School of Psychology and Speech Pathology

Faculty of Health Sciences

Treatment of Depression and Anxiety in Parkinson's Disease

Lakkhina Troeung

This thesis is presented for Degree of

Doctor of Philosophy

of

Curtin University

October 2013

Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signature: …….

Date: ……..

Acknowledgements

First and foremost, I would like to thank my supervisors Dr Sarah Egan and Dr Natalie Gasson for your knowledge, guidance, and support, throughout these four years. I couldn't have done this without the both of you.

Thank you to Dr Andrea Loftus for providing invaluable feedback on the final draft of this thesis.

Thank you to the Parkinson's community of Perth, and especially the participants of this research. To Brenda, Angela, and all of the other amazing staff and volunteers at Parkinson's WA – thank you for your continual support of my research and studies.

To everybody involved with the Curtin Psychology Clinic – there are so many of you to thank – the four therapists who ran the treatments, Cat, Angela, Shanelle and Jo, all the amazing other students who conducted the assessments, and the Clinical Psychology teaching team who provided supervision for students. Thank you also to Lyn Haigh and Maureen Bell for always going the extra mile to help in whichever way you could.

To all my fellow phd-ers with whom I spent so many early mornings, long days, and late nights! You are all so lovely, brilliant, and insane! This journey would not have been anywhere near rewarding or enjoyable without all of you. I will always look back fondly on our time together doing all things phd and not-so-phd related!

Finally, thank you to the two most important people in my life – my parents. Thank you for all the sacrifices you've made your whole lives just so your children could achieve their dreams.

Table of Contents

List of Tables

List of Figures

Abstract

Parkinson's disease (PD) is classically defined as a motor disorder of neurological aetiology. However, there has been a recent movement towards a reconceptualisation of PD in recognition of the multitude of cognitive and psychiatric disturbances that also feature in the disease (Stern, Lang, & Poewe, 2012). Depression and anxiety are the two most clinically significant psychological disturbances in PD and affect up to half of all individuals with PD (Negre-Pages et al., 2010). Research has shown that both depression and anxiety are among the greatest predictors of poor quality of life in PD and consistently rated as more detrimental to well-being than motor symptoms (Carod-Artal et al., 2008), even in the most advanced stages of disease where motor symptoms have fully progressed (Hely et al., 2005). Despite this, the majority of cases of depression and anxiety are not optimally managed or treated to remission in PD, largely due to a lack of empirical research to inform best practice guidelines. This research aimed to make a significant contribution to current knowledge in relation to the treatment of depressive and anxiety disorders in PD. Four studies were conducted.

Study 1 was the first broad meta-analysis of randomised placebo-controlled treatment trials (RCT) for depression and/or anxiety in PD and provided a systematic comparison of the efficacy of existing treatments for depression and/or anxiety in PD to better inform clinical care and future research. A comprehensive literature search highlighted the dearth of controlled treatment trials for depression and anxiety in PD with only nine well-designed placebo-controlled RCTs available for analysis. Random-effects modelling supported previous claims that there is a lack of evidence for the efficacy of antidepressants in PD at present (Klaassen et al., 1995). The pooled effect for antidepressants in general (d = .71, 95% CI = -1.33 to 3.08) and first-line selective serotonin reuptake inhibitor treatments for depression in PD (d = .57, 95% CI = -1.33 to 2.47) were both non-significant. Most significantly, Study 1 highlighted the potential of non-pharmacological interventions, particularly, Cognitive Behavioural Therapy (CBT), in treating depression and anxiety in PD. A recent RCT of CBT in PD (Dobkin et al., 2011) resulted in the largest effect on depression in PD over all other interventions (d = 1.57, 95% CI = 1.06 to 2.07) and strongly warranted further investigation of CBT interventions in PD.

Study 2 evaluated the validity and reliability of the Depression, Anxiety and Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995) as an assessment tool for depression and anxiety in PD. The DASS-21 was the primary outcome measure used in Studies 3 and 4 of this thesis however it has not been previously validated in a PD sample. Selection of appropriate psychological measurement scales has been strongly emphasised in PD given the high degree of symptom overlap between depression, anxiety and PD, with use of inappropriate scales potentially invalidating research findings (Schrag et al., 2007). Confirmatory factor analysis using structural equation modelling was conducted based on responses of a sample of 327 Australian adults with PD and provided strong support for the factorial validity of the DASS-21 in PD, with replication of the scale's a priori structure within the present sample. Moreover, the DASS-21 also displayed strong evidence of internal consistency, criterion validity, and discriminant validity. Overall, Study 2 provided strong support for the use of the DASS-21 as a primary outcome measure in this research and for clinical use in PD populations.

Study 3 provided a direct contribution to the empirical literature on CBT in PD and was the first RCT of a group CBT intervention for depression and anxiety in PD. A waitlist-controlled RCT evaluating the efficacy of an 8-week group CBT intervention was conducted with 18 Australian adults with PD and depression and/or anxiety. At posttreatment, multilevel linear mixed-effects modelling showed that participants who received CBT experienced significant large improvements in depression (d = 1.12) and anxiety (d = .89) relative to waitlist control as assessed by the DASS-21. Acute treatment gains were all maintained over the follow-up period, with the largest gains observed at six-month follow-up (ds = .94 to 2.26), and strongly support the utility of group CBT as an alternative to antidepressant regimens. Despite these positive results, significant recruitment difficulties (and associated small sample size) reduced the overall validity and generalisability of study findings. In spite of recruitment efforts over a 28-month period, the response rate for the trial was less than 1%. Examination of the literature revealed similar recruitment difficulties in previous treatment trials for depression in PD, leading to the hypothesis that there may be significant barriers to seeking psychological treatment among individuals with PD and the conceptualisation of Study 4.

Study 4 was an exploration of mental health service utilisation and barriers to psychological treatment in a PD population. Responses for this study were based on the same sample as Study 2. Participants were 327 Australian adults with PD. The results of this study confirmed the underutilisation of mental health services among individuals with PD. Despite clinically relevant symptoms of depression and/or anxiety in 59% of the sample, only 8% of participants were currently engaged in professional treatment. The key finding of this study was that the underutilisation of mental health services in PD may stem from a lack of awareness regarding psychological complications among individuals with PD. Second to prior treatment experience, a logistic regression analysis showed that having had a PD physician-initiated discussion regarding psychological symptoms in PD was the next most substantial predictor of willingness to seek mental health treatment. Ultimately, this study highlighted the importance of promoting awareness of PD as *"more than just a motor disorder"* as a means of facilitating help-seeking for psychological complications in PD.

Overall, this research found that depression and anxiety remain largely overlooked and unaddressed in PD. It would appear that increasing scientific recognition of the importance and impact of depression, anxiety and other psychological complications in PD over the past 25 years has not necessarily translated into increased clinical care. The final contribution of the present work was a set of clinical recommendations for the treatment of depression and anxiety in PD based on the findings of this research. Recommendations encompassed areas from facilitating awareness and understanding of psychological symptoms in PD, assessment and diagnosis, and treatment and evaluation.

Thesis Overview

"It [is] striking that… in an illness defined by its motor manifestations, affective and cognitive symptoms may have more significance.."

(Weintraub, Moberg, Duda, Katz, & Stern, 2004, p. 788).

In 1817, English physician James Parkinson introduced the shaking palsy to the world. In his pioneering paper, '*An Essay on the Shaking Palsy'*, Parkinson painted a vivid picture of a 'most distressing malady' characterised by the unusual combination of progressive loss of intentional movement with involuntary movement gains. Today, almost 200 years after Parkinson's seminal publication, the shaking palsy, or Parkinson's disease (PD) as it was renamed, is well recognised as a chronic and progressive neurodegenerative disease affecting an estimated 6.3 million individuals worldwide (Baker & Graham, 2004).

Classic definitions of PD conceptualise the disease as a motor disorder characterised by four cardinal features; resting tremor, muscle rigidity, postural instability and slowness of physical movement. However, more recent work suggests that PD may be more accurately conceptualised as a *'neuropsychiatric disorder'* in recognition of the multitude of psychiatric and cognitive symptoms that also feature in the disease, including but not limited to; depression, anxiety, dementia, psychosis, and impulse control disorders (Weintraub & Burn, 2011)

This research focuses on the two most clinically significant non-motor complications in PD; depression and anxiety. Approximately 40 to 50% of individuals with PD will experience clinical depression (Burn, 2002) while approximately 30 to 40% will meet clinical criteria for an anxiety disorder (Leentjens et al., 2008). Research has consistently shown that both depression and anxiety are among the greatest predictors of poor quality of life in PD and consistently rated as more detrimental to well-being and health status than motor symptoms (Hinnell et al., 2011), even in the most advanced stage of illness where motor symptoms have fully progressed (Hely, Morris, Reid, & Trafficante, 2005).

The original aim of this project was to make a significant contribution to the psychological treatment literature in PD by conducting the first randomised controlled trial of a group Cognitive Behavioural Therapy (CBT) intervention for depression and anxiety in PD. This aim was accomplished and reported findings provide strong preliminary support for the efficacy of group CBT for depression and anxiety in PD. However, significant and unforeseen difficulties with participant recruitment were encountered and led to expansion of the scope of the present work. Specifically, recruitment difficulties resulted in the identification of a novel area of research that has yet to be comprehensively explored in PD – barriers to seeking mental health treatment. This thesis now comprises four studies each offering a unique scientific contribution to the existing knowledge regarding depression and anxiety in PD.

Outline of Chapters

Chapter 1 provides a broad overview of depressive and anxiety disorders in PD, beginning with a brief overview of PD as background knowledge for this research. The remainder of Chapter 1 examines depression and anxiety in PD including an overview of aetiology, significance, diagnostic challenges and a review of the negative outcomes associated with untreated depression and anxiety in PD, ultimately highlighting the importance of appropriate clinical attention and treatment.

Chapter 2 explores current treatment options for depression and anxiety in PD. Specifically, Chapter 2 presents the results of Study 1 which is the first broad meta-analysis of both pharmacological and non-pharmacological treatment trials for depression and/or anxiety in PD. The aim of Study 1 was to provide a systematic comparison of the efficacy of current treatments for depression and/or anxiety in PD to better inform clinical care and future research.

Chapter 3 introduces and examines the feasibility of CBT as a treatment for depression and anxiety in PD. The first part of the chapter provides a brief overview of CBT for depression and anxiety. The remainder of the chapter establishes a rationale for the use of CBT in PD by reviewing the relevant theoretical and

empirical literature. The chapter concludes with a review of existing studies evaluating the use of CBT in PD populations and highlights promising preliminary results but the pressing need for more controlled empirical research, particularly for group CBT interventions.

Chapter 4 presents the findings of Study 2 which is an investigation of the validity and reliability of the Depression, Anxiety, and Stress Scale-21 (DASS-21) in a PD sample. The DASS-21 was the primary outcome measure used in Studies 3 and 4 of this thesis however it has not been previously validated in PD. Selection of appropriate measurement scales has been strongly emphasised in PD, with use of inappropriate scales potentially invalidating research findings. The aim of this study was to therefore provide support for the use of the DASS-21 as a primary outcome measure in this thesis.

Chapter 5 presents the findings of Study 3 which is the first randomised waitlist-controlled trial of a group CBT intervention for depression and anxiety in PD. This study aimed to make a direct contribution to the empirical treatment literature on depression and anxiety in PD by evaluating the efficacy of an 8-week PD-specific group CBT intervention. Participants were 18 adults with PD and a comorbid DSM-IV diagnosis of at least one depressive and/or anxiety disorder.

Chapter 6 presents the results of Study 4, which is an exploration of barriers to seeking mental health treatment among a sample of 327 Australian adults with PD. This study was conceptualised *post hoc* as a direct result of recruitment difficulties encountered in Study 3. The aim of Study 4 was to examine patterns of mental health service utilisation among individuals with PD and to identify any pertinent barriers to seeking mental health treatment that may help to understand the recruitment difficulties during the clinical trial.

Finally, this thesis closes with Chapter 7 which presents a general discussion of the current state of knowledge in relation to depression and anxiety in PD and outlines the unique contributions of the present work to this field of knowledge, along with an outline of clinical and future research recommendations.

CHAPTER 1 | Depression and Anxiety in Parkinson's Disease

1.1 Introduction

James Parkinson's initial account of the shaking palsy described a disease predominantly affecting physical functioning with *'the senses and intellects being uninjured'*. It was not until almost six decades later that cognitive and psychological disturbances in Parkinson's disease (PD) were acknowledged, when in 1875, French neurologist Jean-Martin Charcot noted that *'psychic faculties are definitely impaired ... the mind becomes clouded and the memory is lost'* (Charcot, 1875, p. 179).

Today, the range of psychological complications in PD is widely recognised. More than 60% of individuals with PD experience at least one neuropsychiatric symptom at any given time, with 45% experiencing two or more (Schrag, 2004). Depression and anxiety are the two most common psychological problems in PD and, depending on study methodology, affect between 30 to 75% of individuals with Parkinson's at some point during their illness (Veazey et al., 2005).

This chapter comprises two parts. The first provides a brief overview of PD as background knowledge for this research including a review of the definition of PD, clinical presentation, epidemiology, neuropathology, and treatment options. The second half of the chapter focuses on the occurrence of depression and anxiety in PD, beginning with an overview of the prevalence, clinical presentation, aetiological models and challenges with diagnosis of depression and anxiety in PD. The chapter closes with a review the negative outcomes associated with untreated depression and anxiety, highlighting the importance of clinical attention and treatment.

1.2 Definition of Parkinson's Disease

Parkinson's disease is part of the *parkinsonism* family of disorders which are a group of movement conditions characterised by four cardinal features; resting tremor, muscle rigidity, postural instability and slowness of physical movement or bradykinesia (Alves et al., 2008). PD is the most common form of parkinsonism, accounting for 95% of cases (Ben-Shlomo & Sieradzan, 1995), and is also known as *idiopathic* or *primary parkinsonism* in that there is no known cause for symptoms (Ellenberg, Koller, & Langston, 1995). Other primary parkinsonism conditions include progressive supranuclear palsy, multiple system atrophy, and dementia with Lewy bodies. *Secondary* or *symptomatic parkinsonism* is used to describe cases in which a known aetiology is available and includes conditions such as drug-induced parkinsonism, malignant neuroleptic syndrome, and post-encephalitic parkinsonism (Ellenberg et al.).

1.3 Epidemiology

PD is the second most common neurodegenerative disorder after Alzheimer's disease (Phillips, 2007). In Australia, there are an estimated 100 000 individuals living with PD which is equivalent to a prevalence of approximately 0.5% in the general population (Barlow-Stewart, 2007) or between 3.4 to 4.9% for adults aged 55 years and over (Chan et al., 2005). Global estimates of the incidence of PD suggest approximately 20 new cases per 100 000 individuals per annum (Barlow-Stewart). In 2011, it was estimated that that 10 500 new cases of PD were diagnosed in Australia which is equivalent to almost 30 new diagnoses per day (Deloitte Access Economics, 2011). This figure is likely to be an underestimate of the true incidence of PD, however, as it pertains to diagnosed cases only. A review of five European epidemiological studies by De Rijik and colleagues (1997) suggested that there is an average of 3.2 undiagnosed cases of PD for every ten that are diagnosed. Thus, a substantial number of people are affected by PD and researchers suggest that the prevalence of PD in Australia will increase by an estimated 15% in the next five years as a result of demographic ageing (Aarsland, 2002).

1.4 Clinical Presentation

1.4.1 Cardinal Symptoms

Resting tremor is the most visible symptom of PD and is experienced by 70 to 90% of individuals (Weintraub et al., 2008). It is generally the first symptom to manifest and is typically first seen in the thumb or wrist (Rao, Hofmann, & Shakil, 2006). With disease progression, tremor is also often evidenced in the hands, jaw, tongue and/or legs (Frank, Pari, & Rossiter, 2006). Resting tremor is not a major cause of functional impairment in PD despite being the most overtly noticeable symptom (Simuni, 2007).

Muscle rigidity is the most commonly occurring cardinal symptom and is experienced by more than 90% of individuals with PD (Rao et al., 2006). Two types of muscle rigidity are commonly described in PD. The 'lead pipe' pattern of rigidity refers to the experience of a consistent intensity of resistance with passive movement, while the 'cogwheel' pattern refers to a fluctuating intensity of resistance with movement, often resulting in jerky movements (Frank et al., 2006).

Bradykinesia affects approximately 80 to 90% of people with PD (Weintraub et al., 2008). It is generally the most disabling of the cardinal symptoms as it is unpredictable in occurrence and limits personal independence by making completion of simple everyday activities difficult such as rising from a chair, getting in and out of a car or turning over in bed (Rao et al., 2006). In some cases, individuals with PD can experience an extreme form of bradykinesia termed akinesia, which is the complete inability to initiate intentional movement (Frank et al., 2006).

Postural instability is generally the last of the cardinal symptoms to appear and its manifestation indicates advancing disease (Weintraub et al., 2008). The most common postural changes observed in PD are forward flexed and stooped posture as well as difficulties with maintaining and/or correcting posture and balance (Pallone, 2007). Postural instability can be severely debilitating as it places individuals with PD at a high susceptibility to falls and fall-related injuries (Simuni & Sethi, 2007).

1.4.2 Onset

PD predominantly affects older adults with an average onset age of 62 years (de Lau & Breteler, 2006). However, PD can also affect younger adults as well as teenagers and children (see Table 1). Early-onset PD is generally accepted as a manifestation of idiopathic PD only occurring at a younger age, with post-mortem findings showing a matching neuropathology between people with early-onset and later-onset PD (Yokochi, 1993). Juvenile PD is suggested to be a separate disease process from idiopathic and early-onset PD however, with research suggesting a strong genetic component in cases of juvenile PD (Muthane et al.).

Table 1

Classification of Parkinson's Disease Based on Age of Onset

	Age of Onset	Percentage of Cases
PD	> 40 years	85 – 90%
Young/Early Onset	21 – 40 years	10 – 15%
Juvenile PD	Before 21 years	Rare

1.4.3 Progression

The Hoehn and Yahr Staging Scale (Hoehn & Yahr, 1967) remains the most widely accepted classification system for the progression of PD. The scale divides the progression of PD into five stages (see Table 2). However, disease progression does not always occur in a linear manner. It is common for individuals to experience a reduction in symptoms during treatment and subsequently drop back a stage, or undergo accelerated progression and advance through several stages (Scheife, 2000).

Moreover, while the Hoehn and Yahr scale provides a reliable overview of the typical stages and symptoms of PD, there has been widening recognition of the heterogeneity of the disease (Burn et al., 2011; Selikhova et al., 2000). Clinical observations have shown great diversity in the symptom presentation of PD with many researchers suggesting the existence of a number of distinct subtypes (e.g., Brooks & Doder, 2000; Francis & Perry, 2007; Lewis & Barker, 2009; Paulus & Jellinger, 1991; Spiegel et al., 2007). Currently, the only universally accepted PD

Table 2

The Hoehn and Yahr Parkinson's Disease Staging Scale (Hoehn & Yahr, 1967)

Stage	Clinical Presentation
1	Unilateral involvement only, usually minimal or no functional impairment. Symptoms: tremor of one limb, changes in posture and facial expression.
2	Bilateral involvement without balance impairment. Posture and gait affected.
3	First signs of postural instability; significant slowing of body movements, some restriction of activities but is capable of leading an independent life; disability is mild to moderate.
4	Severe symptoms: walking limited, rigidity and bradykinesia. Severely disabling disease; individual is markedly incapacitated and is unable to live alone.
5	Cachectic stage. Individual is restricted to bed or a wheelchair unless aided.

sub-classification is based on age at disease onset however, it has been suggested that distinct subtypes may exist based on: (i) predominant motor symptoms (e.g., tremor-dominant vs. akinetic-rigid, postural instability and gait disturbance (PIGD) vs. non-PIGD), (ii) clinical course and progression (e.g., benign vs. malignant), (iii) cognitive impairment, and (iv) depressive symptomatology (Burn et al., 2011).

