAI-S: State Trait Anxiety Inventory State Subscale. DASS-42-A: Depression, Anxiety, Stress Scale–42 item – Anxiety subscale. BSI-GA: Brief Symptom Inventory – General Anxiety scale. BAI: Beck Anxiety Inventory. AR: Applied relaxation.

While the non-significant difference between treatment and control groups may be a reflection of the efficacy of the protocol, the small sample size used in this study reduced the statistical power of between-group analyses and limited the opportunity to detect smaller treatment effects that may have existed.

Results from one RCT suggests that transdiagnostic treatment is at least as efficacious as relaxation treatment, and results in similar outcomes irrespective of principal diagnosis (174). In this study, post-treatment analyses comparing a 12-week transdiagnostic treatment (n = 65) and 12-week relaxation program (n = 22) demonstrated no significant difference between groups on self-reported generic or disorder-specific outcome measures (partial η^2 = .012 - .029). Within-group effects for the transdiagnostic treatment group were reported as large on the State Trait Anxiety Inventory – State (d = 1.43). Data from the transdiagnostic treatment group were then subdivided based on principal diagnosis (PDA, SP and GAD). Post-treatment analyses of STAI-S scores showed no significant difference in outcome based on principal diagnosis. There is, however, some difficulty interpreting these results as within-group effects for the relaxation group on the STAI-S, and for both treatment groups on disorder-specific measures were not reported. Additionally, between- and within-group effect sizes based on principal diagnosis for the transdiagnostic treatment group were omitted.

1.6.3.2 Naturalistic Observations and Open Trials Examining the Efficacy of Transdiagnostic Treatments

Results from naturalistic observations and open trials indicate that transdiagnostic treatments result in significant reductions on generic measures of anxiety, albeit with varying levels of improvement. For example, moderate within-group effects have been reported in studies assessing anxiety symptom severity with the Beck Anxiety Inventory (BAI) (d = .40 - .73) (175-177) and the Brief Symptom Inventory (d = .75) (178). Other studies have reported larger effect-sizes using the State-Trait Anxiety Inventory (STAI) (d = 1.00 – 1.52) (179, 180), the STAI –State subscale (d = 1.43) (174), the BAI (partial η^2 = .38 - .42) (181), and the Depression Anxiety Stress Scale – Anxiety subscale (partial η^2 = .38) (182). Short-term follow-up data suggest that post-treatment gains remain stable at one month (176), six weeks (182), and three months (183). By six-month follow-up, however, the results vary considerably. For example, one study reported a deterioration from post-treatment to follow-up rendering pre-treatment to

follow-up gains non-significant (181), while two studies suggest post-treatment gains were maintained (178, 180).

The methods of assessment used in these studies may contribute to the variability of reported outcomes. For example, it has been argued that the BAI is more valid for PDA than other anxiety disorders and that this may attenuate treatment efficacy without performing analyses by disorder (38). Additionally it is argued that partial eta squared is more susceptible to overestimating treatment effects when compared to more other methods of calculating effect sizes (184). Thus, while the results of these studies are encouraging, it is difficult to determine to what extent the variability in outcomes is a reflection of the efficacy of each treatment or an artefact of assessment methods.

1.6.4 Limitations of Trials of Transdiagnostic Treatments

While there is encouraging preliminary evidence supporting the efficacy of transdiagnostic treatments in treating anxiety disorders, there are important limitations including in the design, analysis, and reporting of the trials.

For example, the majority of studies have adopted open trial or naturalistic designs, which cannot control for spontaneous improvement, and only three RCTs, mostly with small samples sizes, have been reported. Moreover, only four studies have adopted an intention-to-treat (ITT) model of analysis (174, 175, 181, 185), making it difficult to compare these results with the broader literature of treatment of anxiety disorders. In addition, only three studies have examined the effects of treatment on principal anxiety diagnosis, and these have produced equivocal results (172, 174, 185), leaving substantive questions about the responsiveness of individual anxiety disorders to transdiagnostic treatment and about the responsiveness of comorbid mental disorders to transdiagnostic treatments. Two open trials have examined the effect of comorbidity on treatment outcomes, both of which reported that participants with and without comorbid mental disorders achieve similar outcomes (176, 186). While these preliminary data encouragingly suggest that comorbidity does not prohibit treatment response, and that transdiagnostic treatment may reduce comorbidity, the reliability of these results require evaluations in RCTs.

1.6.3.3 Summary

The aforementioned studies provide preliminary evidence for the efficacy of face-to-face transdiagnostic treatments in reducing generic anxiety symptom severity (173-175, 177, 179, 181), and indicate that these gains may be sustained following the termination of treatment (172, 176, 178, 180, 182, 183). As seen in Table 1.4, while a broad range of measures have been used, treatment has generally been associated with moderate to large within-group effects on general measures of anxiety. Follow-up data indicate that post-treatment gains are generally sustained in the short-term, but vary in the longer-term.

While there is preliminary evidence supporting the efficacy of transdiagnostic treatments, a number of limitations and weaknesses in the field limit the conclusions that can be drawn about this approach. Additionally, all of the aforementioned studies have delivered treatment in a face-to-face format. iCBT treatments represent an alternative method of delivering effective treatment, raising the possibility of developing an internet-delivered transdiagnostic treatment. Transdiagnostic computerised CBT (CCBT) treatments, which represent a precedent for an internet-delivered transdiagnostic treatment, have been developed and will be discussed in the following section.

1.7 TRANSDIAGNOSTIC COMPUTERISED COGNITIVE BEHAVIOURAL THERAPY TREATMENTS

CCBT treatments share similar characteristics to iCBT treatments but are delivered on desktop or laptop computers that are accessed in a clinic, often under the supervision of a nurse or clinician, or by the user in their home environment requiring installation of specific software or provision of a computer, and do not require access to the internet. Three transdiagnostic treatments, FearFighter, Beating the Blues, and Coordinated Anxiety Learning and Management, will be discussed. Each treatment was initially designed to treat psychological disorders, but have been also been used for other purposes. For example, the FearFighter and Coordinated Anxiety Learning and Management packages have been used as educational aids to train clinicians in the delivery of CBT (187, 188). Additionally, Beating the Blues has been used to treat stress-related absenteeism (189). The following review, however, will be restricted to open trials and RCTs examining efficacy and effectiveness of these programs in the

treatment psychological disorders[1], and the results of these trials are summarised in Table 1.5

1.7.1 FearFighter

FearFighter was developed for the treatment of panic disorder and the phobias (190-194), initially as a CCBT treatment (190, 193), but more recently as an iCBT program (191, 195, 196). Both CCBT and iCBT versions of the treatment consist of nine modules that: Orient the consumer to the program; provides psychoeducation about anxiety and a rationale for exposure therapy; instruct how to work with their therapist; introduces self-monitoring and symptom identification; guides the consumer through individualised exposure tasks; teaches coping strategies, and; troubleshoots common problems that arise throughout treatment (190, 192). The program is completed over 10 (192, 195, 196) or 12 weeks (191, 193). Participants complete treatment with guidance from a therapist via face-to-face or telephone contact in CCBT versions of the program (190-192), and via telephone or email contact with a therapist in iCBT versions of the program (191, 196).

Open trials and RCTs have consistently supported the efficacy of FearFighter in treating general symptoms of anxiety and provided preliminary data on the responsiveness of specific-disorders to treatment. For example, in a preliminary open trial participants completing the CCBT delivered version of FearFighter achieved significant and large within-group effects (d = .88) on the Fear Questionnaire General Phobia (FQGP) (190). These findings have been replicated with large post-treatment within-group effects on the FQGP reported for both CCBT (d = 1.40 – 1.70) (191, 192) and iCBT versions of FearFighter (d = 1.40 – 1.50) (191, 196), although direct comparisons between CCBT and iCBT versions of the program have not been conducted. Post-treatment gains appear to endure following the end of treatment, reported as stable at one month (196), three months and four months (195). Moreover, one study examined the ability of FearFighter to reduce disorder-specific symptom severity and reported moderate to large within-group effects for the treatment of SP (d = .75) and agoraphobia (d = .86) as measured by Fear Questionnaire subscales (195).

[1] Estimates of effect size provided throughout this section are reported as per the original published article. Where estimates of effect size were not published for treatment and/or comparison groups, but able to be computed based upon the reported data, Cohen's d was calculated based on the pooled standard deviation. Within-group effects were independently calculated for three studies (189, 196, 197). Between-group effects were calculated for six studies (189-191, 195-197).

Table 1.5
Summary of Published Studies Examining the Efficacy of Transdiagnostic Computerised Cognitive Behavioural Therapy Treatments

Study	Condition	*n*	Measure	Effect size		Follow-up	Contact time
				Within	Between		
FearFighter							
Kenwright et al. (2001)	CCBT	54	FQGP	$d = .88^{\dagger}$	$d = -.24^{\dagger}$	-	63 min
	CBT	31		$d = 1.09^{\dagger}$	-	-	444 min
Marks et al. (2003)	iCBT or CCBT	27	FQGP	$d = 1.40^{\infty}$		-	^
Kenwright et al. (2004)	CCBT	17	FQGP	$d = 1.50^{\infty}$	$d = -.13^{\infty\dagger}$	1 month	99 min
	iCBT	11		$d = 1.50^{\infty}$		-	113 min
Marks et al. (2004)	CCBT	35	FQGP	$d = 1.70^{\infty}$	$d = -.25$ (CBT)$^{\infty\dagger}$ $d = .92$ (RLX)$^{\infty\dagger}$	1 and 3 months	76 min
	CBT	38		$d = 2.80^{\infty}$	$d = 1.34$ (RLX)$^{\infty\dagger}$	1 and 3 months	283 min
	AR	17		$d = .70^{\infty}$		1 and 3 months	76 min
Schneider et al. (2005)	iCBT	45	FQGP	$d = 1.40^{\neq}$	$d = .46^{\dagger}$	1 month	115 min
	iAM	23		$d = 2.90^{\neq}$		1 month	87 min
Hayward et al. (2007)	iCBT	55	BAI	$d = 1.05^{\infty}$	-	4 months	92 min
Beating the Blues							
Proudfoot et al. (2003a)	CCBT	20	BAI	^	-	-	^
Proudfoot et al. (2003b)	CCBT	89	BAI	$d = .88^{\neq\dagger}$	$d = .45^{\neq\dagger}$	1,3 and 6 months	^
	TAU	78		$d = .44^{\neq\dagger}$			^

van den Berg et al. (2004)	CCBT	13	CORE-OM	$d = 1.10^{\infty}$	-	6 month	^
Learmonth et al. (2004)	CCBT	104	CORE-OM-P	$d = .86^{\infty}$	-	^	^
Proudfoot et al. (2004)	CCBT	146	BAI	$d = .79^{\neq\dagger}$	$d = .25^{\neq\dagger}$	1,3 and 6 months	^
	TAU	128		$d = .52^{\neq\dagger}$		1,3 and 6 months	^
Cavanagh et al. (2006)	CCBT	219	CORE-OM	$d = .50$	-	6 months	^
CALM							
Craske et al. (2009)	CCBT	261	OASIS	$\eta^2 = .46$	-	-	^
Roy-Byrne et al. (2010)	CCBT	503	BSI-12	^	$d = .30$	12 and 18 months	^
	TAU	501		^		12 and 18 months	^

Note. † Denotes no effect size reported in published study. Where estimates of effect size were not published for treatment and/or comparison groups, but able to be computed based upon the reported data, Cohen's *d* was calculated based on the pooled standard deviation. ∞ Denotes completer analyses used in study. ^ Denotes insufficient data. ≠ Denotes insufficient detail to determine method of data imputation used. CALM: Coordinated Anxiety Learning and Management. CCBT: Clinician-supported computerised cognitive behavioural therapy. CBT: Individually-delivered cognitive behavioural therapy. iCBT: Clinician-supported internet-delivered cognitive behavioural therapy. AR: Applied Relaxation. iAM: internet-delivered anxiety management without exposure tasks. TAU: Treatment as usual. FQGP: Fear Questionnaire Global Phobia. BAI: Beck Anxiety Inventory. CORE-OM: Clinical Outcomes in Routine Evaluation Outcome Measure. CORE-OM-P: Clinical Outcomes in Routine Evaluation Outcome Measure – Problems subscale. OASIS: Overall Anxiety Severity and Impairment Scale. BSI-12: Brief Symptom Inventory subscales for anxiety and somatization.

Two RCTs have examined the relative efficacy of FearFighter and other treatments. One RCT examined the relative efficacy of CCBT-delivered FearFighter, face-to-face CBT delivered by a nurse or psychiatrist as six hour-long sessions over 10 weeks, or computer delivered relaxation delivered as six online sessions over 10 weeks plus 20 minutes of face-to-face contact with a nurse or psychiatrist per session (192). Post-treatment analyses of FQGP scores showed significant and large within-group effects for FearFighter (d = 1.70) and face-to-face CBT (d = 2.80), and moderate effects for computer delivered relaxation (d = .70). Post-treatment analyses showed significant and large between-group effects for FearFighter and face-to-face CBT when compared to computer-delivered relaxation (d = .92 and d = 1.34, respectively), and no significant difference between FearFighter and face-to-face treatment (d = .25). An additional RCT compared the relative efficacy of iCBT-delivered FearFighter and an internet-delivered anxiety management program (196). The internet-delivered anxiety management program differed from FearFighter insofar that it delivered seven rather than nine modules over 10 weeks, and focussed on progressive muscle relaxation, structured problem solving, activity scheduling, distraction techniques and symptom monitoring. Analyses of post-treatment assessor-rated FQGP scores showed significant and large within-group effects for FearFighter (d = 1.4) and the internet-delivered anxiety management program (d = 1.9). Post-treatment analyses showed non-significant and moderate between-group effects (d = .46). However one-month follow-up analyses showed a partial improvement for participants completing FearFighter and partial deterioration for participants completing the internet-delivered anxiety management program that was associated with significant and large between-group effects favouring FearFighter (d = .80).

1.7.2 Beating the Blues

Beating the Blues is a CCBT treatment developed to treat depression, anxiety, and mixed anxiety and depression (197-199). The treatment consists of a 15 minute introductory video followed by eight interactive therapy sessions (198, 200). The sessions aim to teach consumers how to explore automatic thoughts and thinking errors, challenge unhelpful thinking and core beliefs, and explore consumers' optimistic or pessimistic views of life events (189). The behavioural components of the treatment include activity scheduling, problem solving, sleep management, relaxation training, biofeedback and graded exposure (189). Not all participants receive the same materials

as sessions are tailored to the needs of the consumer (197), although it is unclear how the materials are customised. Consumers additionally receive approximately one hour of guidance from a *clinical helper* throughout treatment who provides technical assistance, orients the consumer to each session and answers consumer questions (200). While the initial pilot of Beating the Blues was trialled over four weeks (199), treatment is typically completed within eight or nine weeks (197, 198, 200, 201).

Initial pilot data of Beating the Blues indicate mixed results, however, more recent trials have generally supported the efficacy of the protocol in reducing anxiety and depressive symptom severity. For example, post-treatment analyses of a pilot trial where Beating the Blues was delivered over four weeks showed significant reductions on the Beck Depression Inventory (BDI), but not the Beck Anxiety Inventory (BAI). Effect-sizes were not published, or able to be independently calculated based on the published data. However, subsequent trials have consistently shown significant improvement from pre- to post-treatment on the BDI (d = 1.21 – 1.25) and BAI (d = .79 - .88) when Beating the Blues has been administered over nine weeks (197, 198), and also on the Clinical Outcomes in Routine Evaluation-Outcome Measure (CORE-OM) – Problems subscale, which measures both depression and anxiety, when administered over eight weeks (201). One study has reported significant, albeit lower within-groups effects (d = .50), although this maybe an artefact of measuring symptom severity via the CORE-OM total score which assesses anxiety, depression, subjective wellbeing, life functioning and risk to self and others (200). This study also examined treatment effects on disorder-specific symptom severity and reported moderate within-group (d = .70) effects for Subjective Units of Distress ratings of anxiety, although it is unclear which disorders may have improved as the diagnostic composition of the sample was not reported.

Four studies of Beating the Blues have included longer-term follow-up. Three studies have indicated that post-treatment gains endure following the end of treatment, at one month, three months and six-months (197, 198, 200), while one trial, using completer data showed a significant improvement at 6-month follow-up on the CORE-OM – Wellbeing subscale (202).

Two RCTs have produced results generally supporting the efficacy of Beating the Blues relative to Treatment as Usual (TAU). In each of these studies, Beating the Blues was administered over nine weeks, and compared to TAU, which consisted of a range of treatments including discussion of problems with a GP, counselling, pharmacotherapy,

or referral to a mental health professional such as a psychiatrist, psychologist, mental health nurse or counsellor. In the first RCT significant between-group effects were reported for both BDI and BAI scores, favouring Beating the Blues over TAU and associated with moderate effects (d = .55 and d = .45, respectively) (197). In a later RCT employing the same design, significant between-group effects were reported for the BDI that were associated with moderate effects (d = .47) favouring Beating the Blues over TAU (198). Between-group analyses of post-treatment BAI scores demonstrated a trend towards significance, favouring Beating the Blues over TAU (p = .06) that was associated with a small effect-size (d = .25).

1.7.3 Coordinated Anxiety Learning and Management

The Coordinated Anxiety Learning and Management (CALM) program is a recently developed transdiagnostic treatment protocol for PDA, SP, GAD and PTSD (203-205). OCD was excluded from the treatment program as it was argued that the psychological and pharmacological treatment of this disorder was more complex than the target disorders (206). The CALM program is delivered as a CCBT package that includes face-to-face consultations with a healthcare provider. Five modules are common to the treatment of each of the disorders and consist of education, self-monitoring, development of an exposure hierarchy, and breathing retraining (205). Three modules comprising cognitive restructuring, exposure to internal stimuli and exposure to external stimuli are tailored to each of the target disorders (205). The delivery of these tailored modules is guided by the consumer's choice of which of the target disorders he or she finds most distressing or impairing (203). Additionally, if a consumer's mood deteriorates to the point of interfering with anxiety treatment, clinicians can further individualise treatment to emphasise behavioural activation and cognitive restructuring to address the depressed mood. Treatment is typically delivered over 10-12 weeks (204, 205).

Efficacy data from one large open trial and one RCT support the efficacy of the CALM program. The CALM treatment was initially examined in an open trial (203). Although 271 consumers participated in the trial, analyses of outcome data were conducted on a random audit of participants with PDA (n = 20), SP (n = 20), GAD (n = 20) or PTSD (n = 14). Intention-to-treat analyses of post-treatment data indicated significant and moderate within-group effects on the Overall Anxiety Severity and Impairment Scale (OASIS) (η^2 = .46), and no significant difference in post-treatment

OASIS scores when conducting between-group comparisons based on principal diagnosis. Positive results were also reported in a large RCT comparing the CALM program (n = 503) with usual care (UC) (n = 501) which was comprised of medication, counselling or referral to mental health specialist (205). Between-group analyses demonstrated significant and small treatment effects on the Brief Symptom Inventory favouring participants in the CALM program at 6-month, 12-month and 18-month follow-up (d = .18 – 31).

The data from the RCT were then re-analysed to examine the effect of treatment on disorder-specific and comorbid symptom severity (204). Between-group analyses demonstrated significant and small-moderate treatment effects for participants with a principal diagnosis of GAD on the Generalised Anxiety Disorder Severity Scale (GADSS) favouring participants in the CALM program at 6-, 12- and 18-month follow-up (d = .33, d = .51, d = .64, respectively). Significant between-group effects were reported for participants with a principal diagnosis of PDA on the Panic Disorder Severity Scale Self-Rating (PDSS-SR) at 6- and 12-month follow-up (d = .35 and d = .46, respectively), but not 18-month follow-up (d = .23). Significant between-group effects favouring the CALM project were reported by participants with a principal diagnosis of SP on the Social Phobia Inventory (SPIN) at 6-month follow-up (d = .53), but were no longer significant at 12- or 18-month follow-up (d = .46 and d = .36, respectively). No significant differences between participants receiving the CALM program or usual care were reported by participants with a principal diagnosis of PTSD on the PTSD Checklist-Civilian Version (PCL-C) at any of the time-points (d = .29-.48). To assess comorbidity, data on the disorder-specific measures were re-analysed by excluding participants with the principal diagnosis that corresponded with the measure. For example, data on the SPIN were re-analysed excluding participants with a principal diagnosis of SP. Between-group analyses indicated significant effects on the SPIN favouring the CALM program at all time-points (d = .29 - .55). While between-group analyses favoured the CALM intervention at all time-points for the other disorder-specific measures, this was associated with non-significant effects on the GADSS (d = .18 - .24), PDSS-SR (d = .21 - .33) and PCL-C (d = .18 - .33). Unfortunately, within-group effects were not reported and insufficient data were provided to calculate a measure of effect size.

1.7.4 Limitations of Trials of Transdiagnostic CCBT Treatments

The pioneering work of the research teams that developed and evaluated Fear Fighter, Beating the Blues, and the Coordinated Anxiety Learning and Management treatments provide invaluable preliminary support for the computerised delivery of treatments for multiple disorders in a single treatment protocol. The generalisability of results is limited in some cases by the reliance on completer analyses (191, 193, 195, 202), or undefined methods of managing missing data (192, 196, 198), although, overall, the results consistently indicate the efficacy or effectiveness of this approach.

Important additional questions remain about how different individual anxiety disorders comorbid mental disorders respond to transdiagnostic treatment. Encouraging evidence from one study suggested that participants with principal GAD, PDA, SP and PTSD achieve equivalent outcomes on general measures of anxiety (203), and three studies have reported that transdiagnostic treatment reduces symptom severity of specific disorders (195, 200, 204). Moreover, there is limited information about whether comorbid mental disorders also respond to CCBT, since only one transdiagnostic CCBT study has examined whether the presence of comorbidity affects treatment outcome (204). As such, future studies that can stratify the sample by principal and comorbid diagnoses and that administer a wide range of disorder-specific measures are required to inform the debate about the responsiveness of principal anxiety disorders and comorbid disorders to transdiagnostic treatment. Such information will help to determine the potential benefits of transdiagnostic treatments relative to disorder-specific interventions.

1.7.5 Summary of Transdiagnostic CCBT Treatments

Table 1.5 provides a summary of published RCTs and open trials examining the efficacy of the FearFighter, Beating the Blues, and CALM treatments. These studies indicate that transdiagnostic CCBT is efficacious in reducing generic anxiety symptom severity (190, 193, 201, 203), with encouraging evidence that post-treatment gains are sustained following the end of treatment (191, 192, 195-198, 200, 202, 205). There is evidence that Beating the Blues and CALM treatments are superior to TAU (198, 205). Moreover, there is emerging evidence that FearFighter is at least as efficacious as other low-intensity treatments such as internet-delivered anxiety management and applied relaxation, and may be as efficacious as face-to-face treatment (190, 192). The amount of therapist contact time per study is only available for the FearFighter treatments and,

while there is some variation between iterations of the treatment, there does not appear to be a strong relationship between therapist contact time and outcome.

1.8 OUTSTANDING QUESTIONS AND AIMS OF THE PRESENT RESEARCH

There is considerable demand for treatments that reduce barriers to accessing evidence-based treatment for anxiety disorders. One approach that has received considerable empirical attention are disorder-specific iCBT treatments, and there is now strong evidence from RCTs supporting the efficacy of iCBT treatments for SP and PDA, and emerging evidence for the efficacy of iCBT treatment of GAD. Another innovative approach receiving increasing interest is transdiagnostic treatment, and there are preliminary data supporting the efficacy of transdiagnostic treatment of anxiety disorders, as measured by reductions on generic measures of anxiety. CCBT treatments developed for the treatment of panic and the phobias (FearFighter), anxiety and depression (Beating the Blues), and for the commonly occurring anxiety disorders (CALM) provide an encouraging precedent for combining the fields of iCBT and transdiagnostic treatment. However, there are a several outstanding questions and issues that this thesis attempts to address.

Firstly, even if the efficacy and effectiveness of transdiagnostic treatments is demonstrated, many patients will continue to experience difficulties accessing face-to-face treatment. The overall aim of the present research, therefore, is to combine the fields of iCBT and transdiagnostic treatment for anxiety disorders and explore the efficacy of a transdiagnostic internet-delivered treatment (the *Anxiety Program*) for anxiety disorders. This is the objective of Chapter 2, which describes the process of developing the treatment materials for the six-lesson Anxiety Program. Chapter 3 describes the results of a RCT of the Anxiety Program that compared a treatment with a waitlist control group and examined change in generic and disorder-specific anxiety measures, and measures of depression, disability, and neuroticism (Chapter 3).

Secondly, while the results from face-to-face and CCBT transdiagnostic treatments are encouraging, there are limited data available to inform which disorders respond to a transdiagnostic approach and the magnitude of symptom reduction that occurs from using this approach. This issue is addressed in Chapter 4, which describes the process of extending the original Anxiety Program based on results from the first RCT and then describes a large RCT examining the effects of transdiagnostic treatment on three target anxiety disorders.

Thirdly, there is encouraging evidence to suggest that Coach-supported iCBT and Clinician-supported iCBT results in similar outcomes for the treatment for SP and GAD (119, 155), however these results require replication. Moreover, one potential advantage of the transdiagnostic treatment is that it may treat comorbidity, yet there are limited data available examining the effect of comorbidity on treatment outcomes, or whether transdiagnostic iCBT can reduce comorbidity. These issues are also addressed in the analysis of the second RCT, as presented in Chapters 4 and 5, respectively.

By conducting the work in this thesis, I hope to contribute to a body of knowledge that facilitates the ability of consumers to more easily access effective treatments and, by doing so, reduce the burden of common mental disorders.

CHAPTER TWO

Development of Transdiagnostic Internet-Delivered Cognitive Behavioural Therapy for Three Anxiety Disorders:

The *Anxiety Program*

2.1 INTRODUCTION

This chapter describes the development of the *Anxiety Program*, a specially developed iCBT intervention that transdiagnostically integrates treatment components relevant to three target anxiety disorders. The development of the Anxiety Program was informed by a close review of the disorder-specific iCBT treatments developed and evaluated by the VirtualClinic, and internet-based research facility at the University of New South Wales and St Vincent's Hospital, Sydney, Australia. These iCBT treatments were based on t he manualised group and individual face-to-face disorder-specific programs offered at the Anxiety Disorder Clinic, St Vincent's Hospital, which represented best practice techniques and contemporary cognitive models of anxiety (48, 96, 207, 208).

The VirtualClinic treatments available for review included the *Worry Program* for the treatment of GAD, the *Shyness Program* for the treatment of SP, and the *Panic Program* for the treatment of PDA. These four programs had been tested in 13 studies with over 900 research participants (112, 119, 120, 145-147, 152, 154, 155, 159, 166, 209, 210). Original source files of the treatments and resulting publications were examined to catalogue the components used throughout the iterations of each treatment. Reviews of the VirtualClinic protocols and development of the Anxiety Program took place between March 2009 and August 2009.

2.2 DEVELOPING THE ANXIETY PROGRAM

2.2.1 Development of the Anxiety Program

The Anxiety Program was developed in four stages. Stage one involved reviewing the *Worry*, *Shyness*, and *Panic* treatments and the transdiagnostic literature. The contents for the six lessons and additional resources were then drafted in consultation with the Director of the VirtualClinic, during Stage two. During Stage three, drafts of the lessons and additional components were circulated to the original authors of the *Panic* and *Worry* programs, Clinical Psychologists, Psychiatrists and researchers affiliated with the VirtualClinic and the Anxiety Disorders Clinic at St Vincent's Hospital. Stage four consisted of compiling and actioning feedback from the previous round of revisions, resulting in the final versions of the lessons and additional treatment components which were then uploaded to the VirtualClinic website (www.virtualclinic.org.au), which was used to host the Anxiety Program.

2.2.2 Components of the Anxiety Program

The first version of the Anxiety Program comprised the following components:

- Homepage. The Homepage presented after login, provided text-based instructions for using the program, and contained the components listed below.
- Educational lessons. The Anxiety Program was delivered in the format of six online lessons delivered over eight weeks. This format had been utilised for disorder-specific programs with good clinical outcomes (145, 159, 166). Each lesson comprised an illustrated story of no more than 60 slides, with each slide generally containing no more than 55 – 65 words. The material was aimed at a Year 10 reading level. Lessons were introduced by an illustrated narrator, followed by stories of characters with the target disorders that learn about their symptoms and how to manage them by applying CBT techniques. The narrator also reviewed the content of previous lessons, introduced the anxiety management techniques to be discussed in the present lesson, and explained the importance of the technique in context of common anxiety symptoms. The narrator was also used throughout the lesson to emphasise key points, summarise the lesson and provide direction to upcoming material.

Lesson content included treatment components common to other disorder-specific programs developed by the research unit and consisted of self-monitoring, management of physical symptoms, cognitive challenging, in vivo exposure, and relapse prevention.

These components are consistent with transdiagnostic protocols such as Barlow's Unified Treatment (39) and Norton's Anxiety Protocol (211). Moreover, the lesson content was limited in scope as it has been argued that transdiagnostic protocols benefit from reduced complexity (212).

Lessons were designed to be read within 30 minutes, completed in consecutive order, and released approximately once per week. Lessons could be reviewed.

- Lesson summaries. Participants were encouraged to download and print a copy of the lesson summary after completing the lesson. Lesson summaries were text based with key images and graphs summarising information presented in the Lesson, as well as homework tasks. The summaries contained completed example worksheets based on the experienced of the characters in the lesson, followed by worksheets to guide participants through practice of the technique. Participants were encouraged to read all lesson summaries, and to practice the homework tasks for approximately four hours per week.
- Automatically generated emails. Three different types of emails were automatically generated and sent throughout the program. *Lesson completion* emails were sent when the software managing the content detected that a participant had read a lesson. *Notification* emails were sent once a new lesson was made available, or sent to notify participants of new content or updates. *Reminder* emails were sent if the participant had not read the lesson within one week of the lesson becoming accessible.
- Weekly contact from VirtualClinic staff. Weekly contact was via secure email, asynchronous messaging or telephone, during which staff reinforced participant progress and reading of lesson materials, normalised difficulties with anxiety, and provided information about upcoming materials. Weekly contact was provided by a Clinical Psychologist, consistent with initial iterations of the disorder specific iCBT programs (145, 159, 166). Although outcomes of studies comparing coach- and clinician-supported iCBT for GAD and SP were similar (119, 155), it was deemed premature to offer non-clinician support for the untested program.
- Online discussion forums. One secure and clinician moderated online discussion forum was available for each lesson. Participants logged on with user-generated pseudonyms. Posting on the forum was voluntary, however, all participants were encouraged to contribute. Forums allowed the clinician to facilitate broad discussion of the lesson contents with the group, troubleshoot difficulties with practicing the skills

presented throughout the program, and provided an environment of shared experience for participants.

- Stories from the Frontline. De-identified forum posts from participants in previous studies were collated and organised according the techniques presented throughout the each lesson. These posts, labelled Stories from the Frontline, were then presented as text-based online vignettes.
- Supplementary resources. These were text-based downloadable documents adapted from the Shyness and Worry programs, which participants were encouraged to download. Topics included material supplementary or extending the lesson content, presentation of additional skills, and answers to Frequently Asked Questions noted by clinicians during weekly contact with participants in previous iterations of the iCBT treatments.
- Announcements. These were brief messages that appeared as text-based dialogue boxes immediately after login, and oriented the participant to the availability of new treatment materials while provide encouragement to continue with the program.

2.2.3 Examples of Anxiety Program Components

Details of the lesson, summary, and forum components of the Anxiety Program are shown in Table 2.1. For each lesson, the primary content and theme for the lesson, material included in the lesson summary and associated homework tasks, and the forum topic for the lesson is described.

Table 2.1
Lesson and Summary Contents, Release Schedule, and Forum Topics Throughout the Anxiety Program

Lesson	Weeks to complete lesson	Primary content/theme	Lesson summary / homework tasks	Forum topics
1	1	Education about the prevalence, symptoms and treatment of anxiety including an explanation of the functional relationship between symptoms	Examples describing symptoms, information and encouragement about self-monitoring symptoms, and information normalising difficulties during recovery	Introduction to fellow participants, examples of symptoms and their impact, and aims for treatment
2	1	Instructions about managing physical symptoms of anxiety including de-arousal strategies, and introduction to the role of avoidance in maintaining anxiety	The importance of lifestyle factors, and consolidation of self-monitoring	Discussion of physical symptoms and use of controlled breathing tasks
3	2	Basic principles of cognitive therapy, including strategies for monitoring and challenging thoughts and beliefs	Examples of thought and belief challenging, and examples of encouragement for integrating skills	Discussion of examples of thought challenging tasks, answer questions about using previous skills
4	1	Education and guidelines about practicing graded exposure	Examples of exposure exercises, normalising difficulties with exposure and troubleshooting common barriers to practice	Discussion of the role of exposure in managing anxiety, and examples of simple exposure exercises
5	1	Education and guidelines for acting *as if* and assertive communication skills, and troubleshooting common barriers to treatment	Identification of communication styles, guidelines about assertive communication and learning new skills, examples of common treatment barriers and potential solutions	Identification of communication styles, future goals for treatment, and participant discussion of their successes and setbacks in practicing the skills in the program
6	2	Information about relapse prevention and constructing relapse prevention plans	Examples of relapse prevention planning, tips to create a relapse prevention plan, and encouragement to continue practicing skills	Reflection of progress to date, future plans to continue practice of skills

Table 2.2 describes the 15 resources used throughout the Anxiety Program. The table provides a brief overview of the content provided in each resource and explains the release schedule for each of the resources relative to the program Lessons.

Table 2.2
Summary of Resources Used Throughout the Anxiety Program

Resource name	Content	Released with Lesson
Introduction Guide	Orient the participant to program components, timeline of the program, troubleshoot technical difficulties	1
In Case of Emergency	Instruction on emergency health services to contact in case of mental health emergency	1
Good Sleep Guide	Information about the role of sleep and anxiety and tips for sleep hygiene strategies	
Shifting Your Attention	Information about attentional biases and tips based upon panic surfing and mindfulness techniques to reduce attentional biases	2
About Assertiveness	Information about communication styles, and tips for practicing assertive communication	2
Frequently Asked Question Lesson 1 and 2	Answers to questions about anxiety; origins of anxiety; managing physical symptoms; and treatment trajectory	2
Managing Your Mood	Information about low mood and anxiety, and provision of simple tips regarding behavioural activation and management of low mood	2
About Health Anxiety	Information about common anxieties regarding health complaints and use of the existing skills to manage health anxieties	4
Frequently Asked Questions Lesson 3 and 4	Answers to questions about thought challenging, exposure exercises, and normalising the experience of anxiety throughout treatment	4
About Self-Esteem	Information about self-esteem and anxiety, and tips on using the program techniques to increase self-esteem	5
Conversation Skills	Information and tips to assist in opening, maintaining and closing conversations	5
Advanced Skills Part 1	Troubleshooting difficulties with thinking distortions, attentional bias and avoidance barriers to treatment	5
Advanced Skills Part 2	Troubleshooting difficulties with negative biases, pre- and post-event processing, and coping uncertainty	6
Frequently Asked Questions 5 and 6	Answers to questions about integrating skills, relapse prevention planning	6
Panic and Strong Physical Sensations	Consolidating education about the fight-or-flight response, information about common fears associated with strong feelings of panic, and using the skills to manage panic and strong physical sensations	6

Pictorial examples of the Anxiety Program are presented in the following figures. Figure 2.1 shows the first slide of lesson 1 of the Anxiety Program. Examples of the slides of the Anxiety Program showing use of diagrams, case-examples of characters learning about symptoms of anxiety, and lesson summary worksheets provided are shown in figures 2.2, 2.3 and 2.4, respectively

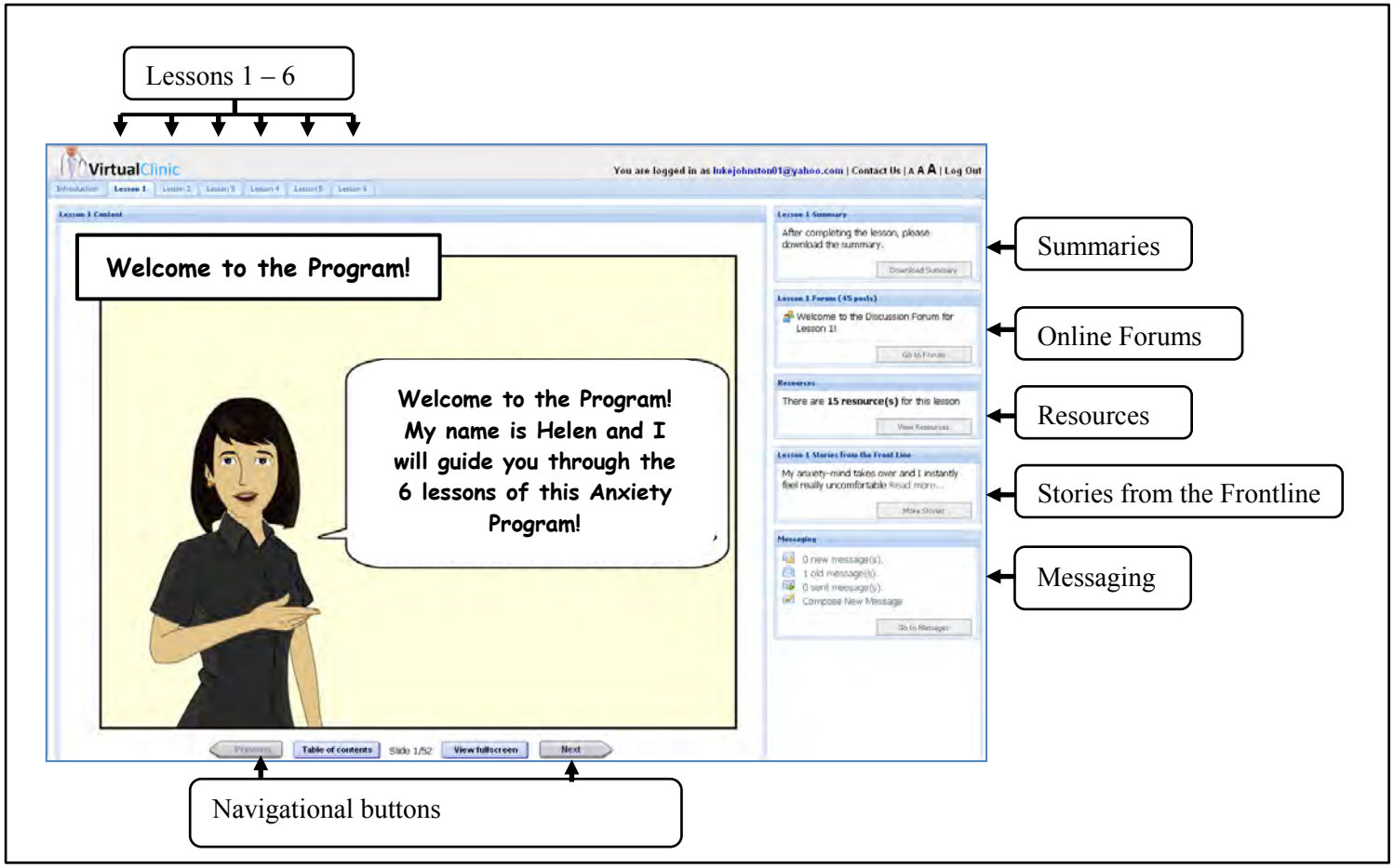


Figure 2.1. The First Slide of Lesson One of the Anxiety Program.

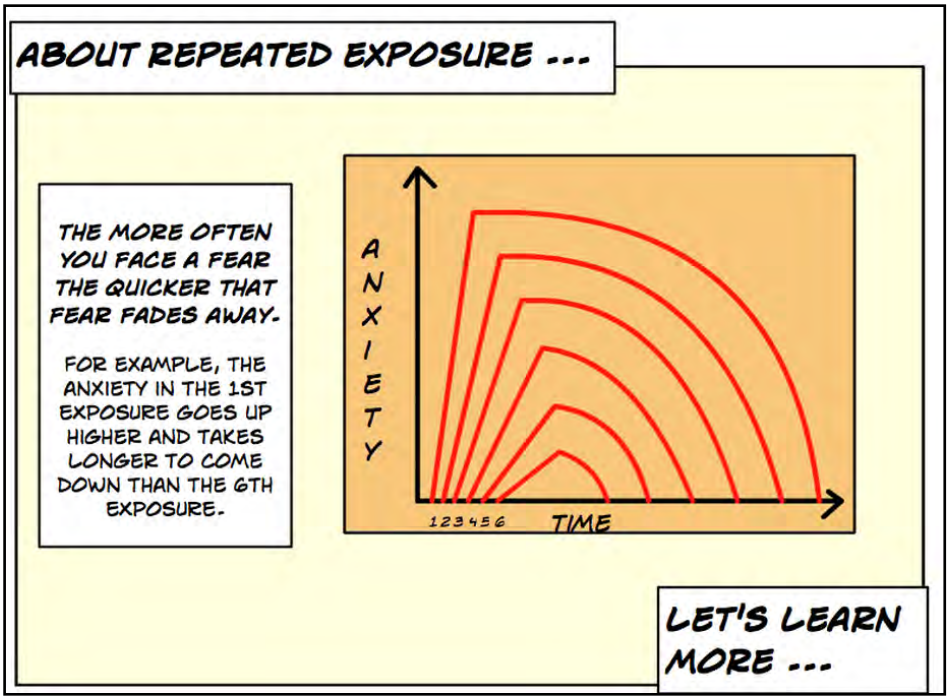


Figure 2.2. Example of the Style of Combining Text and Diagrams in the Anxiety Program.

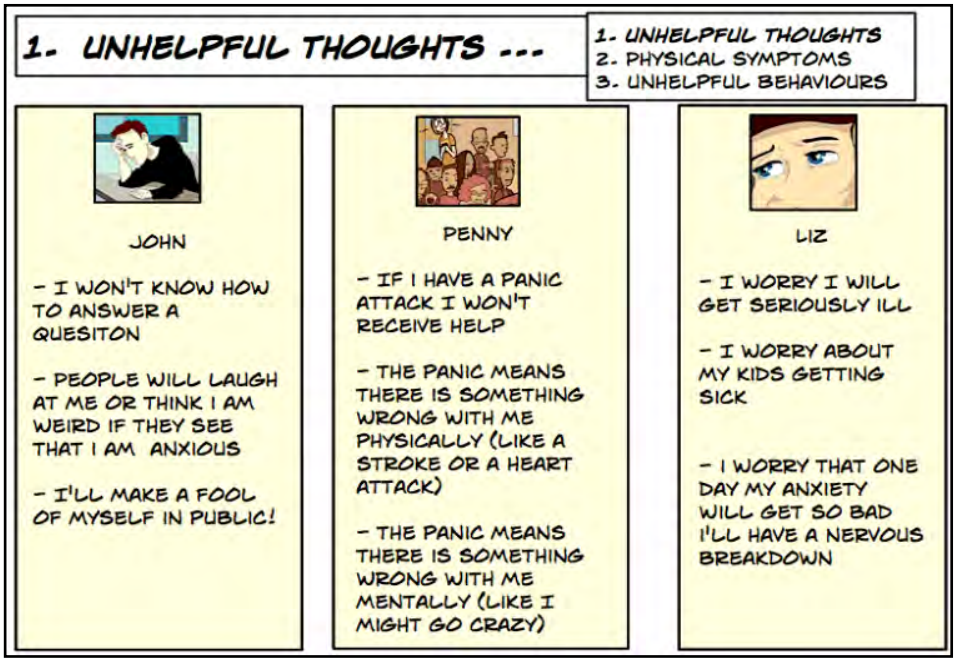
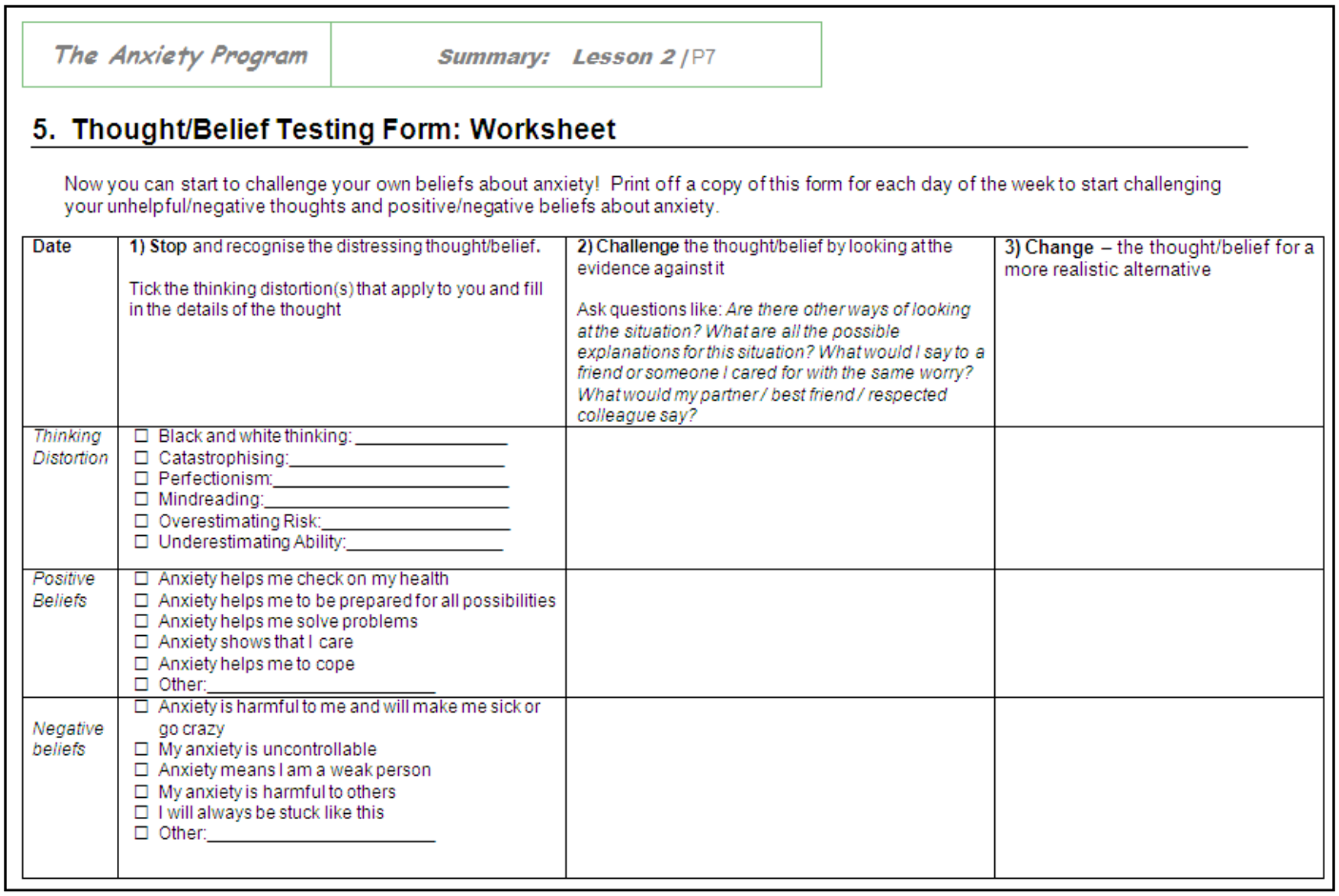


Figure 2.3. Example of Case Examples Used in the Anxiety Program



The Anxiety Program | ***Summary: Lesson 2*** / P7

5. Thought/Belief Testing Form: Worksheet

Now you can start to challenge your own beliefs about anxiety! Print off a copy of this form for each day of the week to start challenging your unhelpful/negative thoughts and positive/negative beliefs about anxiety.

Date	**1) Stop** and recognise the distressing thought/belief. Tick the thinking distortion(s) that apply to you and fill in the details of the thought	**2) Challenge** the thought/belief by looking at the evidence against it Ask questions like: *Are there other ways of looking at the situation? What are all the possible explanations for this situation? What would I say to a friend or someone I cared for with the same worry? What would my partner / best friend / respected colleague say?*	**3) Change** – the thought/belief for a more realistic alternative
Thinking Distortion	☐ Black and white thinking: _____ ☐ Catastrophising: _____ ☐ Perfectionism: _____ ☐ Mindreading: _____ ☐ Overestimating Risk: _____ ☐ Underestimating Ability: _____		
Positive Beliefs	☐ Anxiety helps me check on my health ☐ Anxiety helps me to be prepared for all possibilities ☐ Anxiety helps me solve problems ☐ Anxiety shows that I care ☐ Anxiety helps me to cope ☐ Other: _____		
Negative beliefs	☐ Anxiety is harmful to me and will make me sick or go crazy ☐ My anxiety is uncontrollable ☐ Anxiety means I am a weak person ☐ My anxiety is harmful to others ☐ I will always be stuck like this ☐ Other: _____		

Figure 2.4. Example of a Lesson Summary Worksheet

2.3 SUMMARY

The Anxiety Program represents a distillation of the core treatment strategies targeting symptoms of the three target anxiety disorders, combined into one transdiagnostic treatment protocol. These strategies were identified by a review of the transdiagnostic literature and reviews of existing and efficacious iCBT interventions for PDA, SP, and GAD.

Key aims in creating the Anxiety Program were: To present content consistent with most commonly occurring techniques taught in disorder-specific iCBT programs, and the broader transdiagnostic literature; to introduce core concepts in the lessons, which were supplemented by homework assignments and additional resources, and; to utilise several media to facilitate communication between clinicians and participants.

The efficacy of this program, however, remains untested. A RCT was required to examine the efficacy of the Anxiety Program when guided by a clinician, relative to a no treatment condition. This was the focus of the Study 1.

CHAPTER THREE

Study 1: Transdiagnostic Internet-Delivered Cognitive Behavioural Therapy for Three Anxiety Disorders - A Randomised Controlled Trial

3.1 INTRODUCTION

The benefits of an efficacious and remotely delivered transdiagnostic program are considerable. The present study, Study 1, reports the results of a preliminary RCT of the Anxiety Program, an internet-delivered transdiagnostic program for three anxiety disorders.

The primary and secondary aims of the study were to examine the efficacy and acceptability of the Anxiety Program, respectively. Given the challenges of constructing an efficacious transdiagnostic treatment suitable for different disorders, it was expected that the Anxiety Program could be improved based on post-treatment outcome data and feedback from the clinician providing the treatment. Thus, a tertiary aim was to examine the efficacy and acceptability of the Anxiety Program after modifying it before treating the waitlist control group.

3.2 METHOD

3.2.1 Design

A CONSORT-revised compliant RCT design (213) was employed comparing an immediate treatment group (Treatment) with a waitlist-treatment control group (Control).

3.2.2 Hypotheses

Three hypotheses were tested: Firstly, that Treatment group participants, relative to Controls, would show significant improvement on primary generic anxiety outcome measures, disorder-specific anxiety measures, on secondary measures of depression, disability, and neuroticism; secondly, that Treatment group participants would rate the procedure as acceptable, and; thirdly, that Treatment group participants would show significant improvement on disorder-specific measures corresponding with their principal diagnosis, relative to controls with the same principal diagnosis.

3.2.3 Ethics

This study was approved by the Human Research Ethics Committee (HREC) of the University of New South Wales (Sydney, Australia) and the HREC of St Vincent's Hospital (Sydney, Australia). All participants provided written informed consent. The trial was registered as ACTRN12609000501246 with the Australian and New Zealand Clinical Trials Registry.

3.2.4 Participants and Recruitment

Potential participants were individuals who expressed interest in treatment via online programs available on a research website (www.virtualclinic.org.au). One-hundred and fifty-two individuals applied for this program and 114 met the following inclusion criteria : i) a resident of Australia; ii) at least 18 years of age; iii) access to a computer, the internet, and use of a printer; iv) not receiving additional CBT; v) not using illicit drugs or consuming more than three standard drinks a day; vi) not currently experiencing a psychotic mental disorder or severe symptoms of depression (defined as a total score > 22 or responding > 2 to Question 9 (suicidal ideation) on the Patient Health Questionnaire - 9 Item (214); vii) if taking medication (people taking benzodiazepines were excluded), had been taking the same dose for at least one month and did not intend to change that dose during the course of the program, and; viii) met DSM-IV-TR (4) diagnostic criteria for a principal diagnosis of GAD, SP, or PDA. Applicants who did not meet these criteria were informed via an on-screen message and email thanking them for their application, and encouraging them to discuss their symptoms with their physician. Participants who met the inclusion criteria then completed a 25-item questionnaire enquiring about demographic details and treatment history.

Of the 114 individuals who met the inclusion criteria for the study, four withdrew their application before the telephone interview. The remaining 108 individuals were administered the Mini International Neuropsychiatric Interview Version 5.0.0 (MINI) (215) during a telephone interview to determine whether they meet DSM-IV-TR criteria for an anxiety or affective disorder. Principal diagnosis was defined as the disorder (GAD, SP or PDA) the participant nominated as most troubling. Comorbidity was defined as concurrently meeting criteria for more than one of the target disorders (GAD, SP, or PDA), or meeting diagnostic criteria for PTSD, OCD or a major depressive episode (MDE). Unsuccessful applicants were advised about more appropriate treatment options.

At the end of the diagnostic interview, the allocation schedule was consulted. The participant was then allocated to Treatment or Control group as per the randomisation schedule. This entry was then removed from the remaining and concealed allocation schedule, providing the next eligible participant and equal and non-zero chance of allocation to either the Treatment or Control group. Eighty-six individuals met all eligibility criteria and were randomised into either Treatment or Control groups. Two Treatment and five Control group participants withdrew before beginning the program, and one additional Control group participant did not complete the pre-treatment questionnaires. This resulted in 40 Treatment and 38 control group participants eligible for analysis (see Figure 3.1).