1.5 Neuropathology

1.5.1 Dopaminergic Cell Death

The pathological hallmark of PD is the degeneration of the substantia nigra and associated dopaminergic cell death. The substantia nigra is a midbrain structure which forms part of the basal ganglia, a large group of subcortical nuclei comprising the substantia nigra along with the striatum, globus pallidus and subthalamic nuclei (Brown & Marsden, 1998). The compact zone of the substantia nigra (SN_{PC}) contains pigmented cells which produce the neurotransmitter dopamine. Dopamine is then released by the SN_{PC} via the nigrostriatal pathway for storage in the striatum (Phillips, 2007). In PD, the dopaminergic cells of the SN_{PC} progressively degenerate resulting in a severe loss of dopamine (Hornykiewicz, 1998).

Dopamine is involved in a number of complex functions in the brain including the regulation of neuronal 'circuits' between the basal ganglia, thalamus and frontal cortices (Mandir & Vaughan, 2000). Researchers suggest there are at least five such basal ganglia-thalamocoritical circuits operating in parallel and connecting with different frontal cortical areas to execute various bodily functions (Alexander & Crutcher, 1990). Table 3 provides a summary of these circuits.

Table 3

Summary of Basal Ganglia-Thalamocortical Circuits

Circuit	Cortical Input Areas	Primary Function
Motor	Primary motor cortex Somatosensory cortex Arcuate premotor area Supplementary motor area	Regulation and control of body movement
Oculomotor	Frontal eye fields Dorsolateral prefrontal cortex Posterior parietal cortex	Oculomotor control
Cognitive	Dorsolateral prefrontal cortex Posterior parietal cortex Arcuate premotor area	Working memory, planning, attention, problem solving, processing speed, spatial memory
'Lateral Orbitofrontal'	Lateral orbitofrontal cortex Superior temporal gyrus Inferior temporal gyrus Anterior cingulate area	Not completely functionally characterised but thought to play a role in behaviour
Limbic	Anterior cingulate area Primary motor cortex Entorhinal cortex Superior temporal gyrus Inferior temporal gyrus	Regulation and control of behaviours underlying motivation, decision-making and goal-directed reward

In PD, the motor circuit is proposed to be compromised (Lewis & Barker, 2009). The motor circuit is primarily responsible for the execution and regulation of body movement and receives and transmits neuronal activity between the basal ganglia and the primary motor cortex, somatosensory cortex and premotor areas

(Alexander & Crutcher, 1990). Neuronal activity is transmitted from the frontal cortices, processed and passed through the basal ganglia to the thalamus and transmitted back to the originating cortex via one of two contrasting parallel pathways: (i) the 'direct pathway' which has a net excitatory effect and thus increases body movement, or (ii) the 'indirect pathway' which has a net inhibitory effect and thus decreases body movement (Mandir & Vaughan, 2000).

Dopamine is suggested to stimulate as well as regulate neuronal activity in the motor circuit to facilitate execution of motor responses initiated by the higher order cortical areas. The loss of dopamine in PD disrupts normal functioning of the motor circuit and is proposed to lead to hyperactivity of the *indirect pathway* (Bonnet & Houeto, 1991; Lewis & Barker, 2009), resulting in an overall inhibition of the circuit and ultimately, body movement. When approximately 70 to 80% of dopaminergic cells have degenerated, the clinical symptoms of PD begin to manifest (Doudet al., 1985; Mandir & Vaughan, 2000; Watts & Mandir, 1992).

While the pathological hallmark of PD is the loss of dopaminergic cells in the substantia nigra pars compacta, degeneration of dopaminergic cells is also evidenced in mesolimbic and mesocortical structures, in particular, the ventral tegmental area (VTA; Leentjens, 2004). Dopaminergic neurons in the VTA project to limbic and cortical areas involved in cognition, motivation, emotion, and reward-seeking behaviour (Jones, Kornblum, &Kauer, 2000). It has been hypothesised that loss of dopamine in the VTA may disrupt these processes and thus increase the risk of depression (Fibiger, 1984). In support, neuropathology studies have revealed more severe degeneration of dopaminergic neurons in the VTA of people with PD with affective disorders and dementia compared to those with PD without such disturbances (Torack & Morris, 1988). Lowered levels of dopamine in PD may also play a role in the development of anxiety. Dopaminergic disturbance has been implicated in the development of social anxiety disorder (Potts & Davidson, 1992), panic disorder (Argyl, 1990; Pitchot et al., 1992), and obsessive compulsive disorder (McDougle, Goodman, & Price, 1994; Marazziti et al., 1992).

1.5.2 Non-Dopaminergic Cell Death

In addition to the loss of dopaminergic neurons, selective degeneration of non-dopaminergic cells is also commonly evidenced in PD and has been suggested to play a major role in the development of non-motor and psychological symptoms (Ahlskog, 2005; Benarroch, 1999; Chaudhuri, Healy, & Schapira, 2006).

1.5.2.1 Noradrenergic cell loss. The most prominent non-dopaminergic cell loss in PD occurs in the rostral and caudal locus coeruleus where noradrenergic cell loss has been evidenced (Brooks & Doder, 2000; Burn; 2002; Cummings, 1992). Noradrenergic cells in the locus coeruleus project to limbic and cortical regions including the cerebral cortex, ventral striatum, amygdala, hippocampus and anterior cingulate gyrus (Wiener & Lang, 1989), and have been found to be involved in the processes of cognition, arousal, learning, sleep regulation and stress response mediation (Brunello et al., 2003; Frazer, 2000). Disruption to these processes through reduced noradrenergic activity has been proposed to place people with PD at greater susceptibility to depressive disorders (Cummings, 1992) and particularly panic disorder (Nutt & Lawson, 1992; Richard et al., 1996).

1.5.2.2 Serotonergic cell loss. Loss of the neurotransmitter serotonin has also been documented in PD. Studies have demonstrated a large reduction of serotonergic neurons in the raphe nuclei, and milder losses in the putamen, caudate, globus pallidus, hypothalamus, and frontal cortex of individuals with PD (Richard et al., 1996). Levels of the serotonin metabolite 5-hydroxyindole acetic acid (5-HIAA) in the cerebrospinal fluid of people with PD have also been found to be approximately 50% lower than those without PD (Mayeux et al., 1986). Changed serotonergic activity in PD has been suggested to place people with PD at increased susceptibility to developing OCD (Insel et al., 1990), social anxiety disorder (Miner & Davidson, 1995), GAD and panic disorder (Charney, Woods, Krstyal, & Heninger, 1990), and especially, depression (Leentjens, Scholtissen, Vreeling, & Verhey, 2006). While the exact role of serotonin in the development of depressive disorders is not known, studies have revealed lower cerebrospinal 5-HIAA levels in persons with depression compared to those without an affective disorder (Burn, 2002). Greater serotonin loss is also proposed to be associated with more severe depression, with 5-HIAA levels in

persons with major depression found to be generally lower than those with milder depressive symptoms (Burn). This is consistent with Mayeux and colleagues' (1984) finding that cerebrospinal 5-HIAA levels in depressed PD patients were 20% lower than those with PD not experiencing depression, although not all studies have been able to detect this difference (Kuhn et al., 1996).

1.5.3 Lewy Body Formation

The second pathological marker of PD is the formation of distinct neuronal inclusions termed Lewy bodies in the brain. These inclusions predominantly form in the substantia nigra but have also been identified in neurons of the hypothalamus, brain stem, sympathetic and parasympathetic nervous systems (Wakabayashi & Takahashi, 1997). The purpose of Lewy bodies or the mechanism underlying their formation is unclear, however, they have also been found in the brains of individuals with other neurodegenerative diseases such as Alzheimer's disease and dementia with Lewy bodies (Loatharius & Brundin, 2002).

1.6 Treatment and Management

1.6.1 Primary Treatment

Pharmacotherapy is currently the first-line, most widespread and effective treatment for PD. A selection of drug treatments is available to help manage motor symptoms (symptomatic therapy) and/or attempt to slow the progression of the disease (neuroprotective therapy). There are six main classes of PD medications which operate using different mechanisms (see Table 4).

1.6.1.1 Symptomatic treatment. Symptomatic treatment of PD commences when an individual begins to experience functional impairment. Levodopa is the primary and most effective drug class used to manage symptoms in PD (NICE, 2006). Levodopa is a neutral amino acid and the precursor of dopamine. As dopamine cannot cross the blood-brain barrier, levodopa is ingested and converted to dopamine once past the blood-brain barrier (NICE). Although effective, a number of aversive side effects are associated with levodopa treatment and thus the delay of

Table 4

Pharmacological Treatments for Parkinson's Disease (Starkstein &Merello, 2002)

Drug Group	Medications	Function	Side Effects
Levodopa (Dopaminergic Agents)	Sinemet, Kinson, Madopar	Symptomatic	Nausea, increased dreams, hallucinations, dyskinesias
Dopaminergic Agonists	Sifrol, Cabaser, Permax, Parlodel, Kripton, Apomine	Symptomatic / Potentially neuroprotective	Nausea, dizziness, confusion, increased sleepiness
Catechol-O-Methyltransferase (COMT) Inhibitors	Stalevo, Comtan, Tazmar	Symptomatic Adjunct to levodopa to extend levodopa response	Increased dyskinesia, discolouration of urine
Anti-viral agents	Symmetrel	Symptomatic Used to treat levodopa-induced dyskinesias	Rare but may include insomnia, confusion and rashes on the legs
Anticholinergics	Artane, Cogentin, Akineton	Symptomatic	Dry mouth, constipation, urinary retention, memory loss, hallucinations, blurred vision, confusion
Monoamine Oxidase-B Inhibitors	Eldepryl, Azilect	Neuroprotective	Sleep disturbance

levodopa administration is recommended until the later stages of the disease (NICE, 2006). Most notably, early research suggested that long-term use of levodopa accelerates the neurodegenerative process of PD and results in treatment-related motor dysfunction, specifically, the development of dyskinesias (Swanson, 1994). More recent work has shown that long-term use of levodopa does not enhance progression of PD pathology (e.g., Parkkinen et al., 2011), however dyskinesias remain a common side-effect of levodopa use in PD. Early research also suggested that the effectiveness of levodopa wears off with disease progression and can result in rapid and unpredictable swings between periods of fluid motor control to a state of complete incapacity to conduct voluntary movement (Olanow et al., 2001), a phenomenon commonly referred to as *the on-off effect* of levodopa treatment. Again, however, more recent research suggests that this effect largely reflects the inability of the degenerating brain to effectively absorb levodopa with disease progression rather than non-efficacy of the levodopa itself (Parkkinen et al.).

To delay the onset of levodopa-related treatment complications, dopamine agonists, a class of medications which mimic the effect of dopamine, are generally the first-line choice for initial symptomatic treatment of PD (NICE, 2006). These drugs are less effective than levodopa and thus are most suitable for the treatment of early symptoms. Dopamine agonists also have a lower side effect profile when compared to levodopa and are therefore employed initially to delay the onset of treatment-related motor complications (Swanson, 1994), although the development of impulse control disorders has been linked with dopamine agonist use.

1.6.1.2 Additional drugs used in PD. A number of additional medications are also prescribed alongside symptomatic and neuroprotective drugs in PD to enhance the effect of these drugs and/or to act as neuroprotective agents. There are currently no proven neuroprotective agents for PD, however, several potential neuroprotective substances have been identified including monoamine oxidase-B (MAO-B) inhibitors, vitamin E, caffeine, and co-enzyme Q10 (National Institute of Health and Clinical Excellence; NICE, 2006). Catechol-o-methyltransferase (COMT) inhibitors are often prescribed with levodopa to extend the levodopa response (NICE, 2006). Anti-viral agents are a second drug class that are also commonly prescribed concomitantly with levodopa, particularly after the onset of treatment-related motor

complications (Starkstein & Merello, 2002). In particular, Amantadine is an anti-viral agent with antiparkinsonian effects and has been found to be useful in treating levodopa-induced dyskinesias (Olanow et al., 2001).

1.6.2 Challenges in Pharmacological Treatment of PD

Perhaps the most important challenge in the pharmacological treatment of PD is how to best handle polypharmacy (Preskorn & Lacey, 2007). Concomitant symptomatic and neuroprotective treatments along with adjuvant treatment for any levodopa-induced motor complications ultimately mean that a person with PD will be taking several antiparkinsonian drugs at any given time. In fact, it is common practice for a person with PD to take up to five different medications simultaneously for their motor symptoms (Swanson, 1994). Several authors have highlighted the potential dangers of polypharmacy in PD, most notably the risk of aversive drug interactions. As posed by Swanson, "is it possible that enthusiasm for new drugs has blinded us to the point that we are doing patients harm?" (p. 401).

Despite these concerns, polypharmacy in PD is considered to be safe and rational at large. The PD treatment model has even been used to develop similar rational polypharmaceutical treatments for other health conditions (i.e., Preskorn & Lacey, 2007). However, care must be taken in consideration of potential adverse interactions with any additional medications. Given the age of the majority of individuals with PD, concurrent pharmacological treatment for comorbid health conditions is very common (Olanow et al., 2001). Combinations of different antiparkinsonian drugs are tested to ensure safety and minimal side effects, however, it is not possible to know the outcome of every non-PD drug combination with antiparkinsonian medications. Thus, it is best to minimise the use of any additional medications where possible, only reserving such treatment for cases that are absolutely essential (Marsh, 2000; Swanson).

Overall, pharmacological treatment in PD is complex and challenging but highly effective when correctly implemented. Continual monitoring, review and adjustment of dosage, timing, drug type and combinations is ultimately required to ensure maximal functioning and safety with symptom progression (Starkstein & Merello, 2002).

1.7 Non-Motor Symptoms

Although classically defined as a motor disorder, a growing number of researchers have suggested that PD may be better conceptualised as a multisystem disease, in recognition of the wide range of non-motor disturbances which also feature in PD including autonomic dysfunction, sleep-related problems, communication difficulties and cognitive and psychological disturbances (Braak, Ghebremedhin, Rub, Bratzke, & Tredici, 2004).

1.7.1 Autonomic and Gastrointestinal Symptoms

Dysfunction of the autonomic nervous system (or dysautonomia) has long been recognised in PD (Micieli et al., 2003). Such symptoms have been documented in people with PD across every stage of the disease, on and off medication, including those with a very short duration of illness (Awerbuch & Sandyk, 1994). Common symptoms of dysautonomia in PD include bladder disturbances, excessive sweating, orthostatic hypotension and sexual dysfunction while common gastrointestinal complications include drooling, reflux and vomiting, nausea, constipation and incontinence (Borek, Amick & Friedman, 2006). Dysautonomia occurs in PD more frequently and with greater severity in comparison to age-matched controls (Siddiqui, Rast, Lynn, Auchus, & Pfeiffer, 2002), but is suggested to be milder than dysautonomia in patients with pure autonomic failure or multiple system atrophy (Montastruc, Senrad, Rascol, & Rascol, 1996).

1.7.2 Sleep Disturbances

Almost all people with PD experience sleep disturbances, usually commencing in the early stages of the disease (Chaudhuri, 2003). Common sleep disturbances include restless leg syndrome, insomnia, sleep apnea, enuresis (bed wetting) and rapid eye movement (REM) sleep disorders (Garcia-Borreguero, Larosa, & Bravo, 2003). Sleep problems in PD have been linked with dysfunction in central sleep regulation centres but can also be secondary to PD symptoms (Rye & Jakovic, 2002). For example, insomnia is common in cases when motor symptoms and restless legs continually arouse an individual and thus make it difficult to fall into and maintain sleep (Chaudhuri et al., 2006). Up to 50% of people with PD are also affected by daytime hypersomnia, most notably excessive sleepiness and

involuntary dozing (Abbot et al., 2005). In addition, a number of sleep disorders also commonly occur in PD including but not limited to; arousal disorder (vivid dreams, sleep terror disorder), REM sleep disorder, REM behaviour disorder), and sleep-wake transition disorder (e.g., sleep-talking and jerking; Ferreri et al., 2006).

1.7.3 Communication Symptoms

People with PD experience a number of communication challenges that are predominantly secondary to motor symptoms. Non-verbal communication can be challenging due to a masked expression and decreased body language caused by rigidity of facial and bodily muscles, respectively (Ferreri et al., 2006). Thus, people with PD can often appear disengaged, distant or disinterested. Verbal communication can also be difficult with 50 to 90% of individuals with PD likely to develop speech and voice disorders (Ramig, Fox, & Sapir, 2004). Common speech disturbances include reduced speaking volume (hypophonia), monotone speech (hypoprosdia), hoarse voice, increasingly rapid and less distinct speech (festination), and imprecise articulation (Hartelius & Svensson, 1994). Collectively, these symptoms can make interpersonal communication very challenging for both people with PD and their family members (Ramig et al.).

1.7.4 Cognitive and Psychological Symptoms

There is a particularly high rate of cognitive and psychological disturbances in PD to the degree that several authors have recently suggested that PD may be more accurately conceptualised as a neuropsychiatric disease (Weintraub & Burn, 2011). Cognitive difficulties in PD and can range from mild impairment to overt dementia. Dementia affects an estimated 30% of people with PD, usually in the latter stages of the disease, while approximately 50% are likely to experience mild cognitive impairment (Ferreri et al., 2006). Symptoms of cognitive impairment are idiosyncratic, however, impairments in executive functioning (i.e., planning and working memory), visuospatial ability, attentional and language functioning are commonly reported (Camicioli & Fisher, 2004).

A range of psychological disorders have also been observed in PD with the most common being anxiety, depression, psychosis and addiction (Ferreri et al., 2006). Up to 75% individuals with PD can report depressive symptoms (Veazey et

al., 2005) while approximately 40 to 50% meet diagnostic criteria for clinical depression at some stage of their illness (Burn, 2002). Similarly, between 30 to 40% of people with PD will experience an anxiety disorder at some stage including but not limited to; generalised anxiety disorder, panic disorder and social anxiety disorder (Richards et al., 1996). The prevalence of psychosis in PD has been estimated at between 20 and 40% (Papapetropoulos & Mash, 2005). Common psychotic symptoms that have been reported in people with PD include sensing presences, visual, auditory and/or tactile illusions or hallucinations, and paranoid delusions (Fenelon et al., 2000). It is proposed that the neurochemical changes inherent in PD may place individuals at greater susceptibility to developing these psychological disorders (Frisina et al., 2008).