3.2.5 Intervention

The Anxiety Program was developed using evidence-based principles of CBT (48) and materials from existing disorder-specific iCBT programs for GAD (166), SP (146), and PDA (159), as described in the previous chapter. The intervention was to be modified for the Control group active treatment phase based on results from the initial Treatment group and clinician feedback.

3.2.6 Clinician Support

Clinician support for the Treatment group was provided by a Clinical Psychologist who had been the clinician for previous iCBT programs (119, 166). The provision of Treatment group support was observed by another Clinical Psychologist as training for supporting the Control group during their active treatment. Every contact with each participant was recorded as was the total therapist time spent per participant. Therapists were encouraged to actively engage with participants in treatment, but advised to limit weekly contact time to approximately 10 minutes per participant, except if more time was clinically indicated.

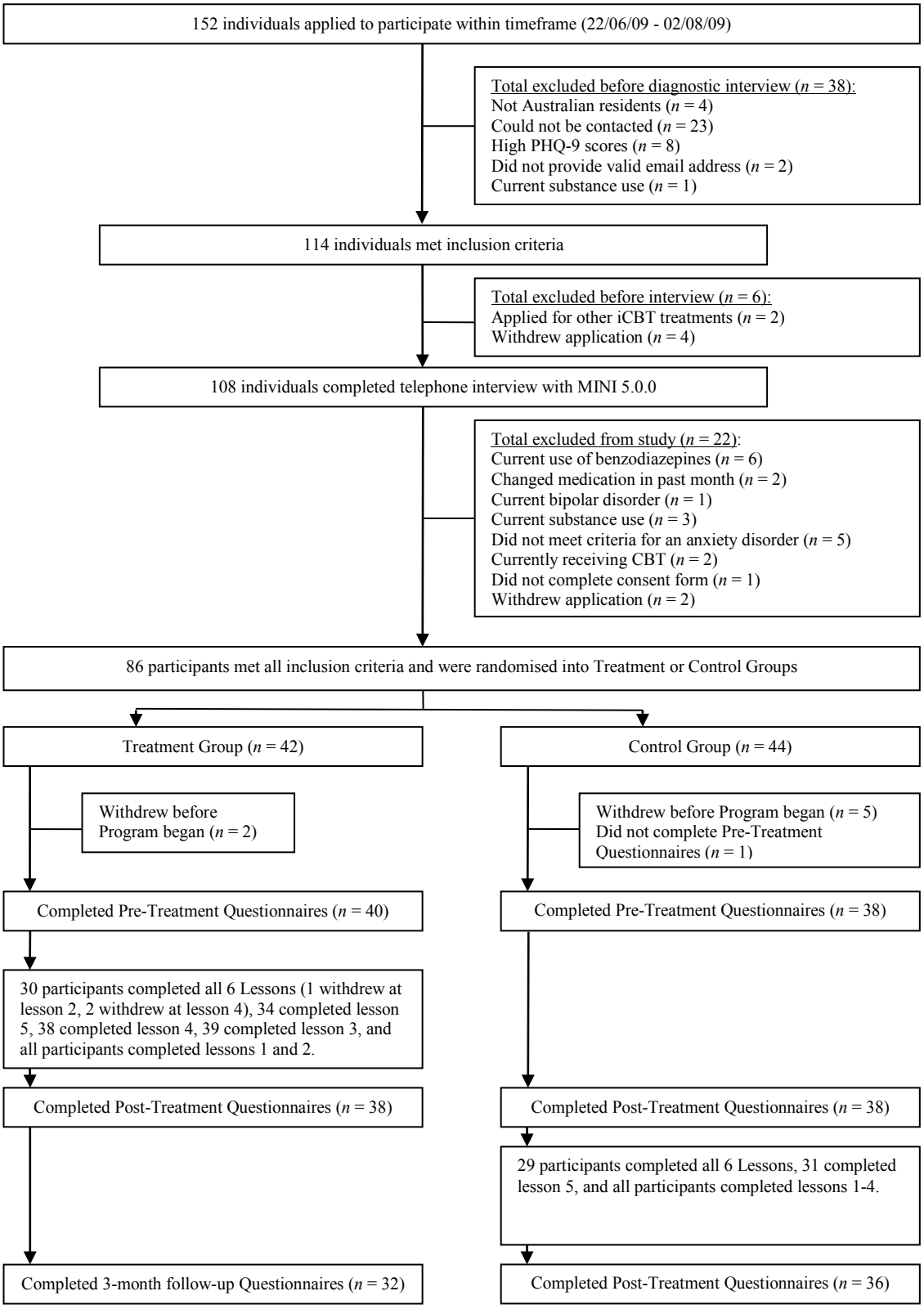


Figure 3.1 Participant Flow Chart.

3.2.7 Outcome Measures

To reduce the burden on participants, the total number of questionnaire items was kept below 90 and abbreviated measures were used where possible.

3.2.7.1 Diagnostic Measure: Mini International Neuropsychiatric Interview Version 5.0.0 (MINI) (215)

The MINI is a brief diagnostic interview developed to determine the presence of current and life-time Axis-I disorders using DSM-IV-TR diagnostic criteria. Psychometric evaluations of the MINI (216) indicate it has excellent inter-rater reliability ($k = .88$ - 1.00) and adequate concurrent validity with the Composite International Diagnostic Interview (217).

3.2.7.2 Primary outcome measure: Generalised Anxiety Disorder 7-Item Scale, (GAD-7) (218)

The GAD-7 comprises seven items measuring symptoms and severity of GAD based on the DSM-IV-TR diagnostic criteria for GAD. The GAD-7 has good internal consistency (.89) and good convergent validity with other anxiety scales (219). However, evidence indicates the GAD-7 is also sensitive to GAD, SP and PDA with increasing scores indicating greater severity of symptoms (220). The GAD-7 is increasingly used in research and in large scale dissemination studies as a g eneric measure of change in anxiety symptoms (221, 222). The internal consistency of the GAD-7 in the current study was high (Cronbach's $\alpha = .91$).

3.2.7.3 Primary outcome measure: Depression Anxiety Stress Scales – 21 Item (DASS-21) (223)

The DASS-21 is a measure of severity of symptoms of anxiety, stress, and depression, and is used to measure change in higher-order, or common symptoms across anxiety and depressive disorders. It comprises three subscales that assess features uniquely associated with depression, anxiety, and psychological distress. The 21-item short form has demonstrated excellent psychometric properties including good internal consistency and concurrent validity comparable with the original 42-item measure (224). The internal consistency of the DASS-21 in the current study was high (Cronbach's $\alpha = .94$).

3.2.7.4 Disorder-specific outcome measures: Penn State Worry Questionnaire (PSWQ) (225)

The PSWQ consists of 16 items and is considered a valid clinical measure of worry characteristic of GAD. Early psychometric evaluations revealed the PSWQ had high internal consistency and temporal stability (225), and was able to differentiate patients with GAD from those with other anxiety disorders (226). The internal consistency (Cronbach's α) of the PSWQ in the current study was .89.

3.2.7.5 Disorder specific outcome measures: Social Phobia Screening Questionnaire (SPSQ) (227)

The SPSQ is a 14-item measure of social anxiety distress. It is a widely used screening measure for SP (142, 143, 149), and psychometric properties indicate it has high internal consistency (Cronbach's alpha = .90) (227). The internal consistency of the SPSQ in the current study was high (Cronbach's alpha = .92).

3.2.7.6 Disorder Specific Outcome Measures: Panic Disorder Severity Scale – Self Rating (PDSS-SR) (228)

The PDSS-SR is a seven-item measure of PDA severity. Psychometric evaluations suggest it has excellent psychometric properties including high internal consistency (Cronbach's α = .92), good test-retest reliability (r = .81), and sensitivity to change (228). Cronbach's α of the PDSS-SR in the current study was high (.91).

3.2.7.7 Secondary outcome measure: Patient Health Questionnaire – 9 Item (PHQ-9) (214)

The PHQ-9 is a nine-item measure based on the DSM-IV-TR Major Depressive Episode criteria, and was used as a measure of depression symptom severity. A total score of 10 on the PHQ-9 has also been identified as an important threshold for identifying DSM-IV-TR congruent depression with increasing scores indicating greater symptom severity (214). Psychometric studies indicate the internal consistency is high (.86 – .89) (214) and the measure is sensitive to change (219). The internal consistency of the PHQ-9 in the current study was high (Cronbach's α = .86).

3.2.7.8 Secondary outcome measure: Sheehan Disability Scales (SDS) (215)

The SDS is a three-item measure that assesses impairment in psychosocial functioning with high internal consistency (α = .89) (229). The internal consistency (Cronbach's α) of the SDS in the current study was .75.

3.2.7.9 Secondary outcome measure: NEO- Five Factor Inventory – Neuroticism Subscale (NEO-FFI-N) (230)

The NEO-FFI-N comprises 12-item, measures the general tendency to experience negative affect, susceptibility to psychological distress, and ability to cope with stress, and is part of the NEO personality inventory. The internal consistency of the Neuroticism subscale has previously been reported as ranging from .75 to .80 (231, 232), although was slightly higher in the current study (.86).

3.2.8 Time-Points

All participants were asked to complete the questionnaire outcome measures (GAD-7, DASS-21, PSWQ, SPSQ, PDSS-SR, PHQ-9, SDS and NEO-FFI-N) at pre-treatment, post-treatment, and at three-month follow-up. Control group participants began treatment immediately after the Treatment group post-treatment time-point, so the three-month follow-up for the Treatment group coincided with the post-treatment time-point for the Control group. Collecting post-treatment results for the Control group enabled exploration of whether changes to the Anxiety Program, based on Treatment group results and clinician feedback, improved outcomes.

3.2.9 Sample Size and Randomization

Power calculations indicated that a sample size of 36 participants in each group was sufficient to detect an effect size difference of .6 between Treatment and Control groups, with an alpha at .05 and power of 80%, which was the minimum expected based on similar studies (147, 159). More participants were recruited to hedge against attrition. The study was not powered to detect small differences between the Treatment and Control groups.

Eighty-six applicants met all inclusion criteria and were randomised via a true randomization process (www.random.org) by an independent person to either Treatment (n = 42) or Control (n = 44) groups. Allocation preceded the screening phone call and precluded blinding.

3.2.10 Statistical Methods

3.2.10.1 Analysis of primary, disorder-specific and secondary outcome measures

Group differences in demographic data and pre-treatment measures were analysed with independent *t*-tests and *chi-square* tests of independence. Post-treatment between-group changes were analysed using univariate Analyses of Covariance (ANCOVAs) using pre-treatment scores as the covariate. This approach is recommended as a robust and reliable statistical strategy for analysing the results of RCTs (233, 234). Within-group changes on outcome measures were analysed using paired-samples *t*-tests. Effect sizes (Cohen's *d*) were calculated for within- and between-group changes, based on the pooled standard deviation. All post-treatment analyses involved an intention-to-treat (ITT) design and missing data were addressed by carrying forward the first available data (baseline-observation-carried-forward; BOCF).

3.2.10.2 Clinical significance

Three measures of clinical significance were employed. Pre-treatment, post-treatment and three-month follow-up GAD-7 scores were compared with clinical cut-offs to provide an index of *remission*. This was defined as the proportion of participants who initially scored above the optimum cut-off (GAD-7 total score $\geq$ 8) and subsequently scored below this cut-off (221). An estimate of *recovery* was made by identifying the proportion of participants in each group who demonstrated a significant reduction in their symptoms (defined here, as a reduction of 50% of pre-treatment GAD-7 scores), as described in recent dissemination studies (222). Additionally, changes in prevalence of principal disorders of anxiety Treatment group was calculated on the results of the diagnostic interviews conducted at pre-treatment and three-month follow-up and were analysed with *chi*-square tests of independence.

3.2.10.3 Control Group Results

As a partial test of the reliability of the treatment program, and to test modifications to the treatment protocol, data from the Control group following their treatments are described.

3.3 RESULTS

3.3.1 Baseline Data

Table 3.1 shows the demographic characteristics of Treatment and Control groups and the overall sample. Analyses of demographic data showed Treatment group participants had significantly higher levels of education than the Control group, $\chi^2(1, N = 78) = 6.70$, $p < .01$, and a trend towards a larger proportion of Treatment group participants being in a married or de-facto relationship $\chi^2(1, N = 78) = 5.79$, $p = .06$. Otherwise there were no significant between-group differences regarding gender, employment, previous discussion of symptoms with a health professional, or use of medication χ^2 (1, $N = 78$) range = .17 – 3.39, p range = .26 - .68 , or age, t (76) = -.62, p = .54.

Principal and additional diagnoses are displayed in Table 3.2. At pre-treatment interview, GAD was the most common principal diagnosis, followed by SP and PDA. Thirty-one of 40 (78%) Treatment and 28/38 (74%) Control participants had a comorbid anxiety or depressive disorder. There were no statistically significant differences between groups in the prevalence of principal diagnoses, or the presence of additional diagnoses, χ^2 (1, $N = 78$) range = .15 - 16, p range = .70 – .92.

Table 3.3 shows the pre-treatment scores for the Treatment and Control groups on primary, disorder-specific and secondary outcome measures. There we no significant pre-treatment between-group differences on any of the outcome measures, F (1, 76) range = -.00 – .71, p range = .40 – .99.

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Table 3.1
Demographic Characteristics of Treatment and Control Groups, and the Total Sample

	Treatment (n = 40)		Control (n = 38)		Total (N = 78)		Statistical significance
Variable	*n*	%	*n*	%	*n*	%	
Gender							
Male	11	27.5	14	36.8	25	32.1	$\chi^2(1, N=78)=.78, p=.26$
Female	29	72.5	24	63.2	53	67.9	
Age							
Mean	38.6		40.5		39.5		
SD	12.0		14.1		13		t (76) = -.62, p = .54
Range	19-74		18-73		18-74		
Marital Status							
Single / Never Married	11	27.5	15	39.5	26	33.3	
Married / De facto	26	65.0	15	39.5	41	52.6	$\chi^2(1, N=78)=5.79, p=.06$
Separated / Divorced	3	7.5	8	21.0	11	14.1	
Education							
High school	5	12.5	11	28.9	16	20.5	
Tertiary	24	60.0	19	50.0	43	55.1	$\chi^2(1, N=78)=6.71, p=.01$
Other Certificate	11	27.5	5	13.2	16	20.5	
None	0	0.0	3	7.9	3	3.9	
Employment Status							
Part time/student	20	50.0	18	47.4	38	48.7	
Full time	13	32.5	13	34.2	26	33.3	$\chi^2(1, N=78)=3.39, p=.50$
Unemployed, retired or disabled	7	17.5	7	18.4	14	18.0	
Previously Discussed Symptoms with Health Professional	35	87.5	32	84.2	67	85.9	$\chi^2(1, N=78)=.17, p=.68$
Taking Medication	17	20.0	20	52.6	37	47.4	$\chi^2(1, N=78)=.80, p=.37$

Table 3.2
Diagnostic Characteristics of Treatment and Control Groups at Pre-Treatment, and the Treatment Group at Three-Month Follow-up

	Pre-treatment						Three-month follow-up	
	Treatment Group		Control Group		Total		Treatment	
	n	%	*n*	%	*N*	%	*n*	%
Principal diagnosis								
GAD	18	45.0	16	42.1	34	43.6	14	35.0
SP	10	25.0	11	28.9	21	26.9	8	20.0
PDA	12	30.0	11	28.9	23	29.5	3	7.5
Comorbid condition								
None	9	22.5	10	26.3	19	24.4	27	67.5
Anxiety only	12	29.3	10	26.3	22	28.2	5	12.5
Affective only	8	19.5	8	21.1	16	20.5	3	7.5
Anxiety and affective only	11	26.8	10	26.3	21	26.9	5	12.5
Number of additional diagnoses								
0	9	22.5	10	26.3	19	24.4	27	67.5
1	14	35.0	14	36.8	28	35.9	6	15.0
2	13	32.5	9	23.7	22	28.2	6	15.0
3 +	4	10.0	5	13.2	9	11.5	1	2.5

Note: Intention-to-treat model was employed with pre-treatment diagnoses being carried forward if follow-up data were not available. Diagnostic interviews were not repeated with Control group as they were still completing treatment. Abbreviations: GAD, Generalised Anxiety Disorder; SP, Social Phobia; PDA, Panic Disorder with or without Agoraphobia.

Table 3.3

Descriptive Statistics and Within- and Between-Group Effects on Self-Report Symptom Measures for Treatment and Control Groups at Each Assessment

Measure and group	Pre-treatment Mean	Post-treatment Mean	Follow-up Mean	Within-group effect size		Between-group effect size
				Pre- to post-treatment	Pre-treatment to follow-up	Post-treatment
GAD-7						
Treatment (*n* = 40)	11.33 (4.98)	7.38 (4.75)	7.30 (4.53)	.81 (.35 – 1.26)	.85 (.38 – 1.30)	.78 (.31 – 1.23)
Control (*n* = 38)	11.34 (5.48)	11.37 (5.53)	-	-.01 (-.46 – .44)	-	-
DASS-21						
Treatment (*n* = 40)	51.65 (25.92)	32.70 (23.09)	30.05 (21.92)	.77 (.31 – 1.22)	.90 (.43 – 1.35)	.80 (.33 – 1.25)
Control (*n* = 38)	52.00 (27.27)	53.42 (28.78)	-	-.05 (-.50 – .40)	-	-
PSWQ						
Treatment (*n* = 40)	64.28 (9.97)	57.65 (11.89)	55.83 (11.91)	.60 (.15 – 1.05)	.77 (.31 – 1.22)	.20 (-.25 – .64)
Control (*n* = 38)	62.74 (11.75)	60.12 (12.98)	-	.21 (-.24 – .66)	-	
SPSQ						
Treatment (*n* = 40)	13.78 (9.80)	8.78 (8.73)	8.88 (8.94)	.54 (.09 –.98)	.52 (0.07 – .96)	.43 (-.02 – .88)
Control (*n* = 38)	13.66 (10.38)	12.88 (10.25)	-	.08 (-.37 – .52)	-	-
PDSS-SR						
Treatment (*n* = 40)	11.03 (6.64)	6.88 (6.79)	5.98 (6.61)	.62 (.16 – 1.06)	.76 (.30 – 1.21)	.43 (-.03 – .87)
Control (*n* = 38)	10.16 (7.07)	9.95 (7.60)	-	0.03 (-.42 – .48)	-	-
PHQ-9						
Treatment (*n* = 40)	10.77 (5.20)	8.28 (5.90)	8.23 (5.83)	.45 (.00 – .89)	.46 (.01 – .90)	.49 (.04 – .94)
Control (*n* = 38)	10.84 (6.26)	11.47 (7.00)	-	-.09 (-.54 – .36)	-	-
SDS						
Treatment (*n* = 40)	14.45 (6.94)	10.48 (7.69)	9.48 (7.72)	.54 (.09 - .98)	.68 (.22 – 1.12)	.70 (.24 – 1.16)
Control (*n* = 38)	15.87 (7.94)	16.42 (9.14)	-	-.06 (-.51 – .39)	-	-
NEO-FFI-N						
Treatment (*n* = 40)	32.65 (7.45)	28.40 (7.86)	29.18 (9.16)	.55 (.10 – 1.00)	.42 (-0.03 -0.85)	.50 (.04 – .94)

Control (n = 38)	34.16 (9.33)	32.74 (9.51)	-	.15 (-.30 – .60)	-	-

Note. The standard deviations of the means and the confidence intervals of effect sizes are shown in parentheses. Intention-to-treat model was employed with pre-treatment scores being carried forward if post-treatment or follow-up data were not available. Abbreviations: GAD-7: Generalised Anxiety Disorder 7-Item; DASS-21: Depression Anxiety Stress Scales-21 item; PSWQ: Penn State Worry Questionnaire; SPSQ: Social Phobia Screening Questionnaire; PDSS-SR: Panic Disorder Severity Scale – Self Rating; PHQ-9: Patient Health Questionnaire-9 item; SDS: Sheehan Disability Scale; NEO-FFI-N: NEO-Five Factor Inventory – Neuroticism Subscale.

3.3.2 Attrition and Adherence

Thirty of 40 (75%) Treatment group participants completed the six lessons within the eight weeks of the program. Post-treatment data were collected from 38/40 (95%) Treatment and 38/38 (100%) Control group participants. Three-month follow-up data were collected from 32/40 (80%) Treatment group participants.

3.3.3 Is a Transdiagnostic iCBT Program for Anxiety Disorders Efficacious?

Mean scores and standard deviations for Treatment and Control groups at pre- and post-treatment, and three-month follow-up are presented in Table 3.3. Univariate ANCOVAs, controlling for pre-treatment scores, revealed significant post-treatment between-group differences on the GAD-7, DASS-21, SPSQ, PDSS-SR, PHQ-9, SDS, K-10 and NEO-FFI-N, F (1, 75) range = 5.93 – 17.28, p range <.001 - < .05, favouring the Treatment group, and a non-significant difference between groups on the PSWQ, F (1, 75) = 2.55, p = .11. Paired samples t-tests demonstrated no significant difference from post-treatment to three-month follow-up scores for the Treatment group on any measure, t (39) range = -1.81 – 1.83, p range = .07 – .86.

Between- and within-group effect sizes on all outcome measures are presented in Table 3.3. Moderate to large between-group effect sizes at post-treatment were achieved by the Treatment group relative to the Control group on the GAD-7 and DASS-21 (d = .78 and d = .80, respectively). Moderate between-group effects were achieved on the SPSQ, PDSS-SR, PHQ-9, SDS, NEO-FFI-N (d = .43 - .70), and small between-group effects were achieved on the PSWQ (d = .20). Large within-group effect sizes were achieved by the Treatment group at post-treatment on the GAD-7 (d = .81), and moderate effects were achieved on all other measures (d = .45 - .77). The within-group effect sizes appeared stable through to three-month follow-up.

At pre-treatment 29/40 (73%) Treatment group and 25/38 (66%) Control group participants scored above the cut-off for the GAD-7 (total score ≥ 8). At post-treatment 16/29 (55%) Treatment group participants met criteria for remission (GAD-7 total score <7), and 13/29 (45%) met criteria for recovery (reduction of at least 50% in pre-treatment GAD-7 total score). In contrast 3/25 (12%) of Control group participants met the criteria for remission, and none met criteria for recovery at post-treatment. At three-month follow-up, 17/29 (59%) Treatment group participants met criteria for remission and 12/29 (41%) met criteria for recovery. Additionally, at three-month follow-up 15/40 (38%) Treatment group participants no longer met criteria for a principal diagnosis of

GAD, SP or PDA (Table 3.2). Chi-square tests demonstrated a significant reduction in the number of participants meeting criteria for GAD, SP or PDA from pre-treatment to three-month follow-up, χ^2 (3, N = 40) = 35.53, p < .001.

3.3.4 Does the Program Result in Change in Each Specific Disorder?

Pre- and post-treatment data for Treatment and Control groups, and three-month follow-up data for the Treatment group, by principal disorder are presented in Table 3.4. Univariate ANCOVAs were conducted on the disorder-specific measures, controlling for pre-treatment scores. For participants with a principal diagnosis of GAD, there were no post-treatment differences between Treatment and Control participants on the PSWQ, SPSQ, or PDSS-SR, F (1, 31) range = .16 - .68, p range = .42 - .70. For participants with a principal diagnosis of SP, there was trend towards the Treatment group having significantly lower scores on the PDSS-SR, F (1, 20) = 4.02, p = .06. Otherwise there was no significant difference on the PSWQ or SPSQ, F (1, 20) range = 1.14 – 3.12, p range = .09 - .30. For participants with a principal diagnosis of PDA, the Treatment groups had significantly lower scores at post-treatment on the PDSS-SR, F (1, 18) = 7.94, p = .01, otherwise there was no significant difference on the PSWQ or SPSQ, F (1, 18) range = 2.05 – 2.12, p range = .16 - .17. Paired samples t-tests demonstrated a trend towards significance from post-treatment to three-month follow-up for Treatment group participants with a principal diagnosis of GAD on the PDSS-SR, t (17) = 2.01, p = .06, yet otherwise demonstrated no significant change by principal diagnosis on any other measures t (9 -17) range = -1.83 – 1.71, p range = .09 – .92.

Between- and within-group effect sizes by principal diagnosis on the disorder-specific outcome measures are presented in Table 3.4. Large between-group effect sizes were achieved by Treatment group participants with a principal diagnosis of PDA relative to their Control group counterparts on the PDSS-SR (d = 1.31). A moderate between-group effect was achieved by Treatment group participants with a principal diagnosis of SP relative to their Control group counterparts on the SPSQ (d = .45), and a small effect size was achieved by participants with a principal diagnosis of GAD on the PSWQ (d = .10). Between-group effect sizes on measures that did not correspond with participants' principal diagnoses ranged from small to large (d = .04 - .80).

Table 3.4

Descriptive Statistics and Within- and Between-Group Effects on Self-Report Symptom Measures for Treatment and Control Groups Stratified by Principal Diagnosis at Each Assessment

Measure, group, principal diagnosis	Pre-treatment Mean	Post-treatment Mean	Follow-up Mean	Within-group effect size		Between-group effect size
				Pre- to post-treatment	Pre-treatment to follow-up	Post-treatment
PSWQ						
Treatment (*n* = 40)						
GAD (*n* = 18)	66.17 (8.77)	60.94 (9.40)	58.72 (11.05)	.57 (-.11 – 1.23)	.73 (.06 – 1.41)	.10 (-.58 – .77)
SP (*n* = 12)	62.17 (9.04)	54.33 (13.35)	55.83 (11.64)	.69 (-.16 – 1.49)	.61 (-.23 – 1.40)	.20 (-.63 – 1.01)
PDA (*n* = 10)	63.40 (13.12)	55.70 (13.69)	50.60 (13.07)	.57 (-.34 – .56)	.98 (.01 – 1.86)	.34 (-.53 – 1.19)
Control (*n* = 38)						
GAD (*n* = 16)	65.19 (9.78)	61.94 (11.16)	-	.31 (-.39 – 1.00)	-	-
SP (*n* = 11)	61.09 (14.67)	57.27 (15.97)	-	.25 (-.60 – 1.08)	-	-
PDA (*n* = 11)	60.82 (11.63)	60.27 (12.95)	-	.04 (-.79 – .88)	-	-
SPSQ						
Treatment (*n* = 40)						
GAD (*n* = 18)	12.94 (8.03)	8.78 (8.73)	7.67 (8.51)	.50 (-.18 – 1.15)	.62 (-.05 – 1.29)	.13 (-.55 – .80)
SP (*n* = 12)	20.00 (9.49)	13.25 (10.69)	14.67 (9.75)	.67 (-.18 – 1.47)	.55 (-.28 – 1.35)	.45 (-.39 – 1.26)
PDA (*n* = 10)	7.80 (9.60)	4.50 (4.55)	4.10 (4.56)	.44 (-.47 – 1.31)	.49 (.-42 – 1.36)	.80 (-.12 – 1.66)
Control (*n* = 38)						
GAD (*n* = 16)	10.44 (7.48)	9.75 (5.95)	-	.10 (-.59 – .79)	-	-
SP (*n* = 11)	18.45 (9.34)	18.36 (11.91)	-	.01 (-.93 – .84)	-	-
PDA (*n* = 11)	13.55 (13.62)	11.91 (12.01)	-	.13 (-.71 – .96)	-	-
PDSS-SR						
Treatment (*n* = 40)						
GAD (*n* = 18)	8.44 (6.26)	6.67 (7.21)	5.00 (7.03)	.26 (-.40 – .91)	.52 (-.16 – 1.17)	.04 (-.63 – .71)
SP (*n* = 12)	13.42 (6.39)	6.50 (8.34)	6.42 (7.58)	.93 (.06 – 1.74)	.96 (.12 – 1.81)	.33 (-.50 – 1.14)
PDA (*n* = 10)	12.80 (6.55)	7.70 (3.97)	7.20 (4.66)	.94 (-.02 – 1.82)	.99 (.02 -1.87)	1.31 (.32 – 2.19)

Control (*n* = 38)						
GAD (*n* = 16)	7.69 (6.46)	6.94 (6.16)	-	.12 (-.58 – .81)	-	-
SP (*n* = 11)	8.73 (7.11)	9.27 (8.30)	-	-.07 (-.90 – .77)	-	-
PDA (*n* = 11)	15.18 (5.67)	15.00 (6.72)	-	.03 (-.81 – .86)	-	-

Note. The standard deviations of the means and the confidence intervals of effect sizes are shown in parentheses. Intention-to-treat model was employed with pre-treatment scores being carried forward if post-treatment or follow-up data were not available. Abbreviations: PSWQ: Penn State Worry Questionnaire; SPSQ: Social Phobia Screening Questionnaire; PDSS-SR: Panic Disorder Severity Scale – Self Rating.

Post-treatment within-group effect sizes for participants with a principal diagnosis of PDA were large on the PDSS-SR (d = .94), moderate for participants with a principal diagnosis of SP on the SPSQ (d = .67) and for participants with a principal diagnosis of GAD on the PSWQ (d = .57). Post-treatment within-group effect sizes on measures that did not correspond with Treatment group participants' principal diagnosis ranged from small to large (d range = .26 - .94). These results appeared stable through to three-month follow-up.

3.3.5 Participant Attitudes and Satisfaction

Thirty-eight of 40 Treatment group participants completed post-treatment satisfaction questionnaires. Of these participants, 27/38 (71%) reported being either *very satisfied* or *mostly satisfied*, 11/38 (29%) reported being *neutral/somewhat satisfied*, and no participants rated the program as *unsatisfactory*. Twenty-five of 38 participants (66%) rated the quality of the treatment modules as *excellent* or *good,* 11/38 (29%) rated the quality as *good*, and 2/38 (5%) rated the quality of treatment modules as *unsatisfactory*. Twenty-five of 38 (66%) participants rated the quality of internet correspondence with the therapist as *excellent* or *good*, 11/38 (29%) rated it as *satisfactory,* and 2/38 (5%) rated it as *unsatisfactory*.

3.3.6 Contact Events

The mean total therapist time per Treatment group participant was 46 minutes (SD = 16 minutes) including monitoring of the discussion forum, sending and reading instant messages, and telephoning participants. An additional average 30 m inutes per participant was required for administrative purposes, including the diagnostic telephone interview. During the program, Treatment group participants received a total of 765 automatic emails (M = 19.1, SD = 2.38), with the clinician sending a mean of 4.5 (SD = 2.32) additional personal instant messages per participant. The clinician also made a total of 215 telephone calls (M = 5.3, SD = 1.25) and made 22 forum posts.

3.3.7 Control Group Results

Based on T reatment group results, and consultation with the Treatment group clinician, the program was modified prior to the Control group beginning treatment. The modification involved exchanging the order of lesson two, which is concerned with

controlling physical symptoms and lifestyle factors, with that of lesson three, which describes basic principles of cognitive therapy.

3.3.7.1 Adherence and attrition

Thirty-six Control group participants commenced the active treatment phase of the Anxiety Program. Of these participants, 29/36 (81%) completed the six lessons within the eight weeks of the program. Post-treatment data were collected from 33/36 (92%) participants. In accordance with the ITT and BOCF paradigm, pre-treatment scores of participants who did not complete the post-treatment questionnaires were replicated as their post-treatment scores.

3.3.7.2 Overall and Disorder-Specific Change in Outcome Measures and Clinical Significance

Overall Control group scores on at pre- and post-treatment on all outcome measures, and within-group effect sizes are presented in Table 3.5. Paired samples *t*-tests revealed that the Control group had significantly lower scores from pre- to post-treatment on all measures, t (37) range = 3.18 – 6.85, $p < 0.001 – 0.003$. This change was associated with large within-group effect sizes on the GAD-7, DASS-21 and PSWQ (d = .92 – 1.02) and moderate effect sizes on the SPSQ, PDSS-SR, PHQ-9, SDS and NEO-FFI-N (d = .64 - .74).

Paired samples *t*-tests revealed that Control group participants with a principal diagnosis of GAD had significantly lower scores on all disorder-specific outcomes at post-treatment, t (15) = 2.51 – 4.86, p range < .01 – .05. Control group participants with a principal diagnosis of SP had significantly lower scores on PSWQ and SPSQ, t (10) range = 3.76 – 3.93, $p < .005$, and a trend towards significance on the PDSS-SR, t (10) = 2.13, p = .06. Control group participants with a principal diagnosis of PDA obtained significantly lower scores on PSWQ and PDSS-SR, t (10) = 2.69 – 3.12, $p < .05$, but not on the SPSQ t (10) = 1.73, p = .14. Participants with a principal diagnosis of GAD, SP or PDA achieved large within-group effect sizes on their corresponding disorder-specific measure at post-treatment (Table 3.6). Additionally, participants achieved small to large effect sizes on disorder-specific measures that did not correspond to their principal diagnosis. At post-treatment, 14/25 (56%) of Control group participants met criteria for remission and recovery.

Table 3. 5

Descriptive Statistics and Within-Group Effects on Self-Report Symptom Measures for the Control Group at Pre- and Post-Treatment

Measure and group	Pre-treatment Mean	Post-treatment Mean	Within-group effect size
			Pre- to post-treatment
GAD-7	11.34 (5.48)	5.89 (5.32)	1.01 (.52 – 1.48)
DASS-21	52.00 (27.27)	26.21 (24.83)	.99 (.50 – 1.45)
PSWQ	62.74 (11.75)	52.16 (11.62)	.91 (.42 – 1.37)
SPSQ	13.66 (10.38)	7.55 (8.85)	.63 (.17 – 1.09)
PDSS-SR	10.16 (7.07)	5.71 (6.38)	.66 (.19 – 1.12)
PHQ-9	10.84 (6.26)	6.61 (6.11)	.68 (.21 – 1.14)
SDS	15.87 (7.94)	9.53 (9.26)	.74 (.26 – 1.19)
NEO-FFI-N	34.16 (9.33)	27.82 (9.90)	.66 (.19 – 1.11)

Note. The standard deviations of the means and the confidence intervals of effect sizes are shown in parentheses. Intention-to-treat model was employed with pre-treatment scores being carried forward if post-treatment or follow-up data were not available. Abbreviations: GAD-7: Generalised Anxiety Disorder 7-Item; DASS-21: Depression Anxiety Stress Scales-21 item; PSWQ: Penn State Worry Questionnaire; SPSQ: Social Phobia Screening Questionnaire; PDSS-SR: Panic Disorder Severity Scale – Self Rating; PHQ-9: Patient Health Questionnaire-9 item; SDS: Sheehan Disability Scale; NEO-FFI-N: NEO-Five Factor Inventory – Neuroticism Subscale.

Table 3.6

Descriptive Statistics and Within-Group Effects on Self-Report Symptom Measures for the Control Group Stratified by Principal Diagnosis at Pre- and Post-Treatment

Measure, principal diagnosis	Pre-treatment Mean	Post-treatment Mean	Within-group effect size
			Pre- to post-treatment
PSWQ			
GAD (*n* = 16)	65.19 (9.78)	55.25 (10.54)	.98 (.22 – 1.68)
SP (*n* = 11)	61.09 (14.67)	48.18 (13.43)	.92 (.01 – 1.76)
PDA (*n* = 11)	60.82 (11.63)	51.64 (10.92)	.81 (-.08 – 1.65)
SPSQ			
GAD (*n* = 16)	10.44 (7.48)	5.31 (6.63)	.73 (-.01 – 1.42)
SP (*n* = 11)	18.45 (9.34)	10.18 (9.31)	.89 (-.02 – 1.73)
PDA (*n* = 11)	13.55 (13.62)	8.18 (11.01)	.43 (-.43 – 1.26)
PDSS-SR			
GAD (*n* = 16)	7.69 (6.46)	3.44 (5.46)	.71 (-.02 – 1.41)
SP (*n* = 11)	8.73 (7.11)	5.55 (6.55)	.47 (-.40 – 1.29)
PDA (*n* = 11)	15.18 (5.67)	9.18 (6.42)	.99 (.07 – 1.83)

Note. The standard deviations of the means and the confidence intervals of effect sizes are shown in parentheses. Intention-to-treat model was employed with pre-treatment scores being carried forward if post-treatment or follow-up data were not available. Abbreviations: GAD-7: Generalised Anxiety Disorder 7-Item; DASS-21: Depression Anxiety Stress Scales-21 item; PSWQ: Penn State Worry Questionnaire; SPSQ: Social Phobia Screening Questionnaire; PDSS-SR: Panic Disorder Severity Scale – Self Rating; PHQ-9: Patient Health Questionnaire-9 item; SDS: Sheehan Disability Scale; NEO-FFI-N: NEO-Five Factor Inventory – Neuroticism Subscale.

3.3.7.3 Treatment Satisfaction

Thirty-three Control group participants completed the post-treatment satisfaction questionnaires. Thirty-one of 33 (94%) participants reported being either *very satisfied* or *mostly satisfied*, while 2/33 (6%) reported being *neutral/somewhat satisfied*. Thirty-two of 33 (97%) participants rated the quality of the treatment modules as *excellent* or *good*, and 1/33 (3%) rated the quality as *unsatisfactory*. Twenty-eight of 33 (85%) rated the quality of internet correspondence with the therapist as *excellent* or *good*, 4/33 (12%) rated it as *satisfactory,* and 1/33 (3%) omitted a response for this question.

3.3.7.4 Time Spent/Contact Events Per Participant

The mean total therapist time per Control group participant was 48 minutes (*SD* = 21 minutes) including the monitoring of the discussion forum, instant messages, and telephone calls. An additional average 30 minutes per participant was required for administrative purposes, including the diagnostic telephone interview. During the program, the control group participants received a total of 700 automatic emails (*M* = 19.4, *SD* = 3.61), with the clinician sending a mean of 4.75 (*SD* = 1.40) additional personal instant messaging messages per participant. The clinician also made a total of 150 telephone calls (*M* = 4.17, *SD* = 1.32) telephone calls, and made 27 forum posts.

3.4 DISCUSSION

This trial examined the efficacy of the Anxiety Program, a clinician-supported transdiagnostic iCBT program for three anxiety disorders. At intake all participants met DSM-IV-TR diagnosis for a principal diagnosis of GAD, SP or PDA. Additionally, 59/78 (75%) met criteria for at least one additional disorder.

3.4.1 Is the Anxiety Program Efficacious and Acceptable?

Post-treatment outcomes for the Treatment group were significantly superior to the Control group on all measures, excluding the PSWQ. Post-treatment between-group and within-group effect sizes for the Treatment group were large for GAD-7 and DASS-21 scores. Small to moderate post-treatment between and within-group effect sizes were achieved on disorder-specific and secondary outcome measures. At post-treatment 55% of participants in the Treatment group were classified as in remission, and 45% met criteria for recovery. Effect sizes, remission and recovery status was generally maintained until three-month follow-up, at which point 38% of Treatment group

participants no longer met criteria for principal GAD, SP or PDA. Moreover, Treatment group participants reported moderate levels of satisfaction with the program and therapist contact. This provides tentative support for the efficacy of a transdiagnostic iCBT treatment for three anxiety disorders. However, the results must be interpreted with caution given the sample size of the study and associated impact on the power of statistical analyses.

3.4.2 Does the Anxiety Program Result in Change for Each Specific Disorder?

However, not all results were as expected. The third hypothesis, that Treatment group participants would show significant improvements on the disorder-specific measures relevant to their primary diagnosis, was only partially supported. Significant differences at post-treatment between Treatment and Control group participants were found only for participants with a principal diagnosis of PDA on the PDSS-SR, whereas participants with principal GAD or SP did a not report significant reduction in their respective disorder specific measures. However, these results must be interpreted with caution given the sample size of the study and associated power these analyses.

3.4.3 Is a Revised Version of the Anxiety Program Efficacious and Acceptable?

As a partial replication of the Treatment group, the program was revised before the Control group commenced active treatment, with material about cognitive skills subsequently presented at Lesson 2 rather than Lesson 3. Control group participants obtained larger within-group post-treatment effect sizes than the Treatment group on all measures (d = .04 - .23), achieved large within-group effect sizes on measures corresponding to their principal diagnosis, and 97% of Control group participants rated their satisfaction with the program as either *very or mostly satisfied.* Importantly, the total amount of time required the therapist of the Treatment group per participant (46 minutes) was approximately the same as that by the therapist in the Control group (48 minutes).

3.4.4 Limitations

The practical and methodological limitations of the present study are relevant to other studies in the emerging field of transdiagnostic treatment. For example, while the sample size selected for this study was sufficient to detect overall differences between groups, it is insufficient to detect between-group differences when conducting analyses

based on principal diagnosis. The sample sizes required for these analyses are considerable. Pragmatic approaches for research teams with limited resources wishing to answer more substantive questions may include pooling treatment data together.

A second important limitation is the statistical and practical challenges of managing comorbidity. As indicated earlier, 72% of participants in this study met DSM-IV-TR criteria for at least one other anxiety disorder or depression. Thus, analysis by primary diagnosis could be contaminated by the secondary or tertiary diagnoses, adding to the difficulty already present with small sample sizes.

A third critical limitation concerns the choice of general and disorder-specific measures. Currently there is no consensus about the most appropriate outcome measures, and the temptation to add additional measures must be balanced with the risk of reducing adherence and completion by participants. A wide range of measures have been included, with details reported in Tables 3.3 and 3.4 to assist in interpreting these results. A related limitation is the relatively small dose of therapeutic content (six lessons) and clinician contact (under 60 minutes per participant) provided during this program. Limited exposure to therapeutic materials may have limited the magnitude of clinical gains, which must be balanced with the risk of overwhelming participants with excessive content and clinician contact, as discussed by Erickson (172).

Individual differences between the clinicians supporting the Treatment and Control groups during active treatment is another limitation of the study, meaning that the improved outcomes observed with the Control group cannot be unequivocally associated with the modifications made to the Program. However, the similarity in contact times between groups, good clinical outcomes of the Treatment clinician in previous programs for treatment of GAD, and that the Treatment group clinician modelled support for the Control group clinician goes some way to assuage this concern. However, independent replication of the study would benefit from employing a single clinician to improve the reliability of results.

Lastly, a possible criticism of the current study is that multiple comparisons were conducted without *a priori* control of alpha levels to reduce risk of Type I errors. Given that the comparisons were planned and that this was an exploratory study with clear aims, and that obtained *p* values were below .05, this is unlikely to be a significant weakness.

3.4.5 General discussion

The results from the initial Treatment group indicate that the Anxiety Program was efficacious as indicated by changes on generic measures of anxiety and, using conservative ITT and BOCF statistical methods, is broadly consistent with those reported in recent meta-analyses of face-to-face transdiagnostic treatments (38, 92) and disorder-specific computerised CBT programs for anxiety (123). Results from the Control group active treatment phase provide encouraging preliminary evidence for the reliability of the program in reducing general symptoms of anxiety.

The efficacy of transdiagnostic treatment for specific disorders remains unclear. Disorder-specific results for the initial Treatment group indicated that the Anxiety Program may not be as efficacious as disorder-specific iCBT programs, which is consistent with findings reported elsewhere. For example, a program aiming to treat PDA and the most severe comorbid condition was reported as less efficacious than a similar program treating PDA alone (235). However, outcomes by principal diagnosis for the Control group were associated with large within-group effect sizes consistent with those observed in previous iCBT disorder-specific programs for GAD, (119, 166), SP (145) and PDA (159). Although the post-treatment results of the Control group need to be interpreted with caution, they provide some evidence that careful attention should be spent on the design of transdiagnostic interventions.

The results from this preliminary study of a transdiagnostic iCBT program are encouraging, yet require replication. The revisions made to the program prior to the Control group active treatment phase provides preliminary evidence that an increased focus on cognitive anxiety management techniques would improve the efficacy of the program, and should be considered in future program revisions. Future research would also benefit from investigating the level of support required to complete the program, as encouraging evidence has been found to indicate that Coach-supported iCBT, when supervised, may produce similar results as Clinician-supported iCBT for treatment of SP (155) and GAD (119). Additionally, future studies employing a larger sample size would allow for a more robust investigation of the efficacy of the program overall, and by principal diagnoses.

3.4.6 Conclusion

This preliminary RCT revealed overall outcomes for transdiagnostic iCBT to be superior to a waitlist control condition. Preliminary examination of outcomes by principal diagnosis appeared lower than those obtained in disorder-specific iCBT programs. However, modifications to the Anxiety Program based on Treatment group results and clinician feedback were associated with improved outcomes for the Control group across all measures, with disorder-specific improvements comparable to diagnosis-specific iCBT studies. Replication of this study is required, and further studies could explore questions about the optimum amount and nature of the content of transdiagnostic programs, the amount and type of support for guided iCBT, and to explore statistical strategies for evaluating the role of comorbidity. Moreover, direct comparisons between transdiagnostic and disorder-specific programs are required to determine the relative benefits of these approaches.

CHAPTER FOUR

Study 2: A Randomised Controlled Trial of Transdiagnostic Internet-Delivered Cognitive Behavioural Therapy for Three Anxiety Disorders - Replication and Extension

4.1 INTRODUCTION

There is growing interest in innovative treatments that have the potential to overcome barriers to treatment. Two approaches that have considerable potential for improving access to evidence-based care for consumers with anxiety disorders include iCBT and transdiagnostic treatments.

There is strong evidence for the efficacy of Clinician-supported iCBT in treating SP (142-146) and PDA (115, 116, 157-160), and emerging evidence for the treatment of GAD (118, 119, 166). There is also preliminary evidence that Coach-supported iCBT may produce similar outcomes to Clinician-supported iCBT for SP (155) and GAD (119). Coach-supported iCBT is an alternative model of dissemination for internet-delivered treatment that may confer a number of advantages, including cost-effectiveness over expert clinician guided iCBT and overcoming existing workforce shortages of appropriately trained clinicians in mental health, making it an important target for treatment research.

The second innovative approach is transdiagnostic treatment. Emerging evidence indicates that transdiagnostic treatment may result in outcomes similar to disorder-specific treatments on generic anxiety measures (38, 171). However, there are limited data about which anxiety disorders respond to transdiagnostic treatment.

Encouraging results for combining the transdiagnostic and iCBT treatments were found in Study 1. However, within-group effects on disorder specific measures were

less than found in similar disorder-specific treatments (119, 138, 145, 146, 159). Post-treatment analyses demonstrated no significant difference between Treatment and Control participants on the Penn State Worry Questionnaire. Moreover, post-treatment analyses demonstrated no difference between Treatment and Control group participants with a principal diagnosis of GAD or SP on their respective disorder-specific measures, although the small sample size limited the ability to detect small differences between groups. This suggested that there was scope to improve the efficacy of the Anxiety Program.

Study 2 had three aims: 1) To determine the efficacy of a revised and extended version of the Anxiety Program; 2) to examine the effects of treatment on disorder-specific measures of anxiety for each of the target disorders, and; 3) to examine the relative efficacy of Clinician- and Coach-supported transdiagnostic iCBT.

4.2 METHOD

4.2.1 Design

The design comprised a CONSORT-revised (213) compliant RCT comparing three parallel conditions: A Clinician-supported iCBT treatment group (CL group); a Coach-supported iCBT treatment group (CO group); and a waitlist deferred-treatment control group (Control).

4.2.2 Hypotheses

The three hypotheses were: 1) The pooled CL and CO group (CL+CO) participants would show significant improvement on general and disorder-specific measures of anxiety, and measures of depression and disability after treatment, relative to Control participants, and would rate the treatment as acceptable; 2) the pooled CL+CO participants would show significant improvement on disorder-specific measures of anxiety over time, and; 3) participants in the CO group would achieve similar outcomes to the CL group across all measures and time-points.

4.2.3 Ethics

The study was approved by the Human Research Ethics Committee (HREC) of St Vincent's Hospital (Sydney, Australia) and the HREC of the University of New South Wales (Sydney, Australia). All participants provided written informed consent. The trial was registered as ACTRN12610000242022.

4.2.4 Participants

The participant recruitment process and inclusion criteria used in the present Study were identical to those used in Study 1 and are described in detail in Section 3.2.5. Two-hundred and fifty-three individuals applied for this program and 203 met the initial inclusion criteria for the study. Of the 203 individuals who met the inclusion criteria for the study, two individuals withdrew their application before the telephone interview and four individuals did not return contact from the researchers. The remaining 197 individuals were administered the Mini International Neuropsychiatric Interview Version 5.0.0 (MINI) (215) during a telephone interview to determine whether they met DSM-IV-TR criteria for an anxiety or affective disorder. One-hundred and thirty-nine individuals met all eligibility criteria and were randomised into either CO, CL or Control groups. One CO and four Control group participants withdrew before beginning the program, two CO and one CL group participant did not complete the pre-treatment questionnaires. This resulted in 43 CO, 46 CL and 42 Control group participants eligible for analysis (see Figure 4.1).

4.2.5 Interventions

Both treatment groups received access to the revised Anxiety Program which was re-written during December 2010 to February 2011. The revised Anxiety Program comprised the following changes: i) Two new lessons were added to include materials about structured-problem solving, core-beliefs, and metacognitions about anxiety; ii) the duration of the program was increased from eight to ten weeks; iii) information about thought challenging were presented in the second rather than third lesson; iv) lesson material on assertive communication was extended to include management techniques for interpersonal boundaries; v) new resources were created to introduce imaginal exposure and worry stories, and; vi) behavioural activation was included in the lesson focussing on management of physical symptoms of anxiety. The lesson content of the revised Anxiety Program is presented in Table 4.1.

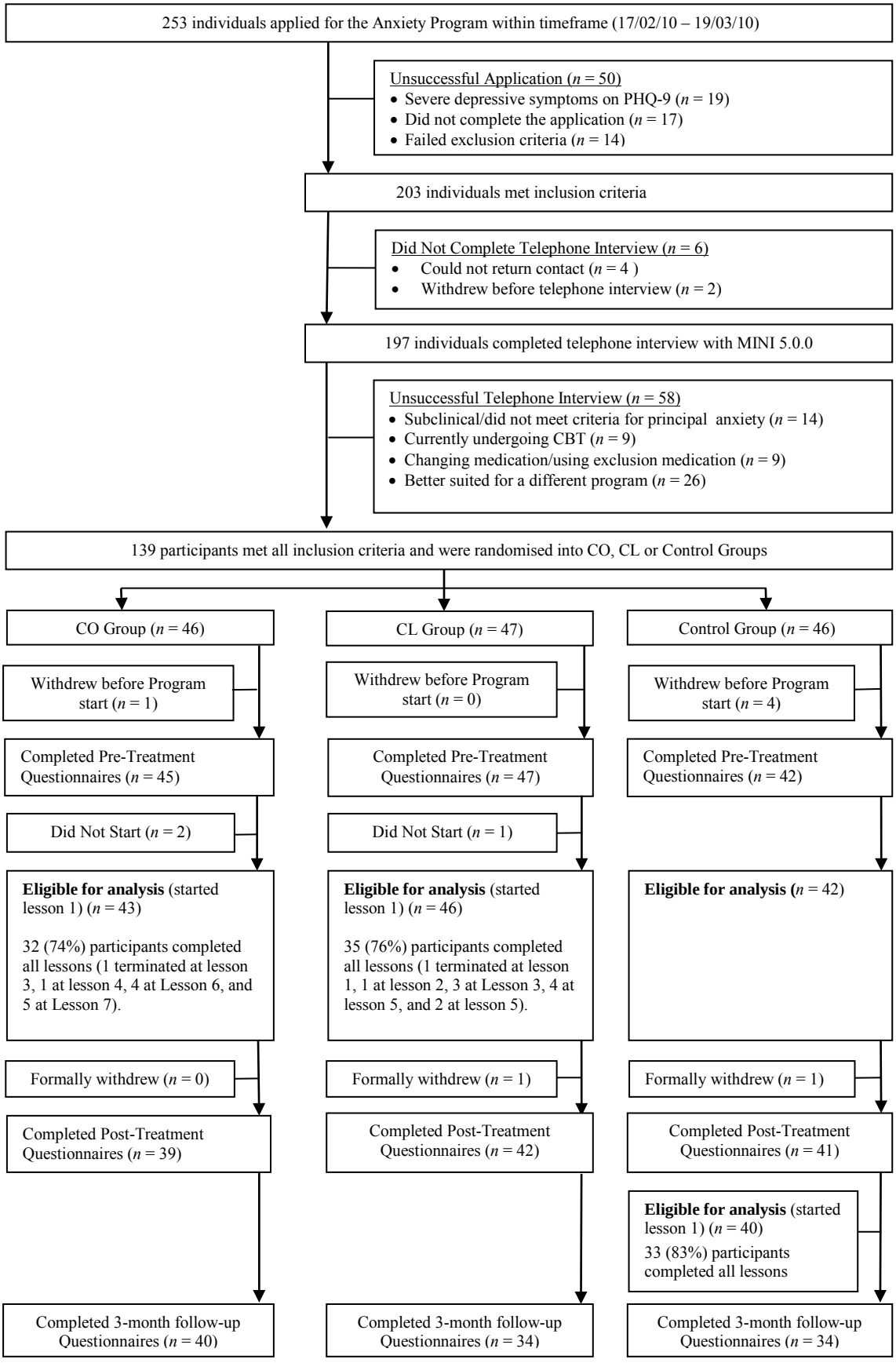

Figure 4.1 Participant Flow Chart.