1.7.5 The Importance of Non-Motor Symptoms in PD

Although historically perceived as secondary aspects of PD, non-motor symptoms contribute substantially to both the clinical picture and burden of disease in PD (Chaudhuri et al., 2013). Studies investigating quality of life in PD have consistently shown that symptoms such as anxiety, depression and cognitive impairment are the greatest predictors of poor quality of life in PD and are consistently rated as more detrimental to subjective well-being and health status than motor symptoms (i.e., Behair, Srivastava, & Pandey, 2005; Carod-Artal, 2008; Den Oudsten et al., 2007; Hinnell, Hurt, Landau, Brown, & Samuel, 2011; Rahman, Grifin, Quinn, & Jahanshai, 2008; Soh et al., 2011). Studies investigating perceived functional disability in PD have also reported that non-motor symptoms such as dribbling, sleep disturbance, memory failure and depression are consistently rated by patients as the most disabling features of PD (Gulati et al., 2004). This has been shown to be the case even in the most advanced stages of disease. For example, in a longitudinal study following a group of individuals with PD for between 15 and 18 years, Hely, Morris, Reid and Trafficante (2005) reported that participants described cognitive failure, hallucinations and depression to be the 'most troubling' symptoms at final follow-up. Thus, even in the final stages of PD whereby motor symptoms were fully progressed, non-motor symptoms were still perceived to be more functionally disabling. Moreover, non-motor symptoms, particularly dementia, psychiatric disturbance and autonomic failure, are the predominant cause of hospitalisation and institutionalisation of individuals with PD as well as the major

cause of morbidity and eventual death in PD (Chaudhuri & Martinez-Martinez, 2008; Findley et al., 2003; Hagell, Nordling, Reimer, Grabowski, & Persson, 2002; Schrag, Jahanshahi, & Quinn, 2000). In recognition of the significance of non-motor symptoms in PD, a number of researchers have recently proposed a reconceptualisation of both the definition and clinical classification of PD to incorporate non-motor symptoms as core elements of the disease (Chaudhuri et al., 2013; Stern, Lang, & Poewe, 2012; Weintraub & Burn, 2011).

1.7.6 Non-Motor Treatment

Despite their adverse effect on quality of life and mortality, non-motor symptoms are largely underreported by individuals with PD, underrecognised by phsyicians, and ultimately, undertreated. In contrast to the established framework for the treatment of motor symptoms in PD, the management of non-motor disturbances is largely inadequate at present (Frisina et al., 2008). Primary treatment strategies in PD (i.e., dopaminergic replenishment) have been found to have minimal effect on the majority of non-motor symptoms (Muller, 2002). For example, in a Movement Disorder Society task force review of surgical and pharmacological treatments for PD, Goetz and colleagues (2005) concluded that dopaminergic therapies could not be recommended for non-motor symptoms in PD due to a lack of evidence of their efficacy in treating such symptoms. Chaudhuri, Healy and Schapira (2006) suggest this is because the majority of non-motor symptoms in PD have a purported noradrenergic or serotonergic basis while primary treatment in PD is focused on restoration of the dopaminergic system. In addition to dopaminergic therapy having a lack of effect for non-motor symptoms, dopaminergic drugs have also been reported to cause and/or exacerbate certain non-motor symptoms (Muller, 2002). For example, it is well known that significant sleep disturbances can emerge as a direct result of dopaminergic and other antiparkinsonian medications (Garcia-Borregueor, Larrosa, & Bravo, 2003). Addiction and impulse control disorders (ICDs) have also been linked with dopaminergic therapies in PD, with ICDs linked particularly with the use of dopamine agonists (Ferreri et al., 2006). Addiction and dependence to levodopa has been well documented among individuals with PD (Stocchi, 2005). Pathological gambling has also been described in PD, particularly among those taking the dopamine agonist pramipexole (Morgan, Iyer, & Sethi, 2006).

Hypersexuality and lack of sexual impulse control have also been described in PD and linked with dopaminergic treatment (Klos et al., 2005; Riley, 2002).

Thus, while dopaminergic therapies are the most common treatment for PD, there is evidence that these therapies complicate non-motor symptoms. In recognition of this, The National Institute for Health and Clinical Excellence (2006) have recently acknowledged the bias towards treatment of motor symptoms in PD and highlighted a pressing need for research into the appropriate management of non-motor symptoms. Lang and Obeso (2004) suggest that current dopaminergic replenishment strategies are inadequate for the treatment of PD on the whole and that alleviation of motor symptoms should not be the ultimate goal of PD treatment. The authors further stated that the development of a primary treatment which addresses both motor and non-motor symptoms will be the next *"truly major advance"* (p. 315) in the management of PD. The remainder of this chapter focuses on the two most prevalent non-motor symptoms in PD; depression and anxiety.

1.8 Depression in PD

1.8.1 Definition

Depression is characterised by the experience of low mood and/or the absence of positive affect. The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association; APA, 2000) specifies three depressive disorders; major depressive disorder, dysthymic disorder and depressive disorder not otherwise specified. Major depressive disorder (MDD) is characterised by the presence of depressed mood and/or a marked loss of interest and/or pleasure in nearly all activities for a period lasting at least two weeks (APA). Dysthymic disorder, also known as dysthymia, is a milder and chronic form of major depressive disorder and is characterised by the presence of a chronically low or depressed mood, occurring for the most of the day, more days than not, over a minimum two year period (APA). The DSM-IV-TR category of DDNOS refers to a group of conditions with depressive features that do not meet the clinical criteria for major depressive disorder, dysthymia, adjustment disorder with depressed mood, or adjustment disorder with mixed anxiety and depressed mood (APA). Aside from low

mood, other symptoms that occur in depression include disturbances to; sleep, appetite, weight, psychomotor functioning, concentration and energy, and feelings of worthlessness and guilt as well as recurrent thoughts of death and/or suicide. At least five symptoms occurring over a two-week period are required for a diagnosis of MDD, while a minimum of three symptoms present over a two-year period are required a diagnosis of dysthymia (APA).

1.8.2 Prevalence

Depression is the most common non-motor complication in PD, with up to 75% of people with PD likely to experience depressive symptoms at some stage throughout their illness (Brooks & Doder, 2000; Veazey et al., 2005). While the exact rate of depression in PD is not known, an average prevalence rate of 40 to 50% is commonly cited in the literature (Lemke, 2008; Stella, Banzato, Quagliato, & Viana, 2008). There is wide variability in prevalence estimates, however, with reported rates ranging from 2.7% to more than 90% depending on the definition of depression, assessment method and study sample used (Reijnders et al., 2008).

Three systematic reviews of studies examining the prevalence of depression in PD have been published. In the first systematic review of the prevalence of depression in PD, Slaughter and colleagues (2001) reported clinically significant depression in 42% of people with PD across 11 studies using DSM-III or DSM-III-R criteria. Minor depression was the most common affective disturbance, affecting 37% of participants, while 22.5% met diagnostic criteria for dysthymia and 25%, major depressive disorder. Similarly, in a systematic review of 8 studies by Veazey and colleagues (2005), major depression was found to affect between 7 and 32% of persons with PD while 10 to 31% met clinical criteria for dysthymia. In the most recent systematic review and meta-analysis of 104 studies assessing the prevalence of depression in PD, Reijnders and colleagues (2008) reported slightly lower rates than the two earlier reviews, finding major depressive disorder in 17% of people with PD, subclinical depression in 22%, and dysthymia in 13% of individuals.

In addition to clinical depression, a significant proportion of individuals with PD have been found to display depressive symptoms, although not at a clinical level (Brooks & Doder, 2000). Across eight studies examining self-reported depressive

symptomology in PD, Veazey and colleagues (2005) found between 27 to 76% of people with PD, with an average of 54%, experienced depressive symptoms at some stage of their illness. A similar review by Reijnders and colleagues (2008) returned a lower although still marked average rate of 35%.

1.8.2.1 Prevalence comparisons. Despite the variability in prevalence estimates, it is clear that there is a marked occurrence of depression in PD populations. Approximately 15% of Australian adults between the ages of 16 and 85 will experience a lifetime depressive disorder (Australian Bureau of Statistics; ABS, 2007). Major depression is the most common lifetime depressive disorder affecting an estimated 11.6% of Australians, while approximately 2% will experience dysthymia (ABS). When compared with even the most conservative prevalence estimates of depression in PD (i.e., Reijnders et al., 2008), it can be seen that depression is substantially more prevalent in PD, with major depression and dysthymia occurring 1.5 and 6.5 times more frequently in PD, respectively. In addition, comparison against the rate of depression in older adults also reveals a higher prevalence of depression in PD. Depression affects an estimated 10% to 25% of older adults (Blazer, 2002; Hunkeler et al., 2006; Reynolds & Kupfer, 1999). Thus, depression is two to four times more common in people with PD.

Perhaps it is not surprising to find that depression is more common among people with PD compared to the general population and healthy older adults given the additional physical and mental stressors associated with living with PD. However, studies comparing the rate of depression in PD against other motor disorders with a comparable level of functional disability have revealed a higher rate of depressive disorders in PD. Miller and colleagues (2007) compared the rate of depression in people with PD, people with dystonia and people with essential tremor. Prevalence rates of 48%, 37% and 34% were reported respectively, indicating a higher rate of depression in PD. Similar findings have been made with respect to other neurological diseases. Starkstein and colleagues (1996) examined the rate of depression in people with Alzheimer's disease and people with PD with dementia. Groups were matched for age, sex and cognitive impairment. Major depression was significantly higher in the PD group (30%) compared to Alzheimer's (6%). However, the same rate of dysthymia (27%) was found for both groups. In addition, the

severity of depression in PD has also been found to be significantly higher when compared to similarly disabled groups. Ehmann, Beninger, Gawel and Riopelle (1990) examined depressive symptoms in individuals with PD and people with various chronic disabling conditions matched for functional disability (e.g., amyotrophic lateral sclerosis and peroneal muscular dystrophy). People with PD were found to score significantly higher across all factors on the Beck Depression Inventory-II (Beck, Steer & Brown, 1996) than the control group.

1.9 Anxiety in PD

1.9.1 Definition

Anxiety is a broad overarching term used to describe a number of anxiety disorders characterised by the presence of distressing fear, worry and apprehension (Richard, Schiffer, & Kurlan, 1996). Other psychological and autonomic symptoms central to anxiety disorders include irritability, poor concentration, sleep disturbance, sweating, dry mouth, heart palpitations, restlessness, muscle tension and avoidance behaviour (NICE, 2000). There are a range of anxiety disorders listed in the DSM-IV-TR defined by their symptom presentation, response to medications, and presumed aetiologic mechanisms. Some common anxiety disorders that present in PD include generalised anxiety disorder, panic disorder, and social anxiety disorder.

1.9.2 Prevalence

Studies examining the occurrence of anxiety in PD are somewhat limited in comparison to those investigating depression however, the available results suggest that anxiety disorders are also common in PD populations. Between 30 to 40% of individuals with PD will meet DSM criteria for an anxiety disorder at some point of their illness and a recent large-scale study by Negre-Pages and colleagues (2010) showed that up to 51% of individuals with PD can experience clinically significant anxiety based on scores equal or greater to 8 on the Hospital Anxiety and Depression Scale (HADS; Snaith & Zigmond, 2000). Panic disorder has been suggested as the most frequently occurring anxiety disorder in PD, affecting between 13 to 30% of individuals (Leentjens et al., 2008). Up to 11% of people with PD experience

generalised anxiety disorder, and one study reported social anxiety disorder in 15% of participants with PD (Stein, Heuser, Juncos, & Uhde, 1990).

1.9.2.1 Prevalence comparisons. Similar to depression, comparison of the rate of anxiety disorders in PD against other populations suggests an elevated rate of anxiety in PD. The ABS estimate that 26% of Australian adults will be affected by a lifetime anxiety disorder, with approximately 5.2% likely to experience panic disorder and 5.9%, generalised anxiety disorder (ABS, 2007). Comparisons against prevalence estimates of anxiety in PD indicate that the rate of anxiety disorders is 1.5 times greater among individuals with PD, with panic disorder up to 6 times greater and generalised anxiety almost two times higher. In particular, the high occurrence of anxiety in PD is considered atypical given that the onset of anxiety disorders in later life is not common in primary psychiatric populations (Henderson et al., 1992). An American study estimated the prevalence of anxiety to be 3.5% for adults over 65 years living independently and 5.5% for those in institutionalised care (Walsh & Bennett, 2001). Other epidemiological studies have reported rates ranging from 0.7 to 9% for community-dwelling older adults (Flint, 1994).

Rates of anxiety disorders in PD are also considerably higher when compared with other equally debilitating diseases. In their comparison of anxiety disorders in PD and multiple sclerosis, Schiffer and colleagues (1988) reported 75% of the PD group met diagnostic criteria for past or present generalised anxiety disorder, compared to only 10% of individuals with multiple sclerosis. Similarly, Menza, Robertson-Hoffman and Banapace (1993) compared anxiety in people with PD and controls with chronic ortheoarthritis matched for age and illness duration. Twenty-nine percent of PD participants were found to meet diagnostic criteria for an anxiety disorder compared to 5% of controls. Stein and colleagues (1990) reported significantly higher rates of anxiety in PD patients (38%) compared to patients with various chronic illnesses (11%). A higher prevalence of anxiety has also been reported in PD compared to Type I diabetes as well as rheumatoid arthritis (Mondolo et al., 2007).

1.9.3 Comorbidity of Depression and Anxiety in PD

In addition, there is a high rate of comorbid depression and anxiety in individuals with PD. In general, depressive and anxiety disorders commonly co-occur in primary psychiatric populations with several studies reporting comorbid major depression and anxiety disorders in up to 66% of primary psychiatric patients (DiNardo et al., 1990; Ormel et al., 1991; Sherbourne et al., 1996; Zung et al., 1990). However, this rate is generally lower in older adult populations. Alexopoulos (1990) reported a 38% rate of comorbid anxiety disorders in elderly outpatients with major depression. Similarly, Lenze and colleagues (2000) found 35% of older adults over 60 with depressive disorders had at least one lifetime anxiety disorder with 23% having a current diagnosis. Comorbidity rates of depression and anxiety in PD have been found to be significantly higher than those in general older adult populations. In a study by Menza and colleagues (1993), 67% of PD patients with depression were found to have an anxiety disorder while 92% with an anxiety disorder had comorbid depression.

Overall, both depression and anxiety have been found to be more prevalent in PD compared to within the general population, older adult populations, with patients with chronic illness, as well as patients with various motor and neurological diseases. In addition, the comorbidity rate of the two conditions is also considerably higher. Collectively, the statistics presented in this section suggest a significant relationship between anxiety, depression and PD, where these psychiatric disorders are more common compared to other chronic, motor or neurological diseases. Most importantly, these findings highlight the clinical significance of depressive and anxiety disorders in PD and suggest the pressing need for appropriate treatment.

1.10 Assessment, Diagnosis and Symptom Presentation of Depression and Anxiety in PD

Although commonly occurring, detecting depression and anxiety in PD can often be challenging as there is considerable overlap between the clinical features of the psychological disorders and PD. Symptoms such as psychomotor retardation, facial masking and appetite disturbance are common in both PD and depression

(Cummings, 1992; Guze & Barrio, 1991), while tremor, tension and muscle aches feature in both anxiety and PD (Leentjens et al., 2008). In addition, sleep disturbance, fatigue and cognitive difficulties are common in all three (Brooks & Doder, 2000). A thorough assessment procedure is therefore crucial in recognising depressive and anxiety disorders in PD.

Assessment for depression, anxiety and other psychological conditions in PD is most frequently performed by the individual's general medical practitioner (Parkinson's Western Australia, 2003). Currently, there are no best practice guidelines or procedures in place to aid physicians in this process despite the known prevalence of depression and anxiety in PD. However, McDonald and colleagues (2003) recommend a two-step assessment process. First, it is advised that physicians screen all PD patients for psychological disturbance, especially depression. Okun and Watts (2002) suggest this can be easily accomplished by asking patients to complete self-rating scales in the waiting room before an appointment. Scores on these scales can then be used to determine whether patients require a more comprehensive clinical assessment. This assessment may be conducted by the general practitioner, or via referral to a mental health professional (i.e., a psychologist or psychiatrist).

1.10.1 Screening

Screening using rating scales is quick, convenient and can be highly effective in detecting signs of psychological disturbance in PD (Okun & Watts, 2002). However, selection of appropriate scales for use with persons with PD is essential. Due to the symptom overlap between anxiety, depression and PD, scales developed for the general population may not always be a valid measure of depression and/or anxiety in PD. Generally, these scales have a propensity to overestimate the presence and/or severity of depression and anxiety in PD as they do not differentiate between PD symptoms and symptoms of anxiety or depression (McDonald et al., 2003). Scales featuring a large number of physical and somatic symptoms, in particular, are likely to overestimate depression and/or anxiety in persons with PD due to the high overlap between physical and somatic symptoms in depression, anxiety and PD.

1.10.1.1 Depression scales. There are currently no scales which specifically measure depression in PD. However, a number of general population scales have

been found to be suitable for use in PD populations. A Movement Disorder Society task force review (i.e., Schrag et al., 2007) evaluated the suitability of several popular depression scales as assessment tools for depression in PD. Scales that were investigated included the Beck Depression Inventory (BDI-I; Beck et al., 1961), Montgomery-Asberg Depression Scale (MADRS; Montgomery & Asberg, 1979), Geriatric Depression Scale (GDS; Yesavage et al., 1982), Hospital Depression and Anxiety Scale (HADS; Snaith & Zigmond, 2000) and Hamilton Depression Rating Scale (Ham-D; Hamilton, 1960). All scales were found to have some utility as screening tools of depression in PD. In particular, the Ham-D and BDI were recommended as they are the only scales to have been validated in PD populations.

The Ham-D is a 17-item clinician-rated scale considered to be the 'gold standard' for assessing depressive symptoms (Bagby, Ryder, Schuller, & Marshall, 2004). With regards to PD, the task force review recommended the Ham-D as being most suitable for assessing depression severity in treatment trials, correlation studies with PD symptoms or pathological markers, and for examining the phenomenology of depression in PD (Schrag et al., 2007). The clinician administered nature of the scale limits its use as a screening tool for PD in clinical situations however. The BDI-I was proposed to be a potentially more appropriate clinical screening tool due to its self-report nature. The BDI-I is a 21-item self-report scale of depression that is widely used in both clinical and research settings (Steer, Cavalieri, Leonard, & Beck, 1999). Schrag and colleagues recommended the use of the BDI-I in PD patients for clinical screening, assessing severity of depressive symptoms and for monitoring change during treatment. More recent research has since confirmed the validity and utility of the Ham-D for assessing depressive symptoms in PD (e.g., Dissanayaka, O'Sullivan, Silburn, & Mellick, 2011).

Since the 2007 Movement Disorders taskforce review, several other psychometric scales measuring depression have also been validated in PD samples. Specifically, Dissanayaka and colleagues (2011) showed that the Geriatric Depression Scale and self-reported Hamilton Depression Rating Scale (HDI) are also valid measurement tools of depression with individuals with PD. Particularly; the authors recommended the use of the GDS over the HDI due to its brevity and slightly higher sensitivity in detecting depression in PD.

1.10.1.2 Anxiety scales. As with depression, no scales specifically measuring anxiety in PD have been developed. However, a similar Movement Disorder Society taskforce review (i.e., Leentjens et al., 2008) was commissioned to assess the utility of popular anxiety rating scales as assessment tools in PD. Scales included in the review were the Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988), the Hospital Depression and Anxiety Scale (HADS; Zigmond & Snaith, 1983), Zung Self-Rating Anxiety Scale (SAS) and Anxiety Status Inventory (ASI; Zung, 1971), Speilberger State Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, & Lushene, 1970), and the Hamilton Anxiety Rating Scale (Ham-A; Hamilton, 1959). The review committee found that as validation studies of these scales in PD were limited, none could be recommended for use in PD populations. However, all scales were classed as 'tentatively suitable' for use in PD, pending further research.