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Table 4.1
Summary of Lessons and Stories from the Frontline Content of the Revised Anxiety Program

Lesson	Weeks to complete lesson	Primary content/theme	Secondary content/theme	Topics of Stories From the Frontline
1	1	Education about the prevalence, symptoms and treatment of anxiety including an explanation of the functional relationship between symptoms	Examples describing symptoms, information and encouragement about self-monitoring symptoms, and information normalising difficulties during recovery	Examples of symptoms and their impact; normalise difficulties during recovery.
2	1	Basic principles of cognitive therapy, including strategies for monitoring and challenging thoughts, and structured problem solving	Examples of thought challenging, and examples of structured problem solving	Examples of common unhelpful thoughts and how to use thought challenging, and of using structured problem solving
3	1	Instructions about managing physical symptoms including de-arousal strategies, and introduction to the role of avoidance in maintaining anxiety	The importance of lifestyle factors, and consolidation of self-monitoring	Examples of using de-arousal strategies use to lower baseline levels of stress and impact of healthy lifestyle factors
4	2	Education and guidelines about practicing graded exposure	Examples of exposure exercises, normalising difficulties with exposure and troubleshooting common barriers to practice	Examples of exposure hierarchies, emphasising realistic treatment goals and normalising difficulties with exposure

5	1	Information and guidelines about advanced cognitive skills including meta-cognitive belief challenging	The importance of managing beliefs, and normalising difficulties identifying belief,	Examples of positive and negative beliefs about anxiety, distressing core beliefs, and of successful attempts at challenging beliefs
6	2	Education and guidelines for acting *as if* and troubleshooting common barriers to treatment	Examples of acting as if and examples of common treatment barriers and potential solutions	Reflection of progress to date, future plans to continue practice of skills
7	1	Information and guidelines surrounding communication skills, assertive communication and interpersonal boundaries	Identification of communication styles, guidelines about assertive communication and examples of healthy and unhealthy personal boundaries	Examples of how communication styles and interpersonal boundaries contribute to anxiety, and can be managed
8	1	Information about relapse prevention and constructing relapse prevention plans	Examples of relapse prevention planning, tips to create a relapse prevention plan, encouragement to continue practicing skills	Example relapse prevention plans and key skills from program

The revised Anxiety Program comprised the following components: Eight online lessons; a summary/homework assignment for each lesson; weekly telephone or email/asynchronous messaging contact with the Clinician or Coach, and regular automated reminder and notification emails. All participants also had access to additional written resources that included guidelines about managing low mood, improving sleep, and answers to frequently asked questions about the application of skills described in the lessons and summaries, although these were not prescribed as per other treatment protocols (236). Forums were omitted from both Clinician- and Coach-supported conditions to increase consistency between groups, as forums had previously been used to answer clinical questions and to promote therapeutic engagement. Participants were also provided with access to de-identified vignettes written by participants in previous iCBT programs, called *Stories from the Frontline*, addressing topics relevant to each of the eight lessons.

Similar to the Lessons in the first version, each Lesson in the enhanced version of the Anxiety Program comprised a review of the skills described in previous lessons, an introduction to skills described in the current lesson, illustrated examples about people with each of the target disorders practicing those skills, and a summary of the main points. Participants were encouraged to complete one lesson each week, to complete the recommended homework and to complete the eight lessons within 10 weeks.

4.2.6 Clinician and Coaching Support Roles

Two staff conducted the study with supervision from the Clinical Psychologist and Director of the VirtualClinic. The Clinician role was performed by a Clinical Psychologist with two and a half years of post-clinical training experience, who had previously treated participants using iCBT in two other trials (119, 237), and was employed as a Clinical Psychologist at the Anxiety Disorders Clinic, St Vincent's Hospital Sydney. The Coach role was performed by a Registered Psychologist without specialist post-graduate training, employed as a Research Assistant at the same research unit.

Clinician- and Coach-support roles performed specific and distinct functions. Both roles required strict adherence to a pre-determined script to be followed throughout all contact with participants that specified: Reinforcing progress to date; encouraging the completion of further lessons; encouraging practice of homework tasks; normalising difficulties with practicing homework tasks; and providing direction to upcoming

materials. In the event of receiving clinical questions the Coach was instructed to direct the participant to the program content or inform of upcoming materials that would address the question. The Coach was not permitted to provide clinical advice or to elaborate, expand upon or add to the existing information or skills provided in the program. The Clinician, however, was invited to provide therapy and engage the participant in more detailed discussion of the materials including how to apply the treatment, to provide further detail about the skills, assist the participant in practicing those skills, and suggest additional skills if applicable. Both Clinician and Coach received weekly supervision from the Director of the research unit, a Clinical Psychologist, as a matter of routine professional and ethical care. These sessions allowed discussion of clinical issues, and the opportunity for the Coach to refer participants to the Clinician in the event of any perceived deterioration in the participants' mental health status, or of any concerns about participants' wellbeing. Supervision was also provided to reinforce adherence to the script and guidelines and ensure that the Coach did not attempt 'therapy'. Both Clinician and Coach were advised to limit weekly contact time to approximately 10 minutes per participant, unless more time was clinically indicated. Every instance of contact with each participant was recorded as was the total time that the Clinician and Coach spent per participant.

4.2.7 Outcome Measures

With one exception, the diagnostic assessment, primary, disorder specific and secondary measures used in the current study were the same as those described in section 3.2.7 in Study 1, the exception being for the measure of SP. The *Social Interaction Anxiety Scale and Social Phobia Scale – Short Form* (SIAS-6/SPS-6) (238) was used as a disorder-specific measure for SP. The SIAS-6/SPS-6 is a recently developed brief measure of social anxiety (12 items) based on the items of the Social Interaction Anxiety Scale (SIAS) and the Social Phobia Scale (SPS) (239). The SIAS-6/SPS-6 correlated strongly and significantly with the SIAS and SPS in clinical samples at pre-treatment, post-treatment, and at three-month follow-up (*rs* = .79 -.90), and also correlated strongly and significantly with change scores in the SIAS and SPS following treatment (*rs* = .81 -.91). The SIAS-6/SPS-6 was chosen to replace the SPSQ used in Study 1 for two reasons. Firstly, the measure was developed with an Australian clinical population and as such may have increased the ecological validity of the present research. Secondly, the SIAS-6/SPS-6 is comprised of fewer items than the SPSQ.

Cronbach's alpha indicated high internal consistency for all measures used in the present study: GAD-7 (.86); DASS-21 (.88); PSWQ (.90); SIAS-6/SPS-6 (.92); PDSS-SR (.92); PHQ-9 (.84); SDS (.83), and; NEO-FFI-N (.81). All questionnaires were administered via the internet. With the exception of the SIAS-6/SPS-6 described above, all other measures are described in more detail in Section 3.2.7 of Chapter 3.

4.2.8 Time-Points

All participants were asked to complete the questionnaire outcome measures (GAD-7, DASS-21, PSWQ, SIAS-6/SPS-6, PDSS-SR, PHQ-9, SDS and NEO-FFI-N) at pre-treatment, post-treatment, and at three-month follow-up. Control group participants began treatment immediately after the CL and CO post-treatment time-point, so the three-month follow-up for the CL and CO groups coincided with the post-treatment time-point for the Control group.

4.2.9 Sample Size and Randomization

Power calculations indicated that a sample size of 36 participants in each group was sufficient to detect an effect size (ES) difference of 0.6 between the treatment groups and the Control group, with alpha at .05 and power of 80%, which was the minimum expected based on similar studies (119, 147, 159). The study was not powered to detect small differences between the treatment groups.

One-hundred and thirty-nine applicants met all inclusion criteria and were randomised via a true randomization process (www.random.org), generated by an independent person, to either CO, CL or Control groups. Dependence on self-report measures precluded blinding.

4.2.10 Statistical Analyses

4.2.10.1 Analysis of primary, disorder-specific, and secondary outcome measures

Baseline between-group differences in demographic data and pre-treatment measures were analysed with *one-way ANOVAs* and *chi*-square tests of independence. To determine whether the transdiagnostic iCBT program was efficacious, scores from the CL and CO groups were pooled to create a single *CL+CO* group. To explore the relative clinical outcomes of each type of support, CL and CO data were analysed separately.

All post-treatment and three-month follow-up analyses involved an intention-to-treat (ITT) design and missing data were addressed by carrying forward the first available data (BOCF). Between-group changes in questionnaire scores were analysed using univariate analyses of covariance (ANCOVAs), assigning pre-treatment scores as the covariate. This approach is recommended as a robust and reliable statistical strategy for analysing the results of RCTs (233, 234). Within-group changes in questionnaire scores were analysed using paired-samples *t*-tests. Effect sizes (Cohen's *d*) were calculated for within- and between-group changes, based on the pooled standard deviation.

4.2.10.2 Analysis of clinical significance

Three criteria of clinical significance were employed. Pre-treatment, post-treatment and three-month follow-up GAD-7 scores were compared with clinical cut-offs to provide an index of *remission.* This was defined as the proportion of participants who initially scored at or above the optimum cut-off (GAD-7 total score $\geq$ 8), and subsequently scored below this cut-off (221). An estimate of *recovery* was made by identifying the proportion of participants in each group who scored above the aforementioned pre-treatment threshold and subsequently demonstrated a significant reduction in their symptoms (defined here, as a reduction of 50% of pre-treatment GAD-7), as described in recent dissemination studies (222). Third, changes in prevalence of principal and additional disorders of anxiety in the two treatment groups were calculated on the results of the diagnostic interviews conducted at pre-treatment and three-month follow-up.

4.2.10.3 Analysis of contact events

Analyses were conducted to explore differences in the number, content, and duration of contacts between participants and the Clinician or Coach. First, independent-samples *t*-tests were used to assess between-groups differences in the number and duration of contacts with participants (contact events). Secondly, to explore potential differences in the content of participant contacts between the treatment groups, a thematic analysis was employed, using manually written correspondence from the Clinician or Coach as the data set. Automated emails were excluded from this data set as they were identical for both groups. This analysis involved the following steps: 1) Familiarisation with the written correspondence without any pre-determined theoretical orientation for semantic patterns; 2) initial generation of codes looking for semantic patterns and grouping of

data; 3) searching for themes in the coded data to determine candidate and sub-themes; 4) reviewing and refining the themes until saturation, collapsing themes and checking the themes for internal reliability, and; 5) defining and naming the collapsed themes. Lastly, a frequency count of the themes was taken to determine the instance of each of the themes in each non-automated written communication. This model is recommended as a reliable strategy for analysing qualitative data (240).

Steps 1-3 were initially undertaken by one rater. During Step 4 an independent rater examined the initial list of themes. Saturation, as defined by Braun and Clarke (240) was reached after analysing 5% of all communication, however, a further 5% of all communication was then analysed to confirm saturation of themes. Themes were then tentatively collapsed, and subjected to inter-rater reliability examination. Two raters independently recorded the instance of the themes in each communication by analysing a further 10% subsample of both CL and CO correspondence. Inter-rater reliability was substantial (Cohen's kappa range = .75 – 1.0, p range = .03 – .00) for 47 of 50 communications, and moderate (Cohen's kappa = .50, p = .16) for the remaining three communications. Given the reliability of the themes, the frequency of themes was examined for all remaining correspondence.

4.2.10.4 Control Group Results

As a preliminary test of the reliability of outcome associated with the Coach condition, data from the Control group following their treatment are reported.

4.3 RESULTS

4.3.1 Baseline Data

Table 4.2 shows the demographic characteristics of each group and the overall sample. There were no significant between-group differences in gender, marital status, education, employment, previous discussions of symptoms with a health professional, use of medication, χ^2 (2, N = 131) range = 0.76 – 8.60, p range = .15 – .69, or age, F (2,12) = 1.89, p = 0.16.

Table 4.2

Demographic Characteristics of Coach-Supported, Clinician-Supported and Control Groups, and the Total Sample

	CO Group		CL Group		Control Group		Total		Statistical significance
Variable	*n*	%	*n*	%	*n*	%	*n*	%	
Gender									
Male	15	34.9	23	50.0	16	38.1	54	41.2	χ^2 (2, N = 131) = 2.35, p = 0.31
Female	28	65.1	23	50.0	26	61.9	77	58.8	
Age									
Mean	38.6	-	43.7	-	42.4	-	41.6	-	
SD	11.6		13.4		13.2		12.8		F (2,12) = 1.89, p = 0.16
Range	19-59	-	20-69	-	21-79	-	19-79	-	
Marital Status									
Single/Never Married	13	30.2	12	26.1	14	33.3	39	29.8	
Married/De Facto	26	58.1	20	43.5	20	47.6	65	49.6	χ^2 (2, N = 131) = 5.29, p = 0.26
Separated/Divorced	5	11.6	14	30.4	8	19.0	27	20.6	
Education									
High school	10	23.3	8	17.4	7	16.7	25	19.1	
Tertiary	29	67.4	30	65.2	25	59.5	84	64.1	χ^2 (2, N = 131) = 5.48, p = 0.48
Other Certificate	4	9.3	7	15.2	10	23.8	21	16.0	
None	0	0.0	1	2.2	0	0	1	.8	
Employment Status									
Part time/student	19	44.2	14	30.4	19	36.5	52	39.7	
Full time	18	41.9	23	50.0	17	40.5	58	44.3	χ^2 (2, N = 131) = 2.63, p = 0.62
Unemployed, retired or disabled	6	14.0	9	19.6	6	14.3	21	16.0	
Previously Discussed Symptoms with Health Professional	29	67.4	32	69.6	31	73.8	92	70.2	χ^2 (2, N = 131) = 0.43, p = 0.81
Taking Medication	11	25.6	18	39.1	9	21.4	38	29.0	χ^2 (2, N = 131) = 3.71, p = 0.16

Principal and additional diagnoses are displayed in Table 4.3. Twenty-nine of 43 (67%) CO, 35/46 (76%) CL and 28/42 (67%) Control participants had a comorbid anxiety or depressive disorder (70% of the overall sample). At pre-treatment, GAD was the most common principal disorder followed by SP and PDA. There were no statistically significant differences between groups in the prevalence of each principal diagnosis, or the presence of additional diagnoses, χ^2 (2, N = 131) range = 1.09 – 1.17, p range = .56 – .90.

Table 4.4 shows the pre-treatment scores for the pooled CL+CO group and for the Control group, and Table 4.5 shows the pre-treatment scores for the CL and CO groups separately, on primary, disorder-specific and secondary outcome measures. There were no significant differences between CL, CO and Control groups in pre-treatment scores on the GAD-7, DASS-21, PSWQ, SIAS-6/SPS-6, PDSS-SR, PHQ-9, SDS, or NEO-FFI-N, F (2, 128) range = .05 – 3.34, p range = .07 – .82.

4.3.2 Adherence and Attrition

Thirty-two of 43 (74%) CO and 35/46 CL (76%) group participants completed all eight lessons within the 10-week program. A further four (9%) CO participants completed the remaining lesson within seven days of the Program ending, but no CL participants completed within that time frame. There was no difference (t_{87} =1.10, p = .27) in the mean number of lessons completed by CO group (M =7.57; SD = 0.99) and CL group participants (M = 7.09; SD = 1.81). Post-treatment data were collected from 39/43 (90%) CO, 41/46 (89%) CL, and from 42/42 (100%) Control group participants. Three-month follow-up data were provided by 40/43 (93%) CO and 34/46 (74%) CL group participants.

Table 4.3

Diagnostic Characteristics of Coach-Supported, Clinician-Supported, and Control Groups at Pre-Treatment, and of Coach-Supported and Clinician-Supported Groups at Three-Month Follow-up

	Pre-treatment								Three-month follow-up					
	CO Group		CL Group		Control Group		Total		CO Group		CL Group		Total	
	N	%	*n*	%	*n*	%	*N*	%	*n*	%	*n*	%	*N*	%
Principal diagnosis														
GAD	18	41.9	21	45.7	20	47.6	59	45.0	7	16.3	9	19.6	16	18.0
SP	14	32.6	16	34.8	15	35.7	45	34.4	5	11.6	11	23.9	16	18.0
PDA	11	25.6	9	19.6	7	25.9	27	20.6	5	11.6	6	13.0	11	12.8
Comorbid condition														
None	14	32.7	11	23.9	14	33.3	39	29.8	35	81.4	26	56.5	61	68.5
Anxiety only	13	30.2	14	30.4	11	26.2	38	29.0	3	7.0	11	23.9	14	15.7
Affective only	3	7.0	7	15.2	2	4.8	12	9.2	1	2.3	1	2.2	2	2.2
Anxiety and affective only	13	30.2	14	30.4	15	35.7	42	32.1	4	9.3	8	17.4	12	13.5
Number of additional diagnoses														
0	14	32.6	11	23.9	14	33.3	39	29.8	35	81.4	26	56.5	61	68.5
1	13	30.2	17	37.0	9	21.4	39	29.8	4	9.3	7	15.2	11	12.4
2	8	18.6	11	23.9	13	31.0	32	24.4	1	2.4	10	21.7	11	12.4
3 +	8	18.6	7	15.2	6	14.3	21	16.0	3	7	3	6.5	6	6.7

Note: Intention-to-treat model was employed with pre-treatment diagnoses being carried forward if follow-up data were not available. Diagnostic interviews were not repeated with Control group as they had begun treatment. Abbreviations: GAD, Generalised Anxiety Disorder; SP, Social Phobia; PDA, Panic Disorder with or without Agoraphobia; CO: Coach-supported; CL: Clinician-supported.

Table 4.4

Descriptive Statistics and Within- and Between-Group Effects on Self-Report Symptom Measures for the Pooled Clinician/Coach and Control Groups at Each Assessment

Measure and group	Pre-treatment Mean	Post-treatment Mean	Follow-up Mean	Within-group effect size		Between-group effect size
				Pre- to post-treatment	Pre-treatment to follow-up	Post-treatment
GAD-7						
CL+CO (*n* = 89)	11.71 (4.34)	6.17 (4.38)	6.61 (5.54)	1.27 (94 – 1.59)	1.02 (.71 – 1.33)	1.24 (.84 – 1.63)
Control (*n* = 42)	12.50 (4.80)	11.69 (4.60)	-	0.17 (-.26 – .60)	-	-
DASS-21						
CL+CO (*n* = 89)	50.70 (21.75)	28.67 (21.71)	27.35 (25.14)	1.01 (.70 – 1.32)	.99 (.68 – 1.30)	.93 (.54 – 1.31)
Control (*n* = 42)	52.57 (20.86)	48.48 (20.41)	-	0.20 (-.23 – .63)	-	-
PSWQ						
CL+CO (*n* = 89)	63.63 (11.01)	52.07 (10.70)	52.06 (13.37)	1.06 (.75 – 1.37)	.94 (.63 – 1.25)	.82 (.44 – .88)
Control (*n* = 42)	61.29 (12.66)	61.50 (12.74)	-	-0.02 (-.44 – .41)	-	-
SIAS-6/SPS-6						
CL+CO (*n* = 89)	20.31 (11.45)	12.56 (9.03)	13.26 (10.53)	.75 (.44 – 1.05)	0.64 (.34 – .94)	.88 (.49 – 1.26)
Control (*n* = 42)	22.17 (13.59)	22.05 (13.83)	-	0.01 (-.42 – .44)	-	-
PDSS-SR						
CL+CO (*n* = 89)	10.20 (6.89)	5.71 (5.80)	5.97 (7.31)	.71 (.40 – 1.00)	.60 (.29 – .89)	.80 (.42 – 1.18)
Control (*n* = 42)	10.74 (6.44)	10.50 (6.35)	-	0.04 (-.39 – .46)	-	-
PHQ-9						
CL+CO (*n* = 89)	11.46 (5.57)	6.88 (5.21)	6.76 (6.00)	.85 (.54 – 1.15)	.81 (.50 – 1.11)	.84 (.46 – 1.22)
Control (*n* = 42)	11.71 (6.31)	11.29 (5.28)	-	0.07 (-.36 – .50)	-	-
SDS						
CL+CO (*n* = 89)	17.17 (7.06)	10.15 (7.54)	9.27 (8.82)	.96 (.65 – 1.27)	.98 (.67 – 1.30)	.75 (.37 – 1.13)
Control (*n* = 42)	16.43 (7.74)	15.88 (7.75)	-	0.07 (-.36 – .50)	-	-

NEO-FFI-N						
CL+CO (*n* = 89)	31.18 (7.37)	27.92 (8.09)	27.11 (10.00)	.42 (.12 – .72)	.46 (.16 – .76)	.46 (.09 – .83)
Control (*n* = 42)	31.64 (7.50)	31.64 (7.84)	-	.00 (-.43 – .43)	-	-

Note. The standard deviations of the means and the confidence intervals of effect sizes are shown in parentheses. Intention-to-treat model was employed with pre-treatment scores being carried forward if post-treatment or follow-up data were not available. Abbreviations: GAD-7: Generalised Anxiety Disorder 7-Item; DASS-21: Depression Anxiety Stress Scales-21 item; PSWQ: Penn State Worry Questionnaire; SIAS-6/SPS-6: Social Phobia Inventory and Social Phobia Scale – Short Form; PDSS-SR: Panic Disorder Severity Scale – Self Rating; PHQ-9: Patient Health Questionnaire-9 item; SDS: Sheehan Disability Scale; NEO-FFI-N: NEO-Five Factor Inventory – Neuroticism Subscale. CO: Coach-supported; CL: Clinician-supported.

Table 4.5

Descriptive Statistics and Within- and Between-Group Effects on Self-Report Symptom Measures for Coach- and Clinician-Supported Groups at Each Assessment

Measure and group	Pre-treatment Mean	Post-treatment Mean	Follow-up Mean	Within-group effect size		Between-group effect size	
				Pre- to post-treatment	Pre-treatment to follow-up	Post-treatment	Follow-up
GAD-7							
CO (*n* = 43)	11.28 (5.18)	6.16 (4.59)	5.37 (4.98)	1.05 (.59 – 1.49)	1.21 (.74 – 1.66)	0.27 (.15 – .68)	0.46 (.03 – .88)
CL (*n* = 46)	11.63 (5.96)	7.54 (5.70)	8.07 (6.61)	0.70 (.27 – 1.12)	0.57 (.14 – .98)	-	-
DASS-21							
CO (*n* = 43)	45.30 (19.54)	22.05 (16.90)	21.16 (22.27)	1.27 (.80 – 1.72)	1.15 (.69 – 1.60)	0.61 (.18 – 1.03)	0.49 (.06 – .91)
CL (*n* = 46)	55.74 (22.69)	34.87 (23.95)	33.13 (26.49)	0.89 (.46 – 1.32)	0.92 (.48 – 1.34)	-	-
PSWQ							
CO (*n* = 43)	62.81 (11.35)	50.28 (10.34)	49.86 (12.00)	1.15 (.69 – 1.60)	1.11 (.64 – 1.55)	0.33 (-.10 – .74)	0.33 (-.10 – .74)
CL (*n* = 46)	64.39 (10.75)	53.74 (10.86)	54.19 (14.37)	0.99 (.55 – 1.41)	0.80 (.37 – 1.22)	-	-
SIAS-6/SPS-6							
CO (*n* = 43)	19.95 (12.84)	10.95 (8.98)	11.65 (9.64)	0.81 (.37 – 1.24)	0.73 (.29 – 1.16)	0.35 (-.07 – .76)	0.30 (-.12 – .71)
CL (*n* = 46)	20.65 (10.12)	14.07 (8.90)	14.76 (11.20)	0.69 (.26 – 1.11)	0.55 (.13 – .96)	-	-
PDSS-SR							
CO (*n* = 43)	9.72 (6.89)	4.95 (4.99)	4.30 (6.68)	0.79 (.35 – 1.22)	0.80 (.35 – 1.23)	0.25 (-.17 – .67)	0.45 (.02 – .87)
CL (*n* = 46)	10.65 (6.93)	6.41 (6.44)	7.52 (7.59)	0.63 (.21 – 1.05)	0.43 (.01 – .84)	-	-
PHQ-9							
CO (*n* = 43)	11.28 (5.18)	6.16 (4.59)	5.37 (4.98)	1.05 (.59 – 1.49)	1.16 (.70 – 1.61)	0.27 (-.15 – .68)	0.46 (.03 – .88)
CL (*n* = 46)	11.63 (5.96)	7.54 (5.70)	8.07 (6.61)	0.70 (.27 – 1.12)	0.57 (.14 – .98)	-	-
SDS							
CO (*n* = 43)	16.23 (6.37)	8.35 (6.72)	6.84 (7.56)	1.20 (.73 – 1.65)	1.34 (.86 – 1.80)	0.47 (.05 – .89)	0.55 (.12 – .97)
CL (*n* = 46)	18.04 (7.62)	11.83 (7.93)	11.54 (9.37)	0.80 (.37 – 1.22)	0.76 (.33 – 1.18)		

NEO-FFI-N							
CO (*n* = 43)	33.00 (8.00)	26.47 (8.44)	25.67 (9.07)	.79 (.35 – 1.23)	.85 (.51 – 1.29)	.35 (-.07 -.77)	.28 (-.14 – .70)
CL (*n* = 46)	35.28 (6.63)	29.28 (7.58)	28.46 (10.73)	.84 (.41 – 1.26)	.76 (.34 – 1.18)	-	-

Note. The standard deviations of the means and the confidence intervals of effect sizes are shown in parentheses. Intention-to-treat model was employed with pre-treatment scores being carried forward if post-treatment or follow-up data was not available. Abbreviations: GAD-7: Generalised Anxiety Disorder 7-Item; DASS-21: Depression Anxiety Stress Scales-21 item; PSWQ: Penn State Worry Questionnaire; SIAS-6/SPS-6: Social Phobia Inventory and Social Phobia Scale – Short Form; PDSS-SR: Panic Disorder Severity Scale – Self Rating; PHQ-9: Patient Health Questionnaire-9 item; SDS: Sheehan Disability Scale; NEO-FFI-N: NEO-Five Factor Inventory – Neuroticism Subscale. CO: Coach-supported; CL: Clinician-supported.

4.3.3 Is a Transdiagnostic iCBT Program for Anxiety Disorders Efficacious?

Univariate ANCOVAs, controlling for pre-treatment scores, on pos t-treatment primary, disorder-specific and secondary outcomes outcome measures (Table 4.4) revealed significant differences between CL+CO and Control groups on the GAD-7, DASS-21, PSWQ, SIAS-6/SPS-6, PDSS-SR, PHQ-9, SDS and NEO-FFI-N, F (2, 130) = 24.63 – 53.68, p < .001. Paired samples t-tests revealed no significant difference between post-treatment and three-month follow-up scores for the CL+CO group, t (88) = -1.15 – 2.13, p = .13 – .99. Between- and within-group effect sizes on all outcome measures are included on Table 4.4. Large between-group effect sizes were achieved by the CL+CO group relative to the Control group on the GAD-7, DASS-21, PSWQ, SIAS-6/SPS-6, PDSS-SR and PHQ-9, (d = .80 – 1.24) and moderate between-group effects were found for the SDS and NEO-FFI-N (d = .75 and d =.46, respectively). Large within-group effect sizes were achieved by the CL+CO group at post-treatment on the GAD-7, DASS-21, PSWQ, PHQ-9 and SDS (d = .85 – 1.27), and moderate effect sizes were achieved on the SIAS-6/SPS-6, PDSS-SR and NEO-FFI-N (d = .46 - .77). The within-group effect sizes appeared stable through to three-month follow-up.