Since this review, the Ham-A, BAI and HADS have all been validated in PD samples. Leentjens and colleagues (2012) compared the three scales as assessment tools for anxiety in PD and reported good acceptability, score distribution, inter-rater reliability and test-retest reliability for all three measures. The authors recommended use of the Ham-A, BAI and HADS in screening for anxiety in clinical practice or for assessing symptom severity in research studies however stated that further investigation of each scale as a measure of treatment response was required. Additionally, Matheson and colleagues (2010) conducted a validation study of the Geriatric Anxiety Inventory (GAI; Pachana et al., 2007) in PD. The GAI is a relatively new self-report anxiety scale developed specifically for the measurement of anxiety in older adults. The GAI contains 20 items and focuses on cognitive symptoms of anxiety. Matheson and colleagues reported that the GAI showed good internal consistency and test-retest reliability, displayed good concurrent validity against the STAI and DSM-IV and was overall an appropriate measure of anxiety with individuals with PD.

1.10.2 Clinical Assessment and Diagnostic Approach

A well-structured clinical assessment is the most crucial factor in detecting depression and anxiety in PD, and should ideally involve three elements; (i) an examination of personal, social, medical and psychiatric history, (ii) a cognitive

status assessment, and (iii) a structured assessment of current psychological symptoms, in which the DSM-IV-TR and associated diagnostic interviews (e.g., the Structured Clinical Interview for DSM (SCID; First, Spitzer, Gibbon, & Williams, 2002) are considered the gold standard (Okun & Watts, 2002).

Diagnosis of depression and/or anxiety in PD is challenging even when strict clinical criteria are employed, however. Due to the symptom overlap between anxiety, depression and PD, people with PD can often display symptoms resembling the former conditions without actually having a depressive or anxiety disorder. The primary challenge to clinicians in diagnosis is therefore how to best deal with this symptom overlap. Two major diagnostic strategies have been proposed. The *inclusive approach* suggests that all presenting symptoms in support of a depressive and/or anxiety disorder should be counted towards a diagnosis. Conversely, the *exclusive* strategy advises that symptoms which may be accounted for by PD, most commonly physical and somatic symptoms, should not be counted towards a psychological diagnosis (Leentjens et al., 2003). The DSM-IV-TR is premised on an exclusive diagnostic approach, although with some leeway, advising that symptoms should only be discounted when they are *clearly* and *fully* accounted for by a general medical condition (APA, 2000).

Differentiating between the aetiological roots of presenting symptoms is essentially impossible to accomplish in clinical practice, however, with any such attribution an informed presumption at best (Starkstein et al., 2011). The ultimate difficulty with employing an exclusive strategy is that valid symptoms may potentially be ignored and can consequently result in failure to detect a presenting depressive and/or anxiety disorder. For example, there is current evidence indicating that specific somatic symptoms featuring in both PD and depression are central to the diagnosis of depression in PD (Leentjens et al., 2003). Automatic exclusion of these symptoms would therefore potentially result in failure to detect a considerable number of cases of depression in PD. Several expert PD taskforces have thus recommended that an inclusive diagnostic approach may represent the best strategy for diagnosing depression and anxiety in PD (Leentjens et al., 2008; Marsh, McDonald, Cummings, & Ravina, 2006; Schrag et al., 2007). Although the potential for false positives and consequently overdiagnosis is acknowledged, this would

appear preferable to failing to recognise and ultimately failing to provide treatment to those affected by depression and/or anxiety in PD.

1.10.3 Clinical Presentation

In addition to difficulties with diagnostic approach, recognition of depression and/or anxiety in PD can be challenging in itself, with a number of researchers suggesting a differing symptom profile of depression and anxiety in PD compared to that in primary psychiatric patients (Brook & Doder, 2000).

1.10.3.1 Depression. The clinical manifestation of depression in PD is generally similar to that of primary depressive disorders with common symptoms being negative emotional reactions, low energy, lack of interest, difficulty with concentration or decision-making, sadness, hopelessness, social isolation, and sleep difficulities (Burn, 2002; Farabaugh et al., 2009), although some slight differences in symptom presentation have been reported. For example, higher rates of pessimism, irrational thinking, sadness, and dysphoria have been observed (Cummings, 1992; McDonald et al., 2003), while there also appears to be a lesser frequency of guilt, self-blame, feelings of failure, and completed suicides (Brown et al., 1988; Richard et al., 1996; Slaughter et al., 2001). In particular, illness-related concerns and cognitions feature prominently in depression in PD (Brook & Doder, 2000). For example, higher rates of sadness, pessimism, and dysphoria in PD have been linked with thoughts of hopelessness and helplessness in regards to having PD and one's inability to cope (Hurt, Weinman, Lee, & Brown, 2012; McDonald et al., 2003). A bimodal frequency of depression in PD has also been commonly reported. An initial peak of cases usually occurs in the period shortly following diagnosis of PD, with a second peak observed in the latter, more advanced stages of illness (Brown & Jahanshai, 1995; Celesia & Wanamaker, 1972; Cummings, 1999; Schrag, Jahanashi, & Quinn, 2001; Starkstein et al., 1992). Thus, these are the most crucial times for physicians to monitor and assess any potential depressive symptoms in people with PD. In addition, cases of depression predating the onset of PD have also been reported in an estimated 12 to 37% of individuals with PD with depressive syndromes (Burn, 2002; Taylor et al., 1986). It remains unclear as to why this occurs, however, some researchers have suggested that in some cases depression may act as a predisposing factor for PD (Brooks & Doder, 2002).

1.10.3.2 Anxiety. The pattern of anxiety disorders in PD generally differs to that observed in the general population. According to the ABS (2007), the three most common lifetime anxiety disorders in Australia, in order from most to least, are post-traumatic stress disorder, social phobia, and agoraphobia. In PD however the three most commonly occurring anxiety disorders from most to least are panic disorder, generalised anxiety disorder and social phobia (Dissanayaka et al., 2010; Prediger et al., 2012). Thus an atypical presentation of anxiety is observed in PD.

There has been little research investigating differences in the symptom profile of the various anxiety syndromes in primary populations and PD. However, an especially high rate of panic symptoms has been noted in PD, even in those without panic disorder (Richard et al., 1996). It has also been suggested that anxiety in PD can manifest as a 'fear of falling', a concern which is frequently observed among patients (Bloem, Grimbergen, Cramer, Willemsen, & Zwinderman, 2001). Further, similar to depression, predominant concerns in anxiety in PD have been found to focus on PD itself, particularly, anxiety regarding the unpredictability of motor symptoms, the uncertainty of prognosis and the perceptions of others towards PD (Backer, 2000). Thus, clinicians examining PD patients for potential anxiety are advised to pay particular focus to these symptoms and cognitions. Studies examining the onset and course of anxiety disorders in PD suggest that anxiety disorders in PD, namely phobias, often precede the diagnosis of PD (Henderson et al., 1992; Stein et al., 1990; Vazquez et al., 1993). Sporadic cases of anxiety preceding the onset of familial PD have been reported, however (i.e., Lauterbach & Duvoisin, 1991). A recent study of 513 individuals with PD in the UK also reported a significant association between anxiety and younger age-of-onset of PD (Burn et al., 2012). The prevalence and severity of anxiety was significantly higher among study participants who were diagnosed with PD before 55 years of age.

1.11 Aetiology of Depression and Anxiety in PD

Early explanations for the occurrence of depression and anxiety in PD heavily favoured a biomedical aetiology (Leentjens et al., 2004). A number of similar neurochemical changes have been observed in people with anxiety, depression and

PD, leading to the hypothesis that depression and anxiety develop as a direct result of the neurochemical changes inherent within PD (Frisina et al., 2008).

Specifically, changes to the dopaminergic, serotonergic and noradrenergic neurotransmitter systems have been demonstrated in all three conditions (Richard et al., 1996). For example, dopaminergic cell loss in the ventral tegmental area (VTA) has been well-documented in PD (Leentjens et al., 2004), and implicated in the development of depression (Fibiger, 1984) as well as social anxiety disorder (Potts & Davidson, 1992), panic disorder (Pitchot et al., 1992), and obsessive compulsive disorder (OCD; McDougle, Goodman, & Price, 1994). Similarly, significant loss of serotonergic neurons in the raphe nuclei and a 50% reduction in the levels of the serotonin metabolite 5-HIAA in the cerebrospinal fluid has been well demonstrated in PD (Mayeux et al., 1986) and implicated in the development of OCD (Insel, 1992), social anxiety disorder (Miner et al., 1995), GAD, panic disorder (Charney, Woods, Krstyal, & Heninger, 1990), and especially depression (Leentjens et al., 2006). Finally, loss of noradrenergic cells in the locus coeruleus is well described in PD. Noradrenergic cells in the locus coeruleus project to limbic and cortical regions involved in the processes of cognition, arousal, sleep regulation and stress response mediation (Brunello et al., 2003). Disruption to these processes has been proposed to place people with PD at greater susceptibility to depressive disorders (Burn; 2002) and especially panic disorder (Richard et al., 1996). Adrenergic receptors have been found to produce panic symptoms (e.g., increased heart rate, pupil dilation, diversion of blood flow to muscles) when binded with an agonist, and a significant decrease in α2-adrenergic receptor sensitivity has been observed in PD (Charney et al.).

A general consensus has been established asserting that a *pure* biomedical aetiology of depression and anxiety in PD is not likely (Frisina et al., 2008). This consensus was drawn based on observations that while dopaminergic, serotonergic and noradrenergic changes are evident in all individuals with PD, not all people with PD develop depression and anxiety (Poewe & Seppi, 2001). It is thus generally acknowledged that rather than constituting a *direct cause* of depression and anxiety in PD, underlying neurochemical changes inherent within PD are likely to place people with PD at a *greater vulnerability* to developing depression and anxiety (Taylor & Saint-Cyr, 1990), with the onset of psychological disturbance ultimately

precipitated by the many life stresses, changes and challenges associated with living and coping with PD (Serra-Mestres & Ring, 2002).

1.11.1 Stressful Life Events and the Development of Depression and Anxiety

Major life events, changes and stresses are well recognised as risk factors for psychological illness (Goldberg, 2006). With respect to depression, an association between stressful life events and the onset of depressive illness has been well documented. Retrospective studies examining life events preceding the onset of depression have consistently reported a significantly higher occurrence of antedating negative life events in people with depression when compared to the same time period in non-depressed controls (e.g., Kendler, Karkowski, & Prescott, 1999; Kessler, 1997; Paykel, 2007; Wilhem et al., 2006). In particular, certain types of life events have been reported significantly more often and include undesirable events, exits from the social field, traumatic events, events related to employment and marriage, and events concerning illness and disability (Evans & Katona, 1993) all of which are associated with PD. No significant differences in preceding desirable events have been reported, however.

Similar findings have been made in regards to anxiety disorders. In a study of people with panic disorder by Faravelli and Pallanti (1989), comparison of life events during the year preceding the onset of panic disorder against the same time period in healthy controls revealed a significantly greater number of negative life events, loss-themed events, threat-themed events as well as adjustment-themed events for the panic group. In particular, loss and danger-themed life events were found to be most frequently associated with panic disorder (Faravelli & Pallanti; Finlay-Jones & Brown, 1981). Most interestingly, and also consistent with earlier findings by Faravelli (1985) and Roy-Byrne, Geraci and Uhde (1986), it was found that the highest concentration of negative life events was reported in the month immediately preceding the onset of panic disorder. The experience of unexpected, negative and very important life events has also been found to result in a threefold increase in the risk of generalised anxiety disorder (Blazer, Hughes, & George, 1987). Thus, there is a strong relationship between stressful life experiences and the development of both depression and anxiety.

Living with a chronic illness is considered to be one of the most stressful circumstances in life (Clarke & Currie, 2009). PD presents many challenges to both the affected individual and their family, with considerable disruptions to normal functioning. Multiple losses, whether actual or perceived, are commonly experienced. The most obvious loss is that of health and physical functioning, with the predominant challenge in PD being adaptation to motor symptoms and deteriorating health. However, several other stressors and challenges are common in PD and include; employment and financial issues most frequently associated with inability to work due to physical symptoms, marital problems and social problems, self-consciousness and negative self-awareness in regards to physical symptoms, as well as fear and uncertainty about the future, especially in regards to the awareness that available treatments are only palliative (McDonald et al., 2003).

It has been proposed that the daily stresses and challenges associated with living with PD combined with a biological vulnerability due to underlying neurochemical changes is likely responsible for the manifestation of depressive and anxiety disorders in PD (Serra-Mestres & Ring, 2002). Thus, a *diathesis-stress* model for the aetiology of depression and anxiety in PD is proposed.

1.12 Correlates of Depression and Anxiety in PD

Research examining the correlates of depression and anxiety in PD have consistently shown that both conditions are significantly associated with a number of negative outcomes in PD including; poorer quality of life, greater cognitive impairment, more severe motor impairment, and greater functional impairment. In this section, the main findings in this area will be reviewed.

1.12.1 Motor Symptoms

Investigations into the relationship between anxiety, depression and motor functioning in PD have resulted in mixed findings. With respect to depression, early studies reported no relationship between depression and symptom severity and/or progression in PD (e.g., Huber, Paulson, & Shuttleworth, 1988; Mayeux et al., 1981; Mayeux, 1984). However, several more recent studies have reported more severe

motor symptoms in people with PD with depressive disorders compared to those without (e.g., Dissanayaka et al., 2011; Dissanayaka et al., 2011b; Prado & Barbosa, 2005; Rojo et al., 2003; Stella et al., 2008; Weintraub et al., 2004). It is not clear whether this indicates that depression results in faster symptom progression or whether individuals with more severe motor symptoms are more likely to develop depression due to the cross-sectional nature of existing investigations. Thus at present, the impact of depressive symptoms on motor functioning in PD remains unclear. A longitudinal study following individuals with PD with and without depression throughout their illness and comparing rates of motor progression between the two groups is required.

However, there does appear to be a relationship between motor symptoms and anxiety, and potentially of a reciprocal nature. Marsh (2000) suggests that anxiety can worsen motor impairment, with more pronounced and/or frequent bradykinesia, freezing (motor blocks) and dyskinesias being common. Greater motor impairment can in turn lead to greater anxiety about one's ability to cope with worsening symptoms. In support, Lauterbach and colleagues (2003) found that people with PD with panic disorder (current or past) experienced more freezing per day when compared to those with PD without anxiety. A recent cross-sectional study by Dissanayaka and colleagues (2010) also showed a significant association between presence of anxiety and severity of PD symptoms among 114 Australian adults with PD. Similarly, in the largest cross-sectional study of anxiety symptoms in PD to date, Leentjens and colleagues (2012) showed that among 342 individuals with PD, generalised anxiety disorder, agoraphobia, and social phobia were more prevalent among individuals with PD with motor fluctuations.

1.12.2 General Functioning and Health Status

Anxiety, and in particular, depression, have also been associated with greater functional impairment and lower health status in PD (e.g. Ehman et al., 1990; Holroyd, Currie, & Wooten, 2005; Menza & Mark, 1994). For example, Stella and colleagues (2008) reported significantly greater functional impairment in people with PD with depression compared to those with PD and no depressive illness. Similarly, Dissanayaka et al. (2010) showed a significant association between anxiety and greater impairment of daily functioning as assessed by the Activities of Daily Living

subscale of the Unified Parkinson's Disease Rating Scale (Fahn et al., 1987). It is not clear whether this indicates that individuals whose daily activities are significantly impaired by PD are more likely to develop depression and/or anxiety out of frustration and sadness for loss of physical functioning, or whether inactivity and avoidance associated with depression and anxiety results in decay in activities of daily living. A study by Weintraub, Moberg, Duda, Katz and Stern (2004) suggests that it may be the latter that is true, however. In a study of 114 community-dwelling individuals with PD, the authors showed that depression contributed significantly and most strongly to the decay of daily functional capacity over all other study variables including motor symptoms.

1.12.3 Quality of Life

There have been several studies investigating health-related quality of life in people with PD. Health-related quality of life is a subjective rating of the degree to which one's health is affecting the quality of one's life situation (Schrag, 2006). Depression has consistently been found to be the main determinant of poor quality of life in people with PD, as well as consistently rated by persons with PD as more detrimental to subjective well-being than motor symptoms and disability factors (e.g., Behair, Srivastava, & Pandey, 2005; Carod-Artal, 2008; Rahman, Grifin, Quinn, & Jahanshai, 2008). In a recent cross-sectional study of 462 individuals with PD in the UK, Hinnel and colleagues (2012) showed that depression explained the largest proportion of variance in low quality of life measured using the Parkinson's Disease Questionnaire-8 (PDQ-8; Peto et al., 1995), over all other study variables including age, PD duration, comorbid health conditions, and motor symptoms. Similarly, depression has been found to negatively correlate with an extensive range of specific life domains. Using the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36; Ware & Sherbourne, 1992), Kupio, Marttila, Helenius, Toivonen and Rinne (2000) reported high negative correlations between depressive symptoms and every SF-36 dimension including vitality, social functioning, role limitations and bodily pain. Depression was also found to be more strongly associated with all dimensions than physical symptoms. In a similar study using the Parkinson's Disease Questionnaire-39 (PDQ-39; Peto et al., 1995), Schrag and colleagues (2000) also reported significant correlations between depression and all PDQ-39 dimensions including activities of daily living, mobility, communication and

social support. Comparison of PDQ-39 scores for depressed and non-depressed PD patients also revealed significantly poorer quality of life across each dimension of the PDQ-39 for PD participants with depression.

In addition, anxiety has also been found to adversely affect quality of life in PD. A recent study by Hinnell et al. (2011) found that second to depression, anxiety symptoms were the second strongest unique predictor of poor quality of life among a sample of 462 individuals with PD in the UK. Moreover, using stepwise linear regression, an earlier study by Rahman and colleagues (2008), demonstrated that anxiety symptoms significantly accounted for a further 17% of variance in quality of life in addition to the variance already explained by depressive symptoms. This was the first study to recognise the additional contribution of anxiety to health-related quality of life in PD and highlights the need for further research into the unique impact of anxiety disorders on well-being in PD.

1.12.4 Cognition

Cognitive difficulties are commonly evidenced in PD and can range from mild impairment to severe dementia. A considerable body of research has found that individuals with PD experiencing depression generally exhibit more severe cognitive decline when compared to those with PD without affective disturbance (Emre, 2003; Kupio et al. 2000; Morrison et al., 2004; Rojo et al., 2003; Uekermann et al., 2003; Zgaljardic, Borod, Foldi, & Mattis, 2003). Stefanova and colleagues (2006) found that impairment in planning, organisation, and problem solving ability was common in all people with PD. Those with dysthymia also evidenced visuospatial and executive dysfunction, while those with major depression exhibited even broader impairment, affecting episodic visuospatial memory and spatial working memory, on top of visuospatial, executive, planning, organisation and problem solving impairment (Stefanova et al.).

Similarly, in an earlier study by Starkstein and colleagues (1992), it was found that people with PD with major depression evidenced significantly greater declines in cognitive functioning over a 12-month period compared to those with PD and minor depression, who in turn showed significantly greater decline than individuals with PD with no depressive illness. Further, it was demonstrated that this marked decline in the major depression group was evident irrespective of whether

individuals still had a diagnosis of major depression at the time of follow-up. This finding suggests that depression may have an early and lasting effect on cognitive functioning in PD. However, a second follow-up study of longer duration by Kremer and Starkstein (2000), found that individuals who received treatment for depression evidenced less cognitive decline over a 3 to 4 year period compared to those who did not receive help. Thus depression may have a particular influence on early cognitive impairment in PD, but further declines can be avoided with the treatment of depressive symptoms. This finding highlights the importance of treating depressive syndromes in PD, especially given evidence of a significantly greater risk for developing dementia in individuals with PD with depression predominantly due to associated cognitive impairment (Lombardi, Woolston, Roberts, & Gross, 2001).

The effect of anxiety on cognitive functioning in PD is less clear. Research on cognition and anxiety in PD is limited and much of the early research suggests no significant difference in cognitive performance between people with PD with anxiety disorders and those without (i.e., Fleminger, 1991; Lauterbach, 1993). However, a limited number of more recent studies suggest that anxiety may be associated with greater cognitive impairment in PD (i.e., Klepac, Hajnsek, & Trulja, 2010; Ryder et al., 2002).

1.13 Chapter Summary

There is a particular relationship between depression, anxiety and Parkinson's disease where rates of these disorders are greater than those observed in any other medical or non-medical population. Neurochemical changes and unique psychosocial stressors encountered in PD place individuals with PD at between 1.5 to 6 times greater risk for developing depression and anxiety compared with the general population.

Recognition and diagnosis of depression and anxiety in PD is complicated by a three-way symptom overlap and can be challenging for clinicians however it is imperative that both conditions are detected and appropriately treated. Studies examining the correlates of depression and anxiety in PD highlight a range of negative outcomes associated with untreated depression and anxiety in PD. Anxiety has been linked with more frequent and/or profound motor symptoms, while a strong

body of evidence associates depression with greater cognitive decline and a significant risk for developing dementia. Moreover, both conditions have been linked with greater functional impairment as well as significantly poorer quality of life.

Research to date has shown that the range of adverse outcomes associated with depression and anxiety in PD can be attenuated with effective treatment. The next chapter reviews and provides a systematic evaluation of current treatment options for depression and anxiety in PD.

CHAPTER 2 | Study I. A Meta-Analysis of Randomised Placebo-Controlled Treatment Trials for Depression and Anxiety in Parkinson's Disease

2.1 Introduction

Despite the negative outcomes associated with untreated depression and anxiety in Parkinson's disease (PD), only an estimated 20% of people with PD experiencing depressive and/or anxiety complications receive some form of professional treatment (Frisina et al., 2008). A substantial knowledge deficit has been identified as an underlying factor, with researchers and clinicians alike calling out for more evidence-based information to guide clinical efforts (Weintraub & Burn, 2011).

In this chapter the current treatment options for depression and anxiety in PD are reviewed by reporting on a meta-analysis of randomised placebo-controlled treatment trials of depression and/or anxiety in PD. Meta-analysis is a statistical technique in which the results from multiple treatment trials are pooled to derive a single standardised treatment effect (Borenstein et al., 2010). Meta-analytic findings hold more validity than single-trial effect estimates and offer the additional advantage of allowing comparisons of efficacy to be made across different treatment modalities through use of a common standardised metric (Borenstein et al.).

This was the first broad meta-analysis of both pharmacological and non-pharmacological treatments for depression and anxiety in PD and aimed to contribute to the current knowledge base of treatments for depression and anxiety in PD by systematically integrating the existing empirical research and identifying the most viable treatment option at present. The first half of the chapter provides an overview of the different treatment modalities for depression and anxiety in PD. The remaining half outlines the study methodology and presents the findings of the first broad meta-analysis of placebo-controlled RCTs for depression and/or anxiety in PD.

2.2 Overview of Treatments for Depression and Anxiety in PD

2.2.1 Pharmacotherapy for Depression and Anxiety

Pharmacological management currently represents the first-line treatment approach for depressive and anxiety disorders in PD. In a recent survey of 33 United States PD specialist neurologists responsible for the care of over 16,000 individuals with PD regarding preferred treatments for anxiety in PD, Palanci, Marsh and Pontone (2011) reported that all surveyed physicians indicated that they preferred to prescribe various classes of psychiatric medication as the treatment of choice. Non-pharmacological therapies were not mentioned. Traditionally, the two most commonly administered psychiatric medications in PD have been selective serotonin reuptake inhibitors and tricyclic antidepressants (Veazey et al., 2005).

2.2.1.1 Serotonin reuptake inhibitors (SSRIs). SSRIs are currently the most commonly administered antidepressants for the treatment of depression in PD. An early survey of practicing neurologists by the Parkinson Study Group (Richard & Kurlan, 1997) revealed that 51% of physicians used SSRIs as a preferred first-line treatment for depression in PD. More recent studies (i.e., Chen et al., 2007; Weintraub et al., 2003) report increased use of SSRIs in contemporary treatment, with approximately two-thirds of physicians now choosing SSRIs as a first-line therapy. SSRIs are a class of medications which increase serotonin levels by inhibiting its reuptake and are widely used for the treatment of depression as well as anxiety in primary psychiatric populations (Veazey et al., 2005). SSRIs have a stimulating effect and have been reported to be well tolerated in older adults (Corrigan, Denahan, Wright, Ragual, & Evans, 2000). There are a range of medications in the SSRI drug class (see Table 5), and all have been anecdotally reported to be of comparable efficacy in treating depression in PD (Masterton, 2003).

There have been several uncontrolled trials (Hauser & Zesiewicz, 2004; Kulisevsky et al., 2008; Marino et al., 2008; Meara, Bhowmick, & Hobson, 1997; Menza, Marin, Kaufman, Mark, & Lauritano, 2004; Tesei et al., 2001; Verma et al., 2012; Weintraub et al., 2006) and randomised controlled trials (RCT) for SSRIs in PD to date (Alca et al., 2011; Andersen et al., 1980; Antonini et al., 2006; Avila et

Table 5

Range of Selective Serotonin Reuptake Inhibitors

Medication	Trade Name(s)
Fluoxetine	Prozac, Sarafem, Fontex
Paroxetine	Aropax, Paxil, Seroxat
Sertraline	Zoloft, Lustral
Fluvoxamine	Luvox
Citalopram	Celexa, Cipramil

al., 2003; Devos et al., 2008; Leentjens et al., 2003; Menza et al., 2009; Richard et al., 2012; Serrano-Duenas, 2002; Wermuth et al., 1988; Xia et al., 2012). However, the efficacy of SSRIs for depression and anxiety in PD remains unclear at present. In the most recent meta-analysis of antidepressant treatments for depression in PD, Rocha et al. (2013) reported a slightly better response rate associated with SSRIs relative to placebos (risk ratio = 1.20) across five placebo-controlled RCTs, however this result was not statistically significant (95% CI = .57 to 2.52). An earlier meta-analysis of SSRIs for the treatment of depression in PD by Skapinakis et al. (2010) also failed to find a significant benefit of SSRIs over placebo in PD (RR = 1.08, 95% CI = .75 to 1.55) across 6 trials. Thus, despite their first-line status, there is a lack of empirical support for the efficacy of SSRI treatments for depression in PD at the present time. There have been no studies specifically examining the effect of SSRIs on anxiety as a primary outcome in PD.

2.2.1.2 Tricyclic antidepressants (TCAs). TCAs are the second most commonly administered medications for depression and/or anxiety in PD. TCAs were initially the preferred first-line treatment for depression in PD however a recent investigation indicated a sharp decrease in the contemporary use of TCAs in PD populations, with only 7% of people with PD reported currently taking a TCA (Chen et al., 2007). This decline has been linked to the high side-effect profile associated with TCA treatment (Veazey et al., 2005). TCAs are sedatives and the majority are serotonin-norepinephrine reuptake inhibitors blocking the reuptake of both serotonin

and noradrenaline (Vajda & Solinas, 2005). There are a wide range of TCAs. Table 6 displays some of the more commonly used medications in the TCA drug class.

Table 6

Common Tricyclic Antidepressants Used in PD

Medication	Trade Name(s)
Amitriptyline	Elavil, Endep
Desipramine	Norpramin, Pertofrane
Doxepin	Adapin, Sinequan
Imipramine	Tofranil
Nortriptyline	Pamelor, Aventyl
Trimipramine	Surmontil

At present, there is insufficient data to recommend the use of a specific TCA in PD (Veazey et al., 2005). However, nortriptyline is generally favoured as there is more information available about its use in PD (Vajda & Solinas, 2005). An early clinical trial by Andersen, Aabro, Gulmann, Hjelmsted and Pedersen (1980) found significantly greater improvement in depression in patients on nortriptyline relative to placebo. Similarly, in a recent placebo-controlled trial, Menza and colleagues (2009) reported a significant reduction in depressive symptoms in participants taking nortriptyline with a large effect size observed at posttreatment relative to control (d = 1.20). A general consensus asserts that TCAs are more effective than SSRIs in treating depression in PD, especially with those with more severe symptoms (Devos et al., 2008; Masterton, 2003) however there are few controlled studies of TCAs in PD. Rocha et al. (2013) recently reported a superior response rate for TCAs relative to SSRIs in PD (RR = 1.78, 95% CI = 1.06 to 2.99) however this comparison was only based on two trials (Devos et al., 2008; Menza et al., 2009). Again, there have been no studies examining the use of TCAs for anxiety disorders in PD although it has been suggested that TCAs may also be more superior than SSRIs for anxiety in PD as many of the antidepressants in this drug class are serotonin-norepinephrine uptake inhibitors, and there is evidence for noradrenergic dysfunction in the development of anxiety disorders in PD, particularly, panic disorder (Marsh, 2000).

Anecdotal evidence from various physicians suggests that nortriptyline, venlafaxine and mirtzapine may be beneficial for anxiety symptoms in PD (Marsh).

2.2.1.3 Criticisms of Psychopharmacotherapy for Depression and Anxiety in PD. Although widely utilised, the use of antidepressants in PD has garnered considerable criticism in recent times. Four main criticisms have emerged, namely; (1) a lack of empirical support for the efficacy of such treatments, (2) substantial side effects, (3) the potential for adverse drug interactions, and (4) a high risk of relapse.

2.2.1.3.1 Efficacy. Despite comprising the first-line treatment for depression and anxiety in PD, there is little empirical evidence to support the efficacy of antidepressant therapies in PD at present. There have been four meta-analyses of antidepressant treatments for depression in PD to date (Klaassen et al., 1995; Rocha et al., 2013; Skapinakis et al., 2010; Weintraub et al., 2005), and all three have not been able to demonstrate a significant advantage of antidepressants for depression in PD over placebo. In the first published meta-analysis, Klassen and colleagues aimed to review placebo-controlled antidepressant trials in PD but could not identify any studies which met their inclusion criteria. The authors thus concluded that there was no empirical evidence to support the widespread use of antidepressants in PD. Weintraub and colleagues conducted a meta-analysis based on 11 antidepressant trials (RCTs and non-RCTs) in PD and reported a significant and large pooled effect for antidepressants in PD (d = .95, 95% CI = .76 to 1.14), however, this effect was less than that of participants who were treated by placebo (d = 1.18, 95% CI = .55 to 1.81). Skapinakis and colleagues (2010) reported a slightly better response rate associated with SSRIs relative to placebos, however this result was not statistically significant (RR = 1.08, 95% CI = .75 to 1.55). Most recently, Rocha et al. (2013) reported an improved response rate associated with SSRI treatments relative to placebo following the publication of the largest RCT of antidepressants in PD to date (i.e., Richard et al., 2012) however again this result was not significant (RR = 1.20, 95% CI = .57 to 2.52). Thus, there is a lack of a consistent evidence base to support the widespread use of pharmacological treatment for depression and anxiety in PD at the present time.

2.2.1.3.2 Side effects. Frequent reports of adverse side effects have also been noted with antidepressant use in PD. TCAs can often leave individuals with blurred vision, sedation, urinary retention, memory impairment, in confused states and possibly delirium at higher doses, as well as increase the risks of falls (Veazey et al., 2005). In addition, TCAs have been linked with the development of cognitive disorders, orthostatic hypotension, cardiac arrhythmias and seizures (Allain, 2000; Klaassen et al., 1995). Although generally regarded as more effective, the use of TCAs is generally limited in PD populations primarily due to its high side effect profile. SSRIs can lead to gastrointestinal complications, sexual dysfunction, sweating, insomnia, weight changes, agitation and nightmares (Vajda & Solinas, 2005). In particular, SSRIs have been found to exacerbate PD motor symptoms in some cases (Gerber & Lynd, 1998; Klassen et al.; Linazasoro, 2000; Veazey et al.), although improvements to bradykinesia with citalopram use has been reported (i.e., Rampello, Chiechio, Raffaele, Vecchio, & Nicholetti, 2002). However, more recent research suggests that while side-effects are commonly associated with antidepressant treatment in PD, such effects are generally only mild and transient (Richard et al., 2012).

2.2.1.3.3 Drug interactions. In addition, concerns regarding polypharmacy and the potential for adverse interactions between antidepressants and PD medications are particularly important. As noted in Chapter 1, it is common for people with PD to take up to five different antiparkinsonian drugs to manage motor symptoms, along with other medication for comorbid health problems (Swanson, 1994). Adding an antidepressant and potentially an anti-anxiety medication (e.g., benzodiazepines) into the mix has the potential to be very dangerous. In particular, caution is advised when considering combining TCAs or SSRIs with the MAO-B inhibitor selegiline, commonly used for neuroprotection in PD, due to reports of increased tremor, agitation, restlessness and decreased consciousness (Richard et al., 1996; Veazey et al., 2005). A fatal 'serotonin syndrome', although of rare incidence, has also been identified resulting from adverse interactions between selegiline and SSRIs fluoxetine and fluvoxamine (Vajda & Solinas, 2005). Thus, to reduce the risk of aversive interactions, Marsh (2000) recommends that all non-essential pharmacotherapy in PD be eliminated. Muller (2002) also advises against

pharmacotherapy of non-motor symptoms in PD, where possible, in order to avoid complications with antiparkinsonian medication.

2.2.1.3.4 Long-term utility. Finally, there are concerns in relation to relapse and the long-term utility of pharmacological treatments. There have not been any studies investigating symptom relapse specifically in regards to depression and anxiety in PD, however, it is widely acknowledged that relapse rates for both depression and anxiety are very high (Kuyken et al., 2008).

There are two main stages to pharmacological treatment for depression and anxiety; (1) acute treatment and (2) continuation therapy. An 'adequate period of treatment' during the acute phase is considered to be prescriptions covering at least 120 days (Dunn et al., 1999). This is followed by continuation therapy to prevent relapse. For major depression in older adults, the National Institute of Health and Clinical Excellence (2010) currently recommend a minimum 12-month duration of continuation therapy and between 2 to 4 years for those with recurrent major depression in order to prevent relapse. Thus, significant ongoing treatment is required in order to maintain any acute treatment gains. Cessation of psychiatric medication following acute treatment has been found to be associated with a 77% increase in the risk of relapse in major depression (Melfi et al., 1998), and a 54 to 70% relapse rate for panic disorder (Otto et al., 2001).

In practice, however, the majority of patients are not considered at high risk for relapse and therefore not offered continuation therapy (Melfi et al., 1998). Of those who do receive ongoing treatment, adherence rates have been found to be low, with many patients discontinuing with their medication because it is too effortful or due to unpleasant side effects (Cooper et al., 2007; Olfson, Marcus, Tedeschi, & Wan, 2006; van Schaik et al., 2004). Thus, the majority of patients do not receive the recommended length of continuation treatment and it can be derived that the rate of relapse in these individuals is high.

Overall, the findings presented in this section strongly suggest that the widespread use of pharmacological treatments for depression and anxiety in PD is a concern based on issues regarding efficacy and safety.

2.2.3 Other Pharmacotherapy

2.2.3.1 Selective norepinephrine reuptake inhibitors (SNRIs). Due to the observed efficacy of TCAs over SSRIs in PD, several researchers have proposed that medications with a primary noradrenergic mechanism may be effective for depression and anxiety in PD (Carpenter, Milosavljevic, Schecter, Tyrka, & Price, 2005). Several SNRIs have been trialled for depression in PD in recent years. Lemke (2002) conducted a small open-label trial of reboxetine for depression with 16 individuals with PD and reported a significant decrease in Ham-D scores following acute 4-week treatment, $Z = -3.31$, $p < .008$. Reboxetine is a medication currently approved in Europe for the treatment of attention-deficit/hyperactivity disorder (ADHD), clinical depression and panic disorder (Lemke). Weintraub and colleagues (2010) conducted an 8-week double-blind randomised placebo-controlled trial of atomoxetine with 55 participants with PD and major depressive disorder. Atomoxetine is also currently approved for ADHD treatment with reported antidepressant effects (Carpenter et al.). No significant differences in response rates for depression were observed between the treatment and placebo groups at posttreatment based on Inventory of Depressive Symptoms scores although a significant reduction in State Anxiety Inventory scores was observed for participants treated with atomoxetine relative to placebo (mean group difference = -4.69, $p = .08$). In a recent RCT, Richard et al. (2012) examined the comparative efficacy of the SNRI venlafaxine, SSRI paroxetine, and placebo for the treatment of depression in 115 individuals with PD. The trial showed that venlafaxine was of equal efficacy to paroxetine in reducing Ham-D scores following 12-weeks of treatment, and that both drugs were significantly superior to placebo.

2.2.3.2 Dopamine agonists. In recent times, there has also been increasing interest in the effect of certain antiparkinsonian medications in reducing depression in PD. Specifically, trials of the dopamine agonist pramipexole in treating PD motor symptoms have shown significant secondary improvements in depressive symptoms (Leentjens et al., 2009), leading to interest in pramipexole as a possible primary antidepressant agent in PD. The particular interest in dopamine agonists for depression in PD stems from the potential dual benefit in treating both motor and depressive symptoms simultaneously, thereby eliminating the need for introducing

additional drug treatments and reducing the risk of any aversive side effects associated with polypharmacy. Pramipexole is a non-ergoline dopamine receptor agonist and exerts its antiparkinsonian effects by acting directly on dopamine receptors and mimicking the effect of dopamine, thereby alleviating motor symptoms. The mechanisms underlying the antidepressant effects of pramipexole are not clear at present however it has been suggested that dopamine dysfunction may contribute to the development of depression in some individuals. Thus, dopamine agonists which increase central dopamine levels may have an inadvertent effect on depressive symptoms.

Several experimental studies of pramipexole as a treatment for depression in PD have emerged over the past ten years (Kano et al., 2008; Lemke, Brecht, Koester, & Reichmann, 2006; Rektorova et al., 2003). In a recent large-scale randomised controlled trial examining the effects of pramipexole against placebo on depressive symptoms among 296 individuals with PD, Barone and colleagues (2010) reported a significant difference in the mean change in BDI-I scores favouring pramipexole at posttreatment. At 12-weeks, a statistically significant but small treatment effect was observed favouring pramipexole, with participants randomised to pramipexole treatment experienced a mean reduction of 5.9 points on the BDI compared with 4.0 for the placebo group (p = .01). An earlier RCT comparing pramipexole against the SSRI sertraline among 67 individuals with PD and comorbid major depressive disorder (Barone et al., 2006) demonstrated a broad equivalence between the two drugs at posttreatment in terms of mean point reduction on the Hamilton Depression Inventory. However, a higher rate of recovery was observed for participants in the pramipexole condition (60.6%) compared with the sertraline group (27.3%), leading the authors to conclude to that dopamine agonists may be a viable alternative to antidepressants in PD. However, there have been a number of smaller trials of dopamine agonists for depression in PD that have not been able to find any significant improvement in depression following pramipexole treatment (e.g., Kano et al., 2008; Leentjens et al., 2011).