At pre-treatment, 71/89 (80%) CL+CO participants scored above the cut-off for the GAD-7 (total score ≥ 8). At post-treatment 46/71 (65%) met criteria for remission (GAD-7 total score <7) and 36/71 (51%) met criteria for recovery (GAD-7 total score <7 and reduction of at least 50% in total score). At three-month follow-up, 45/71 (63%) met criteria for remission and 37/71 (52%) met criteria for recovery. Additionally, at 3 three-month follow-up, 46/89 (52%) of the Treatment group no longer met diagnostic criteria for a principal diagnosis of GAD, SP or PDA (Table 4.3). Chi-square tests demonstrated a significant reduction from pre-treatment to three-month follow-up in the number of participants meeting criteria for GAD, $\chi^2(1, N = 178) = 13.92$, p <.05, SP $\chi^2(1, N = 178) = 5.75$, p <.05), and a non-significant reduction regarding PDA, $\chi^2(2, N = 178) = 3.16$, p = .08.

4.3.4 Does the Program Result in Change in Each Specific Disorder?

Pre-treatment, post-treatment, and three-month follow-up data for the pooled CL+CO group by principal disorder are presented in Table 4.6. Pre to post-treatment paired sample t-tests revealed significant improvements in PSWQ, SIAS-6/SPS-6 and PDSS-SR scores, regardless of principal diagnosis, $t_{\text{range 19-38}}$ = 3.65 – 9.13, p <.000. Paired

sample *t*-tests revealed no change on the PSWQ, PDSS-SR, or SIAS-6/SPS-6 from post-treatment to three-month follow-up for any of the three principal diagnoses, $t_{range\ 19\text{-}38} = .11 – 1.53$, $p = 0.14 – .91$.

Participants with a principal diagnosis of GAD, SP or PDA achieved large within-group effect sizes on their corresponding disorder-specific measure (Table 4.6). Additionally, participants achieved small to large effect sizes on disorder-specific measures that did not correspond to their principal diagnosis. These gains were generally stable at three-month follow-up.

4.3.5 Can Good Clinical Outcomes be Obtained When Support is Provided by a Coach?

Pre-treatment, post-treatment and three-month follow-up data for the CO and the CL groups are presented in Table 4.5. Univariate ANCOVAs controlling for pre-treatment scores revealed the CO group had significantly lower GAD-7 scores, and a trend towards significantly lower DASS-21 scores, than the CL group at post-treatment, $F(1,88) = 5.37$, $p = .02$, and $F(1,88) = 3.85$, $p = .05$, respectively. There was no significant difference between CO and CL groups on PSWQ, SIAS-6/SPS-6, PDSS-SR, PHQ-9, SDS and NEO-FFI-N at post-treatment, $F(1, 88) = .95 – 3.72$, $p = .06 – 33$.

Table 4.6

Descriptive Statistics and Within- and Between-Group Effects on Disorder-Specific Self-Report Symptom Measures for the Pooled Clinician/Coach Group Stratified by Principal Diagnosis at Each Assessment

Measure and Principal diagnosis		Time-point			Within-group effect size	
	n	Pre-treatment Mean	Post-treatment Mean	Follow-up Mean	Pre- to post-treatment	Pre-treatment to follow-up
PSWQ						
Total	89	63.63 (11.01)	52.07 (10.70)	52.06 (13.37)	1.06 (.85 -1.37)	0.94 (.63 – 1.25)
GAD	39	67.38 (10.43)	54.77 (10.23)	54.44 (13.08)	1.22 (.73 – 1.69)	1.09 (.61 – 1.56)
SP	30	58.73 (11.22)	47.57 (10.70)	48.20 (11.64)	1.02 (.54 – 1.48)	0.92 (.45 – 1.38)
PDA	20	63.65 (9.21)	53.55 (9.82)	53.20 (15.58)	1.38 (.87 – 1.85)	0.82 (.35 -1.27)
SIAS-6/SPS-6						
Total	89	20.31 (11.45)	12.56 (9.03)	13.26 (10.53)	0.75 (.44 – 1.05)	0.64 (.34 – .94)
GAD	39	17.85 (11.32)	10.79 (9.28)	10.92 (9.92)	0.68 (.22 –1.13)	0.65 (.19 – 1.10)
SP	30	25.10 (10.29)	15.97 (8.52)	15.73 (9.48)	0.97 (.49 – 1.43)	0.95 (.47 – 1.41)
PDA	20	17.95 (11.61)	10.90 (8.17)	14.10 (12.59)	0.70 (.24 – 1.15)	0.32 (-.13 – .76)
PDSS-SR						
Total	89	10.20 (6.89)	5.71 (5.80)	5.97 (7.31)	0.71 (.40 – 1.00)	0.60 (.29 – .89)
GAD	39	8.97 (6.79)	5.38 (5.27)	4.77 (6.80)	0.59 (.13 – 1.04)	0.62 (.16 – 1.07)
SP	30	7.90 (5.27)	3.87 (4.57)	4.00 (4.79)	0.82 (.35 – 1.27)	0.77 (.31 – 1.23)
PDA	20	16.05 (6.13)	9.10 (7.13)	11.25 (9.03)	1.05 (.56 – 1.51)	0.62 (.16 – 1.70)

Note. The standard deviations of the means and the confidence intervals of effect sizes are shown in parentheses. Intention-to-treat model was employed with pre-treatment scores being carried forward if post-treatment or follow-up data were not available. Abbreviations: PSWQ: Penn State Worry Questionnaire; SIAS-6/SPS-6: Social Phobia Inventory and Social Phobia Scale – Short Form: Panic Disorder Severity Scale – Self Rating.

Univariate ANCOVAs controlling for pre-treatment scores revealed the CO group had significantly lower GAD-7 , PDSS-SR, PHQ-9, and SDS scores than the CL group at three-month follow-up, F (1, 88) =5.11 – 7.71, p =.007 - .03, but no difference on the DASS-21, PSWQ, SIAS-6/SPS-6, or NEO-FFI-N, Fs (1, 88) =.28 - 2.94, p = .09 – .62. Paired samples t-tests revealed no significant change from post-treatment to three-month follow-up on any measure for either CO (p = .49 – 1.0) or CL (p = .25 – .48) groups.

Between and within-group effect sizes on primary, disorder-specific measures, and measures of depression and disability are included in Table 4.5. Small to medium (d = .27 – .61) between-group effect sizes were achieved by the CO group relative to the CL group on all measures at post-treatment and three-month follow-up. Large within-group effect sizes were achieved by the CO group on all measures at post-treatment (d = .81 – 1.27), with the exception of the PDSS-SR on which a moderate effect was achieved (d = .79). At post-treatment, the CL group achieved large within-group effect sizes on the DASS-21, PSWQ, SDS, and NEO-FFI-N (d = .80 – .99), and moderate effect sizes on the GAD-7, SIAS-6/SPS-6, PDSS-SR, and PHQ-9 (d = .63 – .70). These gains appeared generally stable at three-month follow-up.

4.3.6 Participant Attitudes and Satisfaction

Thirty-seven of 43 (86%) CO and 40/46 (87%) CL group participants completed post-treatment satisfaction questionnaires. Results for the two groups were pooled as there were no significant differences in satisfaction ratings, $\chi^2(2, N = 178) = 4.81$, p = .09. Sixty-five of seventy-seven (84%) CL+CO group respondents to the satisfaction questionnaire reported that they were either *very* or *mostly satisfied* with the Program. An additional 12/77 (16%) participants reported they were *neutral/somewhat dissatisfied* with the Program, but no participants reported they were *very dissatisfied* with the Program. Additionally, 75/77 (97%) participants said they would feel confident in recommending the Program to a friend.

4.3.7 Contact Events

Table 4.7 displays the frequency of contact events and duration of total contact time per participant. No significant differences were observed between the CO and CL groups in the number of phone calls , m anually written contacts, automated written contacts or the total contact time provided by the Coach and Clinician throughout the program, t (87) range = -1.79 – .87, p = .08 – .98.

Table 4.7
Descriptive Statistics of Contact Events for Coach- and Clinician-Supported Groups

Contact	Coach-supported		Clinician-supported		Statistical significance
	Mean	SD	Mean	SD	
Number of phone calls	7.56	1.19	7.54	2.43	$t_{87} = .32$, $p = .98$
Number of manual written contacts	8.88	4.38	8.83	3.19	$t_{87} = .87$, $p = .94$
Number of automated written contacts	19.37	1.75	20.43	3.50	$t_{87} = 1.79$, $p = .08$
Total contact time (minutes)	69.09	30.75	69.59	32.29	$t_{87} = .07$, $p = .94$

Thematic analyses revealed four themes common to both CO and CL groups. The themes of *prompts for action, reinforcing progress, normalising difficulties,* and *interest in progress* were common in communication with both CO and CL participants. However, the themes of *establishing mastery*, *additional skills, extension of core skills,* and *process comments* were unique to the CL group. Table 4.8 displays the themes, a verbatim example of each theme from records of written data, and frequency of the theme occurrence in all manually written correspondence for both the CO and CL groups.

Table 4.8

Examples and Frequency of Themes From Written Correspondence for Coach- and Clinician-Supported Groups

Theme	Example	Frequency of theme / total number of written contacts	
		CO group	CL group
Prompt for action	"I hope that you do get a chance to try the new homework exercises out this week. Also I wanted to let you know that a new FAQ for Lesson 5 and 6 has been released, and I hope that you get a chance to read it this week."	180/382 (41.1%)	148/406 (36.5%)
Normalising difficulties	"I understand that the exposure exercises are tough - from what I read it sounds like you are still practicing this, which is great to hear, because most people tell us that this does get easier with more practice."	64/382 (16.8%)	107/406 (26.4%)
Reinforcing progress	"It is great to see that you are able to log on and complete the Lessons so early each week - this really gives you the best amount of time to focus on the content of the Lessons and to practice the different techniques"	178/382 (46.6%)	69/406 (17.0%)
Interest in participant's progress	"I am keen to hear what you made of Lesson 5 and of the Program so far."	173/382 (45.32%)	174/406 (429%)
Establishing mastery	"I thought you did a great job using thought challenging. Here are a few questions to consider to make it even more effective..."	N/A	116/406 (28.6%)
Teaching additional skills	"The skills to practice at the moment might be to balance your assertiveness and requests of others with radical acceptance."	N/A	15/406 (3.69%)
Extension of core skills	"Try keeping a notepad with you and writing out the catastrophic predictions that your anxiety makes. Write 'I thought _____ would happen'. e.g.: I thought that the person would laugh at me. Then write either 'and it did happen' or 'but it didn't happen'."	N/A	65/406 (16.0%)
Process comment	"It's not my intention to drop you from the program because you are not completing lessons…I recognize that your life is very tough right now and I want to help. Whether you do the lessons or not is of course up to you."	N/A	21/406 (5.2%)

4.3.8 Control Group Results

As a partial replication of the CO condition, Control group participants received weekly support from the Coach during their treatment phase, consistent with that provided to the CO group. One Control group participant withdrew before beginning the active treatment phase of the program reporting their symptoms had sufficiently resolved, and another could not be contacted, resulting in 40 Control group participants commencing the active treatment phase of the Anxiety Program and being eligible for analysis. Of these, 33/40 (82.5%) participants completed the eight lessons within the ten weeks of the program, and an additional 2/40 (5%) participants completed the remaining lesson within seven days of the program ending. The average number of Lessons completed was 7.56 (*SD* = 1.19). Post-treatment data were collected from 38/40 (95%) Control group participants.

Post-treatment Control group results and within-group effect sizes on primary, disorder-specific outcome measures, and measures of depression and disability are presented in Table 4.9. The Control group achieved within-group effect sizes consistent with the original CO group, on all measures at post-treatment. Thirty-one of 37 (84%) Control group participants who completed the post-treatment satisfaction questionnaires reported being either *very satisfied* or *mostly satisfied* with the program, while 6/37 (16%) participants reported being *neutral/somewhat dissatisfied* with the program, and no participants reported feeling *very dissatisfied* with the program. Additionally, 36/37 (97%) participants said they would feel confident in recommending the program to a friend.

Table 4. 9

Descriptive Statistics and Within-Group Effects on Self-Report Symptom Measures for the Control Group at Pre- and Post-Treatment

Measure	Pre-treatment Mean	Post-treatment Mean	Within-group effect size
			Pre- to post-treatment
GAD-7	12.50 (4.80)	5.70 (3.53)	1.61 (1.11 – 2.90)
DASS-21	52.57 (20.86)	24.25 (16.54)	1.50 (1.01 – 1.97)
PSWQ	61.29 (12.66)	50.05 (11.23)	0.94 (.48 – 1.38)
SIAS-6/SPS-6	22.17 (13.59)	14.53 (11.10)	0.62 (.17 – 1.05)
PDSS-SR	10.74 (6.44)	5.58 (5.03)	0.89 (.44 – 1.33)
PHQ-9	11.71 (6.31)	6.75 (4.95)	0.87 (.42 – 1.31)
SDS	16.43 (7.74)	9.40 (7.71)	0.91 (.45 – 1.35)
NEO-FFI-N	31.64 (7.50)	26.25 (8.15)	.69 (.24 – 1.12)

Note. The standard deviations of the means and the confidence intervals of effect sizes are shown in parentheses. Intention-to-treat model was employed with pre-treatment scores being carried forward if post-treatment or follow-up data were not available. Abbreviations: PSWQ: Penn State Worry Questionnaire; SIAS-6/SPS-6: Social Phobia Inventory and Social Phobia Scale – Short Form: Panic Disorder Severity Scale – Self Rating.

4.4 DISCUSSION

This trial examined the efficacy of an extended version of the Anxiety Program, a transdiagnostic iCBT program for three anxiety disorders, when guided by either a Coach or Clinician. At intake all participants met DSM-IV-TR diagnosis for GAD, SP, or PDA and 70% met criteria for at least one additional disorder.

4.4.1 Is the Extended Version of the Anxiety Program Efficacious?

Outcomes for the pooled treatment groups (CL+CO) were superior to the Control group on all measures and this was associated with large between-group effect sizes, with the exception of the SDS where a moderate effect size was obtained. Follow-up data indicated treatment effects were maintained. At follow-up more than half the CL+CO group did not meet criteria for their principal diagnosis. Adherence and satisfaction with treatment was high, suggesting that transdiagnostic approaches are acceptable to consumers. Importantly, these results were obtained with less than 70min of total Clinician or Coach time per participant, and appear consistent with outcomes achieved in the low intensity treatments offered in recent field trials of the UK based Improved Access to Psychological Therapy program (222).

4.4.2 Does the Extended Version of the Anxiety Program Result in Change for Each Specific Disorder?

Significant reductions were found on the corresponding disorder-specific outcome measure for participants with each of the three principal diagnoses. Within-group effect sizes for each of the target disorders on their corresponding disorder-specific measure were large and gains were maintained at follow-up. Participants also achieved significant reductions on disorder-specific measures different to their principal diagnosis.

4.4.3 Can Good Clinical Outcomes be Obtained When Support is Provided by a Coach?

With one exception, no significant differences were found between the CL and CO groups at post-treatment, the exception being a lower GAD-7 score in the CO group. At follow-up the CO group had significantly lower symptom severity scores than those in the CL group on the GAD-7, PDSS-SR, and SDS.

The difference in outcomes achieved by CO and CL participants was not anticipated. As such, records of correspondence collected throughout treatment for the purposes of conducting fidelity checks and ensuring adherence to either Coach or Clinician roles was examined for possible explanations for the difference. Analysis of the written communication provided by the Coach and Clinician revealed no significant difference between treatment groups in the total number of written communications or the total duration of contact. However, differences were observed in the themes of the written communication.

Thematic analyses of all written communication excluding automatically generated emails was undertaken to explore potential differences in the content of manually written contacts from the Clinician and Coach. A sample of 10% of written contact from both the Clinician and Coach was examined by one researcher to create an initial list of themes. This list of themes was subsequently verified by an independent researcher who reviewed the same sample of written contacts. Given the substantial inter-rater reliability of the themes in the sampled communications, the frequency of the themes was then examined in all manually written correspondence from the Clinician and Coach to participants. Themes common to both CO and CL groups included *prompts to action*, *normalising difficulties*, *reinforcing progress*, and *interest in participant's progress*. In addition, the Clinician's communications extended to include themes of *establishing mastery*, *teaching additional skills*, *extending core skills*, and *process comments*, which were not present in the non-clinician's communications. While the latter themes would normally be considered an integral part of traditional face-to-face therapy, it is possible that such an approach may not have been as helpful in this iCBT program, which comprised a highly structured treatment protocol. It is hypothesised that the additional instructions provided by the Clinician to participants may have inadvertently impaired the ability of participants to consolidate and master the core skills of the iCBT program. It may well be that optimum iCBT outcomes are obtained by strict adherence to a script that reinforces and encourages exposure to, and practice of, a limited number of skills and that extension beyond this may be contraindicated, especially where contact is limited to 10 minutes per participant per week. These conclusions are obviously highly tentative and clearly require further empirical examination.

The discrepancy between CO and CL groups were unanticipated, and require replication. As a partial replication, the Control group received the CO treatment and

achieved post-treatment outcomes comparable to those obtained by the original CO group. This result is consistent with studies indicating that non-clinical support roles for guided and highly structured iCBT programs for common mental disorders are associated with good clinical outcomes (119, 120, 154).

4.4.4 Limitations

Limitations of the present study are relevant to other studies in the field of transdiagnostic treatment. The study was sufficiently powered to detect medium to large differences between groups, but not to detect small differences between groups or to compare between groups based on principal diagnosis. Consequently, small differences between groups could exist that were not detected in the present study, and which future studies employing larger sample sizes may reveal. It is important to note that the sample sizes required to address these issues are considerable, and was only able to be approximated in the present study by pooling treatment data. Pragmatic approaches such as those used here may provide a practical and preliminary alternative for answering such important questions; however, more expansive research is required. Future research employing larger samples may benefit from considering mixed models approaches that will further inform the debate surrounding treatment response.

A second limitation concerns the choice of general and disorder specific outcome measures; an issue identified in the broader field of transdiagnostic research (38). In the present study we selected brief measures to reduce burden on participants. There is a need for broader discussion regarding the questionnaire batteries most appropriate for the evaluation of transdiagnostic treatment. Moreover, use of multiple questionnaires will facilitate comparison of results with other studies.

A third limitation concerns blinding. Due to resource constraints researchers were not blinded for diagnostic interviews, which may have resulted in under-reporting of diagnostic symptoms at three-month follow-up. The enduring gains made by treatment groups across a broad range of outcome measures mitigates some of this concern, however, future research will clearly benefit from blinding in diagnostic interviews.

A fourth limitation concerns the generalizability of the current findings. Independent replication is required to further understand the relative efficacy of Clinician and Coach roles for guided iCBT. Future studies would also benefit from comparing treatment with an active control group rather than a delayed-treatment waiting list. For example, the treatment gains in the present study may be solely due to telephone contact and,

although unlikely, this cannot be ruled out using a wait-list control group. Future research employing telephone contact as part of an active control may go some way to informing non-specific treatment effects.

An additional limitation is the duration of follow-up analyses. Some authors argue that transdiagnostic treatments target underlying vulnerabilities and thus may lead to more durable treatment effects (241). Follow-up data in the present study are consistent with existing research (183), yet future research would benefit from considering longer follow-up periods.

Lastly, a possible criticism of the current study is that multiple comparisons of multiple dependent variables were conducted without *a priori* control of alpha levels to reduce risk of Type I errors. Given that the comparisons were planned and that this was an exploratory study with clear aims, and that obtained *p* values were below .05, this is unlikely to be a significant weakness.

4.4.5 General discussion

The findings of the current study are consistent with both the broader transdiagnostic and iCBT literature. The magnitude of improvements on the general measures of anxiety are consistent with those obtained in meta-analyses of transdiagnostic face-to-face programs for the anxiety disorders (171). Analyses by principal disorder indicated improvement on the relevant diagnosis-specific outcome measures and also on diagnosis-specific measures different to the principal diagnosis. This supports the argument that transdiagnostic treatments may help consumers generalise anxiety management techniques beyond their principal complaint (38).

The magnitude of treatment gains in the present study are also comparable with those reported in meta-analyses of internet and CCBT treatments for symptoms of anxiety (141). Analyses by principal disorder yielded results consistent with those reported in recent studies of disorder-specific iCBT programs for GAD (166), SP (145) and PDA (159) that employed a similar structure to the Anxiety Program. The outcomes achieved by the CO group, which were partially replicated with the Control group, are consistent with research indicating that Coach-supported iCBT and Clinician-supported iCBT can result in similar outcomes (119, 147).

The Control group in the present research provided a partial replication of the CO condition, but independent replication of the study is required to examine the reliability of the findings. Future research examining the role of comorbidity and consumer

attitudes, are two areas of research that will inform discussion regarding transdiagnostic treatment and are the topic of studies currently underway. Future research exploring the relative efficacy of transdiagnostic and individually-tailored treatments would be of value, as both approaches have provided encouraging findings regarding disorder specific change and have potential for the treatment of comorbidity (236, 242). Additionally, future studies using a larger sample size would allow comparison of transdiagnostic iCBT with disorder-specific iCBT, and would begin to inform the debate around the relative utility of these approaches. An unresolved tension in the field of transdiagnostic treatment concerns the suitability of disorders such as OCD and PTSD to this approach (212), and inclusion of a broader range of disorders is required for future research to begin answering these questions. Moreover, research examining the relative benefits of clinician and coaching guidance in non-research environments is required to inform discussion about the dissemination of low-intensity treatments (243, 244).

4.4.6 Conclusions

This RCT revealed overall outcomes that were superior for the treatment groups relative to a waitlist control condition and which were stable over a three-month follow-up period and satisfactory to participants. Significant changes were observed for each of the target disorders in general symptoms and in disorder-specific anxiety symptoms, and the magnitude of these appeared consistent with those obtained in disorder-specific iCBT programs. Moreover, improvements were generalised beyond symptoms of participants' principal disorder. Coach-supported iCBT appeared at least as efficacious as Clinician-supported iCBT. Further studies need to explore questions about the role of comorbidity, consumer attitudes, Clinical and Coaching support roles and the relative efficacy of transdiagnostic and disorder-specific iCBT.

CHAPTER FIVE

Study 3: The Role of Comorbidity in Response to Transdiagnostic Internet-Delivered Cognitive Behavioural Therapy

5.1 INTRODUCTION

Comorbidity, or the co-occurrence of two or more disorders, is common within the mental disorders. For example, the 2007 National Survey of Mental Health and Wellbeing indicated that 25.4% of Australians met criteria for more than one mental disorder (8). Comorbidity is associated with higher levels of distress, disability (245) and service utilization (246) and is therefore an essential target in treatment and a key issue for treatment research. Two important and inter-related questions regarding comorbidity are whether patients with comorbid diagnoses respond differently to treatment compared with participants without comorbid disorders and whether it is possible to use a single treatment protocol to reduce the incidence of comorbid disorders.

Studies examining the role of comorbidity in treatment have reported different results. Some studies have reported that the presence of comorbidity is associated with higher attrition rates (207) and poorer outcomes than non-comorbid conditions (247), while other studies have suggested that participants with and without comorbid disorders improve at the same rate (248). Despite these equivocal findings, there is encouraging evidence suggesting that disorder-specific CBT treatment effects can generalize beyond the target disorder, and reduce the incidence of comorbidity (209, 248-252). Of note, the addition of treatment material to address comorbid disorders does not equivocally improve treatment outcomes. Indeed, one study indicated that a disorder-specific protocol for PDA alone was more efficacious in reducing comorbidity than administering the same protocol with additional components tailored to target the

participants' most severe comorbid disorder (235). Moreover, the inclusion of additional material to address comorbid conditions does not guarantee a better outcome, as one study demonstrated that participants with SP and alcohol dependence achieved greater reductions in measures of substance abuse when completing a treatment program aimed at alcohol-use alone, compared to an alcohol-use program combined with a SP treatment program (253).

However, the ability of transdiagnostic protocols to treat comorbidity and whether patients with and without comorbid diagnoses respond similarly to this kind of treatment is less well established, due in part to methodological issues of sample size. While face-to-face (254) and internet-delivered (237) transdiagnostic treatments have demonstrated encouraging reductions in the number of participants meeting diagnostic criteria for comorbid conditions, small sample sizes have limited the conclusions that can be drawn from these studies. Moreover, while some authors have argued that engagement with transdiagnostic treatment may be attenuated by presenting treatment materials that do not correspond to participants' principal complaint (38), treatment satisfaction for transdiagnostic treatment has not been empirically examined.

The present research, Study 3, sought to examine the issue of comorbidity in the context of transdiagnostic treatment. Specifically, the present study sought to examine whether: 1) Participants with a comorbid disorder reported higher levels of symptom severity before and after treatment? 2) Participants with comorbid disorders would achieve similar levels of symptom improvement to participants without comorbid disorders? 3) Treatment reduced the number of participants meeting diagnostic criteria for comorbid diagnoses? 4) Participants with comorbid disorders found transdiagnostic treatment as acceptable as participants without comorbid diagnoses? To answer these questions, the present study re-analysed the data from Study 2.

5.2 METHOD

5.2.1 Design

The present study involves a re-analysis of the data from Study 2 and combines the treatment data available after all participants had participated in active treatment. For the purposes of this study and consistent with recently published studies examining comorbidity and disorder-specific CBT treatments (208, 248, 250), the sample in the present study was divided into two groups based upon whether they met criteria for only one diagnosis (Non-Comorbid group) or two or more disorders (Comorbid group).

5.2.2 Hypotheses

Four hypotheses were tested. It was hypothesised that: 1) Participants with a comorbid disorder would report significantly higher scores at both pre-treatment, post-treatment and three-month follow-up, relative to participants without a comorbid disorder; 2) that all participants' symptom scores would improve significantly as a result of treatment and that participants with and without comorbid diagnoses would achieve a similar magnitude of change; 3) that treatment would significantly reduce the number of participants meeting diagnostic criteria for comorbid diagnoses following treatment, and; 4) that participants would report a high level of satisfaction with the program and would rate the program as acceptable.

5.2.3 Participants and Recruitment

As per Study 2, 139 individuals met all eligibility criteria and were randomised into CO, CL or Control groups, as described in section 4.4.2. A total of 43 CO and 46 CL group participants began lesson 1 and were eligible for analysis. Following the end of the initial treatment phase, Coach-supported iCBT was offered as active treatment for the Control group. A total of 40 Control group participants began this active treatment. This resulted in 43 CO, 46 CL and 40 Control group participants eligible for analysis (see Figure 4.1 in section 4.4.2 of Chapter 4). Using the criteria described above, the Non-Comorbid (one diagnosis) group included 36 participants, and the Comorbid (two or more disorders) included 93 participants

5.2.4 Intervention

All participants received access to the revised version of the Anxiety Program used in Study 2. The intervention is described in detail in section 4.2.5 of Chapter 4.

5.2.5 Outcome Measures

The diagnostic measure, primary, disorder-specific and secondary outcome measures used in the present study are the same as those used in the previous study. The measures are described in detail in section 3.2.7 of Chapter 3 and 4.2.7 of Chapter 4. The internal reliability of each measure is described in section 4.2.7 of Chapter 4. Additionally, and to assess consumer attitudes, participants were asked to rate their satisfaction with the

program, and about the extent to which reading about symptoms that did not correspond to their own helped or hindered their understanding of their anxiety.