2.2.4 Omega-3 Fatty Acid Supplements

In recent times there has also been interest in the effect of fish oil supplementation on depressive symptoms in PD. Epidemiological studies showing a

lower prevalence of depression within nations with high dietary fish consumption (i.e., Freeman, 2000; Morris, Evans, Tangney, Bienias, & Wilson, 2005) have led to investigations into the potential antidepressant properties of fish oil and/or its constituents, particularly, Docosahexaenoic acid (DHA) and Eicosapentaenoic acid (EPA). Polyunsaturated fatty acids have been shown to be effective in reducing depressive symptoms in trials with primary psychiatric populations (i.e., De Vriese, Christophe, & Maes, 2003; Lin & Su, 2007; Nemets, Stahl, & Belmaker, 2002; Su, Huang, Chiu, & Shen, 2003), although other studies have not shown any benefits of fish oil for depression (i.e., Marangell et al., 2003; Silvers, Woolley, Hamilton, Watts, & Watson, 2005). The emerging interest in fish oil supplements for depression in PD is also related to research findings showing a reduced risk of developing PD among older adults with a high dietary intake of polyunsaturated fatty acids (De Lau et al., 2005) as well as the finding that DHA is able to reduce and/or delay the development of levodopa-induced dyskinesias in parkinsonian-treated monkeys (Samadi et al., 2006). Thus, similar to dopamine agonists, the appeal of Omega-3 fatty acid supplements for the treatment of depression in PD is largely related to a potential dual benefit. In a double-blind placebo-controlled RCT of omega-3 fatty acid supplementation in 31 individuals with PD and major depression, Moralez Da Silva and colleagues (2008) reported a significant reduction in MADRS scores for the fish oil group.

2.2.5 Brain Stimulation Procedures

In addition to pharmacological and supplementation therapies, brain stimulation procedures have also been of key interest to researchers and clinicians for depression and/or anxiety in PD.

2.2.5.1 Electroconvulsive therapy. Electroconvulsive therapy (ECT) is a procedure involving the electrical induction of seizures and its potential in treating depression in PD has long been recognised. There have been several case reports of ECT for depression in PD (Bailine et al., 2008; Burke, Peterson, & Rubin, 1988; Chou et al., 2005) however there have been no larger trials. An early case study of ECT for depression in PD was published by Asnis (1977) who examined the use of ECT with a 61 year old man with PD and chronic depression. ECT was administered three times a week over a 6-week period. The participant's pretreatment severity of

depression was severe as rated by the Zung Self-Rating Depression Scale). Following the fifth week of ECT, the participant no longer scored within the clinical range for depression severity. However, subsequent follow-ups one week and one-month following treatment cessation showed that depression levels had returned to a severe level. The most recent case report of ECT in PD was presented by Marino and Friedman (2013) who reported successful treatment of anxiety following ECT in two individuals with PD with longstanding histories of depression and severe anxiety.

2.2.5.2 Repetitive transcranial magnetic stimulation. Repetitive transcranial magnetic stimulation (rTMS) is a second brain stimulation technique that has received attention in PD. RTMS is a non-invasive procedure that involves placing metal coils on an individual's head to induce strong magnetic fields which in turn produce localised electrical changes to targeted brain sites (Kozel & George, 2002; Siebner et al., 2000). High frequency rTMS of the left dorsolateral prefrontal cortex is an approved treatment for resistant-depression in the US and Canada and several other countries (Chen, 2010), and is currently entering into mainstream clinical practice in Australia (Fitzgerald, 2012). Increasing interest in rTMS for depression in PD has recently emerged, with several researchers suggesting that the localised nature of rTMS may make it a safer as well as more effective treatment alternative to psychiatric pharmacotherapy in PD (Epstein et al., 2007). Particularly, rTMS is able to accurately target specific brain areas and thus avoid any exacerbation of motor complications by prohibiting inadvertent stimulation of the primary motor cortex (Epstein et al.). Moreover, the acute phase of treatment for rTMS is considerably shorter than pharmacological or psychological regimens, with a course of rTMS generally completed in between 10 and 30 days, and consisting of a 30 to 45 minute daily session over the acute period (Fitzgerald).

There have been several open trials (Dragasevic et al., 2002; Epstein et al., 2007; Kormos, 2007) and RCTs (Fregni et al., 2004; Pal et al., 2010) of rTMS for the treatment of depression and/or anxiety in PD in recent times. In the largest of these, Fregni and colleagues compared the efficacy of rTMS against the SSRI fluoxetine in treating depression in 42 individuals with PD and a comorbid DSM-IV diagnosis of major or minor depression. Participants were randomised to a combination of either active rTMS and placebo drug treatment or sham rTMS and fluoxetine. Following

two weeks of treatment, an equivalent reduction in Ham-D scores was observed for both groups (rTMS: -9.5, fluoxetine: -10.5, p = .278), leading the authors to conclude that rTMS is as effective as SSRI treatment in the treatment of depression in PD

2.2.6 Psychotherapy

Finally, an emerging interest in psychological interventions for depression and anxiety in PD has surfaced in recent years. In recognition of the aversive side effects often associated with mainstay pharmacological treatments, researchers have turned their interest to arguably the safest treatment modality for psychological disturbances – psychotherapy.

In particular, a growing interest in Cognitive Behavioural Therapy (CBT) for depression and anxiety in PD has surfaced over the past decade. CBT is an overarching term used to refer to a family of therapies guided by Beck's (1965) 'cognitive theory'. Broadly, the central premise of cognitive theory is that psychological disorders are manifestations of underlying cognitive distortions (Clark, Beck, & Alford, 1999). Cognitive biases are posited to stem from dysfunctional core beliefs about oneself and the environment (Beck, 2008). CBT is a time-limited and structured form of therapy, employing a combination of cognitive and behavioural techniques, which aims to help individuals identify the maladaptive thoughts and beliefs underlying emotional and psychological discomfort and to ultimately replace such thoughts with more functional alternatives (Westbrook et al., 2011). Thus, cognitive change is the proposed key to achieving symptomatic relief as well as the primary aim of any CBT treatment (Brewin, 1996).

In a review of CBT for PD, Laidlaw (2008) highlighted several treatment characteristics that make CBT a 'potentially very effective' treatment option for psychological disturbances in PD including; a here-and-now focus, enhancement of problem-solving skills and ability to deal with increasingly difficult challenges with disease progression, enhancement of social engagement and particularly, its ability to directly address illness-related concerns.Previous research has shown that illness-related concerns feature prominently in both depression and anxiety in PD (Brook & Doder, 2000). Higher rates of sadness, pessimism, and dysphoria have been observed in depression in PD and linked with hopelessness and helplessness in regards to

having PD (McDonald et al., 2003). Similarly, predominant concerns in anxiety in PD have been found to focus on the unpredictability of motor symptoms, the uncertainty of prognosis and the perceptions of others towards PD (Backer, 2000). While illness-related concerns are common and expected among those with medical illnesses, it has been suggested that individuals with depression and anxiety and comorbid medical illness tend to have distorted beliefs regarding their illness and their ability to cope. Although pharmacotherapy is able to bring about symptomatic relief (e.g., raise mood, reduce tension, improve sleep etc.), illness-related concerns are largely unaddressed. The primary benefit of CBT over pharmacotherapy is therefore its ability to directly address illness-related concerns such as those outlined in the example above. Cognitive therapy can be used to identify and correct any distortions in thinking while behavioural experiments may be particularly useful to build confidence and show clients what they are capable of achieving in spite of physical limitations (Cole & Vaughan, 2005). CBT is able to help clients develop a realistic yet hopeful perspective of life with PD which acknowledges loss and limitations but at the same time encourages the highest possible level of functioning (Evans, 2007).

Moreover, CBT is an established treatment for depression and anxiety that has demonstrated equal efficacy as pharmacotherapy in primary populations over the acute phase of treatment and superior performance to pharmacotherapy over the long-term in regards to maintenance of acute treatment gains and relapse prevention (NICE, 2010). There is also increasing evidence of the efficacy of CBT in treating depression and anxiety in older adults (Pinquart, Duberstein, & Lyness, 2007), and individuals with various chronic illnesses (Hackett, Anderson, & House, 2004), and a growing body of research now also supports the efficacy of CBT in treating depression and/or anxiety in PD populations (e.g., Dobkin et al., 2011; Farabaugh et al., 2010; Feeney, Egan, & Gasson, 2005; Gupta, 2000;; Mohlman et al., 2010). In a recent RCT of individual CBT for the treatment of depression in PD, Dobkin and colleagues (2011) reported statistically significant and large effects on both depression (Ham-D; $d = 1.59$, BDI; $d = 1.1$) and anxiety (Ham-A; $d = .98$) following a 10-week CBT programme. At 1-month follow-up, improvements in clinician and self-rated depression as well as anxiety were maintained.

2.3 A Meta-Analysis of Randomised Placebo-Controlled Trials for Depression and/or Anxiety in PD

The preceding review provides a brief overview of the main treatment approaches for depression and anxiety in PD at the present time. Overall, psychopharmacotherapy currently represents the first-line and most widespread treatment approach for depression and anxiety in PD. However, antidepressant treatment regimens in PD are complicated by concerns regarding safety and the efficacy of such treatments is unclear. Several other treatments have been put forward as potentially safer and more effective alternatives for depression and anxiety in PD including dopamine agonists, Omega-3 supplementation, CBT and rTMS. The aim of this meta-analysis is to systematically examine the efficacy of the different treatment approaches for depression and anxiety in PD and to identify the most viable treatment option at the present time.

There have been four published meta-analyses for depression in PD to date (Klaassen et al., 1995; Rocha et al.; 2013; Skapinakis et al., 2010; Weintraub et al., 2005), while there have been no meta-analyses for anxiety in PD. A fifth meta-analysis of antidepressant therapies in PD was identified (Frisina, Tenebaum, & Borod, 2008) however this study did not specifically examine the treatment of clinical depression in PD (i.e., a DSM or ICD diagnosis of depression was not a required inclusion criteria). Of the four existing meta-analyses specifically for depressive disorders in PD, all have focused solely on the efficacy of antidepressant interventions. The present study is therefore the first meta-analysis of both pharmacological and non-pharmacological treatments for depression in PD as well as the first meta-analysis of any kind for anxiety in PD, and begins with a brief overview of the different treatments for depression and anxiety in PD.

2.4 Search Strategy

A comprehensive literature search was conducted for treatment studies of depression and/or anxiety in PD. Several online databases including Medline, PubMed, PsycInfo, Proquest, EMBASE, ScienceDirect and Google Scholar were

systematically searched from the first available year of publication to April 2013 for the keywords; *Parkinson's disease, depression, anxiety, treatment, therapy, RCT, trial, CBT, antidepressants.* Reference lists of previous meta-analyses of treatments for depression in PD were also searched.

2.5 Study Selection

To be eligible for inclusion in the meta-analysis, studies had to:

1. Feature participants with idiopathic PD
2. With a concurrent diagnosis of depression and/or anxiety according to DSM or ICD-10 criteria
3. Evaluated an intervention targeting depression and/or anxiety in PD as the primary focus
4. Used a randomised controlled design with a non-active control (no treatment, treatment as usual, clinical monitoring, waitlist, placebo)
5. Employed a standardised primary outcome measure for depression and/or anxiety to assess participant change
6. Included sufficient quantitative data from which an effect size could be computed (means, *SDs*, *t* or *F* values and probability values)
7. Be written in English

2.6 Statistical Analysis

All aspects of this meta-analysis were conducted in line with recommendations by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (PRISMA, 2009). Statistical analyses were guided by recommendations by Borenstein, Hedges, Higgins and Rothstein (2010), DerSimonian and Kacker (2007) and Marin-Martinez and Sanchez-Meca (2009).

2.6.1 Effect Size Calculation

Effect sizes for each study were represented by the standardised mean difference (Cohen's *d*) between the treatment and control groups at posttreatment.

Three methods were used to calculate effect sizes. Where there was sufficient data reported (pretreatment and posttreatment means and standard deviations for both treatment and control groups), effect sizes were calculated using change scores, according to the following formula:

$$d = \frac{M_{T\Delta} - M_{C\Delta}}{SD_{pooled}}$$

where: $M_{T\Delta}$ = mean change in treatment group from pretreatment to posttreatment

$M_{C\Delta}$ = mean change in control group from pretreatment to posttreatment

and: $$SD_{pooled} = \sqrt{\frac{(n_T - 1)(\sigma_T)^2 + (n_C - 1)(\sigma_C)^2}{n_T + n_C - 2}}$$

n_T = number of participants (treatment group)

n_C = number of participants (control group)

σ_T = standard deviation (treatment group)

σ_C = standard deviation (control group)

The change score method enhances the precision of the effect size estimate by comparing the absolute magnitude of change over the treatment period between the treatment and control groups. Thus, change scores are able to account for any differences in pretreatment levels of an outcome that are not otherwise reflected in traditional effect size estimates based only on the difference between posttreatment scores. The change score method has been used in several previous meta-analyses (e.g., Kobak et al., 1998; Watson & Rees, 2008).

Where all the required means and standard deviation statistics were not available, effect sizes were computed using *t*-values or *F* statistics reported for between-group comparisons on posttreatment scores. Effect sizes based on *t*-values were calculated using the following formula:

$$d = t\sqrt{\left(\frac{n_T + n_C}{n_T n_C}\right)\left(\frac{n_T + n_C}{n_T + n_C - 2}\right)}$$

Effect sizes based on *F*-values were calculated using:

$$d = \sqrt{F\left(\frac{n_T + n_C}{n_T n_C}\right)\left(\frac{n_T + n_C}{n_T + n_C - 2}\right)}$$

(Thalheimer & Cook, 2002)

Where a study did not report all the required means, standard deviations or any *t* or *F*-values, but reported probability levels for a one-way two-group test (e.g., a *t*-test, two-group ANOVA or ANCOVA) based on posttreatment scores, probability levels were used to calculate effect size. The corresponding *t*-value for the reported probability was attained through a *t* distribution table and then substituted into the effect size formula based on the *t* statistic to estimate effect size as per Ray and Shadish (1996).

2.6.1.1 Hedge's small sample correction. As Cohen's *d* is known to overestimate the effect size in small samples, Hedge's small sample correction (Hedge, 1981) was applied to effect size estimates where the number of participants was less than 20. Corrected effect sizes were computed using the formula:

$$d'' = d\left(1 - \frac{3}{4n - 9}\right)$$

(Hedges & Olkin, 1985)

2.6.1.2 Multiple treatment conditions. Finally, where a study included two active treatment conditions against a single control condition, participants in the control condition were split evenly into two subgroups to serve as controls for each treatment condition. In doing so, each individual's data was included only once in the analysis as required for a meta-analysis (Borenstein et al., 2010). Hedge's small sample correction was then applied where the sum of the treatment and split control group was less than 20.

2.6.2 Pooled Effect Size Calculation

The pooled effect size represents the overall or combined effect of all included studies in a meta-analysis and is computed by calculating the weighted mean of the effect sizes of each individual study (Borenstein, Hedges, & Rothstein, 2007). There are two models for computing a pooled effect size; the fixed-effects model and the random effects model. The fixed-effects model assumes that all studies within a meta-analysis are functionally identical in terms of sample characteristics, study design and method, and the nature of the treatment intervention employed (Borenstein et al., 2010). In contrast, the random-effects model assumes a degree of heterogeneity in participant characteristics, design, method and treatment interventions across each study included in a meta-analysis (Hunter & Schmidt, 2002). In recent times, a wide consensus has been established supporting the increased precision of random-effects models for meta-analyses (e.g., Brockwell & Gordon, 2001; Erez, Bloom, & Wells, 1996; Hedges & Vevea, 1998; Kisamore & Brannick, 2008; Sanchez-Meca & Marin-Martinez, 2008).

A random effects model was thus employed to estimate the pooled effect size in this study to control for differences in participant characteristics across each study, as well as differences relating to the nature of each treatment intervention. Individual effect sizes from each study were weighted to account for both within-study variance and between-study variance using the Hedges and Vevea (1998) 'weighting by inverse variance' method.

2.6.2.1 Within-study variance. Within study variance (v_i) was calculated using the formula:

$$v_i = \frac{n_T + n_C}{n_T \times n_C} + \frac{d^2}{2(n_T + n_C)}$$

(Hedges & Olkin, 1985)

where: n_T = number of participants (treatment group)
n_C = number of participants (control group)
d = effect size

2.6.2.2 Between-study variance. Between-study variance (T^2) was calculated using the DerSimonian and Laird (1986) general method-of-moments estimate:

$$T^2 = \frac{Q - df}{C}$$

with: $Q = \sum \frac{(d - \bar{d})^2}{v_i}$ $df = n - 1$ $C = \sum \frac{1}{v_i} - \frac{\sum \left(\frac{1}{v_i}\right)^2}{\sum \frac{1}{v_i}}$

giving: $$T^2 = \frac{\sum \frac{(d - \bar{d})^2}{v_i} - (n - 1)}{\sum \frac{1}{v_i} - \frac{\sum \left(\frac{1}{v_i}\right)^2}{\sum \frac{1}{v_i}}}$$

Where d = effect size, $\bar{d}$ = mean effect size, n = number of studies and v_i = within-study variance. Where the value of T^2 was negative, T^2 was set to 0 as a variance cannot be negative (Borenstein et al., 2010).

2.6.2.3 Weighted effect size. Individual weights for each study were then computed using the formula, then multiplied by the effect size estimate in each study to produce a weighted effect size for each study.

$$W_i = \frac{1}{v_1 + T^2}$$

(Hedges, 1983)

2.6.2.4 Pooled effect size. The weighted mean effect size for all studies was then computed to determine the pooled effect size (M_W). A separate pooled effect size was computed for each different treatment modality (pharmacological, psychotherapy, rTMS etc.) using the following formula:

$$M_W = \frac{\sum W_i Y_i}{\sum W_i}$$

(Hedges, 1983)

2.6.2.5 Statistical significance. Finally, to test the statistical significance of pooled effect sizes, 95% confidence intervals were calculated as a function of the pooled effect size and standard error of the pooled effect size (SE_M) using the following formulas:

$$Lower\ \ Limit = M_W - 1.96\sqrt{\frac{1}{\sum W_i}}$$

$$Upper\ \ Limit = M_W + 1.96\sqrt{\frac{1}{\sum W_i}}$$

(Borenstein et al., 2010)

The null hypothesis was rejected at the .05 significance level if the calculated confidence interval did not include zero, and indicated that there was an overall significant effect of treatment for depression and/or anxiety in PD across the studies included in the meta-analysis.

2.6.3 Publication Bias

Publication bias refers to the tendency for researchers and scientific journals to publish only positive results from clinical trials (i.e., significant and large effect sizes) while neglecting to report any small or non-significant findings (Thornton & Lee, 2000). Consequently, pooled effect sizes in meta-analyses based only on published studies may overstate the true effect of a given treatment intervention.

To assess publication bias in this study, funnel plots and Egger's regression asymmetry test were employed. Funnel plots are scatterplots of effect sizes from individual studies (X-axis) against an index of each study's precision (often the standard error of the effect size) on the Y-axis (Sterne, Egger, & Smith, 2001). When there is no publication bias in a meta-analysis, the distribution of effect sizes resembles a symmetrical inverted funnel, while an asymmetrical distribution indicates the presence of bias (Sterne et al.). Egger's (1997) test is a statistical test for funnel plot asymmetry and involves a simple linear regression between weighted effect size estimates against their standard errors. Statistically significant regressions indicate that the results of a meta-analysis are affected by publication bias. The Fail-Safe *N* method (Rosenthal, 1979) was also used to examine any publication bias present in the meta-analysis. The fail-safe *N* refers to the number of unpublished null studies required to negate the significance of the pooled effect size in a meta-analysis and was calculated according to the following formula:

$$\textit{Fail-safe}\ \ \mathrm{N} = \left(\frac{\mathrm{k}}{\mathrm{Z_C}^2} \right) \times \left[k\left(\overline{\mathrm{Z}}_k \right)^2 - \mathrm{Z_C}^2 \right]$$

where: k = number of studies

Z_C = critical Z value

$\overline{Z}_k$ = mean Z for k studies

Rosenthal (1979) asserts that a fail-safe *N* value greater than $5k + 10$ indicates a low likelihood of publication bias within a meta-analysis.

2.6.4 Heterogeneity Analysis

A second essential component of a meta-analysis is to demonstrate the consistency of treatment effects across studies to show support for the validity and generalisability of the pooled effect estimate. Heterogeneity within a meta-analysis is undesirable as it indicates that a treatment has differential effects across separate studies (Higgins, Thompson, Deeks, & Altman, 2003). The degree of heterogeneity in a meta-analysis can be computed according to the I^2 statistic (Higgins & Thompson, 2002), which is an index of the proportion of total variance in the pooled effect size that is due to heterogeneity between studies. Values for the I^2 statistic are expressed as a percentage with 0% indicating no observed heterogeneity (Higgins et al.). The I^2 statistic was calculated using the following formula:

$$I^2 = 100\% \times \frac{\text{Q - df}}{\text{Q}}$$

with: Q = Cochran's heterogeneity statistic

$$= \sum W_i \left(d - \bar{d}\right)^2$$

giving:
$$I^2 = 100\% \times \frac{\left[\sum W_i \left(d - \bar{d}\right)^2\right] - df}{\sum W_i \left(d - \bar{d}\right)^2}$$

2.7 Results

2.7.1 Search Results

A total of 86 treatment trials for depression and/or anxiety in PD were identified. Fifty-six papers were excluded as they were case studies or case series (26), uncontrolled trials (28), or non-randomised controlled trials (3). This resulted in a total of 29 randomised controlled trials (see Table 7). There were 28 RCTs for the treatment of depression in PD, while one RCT was targeted at the treatment of comorbid depression and anxiety. There were no RCTs of any intervention solely for anxiety in PD. Publication dates ranged from 1980 to 2011, with the majority of studies (72%) published over the past 10 years. There were 16 RCTs of antidepressant interventions, 4 RCTs of antiparkinsonian medications, 5 RCTs for rTMS, 2 RCTs for CBT, and one RCT each of atomoxetine and Omega-3 supplementation. There were no RCTs for ECT for depression in PD.

Of the 29 RCTs, 16 were excluded as these were active-comparator trials, leaving 13 placebo-controlled RCTs. A further four placebo-controlled trials were excluded. The Andersen et al. (1980) trial of the TCA nortriptyline was omitted for not using a standardised outcome measure. The Barone et al. (2010) trial of the dopamine agonist pramipexole and Werneck et al. (2009) trial of trazodone (serotonin antagonist and reuptake inhibitor) were excluded as participants in both studies were not required to have a clinical diagnosis of depression according to DSM or ICD criteria. Finally, The Djokic et al. (2010) trial comparing six antidepressants with placebo was also excluded as there was insufficient quantitative data in the published conference abstract to calculate effect sizes.

Two active-comparator RCTs have been previously included in an earlier meta-analysis of placebo-controlled RCTs of SSRIs in PD (i.e., Skapinakis et al., 2010). The authors argued that the low dosage of the comparator amitriptyline drug in the Antonini et al. (2006) study, as well as the unestablished nature of the rTMS treatment in the Fregni et al. (2004) trial were equivalent to placebo-controlled conditions. These two trials were not included in the main analysis for this study as they were not explicit placebo-controlled trials, however they were included as part of the subsequent sensitivity analysis to examine whether their inclusion would significantly alter the results of the main analyses.

2.7.2 Study Characteristics

Table 8 summarises the characteristics of the nine trials included in the meta-analysis. There were five placebo-controlled RCTs of antidepressants for depression in PD (Devos et al., 2008; Leentjens et al., 2003; Richard et al., 2012 Menza et al., 2009; Wermuth et al., 1998) and one RCT each of Omega-3 fatty-acid supplementation (Da Silva et al., 2008), atomoxetine (Weintraub et al., 2010), rTMS (Pal et al., 2010) and CBT (Dobkin et al., 2011a). There were no eligible RCTs of dopamine agonists or ECT for depression in PD and no new placebo-controlled RCTs of antidepressants for depression in PD since the publication of the Rocha et al. (2013) meta-analysis.

Table 7

List of Randomised Controlled Trials for Depression and/or Anxiety in PD

Intervention Type	First Author (Year)	Treatment	Comparison	N
Antidepressant	Alca (2011)	Sertraline (SSRI)	Venlafaxine (SNRI)	32
	Andersen (1980)	Nortriptyline (TCA)	Placebo	22
	Antonini (2006)	Sertraline (SSRI)	Amitriptyline (TCA)	31
	Avila (2003)	Nefazodone (SARI)	Fluoxetine (SSRI)	16
	Dell'Agnello (2001)	Fluoxetine (SSRI)	Fluvoxamine (SSRI) Citalopram (SSRI) Sertraline (SSRI)	62
	Devos (2008)	Citalopram (SSRI) Desipramine (TCA)	Placebo	48
	Djokic (2010)	Clomipramine (TCA) Fluoxetine (SSRI) Sertraline (SSRI) Escitalopram (SSRI) Mirtazapine (NaSSa) Tianeptine (SSRE)	Placebo	339
	Leentjens (2003)	Sertraline (SSRI)	Placebo	12
	Menza (2009)	Nortriptyline (TCA) Paroxetine (SSRI)	Placebo	52
	Rabey (1996)	Fluvoxamine (SSRI)	Amitriptyline (TCA)	47
	Richard (2012)	Paroxetine (SSRI) Venlafaxine (SNRI)	Placebo	115
	Serrano-Duenas (2002)	Fluoxetine (SSRI)	Amitriptyline (TCA)	77
	Trivedi (2003)	Sertraline (SSRI)	Bupropion	46
	Wermuth (1998)	Citalopram (SSRI)	Placebo	18
	Werneck (2009)	Trazodone (SARI)	Placebo	20
	Xia (2012)	Fluoxetine (SSRI)	Fluoxetine (SSRI) + electroacupuncture	60
Pharmacological (other)	Barone (2006)	Pramipexole (DA)	Sertraline (SSRI)	67
	Barone (2010)	Pramipexole (DA)	Placebo	287
	Rektorova (2003)	Pramipexole (DA)	Pergolide (DA)	41
	Steur (1997)	Moclobemide (MAO-I)	Moclobemide + Selegiline	10
	Weintraub (2010)	Atomoxetine (SNRI)	Placebo	55
Supplements	Moralez Da Silva (2008)	Omega-3 fatty-acid	Placebo	29
rTMS	Boggio (2005)	Left prefrontal rTMS	Fluoxetine (SSRI)	25
	Cardoso (2008)	Left prefrontal rTMS	Fluoxetine (SSRI)	21
	Fregni (2004)	Left prefrontal rTMS	Fluoxetine (SSRI)	42
	Fregni (2006)	Left prefrontal rTMS	Fluoxetine (SSRI)	26
	Pal (2010)	Left prefrontal rTMS	Placebo (sham rTMS)	22
Psychotherapy	Dobkin (2011)	Individual CBT	Clinical monitoring	80
	Veazey (2009)	Telephone CBT	Telephone counselling	10

TCA = tricyclic antidepressant, SSRI = selective serotonin reuptake inhibitor, SARI = serotonin 2 antagonist/reuptake inhibitor, DA = dopamine agonist, SNRI = selective norepinephrine reuptake inhibitor, rTMS = repetitive transcranial magnetic stimualation, CBT = cognitive behavioural therapy

2.7.3 Primary Effect on Depression

A forest plot of effect sizes and 95% confidence limits for all interventions appears in Figure 1. Overall, all interventions favoured the treatment condition at posttreatment with effect sizes ranging from .08 to 1.64. However, only 58% of the treatment effects were statistically significant. These were; citalopram and desipramine (Devos et al., 2008), nortriptyline (Menza et al., 2009), paroxetine and venlafaxine (Richard et al., 2012), Omega-3 supplementation (Moralez Da Silva et al., 2008), and CBT (Dobkin et al., 2011).

2.7.3.1 Pooled effect sizes. A pooled effect size was computed only for antidepressant interventions as this was the only treatment modality with more than one published placebo-controlled RCT. The pooled effect for antidepressants ($N = 8$) was moderate ($d = .71$) in favour of antidepressants, although this was not statistically significant (95% CI = -1.33 to 3.08). There was also substantial heterogeneity observed between the antidepressant studies, $I^2 = 68.53\%$, $p < .05$.

2.7.3.2 Publication bias. Due to the small number of studies, visual verification of the presence or absence of asymmetry using funnel plots was difficult to accomplish. However, Egger's regression test showed no evidence of publication bias among the antidepressant studies, p = .652. A fail-safe N statistic was not computed given that the pooled effect of antidepressants was non-significant.

2.7.3.3 Sensitivity and subgroup analyses. Given the significant heterogeneity observed across antidepressant studies, subgroup analyses were conducted for SSRIs and TCAs separately. The pooled effect for SSRIs was moderate and non-significant ($d = .57$, 95% CI = -1.33 to 2.47). The pooled effect for TCAs was significant and large ($d = 1.35$, 95% CI = .19 to 2.52). There was no longer any significant heterogeneity across studies for both SSRIs ($I^2 = 0.00\%$, $p > .05$) and TCAs ($I^2 = 21.13\%$, $p > .05$), suggesting that the initial heterogeneity was attributable to the different drug classes and mechanisms of action.

Table 8

Characteristics of Placebo-Controlled Randomised Controlled Trials for Depression in PD used in the Present Meta-Analysis

First author	Year	Location	Condition	Design	Time (weeks)	Diagnostic system	*N*	Primary Outcome
Devos	2008	France	1. Citalopram 2. Desipramine 3. Placebo	Double-blind parallel	4	DSM-IV	48	MADRS
Dobkin	2011	USA	1. CBT 2. Clinical monitoring	Parallel	10	DSM-IV	80	HAM-D
Leentjens	2003	Netherlands	1. Sertraline 2. Placebo	Double-blind parallel	10	DSM-IV	12	MADRS
Menza	2009	USA	1. Paroxetine 2. Nortriptyline 3. Placebo	Double-blind parallel	8	DSM-IV	52	HAM-D
Moralez Da Silva	2008	Brazil	1. Omega-3 2. Placebo	Double-blind parallel	12	DSM-IV	29	MADRS
Pal	2010	UK	1. rTMS 2.Placebo	Double-blind parallel	10 days	DSM-IV	22	MADRS
Richard	2012	USA	1. Sertraline 2. Venlafaxine 3. Placebo	Double-blind parallel	12	DSM-IV	115	HAM-D
Weintraub	2010	USA	1. Atomoxetine 2. Placebo	Double-blind parallel	8	DSM-IV	55	IDS-C
Wermuth	1998	Denmark	1. Citalopram 2. Placebo	Double-blind parallel	8	DSM-III-R	37	HAM-D

DSM-IV = Diagnostic and Statistical Manual of Mental Disorders (fourth edition), DSM-III-R = Diagnostic and Statistical Manual of Mental Disorders (third edition, revised), MADRS = Montgomery-Asberg Depression Scale, HAM-D = Hamilton Depression Inventory, IDS-C = Inventory of Depressive Symptomatology-Clinician

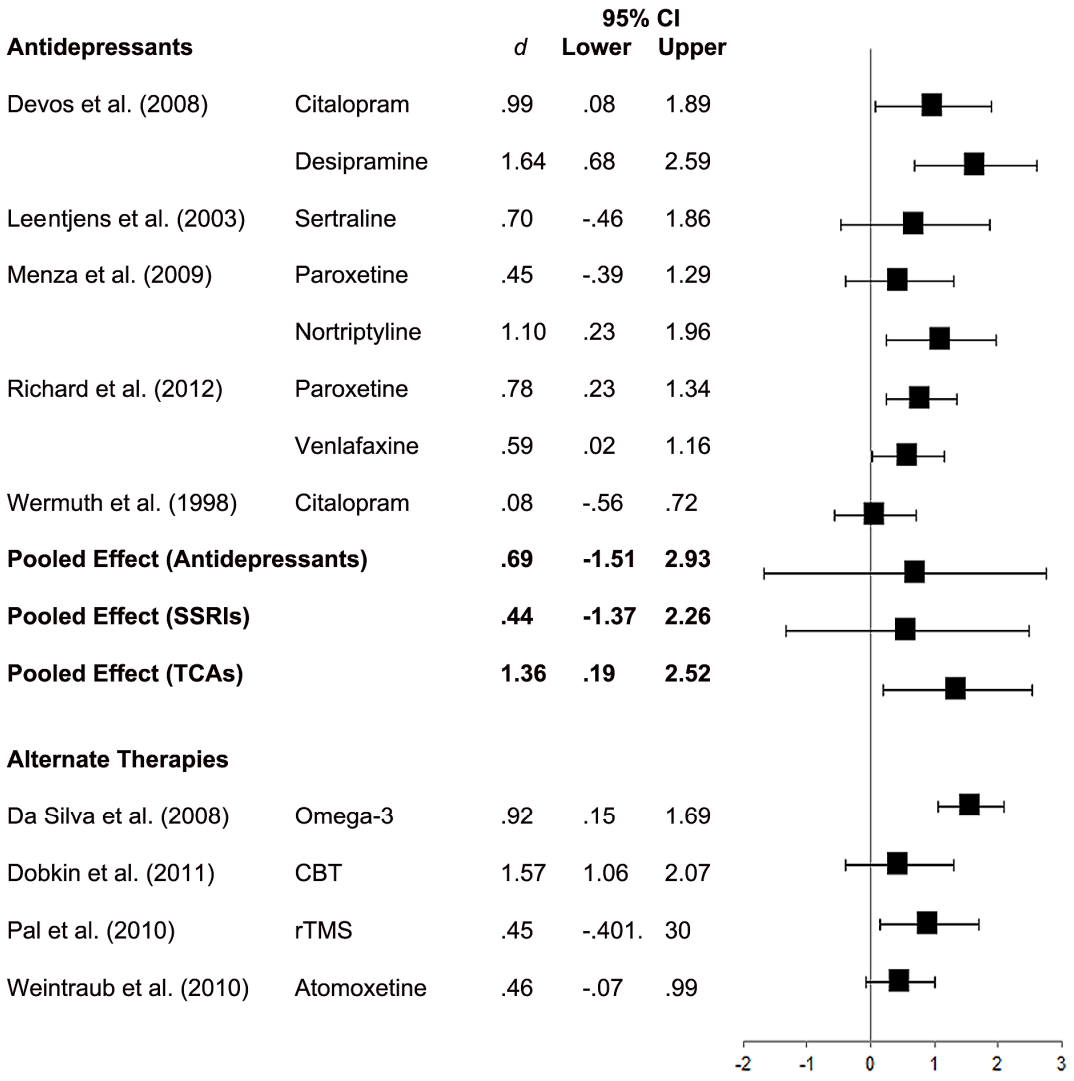


Figure 1. Forest Plot of Effect Sizes for Depression

A further sensitivity analysis was conducted including data from two additional active-comparator antidepressant trials (Antonini et al., 2006; Fregni et al., 2004) that were included in the Skapinakis et al. (2010) meta-analysis of placebo-controlled RCTs of SSRIs for depression in PD. Inclusion of these two trials did not significantly alter findings. The pooled effect for antidepressants remained moderate and non-significant (d = .62, 95% CI = -2.13 to 3.37), as did the pooled effect for SSRIs (d = .48, 95% CI = -1.88 to 2.84), although there was a slight reduction in the magnitude of both pooled effects.

2.7.4 Anxiety

There were no RCTs of any treatment for anxiety in PD, however, four of the depression trials reported the effect of treatment on anxiety as a secondary outcome (Devos et al., 2008; Dobkin et al., 2011; Menza et al., 2009; Weintraub et al., 2010). There were two trials of antidepressants, one trial of CBT and one trial of atomoxetine. Table 9 provides a summary of the characteristics of these studies and the outcome data reported for anxiety used to estimate effect sizes.

Table 9

Study Characteristics of Randomised Placebo-Controlled Trials for Depression in PD Reporting the Secondary Effect on Anxiety

Study	Condition	*N*	Time (weeks)	Outcome measure	T1 *M*	T1 *SD*	T2 *M*	T2 *SD*	*ΔM*	*t*	*p*
Devos (2008)	1. Citalopram	48	4	HAM-A	18.00	N.R.	6.00	N.R.	-12.00	N.R	.05
	2. Desipramine				20.00	N.R.	8.00	N.R.	-12.00	.	.05
	3. Placebo				18.00	N.R.	10.00	N.R.	-8.00	N.R	-
Dobkin (2011)	1.CBT	80	10	HAM-A	19.32	4.41	14.73	4.54	-4.59	-	-
	2. Monitoring				18.49	4.35	18.21	4.35	-0.28		
Menza (2009)	1. Paroxetine	52	8	HAM-A	N.R.	N.R.	N.R.	N.R.	N.R.	N.R	.074
	2. Nortriptyline				N.R.	N.R.	N.R.	N.R.	N.R.	.	.0001
	3. Placebo				N.R.	N.R.	N.R.	N.R.	N.R.	N.R	-
Weintraub (2010)	1. Atomoxetine	55	8	SAI	55.9	10.5	N.R.	N.R.	N.R.	4.69	.08
	2. Placebo				56.5	10.4	N.R.	N.R.	N.R.		