5.2.6 Time-points and Response Rates

All participants completed the aforementioned diagnostic interviews and outcome questionnaires prior to starting treatment. At post-treatment 34/36 (94%) Non-Comorbid and 86/93 (92%) Comorbid group participants completed the outcome questionnaires. At three-month follow-up, 32/36 (89%) Non-Comorbid and 78/93 (84%) Comorbid group participants completed the diagnostic interviews and outcome questionnaires.

5.2.7 Statistical Analyses

Chi-square tests of independence and independent *t*-tests were used to compare Non-Comorbid and Comorbid groups on d emographic characteristics, treatment history, adherence, attrition, and contact time with staff throughout treatment.

A series of 3 X 2 repeated measures ANOVAs (time X group) were conducted to examine effects of time and pre-treatment comorbidity on treatment outcome. Subsequent one-way ANOVAs were conducted as planned comparisons to examine whether the Non-Comorbid and Comorbid groups differed significantly in their scores at pre-treatment, post-treatment and at three-month follow-up across the various measures (Hypothesis 1). Additionally, and because of anticipated differences in baseline scores, one-way repeated measures ANOVAs using Bonferroni corrected alpha levels were also conducted separately for each group as planned comparisons to examine change in symptom severity from pre-treatment to post-treatment, and to examine any change from post-treatment to three-month follow-up. Mean change scores were calculated by subtracting post-treatment from pre-treatment scores, and subtracting follow-up from post-treatment scores, for each participant. One-way repeated measures ANOVAs using Bonferroni corrected alpha levels were then conducted on mean change scores for each group to examine whether the two groups differed in terms of the magnitude of change (Hypothesis 2).

Chi-square tests were conducted to examine changes in proportions of the overall presence or absence of comorbidity, number (0, 1, 2, or 3+) and type (none, anxiety only, depression only, or anxiety and depression) of additional diagnoses from pre-

treatment to follow-up (Hypothesis 3). Chi-square tests were also conducted to examine participant attitudes and satisfaction data (Hypothesis 4).

An intention-to-treat (ITT) design was employed with all data. Specifically, all missing data were addressed by carrying forward the first available data (BOCF). Effect sizes (Cohen's *d*) were calculated for within- and between-group changes, based on the pooled standard deviation.

5.3 RESULTS

5.3.1 Baseline Data

Table 5.1 displays the demographic characteristics of the sample. Significantly more participants with a comorbid disorder were taking medication for their mental health than participants without a comorbid disorder, χ^2 (1, N = 129) = 3.93, p = .05. Otherwise, there were no significant differences between the two groups in age, t_{127} = 1.43, p = .16, or gender, marital status, education, employment, or previous discussions of symptoms with a health professional, χ^2 (1-3, N = 129) = 0.78 – 2.69, p = .30 - .55.

Table 5.2 s hows the diagnostic characteristics of the Comorbid group at pre-treatment. Thirty-nine of 93 (42%) Comorbid group participants met criteria for one additional disorder, 32/93 (34%) met criteria for two disorders, and 22/93 (24%) met criteria for three or more disorders. Thirty-eight of 93 (41%) had comorbid anxiety diagnoses only, 12/93 (13%) had a comorbid depressive disorder only, and 43/93 (46%) had both comorbid anxiety and depressive disorders.

5.3.2 Adherence and Attrition Rates

Thirty of 36 (83%) Non-Comorbid and 71/93 (76%) Comorbid group participants completed the eight lessons within the 10 weeks of the program. Independent *t*-tests revealed no s ignificant difference between mean number of lessons completed by participants in the Non-Comorbid and Comorbid groups, t_{127} = .07, p = .95.

Table 5.1
Demographic Characteristics of Non-Comorbid and Comorbid Groups, and the Total Sample

Variable	Non-Comorbid (n = 36)		Comorbid (n = 93)		Total (N = 129)		Statistical significance
	n	%	*n*	%	*n*	%	
Gender							
Male	17	47.2	36	38.7	53	41.1	$\chi^2(1, N = 129) = .78, p = .38$
Female	19	53.8	57	61.3	76	58.9	
Age							
Mean	41.11	-	40.52	-	41.52	-	
SD	14.27		12.26		12.89		$t_{127} = 1.43, p = .16$
Range	19-79	-	19-69	-	19-79	-	
Marital Status							
Single/Never Married	11	30.5	27	29.0	39	30.3	
Married/De Facto	15	41.7	50	53.8	65	50.4	$\chi^2(2, N = 129) = 2.21, p = .33$
Separated/Divorced	10	27.8	16	17.2	26	20.3	
Education							
High school	6	16.7	18	19.4	24	18.6	
Tertiary	23	63.9	60	64.5	83	64.3	$\chi^2(3, N = 129) = 2.69, p = .44$
Other Certificate	6	16.7	15	16.1	21	16.3	
None	1	2.7	0	0.0	1	0.8	
Employment Status							
Part time/student	18	50.0	39	41.9	57	44.2	
Full time	14	38.9	37	39.8	51	39.5	$\chi^2(2, N = 129) = 1.21, p = .55$
Unemployed, retired or disabled	4	11.1	17	18.3	21	16.3	
Previously Discussed Symptoms with Health Professional	23	63.9	68	73.1	91	70.5	$\chi^2(1, N = 129) = 1.06, p = .30$
Taking Medication	6	16.7	32	34.4	38	29.5	$\chi^2(1, N = 129) = 3.93, p = .05$

Table 5.2
Diagnostic Characteristics of the Sample at Pre-Treatment and Three-Month Follow-up

	Principal diagnosis							
	Pre-treatment				Three-month follow-up			
Comorbidity status	GAD *n* (%)	SP *n* (%)	PDA *n* (%)	Total *n* (%)	GAD *n* (%)	SP *n* (%)	PDA *n* (%)	Total *n* (%)
Comorbidity present								
No – Did not meet criteria for any disorder	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	28 (49.1)	23 (51.1)	14 (51.9)	65 (50.4)
No – Principal diagnosis only	15 (26.3)	18 (40.0)	3 (11.1)	36 (27.9)	13 (22.8)	14 (31.1)	2 (7.4)	29 (22.5)
Yes	42 (73.7)	27 (60.0)	24 (88.9)	93 (72.1)	16 (28.1)	8 (17.8)	11 (40.7)	35 (27.1)
Number of additional diagnoses								
0	15 (26.3)	18 (40.0)	3 (11.1)	36 (27.9)	41 (71.9)	37 (82.2)	16 (59.3)	94 (72.9)
1	15 (26.3)	14 (31.1)	10 (37.0)	39 (30.2)	6 (10.5)	4 (8.9)	5 (18.5)	15 (11.6)
2	16 (28.1)	10 (22.2)	6 (22.2)	32 (24.8)	7 (12.3)	4 (8.9)	3 (11.1)	14 (10.9)
3+	11 (19.3)	3 (6.7)	8 (29.7)	22 (17.1)	3 (5.3)	0 (0.0)	3 (11.1)	6 (4.6)
Comorbidity type								
Nil	15 (26.3)	18 (40.0)	3 (11.1)	36 (27.9)	41 (71.9)	37 (82.2)	16 (59.3)	94 (72.9)
Anxiety only	11 (19.3)	15 (33.3)	12 (44.4)	38 (29.5)	5 (8.8)	4 (8.9)	7 (25.9)	16 (12.4)
Depression only	8 (14.0)	3 (6.7)	1 (3.7)	12 (9.30)	2 (3.5)	1 (2.2)	1 (3.7)	4 (3.1)
Comorbid anxiety and/or depression	23 (40.4)	9 (20.0)	11 (40.8)	43 (33.3)	9 (15.8)	3 (6.7)	3 (11.1)	15 (11.6)

5.3.3 Effect of Comorbidity on Symptom Severity and Clinical Change across Pre-treatment, Post-treatment and Three-Month Follow-Up

Table 5.3 presents pre-treatment, post-treatment and three-month follow-up scores on all measures for the Non-Comorbid and Comorbid groups. The 2 (Group: Comorbid v. Non-*C*omorbid) x 3 (Timepoint: Pre-treatment v. post-treatment v. follow up) repeated measures ANOVAs revealed significant main effects for Group and Time on all measures, F (1, 127) = 6.28 – 103.49, p <.001 – .05. However, these main effects were subsumed under significant Group by Time interaction effects for the DASS-21, PSWQ, SIAS-6/SPS-6, PDSS-SR, PHQ-9 and NEO-FFI-N, F (1, 127) = 3.20 – 8.82, p < .001 - .05, but not GAD-7 and SDS, F (1, 127) = .64 – 2.50, p = .08 - .51. To understand these results several planned comparisons were conducted.

The planned comparisons comparing the two groups at the different time points revealed that the Comorbid participants had significantly higher pre-treatment scores than Non-Comorbid participants on all measures, F (1, 127) = 13.64 – 49.55, p < .001. These comparisons revealed that Comorbid participants had significantly higher scores at post-treatment on the GAD-7, DASS-21, SIAS-6/SPS-6, PDSS-SR, PHQ-9, SDS and NEO-FFI-N, F (1, 127) = 4.91 – 9.80, p < .001 - .03, but not on the PSWQ, F (1, 127) = .60, p = .60. They also revealed that, at three-month follow-up, Comorbid participants had significantly higher scores on GAD-7, DASS-21, SIAS-6/SPS-6, PDSS-SR, PHQ-9, and SDS, F (1, 127) = 4.90 – 10.90, p < .001 - .03, but not the PSWQ or NEO-FFI-N, F (1, 127) = 1.68 – 3.58, p = .06 - .20.

The planned comparisons examining the Comorbid Group over the different time points revealed significant reductions from pre- to post-treatment on all measures, F (1, 35) = 9.42 – 35.61, p = .001 - .004, and showed a trend towards significance from post-treatment to three-month follow-up on the PSWQ, F (1,35) = 4.18, p = .05, and no significant change for the remaining measures, F (1,35) = .07 – 3.37, p =.07 - .78. The same comparisons for the Non-Comorbid group indicated significant reductions on all measures from pre- to post-treatment, F (1,92) = 83.43 – 209.12, all p <.001, and no significant change from post-treatment to three-month follow-up, F (1,92) = .04 – 1.53, p =.15 - .86.

Table 5.3

Descriptive Statistics and Within- and Between-Group Effects on Self-Report Measures for Comorbid and Non-Comorbid Groups at Each Assessment

Measure and group	Pre-treatment Mean	Post-treatment Mean	Follow-up Mean	Within-group effect size		Between-group effect size	
				Pre- to post-treatment	Pre-treatment to follow-up	Post-treatment	Follow-up
GAD-7							
Non-Comorbid (*n* = 36)	9.03 (4.36)	4.44 (3.45)	4.31 (3.32)	1.17 (.66 – 1.65)	1.22 (.70 – 1.71)	.55 (.16 – .94)	.60 (.20 – .98)
Comorbid (*n* = 93)	13.18 (4.04)	6.67 (4.27)	7.26 (5.45)	1.57 (1.23 – 1.89)	1.2 (.92 – 1.54)	-	-
DASS-21							
Non-Comorbid (*n* = 36)	33.39 (13.77)	18.61 (14.03)	17.89 (13.85)	1.06 (.56 – 1.54)	1.12 (.61 – 1.61)	.60 (.20 – .99)	.50 (.11 – .88)
Comorbid (*n* = 93)	58.67 (19.75)	30.37 (21.37)	29.03 (24.82)	1.38 (1.05 – 1.69)	1.32 (1.00 – 1.63)	-	-
PSWQ							
Non-Comorbid (*n* = 36)	55.72 (14.12)	50.61 (11.17)	48.53 (12.24)	.40 (-.07 – .86)	.54 (.07 – 1.01)	.10 (-.28 – .49)	.29 (-.10 – .67)
Comorbid (*n* = 93)	65.70 (9.16)	51.74 (10.82)	51.95 (13.86)	1.39 (1.07 – 1.71)	1.17 (.85 – 1.48)	-	-
SIAS-6/SPS-6							
Non-Comorbid (*n* = 36)	15.22 (11.14)	10.06 (7.26)	10.31 (7.72)	.55 (.07 – 1.01)	.51 (.04 – .98)	.42 (.03 – .81)	.43 (.04 – .82)
Comorbid (*n* = 93)	23.60 (11.72)	14.09 (10.25)	14.66 (10.75)	.86 (.56 – 1.16)	.79 (.49 – 1.09)	-	-
PDSS-SR							
Non-Comorbid (*n* = 36)	5.64 (5.28)	3.31 (3.98)	2.83 (4.02)	.50 (.02 – .96)	.60 (.12 – 1.06)	.61 (.22 – 1.00)	.62 (.23 – 1.01)
Comorbid (*n* = 93)	12.41 (6.24)	6.60 (5.83)	6.82 (7.10)	.96 (.65 – 1.26)	.84 (.53 – 1.13)	-	-
PHQ-9							
Non-Comorbid (*n* = 36)	7.94 (5.72)	4.94 (4.19)	4.00 (3.88)	.60 (.12 – 1.06)	.81 (.31 – 1.02)	.53 (.14 – .92)	.73 (.33 – 1.12)
Comorbid (*n* = 93)	13.20 (5.21)	7.59 (5.27)	7.49 (5.86)	1.07 (.76 – 1.37)	1.03 (.72 – 1.33)	-	-
SDS							
Non-Comorbid (*n* = 36)	13.42 (7.18)	7.22 (6.33)	6.11 (6.30)	.92 (.42 – 1.42)	1.08 (.58 – 1.56)	.50 (.11 – .89)	.47 (.08 – .85)
Comorbid (*n* = 93)	18.60 (6.66)	10.94 (7.76)	9.97 (8.90)	1.06 (.75 – 1.36)	1.10 (.79 – 1.40)	-	-
NEO-FFI-N							
Non-Comorbid (*n* = 36)	28.61 (7.02)	24.89 (7.81)	24.53 (9.10)	.50 (.03 – .96)	.50 (.03 – .97)	.44 (.04 – .82)	.37 (-.02 – .76)
Comorbid (*n* = 93)	35.45 (6.80)	28.37 (8.06)	27.86 (8.93)	.95 (.64 – 1.25)	.96 (.65 – 1.26)	-	-

To examine the interaction effect, one-way ANOVAs conducted on pre-treatment to post-treatment mean change scores revealed the Comorbid group achieved significantly greater magnitude of change than the Non-Comorbid group on the GAD-7, DASS-21, PSWQ, SIAS-6/SPS-6, PDSS-SR, PHQ-9 and NEO-FFI-N, F (1, 127) = 4.79 – 16.24, p = .01 - .03. However no difference was found on the SDS, F (1, 127) = 1.05, p = .31. One-way ANOVAs conducted on post-treatment to three-month follow mean change scores revealed no significant difference between groups on any measure, F (1, 127) = .01 – 1.34, p = .25 - .99. Figure 5.1 displays mean change scores from pre-treatment to post-treatment for Non-Comorbid and Comorbid groups on all measures.

As shown in Table 5.3, the between-group effect-sizes at post-treatment were small for the PSWQ, SIAS-6/SPS-6 and NEO-FFI-N, d = .10 - .44, and moderate for the GAD-7, DASS-21, PDSS-SR, PHQ-9 and SDS, d = .50 - .61. Between group effects at three-month follow-up were small for the PSWQ, SIAS-6/SPS-6, SDS and NEO-FFI-N, Cohen's d = .29 - .47, and moderate on the GAD-7, DASS-21, PDSS-SR and PHQ-9, Cohen's d = .50 - .73. Table 5.3 also shows the pre- to post-treatment within-group effects for the Non-Comorbid group were large for the GAD-7, DASS-21, and SDS, d = .92 – 1.17, moderate on the PSWQ, SIAS-6/SPS-6, PDSS-SR, PHQ-9 and NEO-FFI-N, d = .40 - .60. The Comorbid group achieved large within-group effect sizes on all measures at post-treatment Cohen's d = .86 – 1.39. Post-treatment within-group effects appeared stable at three-month follow-up for both groups.

5.3.5 The Effect of Treatment on Comorbidity

Table 5.2 shows the diagnostic characteristics of the sample at three-month follow-up. Chi-square tests demonstrated a significant reduction from pre-treatment to three-month follow-up in the proportion of participants meeting criteria for any comorbid diagnosis, $\chi^2(3, N = 139) = 52.16$, p <.001, number of comorbid diagnoses (0, 1, 2 or 3+), $\chi^2(3, N = 139) = 52.73$, p <.001, and type of comorbid disorder (none, anxiety only, depression only, or anxiety and depression), $\chi^2(3, N = 139) = 52.36$, p < .001.

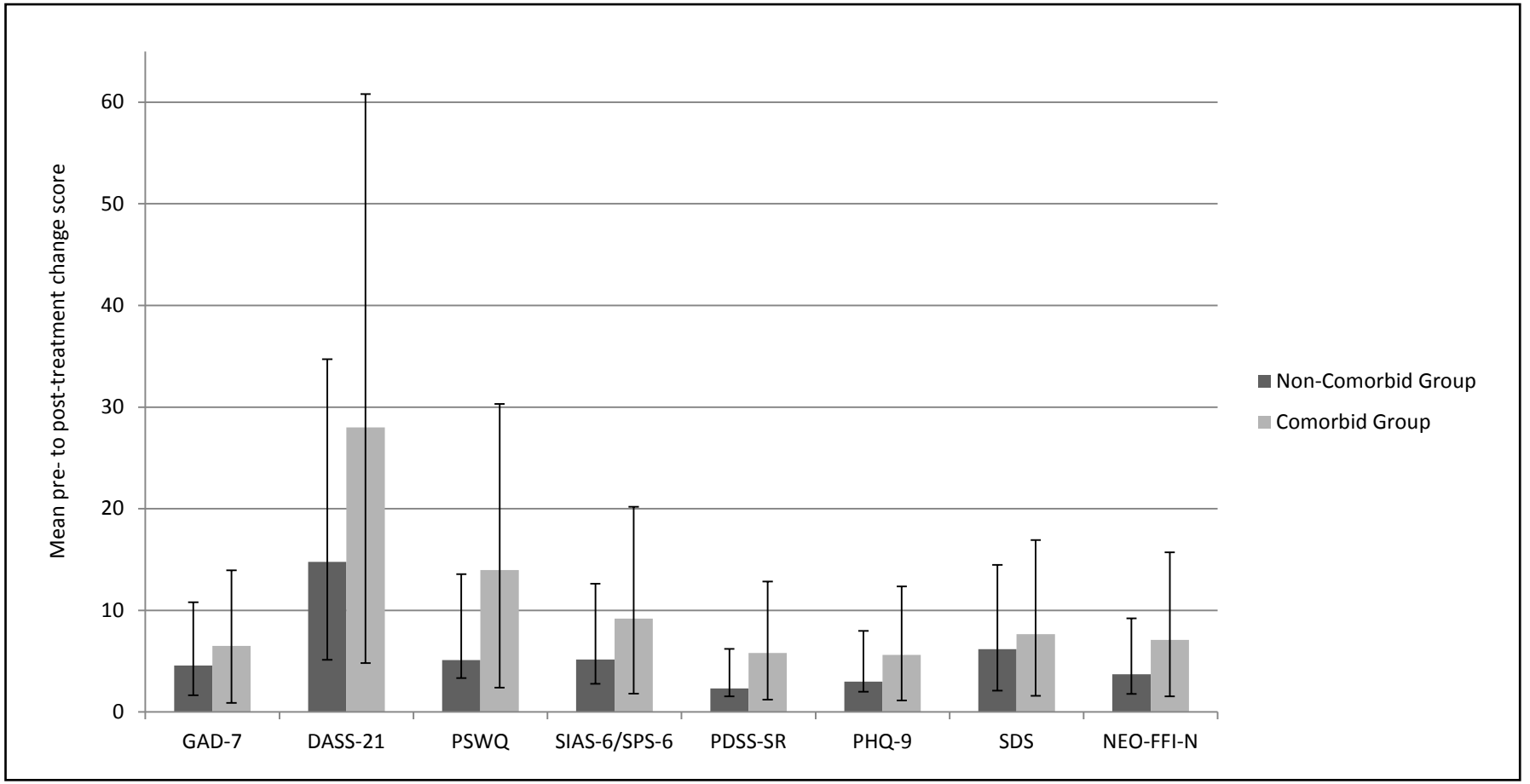

Figure 5.1. Mean Change Score and 95% Confidence Interval Lower and Upper Bounds for Magnitude of Change from Pre-Treatment to Post-Treatment on All Measures for Non-Comorbid and Comorbid Groups.

5.3.6 Participant Attitudes and Satisfaction

Thirty-two Non-Comorbid participants and 83 Comorbid participants provided responses to a question about their satisfaction with the program. Overall, 26/32 (81%) Non-Comorbid participants and 70/83 (84%) Comorbid participants reported being either *very* or *mostly satisfied* with the treatment program. Six of 32 (19%) Comorbid participants, and 13/93 (14%) Non-Comorbid participants reported feeling neutral/somewhat satisfied with the program. Chi-square tests indicated no significant differences between groups in satisfaction with the program, χ^2 (2, N = 115) = .491, p = .782.

Thirty-one Comorbid and 77 Non-Comorbid participants responded to the question *how did reading about anxiety symptoms, different to your own, influence your understanding of your own anxiety?* Overall, 24/31 (77%) Non-Comorbid and 68/77 (88%) Comorbid group participants reported that *it helped me to better understand my anxiety.* Six of 31 (19%) Non-Comorbid and 8/77 (10%) Comorbid participants reported that *it made no difference to understanding my anxiety.* One of 31 (3%) Non-Comorbid and 1/77 Comorbid (1%) participants reported that *it made it more difficult to understand my anxiety.* Chi-square tests demonstrated no significant difference between groups regarding acceptability with the program, χ^2(2, N = 108) = 2.12, p = .35.

5.3.7 Contact Events

Table 5.4 displays the mean contact events for both groups. No significant differences were observed between the participants in the Non-Comorbid or Comorbid groups in the number of phone calls, staff-written emails and messages, automatically generated email contacts or the total contact time with the researchers throughout the program, ts_{127} = -.91 – .66, ps range = .36 - .51.

Table 5.4
Descriptive Statistics of Contact Events for Non-Comorbid and Comorbid Groups

Contact	Non-Comorbid		Comorbid		Statistical significance
	Mean	SD	Mean	SD	
Number of phone calls	6.86	1.79	7.25	2.28	$t_{127} = -.91$, $p = .36$
Number of manual written contacts	9.28	3.85	8.69	3.78	$t_{127} = .66$, $p = .51$
Number of automated written contacts	19.48	1.98	20.09	3.10	$t_{127} = .-.92$, $p = .36$
Total contact time (minutes)	63.47	22.88	68.16	31.59	$t_{127} = -.81$, $p = .42$

5.4 DISCUSSION

This study examined the effect of comorbidity during transdiagnostic iCBT treatment for participants with principal diagnoses of GAD, SP, or PDA. At pre-treatment 72% of the sample met criteria for comorbid anxiety or depression. It was hypothesized that: 1) Participants with a comorbid disorder would report higher levels of symptom severity before and after treatment than participants without a comorbid disorder; 2) participants with and without comorbid disorders would achieve a similar magnitude of change on all outcome measures; 3) treatment would reduce the number of participants meeting diagnostic criteria for comorbid diagnoses, and; 4) participants with comorbid disorders would find treatment as satisfactory and acceptable as participants without a comorbid diagnosis. These hypotheses were supported.

5.4.1 Is the Extended Version of the Anxiety Program Efficacious for Participants with Comorbid Anxiety and Depression?

The higher symptom severity reported by Comorbid participants at both pre-treatment, post-treatment and three-month follow-up is consistent with findings from disorder-specific CBT programs developed for treatment of anxiety (248, 249). However, also consistent with previous disorder-specific CBT programs (248, 249), the present study demonstrated that Comorbid participants achieved at least the same, if not greater, magnitude of change as Non-Comorbid participants. These results support the argument that comorbidity does not prohibit response to treatment.

5.4.2 Does the Extended Version of the Anxiety Program Reduce Comorbid Anxiety and Depression?

The effect of treatment on comorbidity reported in the present study is consistent with both face-to-face disorder-specific (249, 252) and transdiagnostic treatments (71, 254). The present study found statistically significant reductions from pre-treatment to three-month follow-up in the proportion of participants meeting criteria for any comorbid disorder, number of comorbid disorders, and type of comorbid disorder. These results provide encouraging preliminary support that comorbidity may be treated effectively online.

5.4.3 Is the Extended Version of the Anxiety Program Acceptable to Comorbid and Non-Comorbid Participants?

The present research also provided preliminary data about consumer satisfaction and the acceptability to consumers of treating anxiety disorders transdiagnostically. Over 80% of Comorbid and Non-Comorbid participants reported being very or mostly satisfied with the program. These rates are consistent with levels of satisfaction reported in disorder-specific iCBT studies (119, 154). Additionally, 88% of Comorbid and 77% of Non-Comorbid participants reported that reading about symptoms and difficulties different to their own helped them better understand their own anxiety. These findings indicate a high level of acceptability of the program. Importantly, these gains were achieved with no significant difference between groups in mean number of lessons completed, number of contacts or amount of contact with the support staff. This suggests that both groups received the same *therapeutic dose* throughout treatment, and that the Comorbid group did not require additional support to obtain good clinical outcomes.

5.4.4 Limitations

The study was not without limitations. Researchers were not blinded for diagnostic interviews due to resource constraints. This may have resulted in under-reporting of diagnostic symptoms at three-month follow-up. However, the enduring gains made by participants across a broad range of outcome measures, irrespective of comorbidity status, corroborates the improvement seen in diagnostic status.

A possible criticism of the current study is that multiple comparisons of several dependent variables were conducted without *a priori* control of alpha levels to reduce risk of Type I errors. Given that the comparisons were planned and that this was an exploratory study with clear aims, and that obtained *p* values were below .05, this is unlikely to be a significant weakness.

A third limitation concerns the generalisability of the current study which was limited by the range of comorbid conditions considered. Substance use, bi-polar disorder and active suicidal ideation were exclusion criteria and participants were not screened regarding potential Axis II conditions. While this means the present findings cannot be generalised to these groups, it is argued that most clinicians would not focus on treatment of emotional disorders as a primary strategy if a client was to present with such conditions (248). Nonetheless, future research may benefit from investigating the efficacy of transdiagnostic treatment with a more diverse range of mental disorders.

The lack of a control group means that spontaneous symptom resolution or that change in symptom severity due to regression to the mean cannot be entirely ruled out as an explanation for the present findings. Both seem unlikely to account for the findings, however, given the broad-based changes observed and the magnitudes of change observed, both of which are consistent with previous literature involving control groups (140).

Lastly, the current research was limited regarding the duration of post-treatment follow-up. While participants with comorbidity generally reported higher symptom severity, they also improved at a greater magnitude of change than Non-Comorbid participants at post-treatment on all measures excluding the SDS. Longer-term follow-up studies will help determine the treatment trajectory for participants who meet criteria for only one or comorbid disorders, and the robustness of transdiagnostic treatments.

5.4.5 General Discussion

These results provide interesting directions for future research. For example, while the outcomes of this study are promising, they present only one avenue for reducing comorbidity, and the relative utility of transdiagnostic treatment compared with disorder-specific and individually tailored treatments have not been tested. The efficacy of individually tailored iCBT treatments, which offer individual modules from disorder

specific treatments based upon the consumers presenting difficulties, will be of particular interest as both transdiagnostic and individually-tailored iCBT treatments share a common aim of providing a treatment that accounts for the high rate of comorbidity between disorders such as anxiety and depression (236, 242). Moreover, there is encouraging evidence from two studies that support the efficacy of individually-tailored iCBT treatment in reducing general anxiety and depression symptom severity.

Similarly, it is unclear which principal or comorbid disorders respond to transdiagnostic treatment. While there is encouraging evidence for the efficacy of transdiagnostic treatment protocols for treating symptoms of GAD, SP, PDA and MDE, it is unclear whether other disorders can be also simultaneously treated (255). For example on the one hand it has been argued that, because of their complexity, OCD and PTSD may not respond to transdiagnostic treatment (212). On the other hand, at least one study has demonstrated that a computer-assisted face-to-face CBT treatment for anxiety disorders with minimal tailoring resulted in similar outcomes to usual care for participants with a principal diagnosis of PTSD (204). Additionally, one study examining the efficacy of face-to-face transdiagnostic CBT reported that participants with OCD achieved similar outcomes to participants with a principal diagnosis of GAD, SP or PDA (181). Future comparisons of the respective clinical efficacy of transdiagnostic and other approaches to treating comorbidity, and the responsiveness of different principal and comorbid diagnoses to these various treatments, would have considerable implications for treatment services. These issues will likely need to be explored by research studies involving large samples across multiple diagnoses.

5.4.6 Conclusion

This study provides encouraging evidence that the presence of comorbidity does not prohibit a significant treatment response to a transdiagnostic iCBT treatment for anxiety disorders. Moreover, the study provides preliminary evidence that transdiagnostic treatment significantly reduces the overall frequency and type of comorbid conditions. Independent replication is required, and comparison with other treatment approaches is necessary to determine the efficacy of transdiagnostic treatment for both principal and comorbid disorders. Innovative treatments that address comorbid conditions and that are delivered in a format that overcomes many barriers to treatment have considerable potential in reducing the burden of disease associated with the anxiety disorders.

CHAPTER SIX

General Discussion

6.1 GENERAL SUMMARY

The anxiety disorders are common, costly to individuals and society, chronic and frequently co-occur. Despite the efficacy of treatments for anxiety disorders, many people delay seeking treatment and, of the minority who do seek treatment, few receive evidence-based care due to well recognised barriers to treatment. Two innovative strategies that may reduce barriers to treatment are iCBT and transdiagnostic treatments. There is strong evidence for the efficacy of guided-iCBT treatments for SP and PDA, and emerging evidence for the efficacy of guided-iCBT for GAD. There is preliminary and encouraging evidence for the efficacy of face-to-face transdiagnostic treatments for anxiety, and efficacious transdiagnostic CCBT programs have been developed. However, at the time of planning this thesis, there were important and outstanding questions about which anxiety disorders responded to transdiagnostic treatment, about the ability of transdiagnostic treatment to reduce disorder-specific symptom severity, about the effect of comorbidity on transdiagnostic treatment outcome and, about the effect of transdiagnostic treatment on comorbidity. The aims of the present research were to explore these questions in the context of developing and evaluating a transdiagnostic iCBT intervention, the Anxiety Program, for three anxiety disorders.

The aim of Study 1 was to compare the six-lesson Anxiety Program, delivered by a Clinical Psychologist over eight weeks, with a waitlist control condition. Efficacy was assessed using generic (GAD-7 and DASS-21) and disorder-specific measures of anxiety (PSWQ, SPSQ and PDSS-SR), and measures of depression (PHQ-9), disability (SDS) and neuroticism (NEO-FFI-N). With the exception of a measure of GAD symptom severity, treatment resulted in significant improvement relative to a waitlist control condition, with gains sustained at three-month follow-up. Results on disorder-specific measures were encouraging, but poorer than found on similar disorder-specific iCBT programs.

Modifications were made to the protocol offered to control-group participants for their active treatment phase, which were associated with improved outcomes on all measures of symptom severity, completion rates and acceptability of the treatment. The encouraging results of Study 1 provided preliminary evidence that the three target anxiety disorders may be treated using a single protocol online and that this approach warranted further investigation.

Study 2 was a partial replication and extension of Study 1, and aimed to examine the efficacy of an extended version of the Anxiety Program while investigating the relative efficacy of Clinician- and Coach-support roles in guided iCBT. Combining the data from both treatment groups indicated that treatment significantly reduced symptom severity and was superior to no treatment. Study 2 also demonstrated that each of the three target disorders responded well to treatment, with significant and large within-group effects reported on measures corresponding with treatment group participants' principal diagnoses, and also on measures that did not correspond with treatment group participants' principal diagnoses. Additionally, Study 2 demonstrated that Coach-supported iCBT was associated with at least similar levels of improvement to Clinician-supported iCBT. Post-hoc thematic analysis of written communication between participants and researchers showed themes common to both Coach and Clinician support roles including prompts for action, reinforcing progress, normalising difficulties, and interest in progress. However, themes that were unique to the Clinician support role included establishing mastery, teaching additional skills, extension of core skills and process comments. While the rationale for these analyses were adopted post-hoc and the Coach and Clinician differences were unexpected, it was tentatively concluded that, in time-limited iCBT treatments, providing certain additional information during contact may be distracting, and impair outcomes. As a partial replication of the Coach-supported condition, the control group received Coach-supported iCBT when completing treatment and achieved results consistent with the initial Coach-supported treatment group. Both Study 1 and Study 2 provided support for the efficacy of a transdiagnostic iCBT approach for the three target anxiety disorders.

Study 3 involved re-analysis of the data from Study 2 to examine the effects of comorbidity on treatment outcome, and the effect of treatment on comorbidity. The results indicated that participants with comorbid conditions reported higher levels of symptom

severity both before and after treatment, yet achieved at least a similar magnitude of change over time, when compared to their non-comorbid counterparts. Additionally, Study 3 showed treatment significantly reduced the overall presence of comorbid disorders as well as number and type of comorbid disorders. On the whole, this study provided encouraging preliminary evidence that comorbidity does not prohibit response to transdiagnostic treatment and that transdiagnostic treatment may reduce comorbidity.

6.2 RELATIONSHIP BETWEEN THE PRESENT AND PRIOR RESARCH IN TRANSDIAGNOSTIC TREATMENT

The results of these three studies are consistent with previous research indicating that transdiagnostic treatment is efficacious in treating general symptoms of anxiety. Within-group effects on generic measures of anxiety, such as the GAD-7, reported by treatment groups in Study 1 and 2 (d = .81 and d = 1.27, respectively) were in the range of effect sizes reported in face-to-face transdiagnostic efficacy studies (d = 1.29, 95% CI .66 – 1.93) (171), albeit in the lower range for Study 1. Importantly, the treatment data for the control groups in both Study 1 and Study 2 indicated a similar magnitude of outcomes, indicating the reliability of the protocol. The follow-up data reported in the present research are also consistent with previous transdiagnostic studies indicating that treatment gains are robust, at least in the medium term (176, 183). Moreover, while most previous transdiagnostic studies reported completer analyses only (172, 173, 176, 178-180, 182), the results reported in the present studies employed more conservative methods of analysis (ITT, BOCF) that are less likely to over-estimate treatment efficacy.

The present research extends the transdiagnostic literature in several ways. At the time of planning the studies for this thesis, only two RCTs had examined the relative efficacy of face-to-face delivered transdiagnostic treatment against no treatment (172, 173) and the majority of research comprised open-trials and naturalistic observations, which could not account for spontaneous remission. With the exception of a measure of worry in the first study, the present research consistently supported the efficacy of transdiagnostic treatment over no treatment across a b road range of measures. Similar results have since been reported in a recently published RCT examining the efficacy of a transdiagnostic iCBT program that targets PDA, SP, GAD and MDE, showing significant and large between

group effects over no treatment on the DASS-21 (255). As such, the present research contributes to a small but growing body of research suggesting that transdiagnostic treatment is superior to no treatment. This allows more substantial questions to be asked about the efficacy of transdiagnostic treatments relative to other treatments.

The present research has also contributed to knowledge about potential transdiagnostic treatment effects on disorder-specific measures of symptom severity. At the time of planning this thesis, disorder-specific outcomes had been reported in four studies, but results were equivocal (173, 174, 177, 181). The results of the present research indicated that treatment resulted in moderate within-group effects on self-report disorder-specific measures for the treatment group in Study 1 (d = .54 – .62). More encouraging findings were produced by the modified treatment offered to the control group in Study 1, and the revised version of the protocol in Study 2, which resulted in significant and large within-group effects on self-report measures corresponding to participants' principal diagnosis (d = .97 – 1.22). Significant within-group improvements on disorder-specific outcome measures have been reported in subsequent transdiagnostic iCBT treatments aimed at the treatment of GAD, SP, PDA and MDE (255). These preliminary findings provide encouragement that transdiagnostic treatment may result in significant symptom reduction for specific disorders.

An important outstanding question in the literature was whether participants with comorbid disorders or one anxiety disorder would respond differently to transdiagnostic treatment, and if a transdiagnostic program could indeed treat comorbid conditions (38, 167, 169). Two previous studies had examined the effect of comorbidity on treatment (176, 185) and three studies had examined treatment effects on comorbidity (173, 181, 204). Study 3 extended this work and indicated that comorbidity did not inhibit treatment response; participants with a comorbid condition achieved at least a similar magnitude of symptom reduction in response to treatment than those without comorbidity. Moreover, results from Study 3 demonstrated that treatment significantly reduced the proportion of participants meeting criteria for a comorbid disorder, number of comorbid disorders, and type of comorbid disorders. While the present research requires independent replication, the results are encouraging and suggest transdiagnostic iCBT may be an efficacious treatment for individuals with principal PDA, SP or GAD, and a comorbid anxiety disorder or MDE.

The current research also provides preliminary evidence about transdiagnostic treatment effects on neuroticism, which has been identified as an underlying vulnerability for the anxiety disorders and depression. The present research indicated that transdiagnostic treatment resulted in significant reductions on the NEO-FFI Neuroticism subscale, evidenced by moderate to large within-group effects for groups completing the Anxiety Program (d = .42 - .95). This was unexpected given arguments that neuroticism reflects biological and genetic factors that are not responsive to behavioural interventions (256). The observed changes while encouraging, require independent replication and assessment over a longer period of time following termination of treatment to allow comment on potential longer-term benefits or reduced vulnerability to future experience of anxiety. Additionally, even if the shifts in neuroticism reported in the present studies did reflect a genuine reduction in an underlying vulnerability to anxiety, this would not preclude the same result from being achieved from a disorder-specific treatment. Nevertheless, the results are encouraging and contribute to evidence that transdiagnostic treatment may result in improvement across a wide range of outcome measures and may affect both surface level symptoms and underlying vulnerabilities.

6.3 RELATIONSHIP BETWEEN THE PRESENT AND PRIOR RESEARCH ON iCBT

Results from the present studies are consistent with those reported in the disorder-specific iCBT literature. Post-treatment outcomes on disorder-specific symptom severity achieved in Study 2 are consistent with the magnitude of within-group effects achieved in disorder-specific iCBT studies for the treatment of GAD (118, 119, 166), SP (142-146), and PDA (115, 116, 157-160), obtained by several different research teams. The findings from Study 2 suggested that support from a Coach or Clinician resulted in similar outcomes, consistent with studies which explicitly tested the relative efficacy of these roles in the treatment of GAD (119), SP (155) and MDE (120).

The results from the present studies also extend the iCBT literature in several ways. Firstly, it is noteworthy that the amount of support time required to achieve these results were consistent with the amount of clinician time required in disorder-specific iCBT studies (119, 155, 166). This offers preliminary evidence suggesting that transdiagnostic treatments

are not more 'complex' than disorder-specific treatments to administer and do not require more staff time than disorder-specific treatments. Additionally, the results from Study 3 showed participants with comorbid disorders received the same amount of contact with researchers throughout treatment as participants without comorbid disorders, and that the former group achieved at least the same magnitude of change as those without comorbid conditions. These findings indicate that transdiagnostic iCBT is not a 'simplistic' treatment but has potential as a valuable clinical tool. This potential is discussed in the following sections.

6.3.1 Theoretical Implications of Transdiagnostic iCBT

The present research lends support to the theory of a unified treatment for emotional disorders proposed by Barlow and colleagues (39). The treatment components in the Anxiety Program are consistent with the components of altering antecedent appraisals, preventing emotional avoidance and facilitating action tendencies that comprise Barlow's unified treatment. For example, the techniques in the Anxiety Program of thought challenging, challenging positive and negative beliefs about anxiety are consistent with the component of altering antecedent appraisals. The use of graded in-vivo exposure and imaginal exposure techniques, as well as worry stories, is consistent with the component of preventing emotional avoidance. Additionally, techniques such as assertive communication and boundary setting are consistent with the component of facilitating action tendencies.

Importantly, Barlow's unified model of treatment has been extended to a broader scope of psychopathology than that studied in the present research, including the treatment of bipolar, dissociative, anger-related and eating disorders (39). In contrast, the present research provides preliminary support for a theory of a unified treatment limited to treatment of SP, PAN and GAD. Recent studies indicate that transdiagnostic iCBT can additionally treat major depressive disorder (255, 257), but further research is required to determine the limits of Barlow's model.

6.3.2 Clinical Implications and Applications of Transdiagnostic iCBT

Transdiagnostic iCBT interventions have numerous potential applications in mental health services. For example, transdiagnostic treatments may be well poised for use in prevention-oriented service delivery due to their ability to target shared risk and vulnerability factors and may be more cost effective than creating prevention programs for individual disorders (258). Additionally, iCBT is well suited for prevention programs due to its accessibility, scalability, fidelity and cost-effectiveness (259, 260). Consistent with this possible application, disorder-specific iCBT treatments have already been used successfully for prevention, including in at least one open trial of iCBT for prevention of depression in adolescents (111). Combining these two approaches may offer considerable benefits to both service providers and consumers.

With respect to integrating transdiagnostic treatments with existing services, such interventions could be offered prior to the administration of disorder-specific treatments. The broader focus of transdiagnostic treatment may provide generic skills for supporting patients to learn to manage symptoms of multiple disorders, without having to undertake several separate disorder-specific interventions. Patients who do not benefit from the transdiagnostic approach, or who continue to experience residual symptoms may subsequently benefit from disorder-specific treatment, presented either via iCBT or in a more intensive face-to-face delivery model. This model of service provision represents a stepped-care approach, where patients are initially provided with access to lower-intensity treatments such as iCBT and subsequently to higher-intensity treatments such as face-to-face treatment, based on the severity of symptoms (261). An important advantage of this approach is that because lower intensity services are provided earlier in care, valuable clinical resources are made more available for patients with more complex presentations (262).

In addition to potential roles in prevention and treatment, transdiagnostic iCBT interventions may also be applied to facilitate relapse prevention and to reduce residual symptoms remaining after completion of disorder-specific treatment (169). Recent and encouraging results were obtained from a RCT exploring the efficacy of a transdiagnostic treatment as a relapse prevention intervention following psychotherapy or antidepressant

medication, indicating this approach has considerable potential in reducing risk of relapse (263). While face-to-face transdiagnostic treatment may produce similar outcomes as iCBT administered treatments, the advantages of the latter in reducing common barriers to treatment are compelling.

The Coach-supported condition evaluated in Study 2 represents a potentially cost-effective and clinically-effective model of dissemination for iCBT. It has been argued that, if iCBT were to be implemented as part of routine care, there would be considerable workforce issues in training a sufficient number of workers to provide such services (264). Drawing from the pool of existing mental health professionals to deliver such services would run the risk of depleting existing mental health services of its most valuable trained resource (265). One model of dissemination that may overcome potential workforce shortages is that of up-skilling non-expert workers to provide structured, manualised evidenced-based psychological services. There is an existing precedent for this approach in face-to-face services in the UK under the Increased Access to Psychological Therapy (IAPT) initiatives (266). The IAPT initiatives employed a stepped-care approach with low-intensity interventions provided as a first step (243). Under the IAPT initiatives, it was anticipated that there would be significant difficulties in attracting clinical experts to provide highly manualised low-intensity treatments, including the burden of additional training and that low-intensity treatments are less well remunerated (265). As such, the workforce that provides the low-intensity treatments are non-expert 'low intensity' workers, who provide highly structured and manualised face-to-face CBT services under the supervision of clinical experts (261). If the results from the Coach-supported iCBT condition in Study 2 were replicated, there would be scope to examine a dissemination model whereby non-expert iCBT support staff would be trained to provide iCBT, freeing expert CBT clinicians' time to provide supervision to the non-expert support staff and otherwise provide higher intensity services.

6.4 LIMITATIONS

When considering the aforementioned practical and theoretical implications, it is also important to acknowledge the limitations of the present research. The more substantial limitations of the present research are discussed below.

6.4.1 Blinding

The lack of blinding for diagnostic interviews, and for treatment allocation may have introduced biases that threaten the validity of present findings. Examination of the magnitude of change observed on disorder-specific measures across the studies indicates that this was not a significant threat. However, future research that is afforded greater resources would benefit from blinding researchers to increase the internal validity of their findings.

6.4.2 Treatment Effects of Individual Support Staff

The generalizability of the present studies is limited by the small number of individual staff who conducted treatments in the present studies, which raises the question of whether other clinicians would obtain similar results. Due to resource limitations, this issue was not examined in the present studies, although this is an important topic for future research. However, recent studies by other research teams have found that therapist effects are less likely to affect structured iCBT programs similar to that used in the present studies (267).

6.4.3 Representativeness of the Sample

An important question with implications for the generalizability of these results is whether participants who were treated via the internet are representative of those in the general population who have anxiety disorders. Answering this question in detail is beyond the scope of this thesis. However, a recent study comparing the demographic characteristics and symptom severity of a sample seeking treatment via the internet with those identified in an epidemiological survey reported that the internet sample had disorders as severe as those attending an outpatient clinic, but with demographic characteristics more consistent with the national sample (268). These data indicate that the benefits of iCBT may apply to the wider population

6.4.4 Comparison Conditions

The use of waitlist controls rather than an active control group in Study 1 and 2 limit the conclusions that can be made about the efficacy of the Anxiety Program. However, given the chronicity of the anxiety disorders (25) and low rates of remission in the absence of effective treatment (27) it is unlikely that the treatment effects reported in the present research are the result of spontaneous remission. Nonetheless, future studies would benefit from employing a placebo or active control to more accurately determine the effects of transdiagnostic iCBT.

6.4.5 Sample Size

An additional and important limitation of the present studies were the limited samples sizes, which provided power to detect medium to large between-group effects only. This limitation is common to transdiagnostic studies, due to the very large sample sizes required to examine the effects of specific constellations of principal and comorbid disorders. It is unlikely that any research team will have the capacity to treat sufficient numbers for testing small differences, and pooling data between research teams may be a sensible future solution.

6.4.6 Measures

Another important limitation of the present research is that the processes of change during the transdiagnostic treatment and the mediators and moderators of change were not examined. The process data from the present studies are, however, currently being examined to begin to inform these questions.

6.4.7 Statistical Methods

Lastly, the present research is limited by the use of traditional methods of statistical analysis rather than more advanced statistical methods such as mixed-effects modeling which allow estimates about patterns of symptom change for both individuals and groups throughout treatment (269). These alternative methods of statistical analyses were not chosen for the present study for several reasons. These include that, at the time of designing

the studies for this thesis they were not widely used, and that the high level of computational complexity associated with these procedures make them difficult to easily communicate with a broader audience (269). Notwithstanding these limitations, the results of the present studies appear robust, reliable, and valid.

6.5 FUTURE RESEARCH

The results of the studies described in this thesis indicate promising directions for future research relevant to both face-to-face and iCBT transdiagnostic treatments.

6.5.1 Establishing the Relative Merits of Transdiagnostic and Other Treatments

An important area for future research is to examine the relative efficacy and acceptability of transdiagnostic treatments relative to other types of treatment. An outstanding and important question is to compare transdiagnostic and disorder-specific treatment. For example, a recent study compared the CALM program, a CCBT treatment that is minimally tailored for the target disorders of GAD, SP, PDA and PTSD, with usual care which comprised medication, counselling or referral to mental health specialist (205). The study found small but significant between-group effects (d = .18 – 31) favouring CALM on measures of general anxiety in short and longer-term follow-up analyses. However, further studies are required to replicate and extend these findings. Although it is argued that transdiagnostic treatments would be unlikely to produce a superior treatment effects to disorder-specific treatment, if transdiagnostic treatments cannot produce similar treatment effects to disorder-specific treatments then there may be limited interest in their use (270).

An additional and important comparison would be to evaluate the relative benefits of transdiagnostic iCBT and individually tailored iCBT. Both transdiagnostic and individually-tailored iCBT treatments share the common aim of providing a treatment that accounts for the high rate of comorbidity between disorders. However, individually tailored iCBT comprise individual modules from treatments developed for specific disorders. These modules are then prescribed by a clinician or chosen by a participant based upon the participants' characteristics and comorbidities. Results from two recent studies support the

efficacy of individually-tailored treatments in reducing anxiety symptom severity and severity of depression (236, 242).

6.5.2 Determining Which Disorders Can Be Treated With Transdiagnostic iCBT

Additional important and outstanding questions concern the specific disorders that can be treated using a transdiagnostic approach. Recent studies indicate that the content of transdiagnostic treatments may be extended to also treat depression. Indeed, since the completion of the studies presented in this thesis one RCT has examined the efficacy of a transdiagnostic iCBT treatment designed to treat PDA, SP, GAD and MDE (255). This RCT demonstrated large within-group effects on the DASS-21 and PHQ-9 (d = 1.0 and d = .80, respectively), and moderate effects on the PDSS-SR, SIAS-6/SPS-6 and PSWQ (d = .36, d = .40 and d = .63, respectively). These results should not be unexpected given the shared vulnerability between anxiety disorders and MDE (73, 75, 77).

It remains to be seen, however, whether people with anxiety disorders not targeted in the present study will benefit from transdiagnostic iCBT. The few studies that have examined other anxiety disorders provide inconclusive results. For example, one study found that a transdiagnostic CCBT treatment for anxiety disorders required minimal tailoring to result in similar outcomes to usual care, which comprised of medication, counselling or referral to mental health specialist, for participants with a principal diagnosis of PTSD (204). Moreover, data from one study examining the efficacy of face-to-face transdiagnostic CBT showed that participants with OCD achieved similar responses to those with a principal diagnosis of GAD, SP or PDA (181). However, a report of a face-to-face group transdiagnostic treatment of anxiety disorders suggested that people with principal diagnoses of PTSD and OCD may experience limited motivation, are more complex, or may distract people with other anxiety disorders (212). These knowledge gaps indicate the need for larger studies to directly compare response to treatment based on principal and comorbid diagnoses and to empirically question assumptions that transdiagnostic treatments will be beneficial for all consumers.

6.5.3 What are the Effective Ingredients for Transdiagnostic Treatment?

Given the consistent results indicating that iCBT interventions are reliably and clinically effective and the emerging literature indicating the potential of transdiagnostic iCBT, researchers may also begin to answer the question of which psychological and therapeutic processes mediate or moderate outcomes. For example, if psychological processes such as intolerance to uncertainty or repetitive negative thinking prove to be transdiagnostic processes that account for significant variability in treatment outcome, then future iterations of transdiagnostic treatments may benefit from more explicitly targeting this throughout therapy. While the present body of research supporting transdiagnostic treatment is small, the process of refining future treatments may be expedited by a greater understanding of which components are required to produce good clinical outcomes.

6.5.4 Alternate Formats of Remote Treatment

Future research may also examine the relative benefits of other forms of remotely-delivered transdiagnostic treatment. The present research used a guided-iCBT approach, which requires more resources than other forms of remote treatment (154). Other formats of remote treatment that produce similar treatments effects to guided-iCBT, but require fewer resources, may provide a more cost-effective approach. For example, studies examining iCBT and guided and unguided bibliotherapy treatments for SP, have found no statistically significant differences in treatment outcomes (149). Moreover, one study examining guided-iCBT and guided bibliotherapy for PDA found no significant difference between treatment conditions, and that both treatments significantly improved relative to waitlist controls (116). The combination of transdiagnostic treatment and other forms of remote treatment, such as guided or unguided bibliotherapy or self-guided iCBT, may provide another way of increasing access to effective care.

6.5.5 Can Transdiagnostic Treatments be Offered to Other Populations?

Transdiagnostic treatments may also be of considerable benefit to populations with traditionally low levels of treatment seeking and who are more likely to drop out of treatment prematurely. Such populations, including younger adults, seniors, and culturally and linguistically diverse (CALD) populations, may benefit from low intensity and brief

interventions that target core and common symptoms. Such an approach may increase their engagement with services, while also maximizing the generalizability of the skills that they are taught. Preliminary data from recent trials indicate that a transdiagnostic iCBT intervention targeting symptoms of anxiety in older adults resulted in large within-group effects on the GAD-7 (d = 1.03) and DASS-21 (d = .98), that are sustained at three-month follow-up (271).

6.6 CONCLUSIONS

The anxiety disorders are common, disabling, chronic and frequently co-occur. While effective treatments do exist, less than 50% seek treatment in a 12-month period, and fewer still receive evidence-based treatment after initiating treatment. Internet-delivered CBT and transdiagnostic treatments are two innovative treatments that have the potential to increase access to effective care. There is good evidence for the efficacy of iCBT treatments for PDA and SP, and emerging evidence for the treatment of GAD. There is a small, but encouraging, body of evidence supporting the efficacy of face-to-face transdiagnostic treatment of anxiety. At the time of designing the studies for this thesis, no studies had combined transdiagnostic and internet-delivered CBT for treating SP, PDA or GAD.

The primary aims of the present thesis were to develop and create a transdiagnostic treatment for three anxiety disorders, examine disorder-specific treatment effects and outcomes by principal diagnosis, and to examine the effect of comorbidity on treatment outcome and treatment effects on comorbidity. Overall, Study 1 found transdiagnostic treatment to be superior to no treatment. In Study 2, an extended version of the treatment protocol produced significant and large treatment effects on measures corresponding to participant's principal disorder. Study 2 also provided preliminary support for the efficacy of Coach-supported iCBT, which has implications for potential models of dissemination. The results of Study 3 indicated that comorbidity did not prohibit response to treatment, and provided preliminary evidence that transdiagnostic treatment may reduce comorbidity. While encouraging, these results require independent replication.

Outstanding issues include questions about the relative efficacy of transdiagnostic and disorder-specific treatments, the responsiveness of other disorders to transdiagnostic treatment, additional understanding about what is required for creating an efficacious transdiagnostic treatment, and the possibility of creating transdiagnostic treatments for other populations. Nonetheless, the present research presents encouraging preliminary support for a novel and innovative treatment approach that may increase access to effective care.

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