HAM-A = Hamilton Anxiety Rating Scale, SAI = State Anxiety Inventory

A forest plot of effect sizes and 95% confidence intervals for all interventions reporting the secondary effect of treatment on anxiety, as well as the pooled effect for antidepressants, SSRIs and TCAs appears in Figure 3. Apart from paroxetine which showed no significant effect on anxiety, all interventions resulted in large and statistically significant reductions in anxiety with effect sizes ranging from .93 to 1.98. A pooled effect size for antidepressants was computed by pooling data from the Devos et al. (2008) and Menza et al. (2009) trials. The pooled effect size for antidepressants on anxiety in PD was large (d = 1.13) but non-significant (95% CI =

-.67 to 2.94). Again, there was substantial inconsistency in the effect of antidepressants on anxiety across studies, $I^2 = 75.35\%$, $p < .05$

Subgroup analyses were conducted to estimate the pooled effect of SSRIs and TCAs on anxiety in PD separately in light of the observed heterogeneity across antidepresant studies. Similar to depression, the pooled effect for TCAs was large and significant ($d = 1.40$, 95% CI = .09 to 2.70) while the pooled effect for SSRIs was non-significant ($d = .85$, 95% CI = -.40 to 2.09). A forest plot of effect sizes and 95% confidence intervals for all interventions reporting the secondary effect of treatment on anxiety, as well as the pooled effect for antidepressants, SSRIs and TCAs appears in Figure 2. Overall, TCAs, atomoxetine and CBT all demonstrated a significant and large secondary effect on anxiety outcomes.

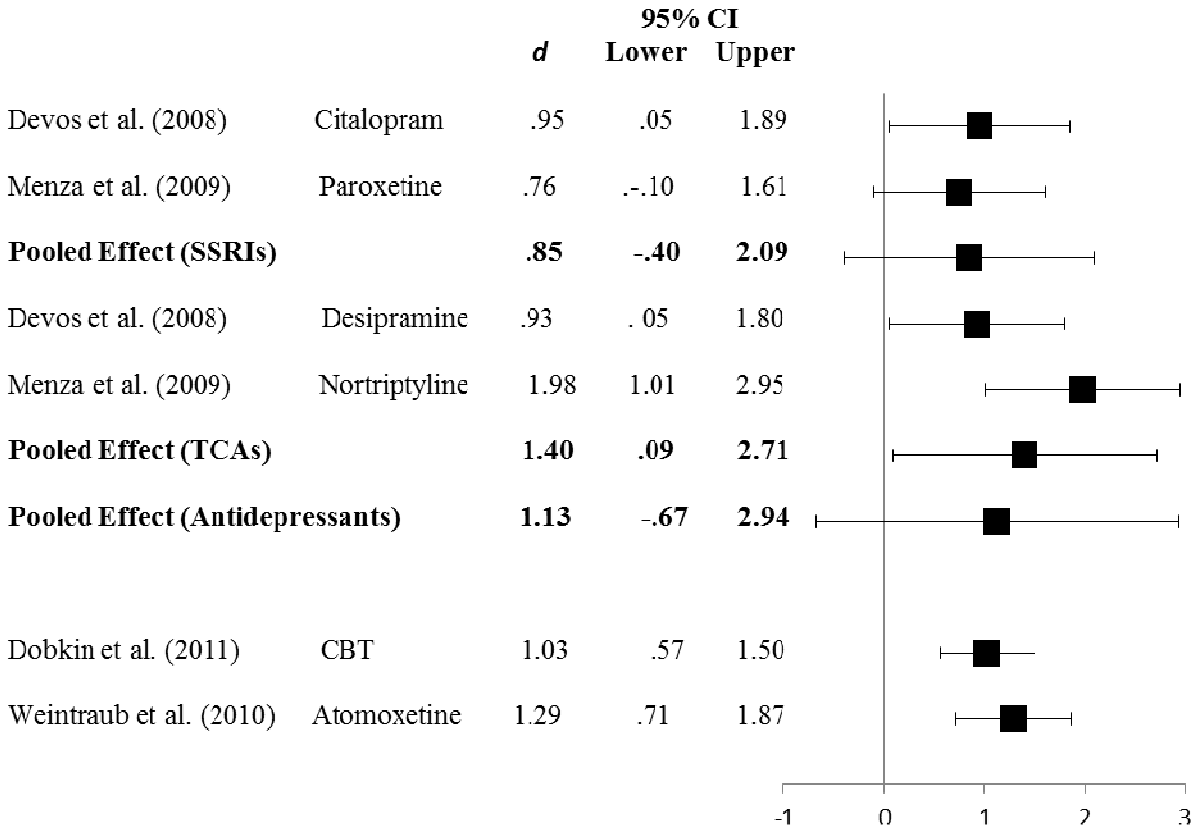


Figure 2. Forest Plot of Effect Sizes for Subgroup Analyses for Anxiety

2.8 Discussion

In the first published meta-analysis of treatments for depression in PD, Klaassen and colleagues (1995) concluded that there was no available empirical evidence with which to base a treatment plan for depression in PD. Despite increasing awareness of the significance of psychiatric and non-motor disturbances in PD over the past decade and a half, it would appear that the empirical literature for treatments for depression and anxiety in PD remains in an elementary stage. An extensive literature search revealed only nine trials meeting the inclusion criteria of being randomised placebo-controlled trials for depression and/or anxiety in PD, and employing formal diagnostic procedures and standardised outcome measures. Thus, despite the high prevalence of depression and anxiety in PD there is still a considerable lack of controlled research in the treatment of these disorders.

2.8.1 Main Findings

This meta-analysis was the first to provide a controlled pooled effect size estimate for antidepressant therapies in PD. While there have been four prior meta-analyses assessing the efficacy of antidepressant therapies for depression in PD to date, none of these reviews calculated a pooled effect size of antidepressant therapies in PD. There was insufficient empirical data to do so at the time of the Klaassen et al. (1995) review, while Weintraub and colleagues (2005) pooled results from both RCTs and non-RCTs and reported an uncontrolled pooled effect size for antidepressant therapies in PD. In the two most recent meta-analyses, Skapinakis et al. (2010) and Rocha et al. (2013) both calculated and reported risk ratios for antidepressant response in PD rather than standardised treatment effects. The present analysis showed that the pooled effect of antidepressants for depression in PD was moderate but non-significant (d = .71, 95% CI = -1.33 to 3.08), as was the pooled effect for the current first-line SSRI treatments (d = .57, 95% CI = -1.33 to 2.47). Antidepressants appeared to have a greater effect on anxiety in PD, with large pooled effect sizes observed for both antidepressant therapies in general (d = 1.13, 95% CI = -.67 to 2.94) and SSRI treatments (d = .85, 95% CI = -.40 to 2.09), although again, both results were non-significant.

The finding that both antidepressants in general and SSRI therapies have a non-significant pooled effect on depression in PD relative to placebo is consistent with prior results. Weintraub et al. (2005) reported a large and statistically significant effect of antidepressants on depression in PD (*d* = .95, 95% CI = .76 to 1.14). However, this effect was less than that for placebo for depression in PD (*d* = 1.18, 95% CI = .55 to 1.81) suggesting that there appears to be no benefit of antidepressant therapies relative to placebo, consistent with the present findings. Skapinakis and colleagues (2010) reported a slightly better response rate associated with SSRIs relative to placebos, however this result was not statistically significant (RR = 1.08, 95% CI = .75 to 1.55). Most recently, Rocha et al. (2013) reported an improved response rate associated with SSRI treatments relative to placebo following the publication of the largest RCT of antidepressants in PD to date (i.e., Richard et al., 2012) however again this result was not significant (RR = 1.20, 95% CI = .57 to 2.52).

While it has been suggested that this result indicates that the widespread use of antidepressants in PD is largely unjustified (i.e., Chen et al., 2007), the magnitude of the pooled effect obtained in this study suggests that antidepressant therapies show promise in the treatment of the depression in PD. A pooled effect size of .71 represents a moderate to large effect and indicates that individuals with PD treated with antidepressants do experience a reduction in depressive symptoms compared with placebo, even if this effect is statistically non-significant. Similar to the conclusions of Rocha et al. [24] and Skapinakis et al. [56], at this stage, it is likely that the non-significance of the pooled effect for antidepressants in PD reflects a Type II error due to the very limited number of available placebo-controlled RCTs in the literature at present (n = 5). Ultimately, there is a need for more controlled research to resolve the ambiguity surrounding the efficacy of antidepressant therapies in PD.

In regards to the comparative efficacy of SSRIs and TCAs, the results of this meta-analysis support the general consensus that TCAs are more effective than SSRIs for the treatment of depression in PD. The pooled effect for TCAs was large and significant for both depression and anxiety, while the pooled effects for SSRIs were moderate but non-significant. Rocha et al. (2013) also reported a superior

response rate for depression associated with TCAs than SSRIs (RR = 1.78, 95% CI = 1.06 to 2.99). Despite the efficacy of TCAs in PD, the high side-effect profile associated with this class of medications has seen a sharp decline in its use in PD. Thus, SSRIs remain the most widely used treatment for depression in PD at present. It is therefore imperative to resolve the ambiguity surrounding the efficacy of SSRIs for depression in PD, to ensure that individuals with PD are being offered the most optimal first-line treatment.

However, although the current results suggest that antidepressant therapies do show promise in reducing symptoms of depression and anxiety in PD, there still remains concerns regarding polypharmacy, adverse drug interactions, and harmful side effects. These concerns regarding safety have ultimately resulted in an emerging interest in the utility of non-pharmacological treatment approaches for depression and anxiety in PD in recent times. The present analysis was the first to systematically examine the efficacy of non-pharmacological therapies for depression and anxiety in PD, and highlighted the potential of several non-pharmacological treatments as viable alternatives to antidepressant therapies for depression and anxiety in PD.

Although these findings must be interpreted with caution as they are based on the results of single RCTs, at this stage it would appear that there are several treatment options that warrant further research as alternatives and/or adjuncts to antidepressant therapies. The trial of Omega-3 supplementation (Moralez Da Silva et al., 2008) resulted in a significant large effect on depressive symptoms (d = .92, 95% CI = .15 to 1.69), while the trial of atomoxetine (Weintraub et al., 2010) resulted in a significant large effect on anxiety symptoms (d = 1.29, 95% CI = .71 to 1.87). In addition, the CBT trial (Dobkin et al., 2011a) resulted in the largest effect on depression in PD (d = 1.57, 95% CI = 1.06 to 2.07) over all other interventions including TCAs, as well as a large secondary effect on anxiety symptoms (d = 1.03, 95% CI = .57 to 1.50). While these results are promising, neither Omega-3 supplementation nor atomoxetine are established treatments for depression and/or anxiety in primary psychiatric populations at present. CBT, however, has extensive evidence for efficacy in the treatment of depression and anxiety in general psychiatric populations and general older adult populations. In a meta-analysis of 26 RCTs of CBT interventions for depression in older adult populations, Pinquart,

Duberstein and Lyness (2007) reported a pooled effect size of 1.12 at posttreatment against non-active controls. Moreover, CBT has been shown to be of equal efficacy to pharmacotherapy for the acute treatment of depression and anxiety in primary populations, and superior to pharmacological treatments over the long-term, with pharmacological treatments associated with an 82% increase in the relative risk of relapse of depression (NICE, 2010a; 2010b).

In recognition of the potential of CBT for depression in PD, Black (2011) recently urged researchers and clinicians alike to truly consider the utility of this 'new (old)' treatment modality as an alternate to current pharmacological regimens for depression in PD. CBT is a safe, effective and established treatment approach for depression and anxiety in primary populations that has demonstrated long-term benefits and preliminary evidence of its efficacy in PD is now emerging. When considering that the major criticisms of current first-line SSRI treatments are related to a lack of efficacy, aversive side effects and high relapse rates, it would appear that CBT offers a promising alternative approach.

2.8.2 Limitations and Direction for Future Research

There are several limitations to this meta-analysis. First, the restriction of studies to only those in English language excludes trials conducted and reported in non-English speaking countries. Direct comparison of treatment effects across studies employing different control groups (primarily placebo-controlled vs. waitlist-controlled) is a second limitation of the study. The primary limitation of this meta-analysis concerns the limited number of studies available for inclusion for analysis which has important implications for the interpretation of findings. As previously noted, while current results indicate that the pooled effect of antidepressant therapies for the treatment of depression in PD is non-significant, this result may likely represent a Type-II error given that moderate to large effect sizes were observed. Ultimately, there is a pressing need for more well-designed placebo-controlled trials of SSRIs in PD to provide a more accurate estimate of treatment effect. This is especially important given that such treatments currently constitute the first-line approach for depression and anxiety in PD. It is therefore imperative to resolve the ambiguity surrounding the efficacy of SSRIs for depression in PD to better inform clinical care. If SSRIs are to continue to be the first-line treatment for depression in

PD, there needs to be a solid empirical base to support the efficacy of such interventions in PD.

There are two other important directions for future research in the depression and anxiety treatment area. First, is an urgent need for research and treatment trials specifically for anxiety in PD. While the empirical literature for depression treatments in PD is steadily increasing, there remains no RCTs of pharmacological or psychological treatments for anxiety in PD. Anxiety and depression share an overlap of symptoms however there are core components of anxiety disorders that are distinct from depression and that require specific clinical attention. Previous research has shown that anxiety accounts for a significant proportion of unique variance in poor quality of life in PD, beyond any variance explained by depressive symptoms (Rahman et al., 2008). Thus, anxiety disorders on their own comprise a significant component of the burden of disease in PD and research and development of appropriate treatments for anxiety in PD is duly needed.

Finally, researchers developing treatments for depression and/or anxiety in PD need to also consider the use of CBT as an alternative to current pharmacological regimes. While pharmacological treatments have been heavily favoured for the treatment of depression in PD, CBT offers a safer alternative. Preliminary data indicates that CBT may be a more efficacious treatment approach than current first-line SSRI interventions however there is a pressing need for more empirical studies of CBT in PD in order to establish the true magnitude of treatment effect. Overall, this meta-analysis highlights the promise of CBT as a treatment for both depression and anxiety in PD and strongly warrants further exploration of this currently understudied treatment modality in PD.

2.9 Chapter Summary

This study was the first known meta-analysis of both pharmacological and non-pharmacological randomised placebo-controlled treatment trials for depression and/or anxiety in PD. Despite growing awareness of psychiatric and non-motor disturbances in PD, there remains a considerable dearth of empirical research in this area at the present time. An extensive literature search uncovered only nine well-designed placebo-controlled RCTs for depression in PD, and no trials specifically for anxiety. Based on the available results, it would appear that both pharmacological and non-pharmacological interventions show potential in the treatment of depression and anxiety in PD. While the pooled effects of antidepressant therapies in PD were non-significant, the moderate to large magnitude of the pooled effect for both depression and anxiety is promising. More controlled trials are required to establish a more valid and reliable estimate of the treatment effect of antidepressants in PD. CBT appears to be a particularly promising non-pharmacological approach, and the results of this meta-analysis strongly suggest that future research needs to also be directed at the development and evaluation of CBT interventions in PD. Overall, however, it is difficult to draw definitive conclusions regarding the efficacy or non-efficacy of treatments for depression in PD given the very limited amount of empirical research in this area. There is a pressing need for more well-designed placebo-controlled trials of both pharmacological and non-pharmacological treatments for depression and/or anxiety in PD, especially given the range of negative outcomes associated with both conditions in PD.

In the next chapter, the feasibility of CBT as a potentially more viable, safer and effective alternative to pharmacological treatment for both depression and anxiety in PD is more closely explored.

CHAPTER 3 | Cognitive Behavioural Therapy as a Treatment for Depression and Anxiety in Parkinson's Disease

3.1 Introduction

In recent times, increasing interest in psychotherapy as an alternate to pharmacological treatments for depression and anxiety in Parkinson's disease (PD) has emerged. In primary psychiatric populations, psychotherapy is an established treatment used to manage a wide range of psychological disturbances and the preferred method of treatment by patients (Prins et al., 2008).

Recent meta-analyses have concluded that psychotherapy used alone is equally effective as pharmacological interventions for the acute treatment of depression, panic disorder, social anxiety and generalised anxiety disorder (NICE, 2010). Moreover, the side-effect profile associated with psychotherapy is minimal to none (Dobkin et al., 2011), and long-term sustained benefits have been widely demonstrated (NICE).

Cognitive Behavioural Therapy (CBT) has been identified as a potential therapy of choice for use in PD. This chapter examines the feasibility of CBT for depression and anxiety in PD. The first part of the chapter provides a brief overview of CBT for depression and anxiety, including a review of the underpinning theoretical framework, therapy components and course of treatment. The remainder of the chapter establishes a rationale for the use of CBT in PD by reviewing the relevant theoretical and empirical literature. The chapter concludes with an empirical review of existing studies evaluating the use of CBT in PD populations and highlights promising preliminary results but. ultimately, a need for more well-designed clinical research, particularly for group CBT interventions.

3.2 Cognitive Theory

Cognitive Behavioural Therapy is an overarching term used to refer to a family of therapies guided by Aaron Beck's 'cognitive theory'. Cognitive theory was first formulated in the mid-1960s to account for the aetiology of depression and has since been applied to a wide range of psychological conditions including anxiety, personality, eating and substance disorders (Beck, 2008).

3.2.1 Psychological Disturbances in PD: A Cognitive Explanation

There is a general consensus among researchers that depressive and anxiety disorders likely manifest in PD as a result of a complex interaction between neurochemical changes inherent within the PD degenerative process and environmental stressors associated with living and coping with a chronic and progressively disabling illness (Poewe & Seppi, 2001; Serra-Mestres & Ring, 2002). However, no model accounting for this process has been proposed. The following is a proposed cognitive explanation for the occurrence of depression and anxiety in PD.

Broadly, cognitive theory proposes that at the core of psychological disturbance lies a set of dysfunctional and maladaptive attitudes or core beliefs termed 'schemas' (Clark, Beck, & Alford, 1999). These schemas form following the experience of adverse developmental events (or a single negative event) and become integrated within an individual's cognitive facilities (Beck, 2008). Schemas vary in terms of stability and salience depending on the intensity of the adverse experience(s) and are latent until activated by a major stressful event in later life or a series of smaller stressful events (Beck). Cognitive theory thus proposes a diathesis-stress model of psychopathology. Once activated, dysfunctional cognitive schemas 'hijack' normal cognitive processes to produce automatic memory, attentional and perceptual biases that are in line with dysfunctional beliefs (Beck). Ultimately, what results is a distorted and dysfunctional perception of reality which triggers as well as maintains psychological disturbance (Garrat & Ingram, 2007).

Contemporary forms of the cognitive model also acknowledge other diatheses for depression, such as the role of genetic and biological predispositions (Beck, 2008), which is particularly relevant to PD. Specifically, a number of studies have

identified a higher rate of depression among individuals carrying the short variant of the serotonin transporter gene, 5-HTTLPR (i.e., Uher, 2008). It is also widely acknowledged that underlying neurochemical changes in PD constitute a biological predisposition for developing depression and anxiety (Poewe & Seppi, 2001). The mechanisms underlying the influence of genetic and/or biological predispositions in the development of depression and anxiety are not fully understood (Beck, 2008). It is possible that a genetic and/or biological predisposition may predispose certain individuals to developing dysfunctional schemas in response to adverse developmental experiences which then act as a diathesis for depression and anxiety in later life (Path A; see Figure 3). It may also be possible that, rather than play a role in the formation of schemas, genetic and/or biological predispositions make it easier for latent schemas to become activated in response to stressful events in later life (Path B).

In terms of genetic predisposition, Beck (2008) states that an accumulating body of evidence suggests that negative cognitive biases are linked with possession of the 5-HTTLPR gene. Thus, it may be the case that genetics predispose certain individuals to developing dysfunctional self-schemas in response to adverse experiences (i.e., Path A). In terms of PD, however, it is likely that Path B represents a more likely aetiological pathway given the temporal ordering of the model. As dysfunctional schemas are proposed to develop in response to adverse developmental experiences, it is unlikely that PD (typically occurring in late-life) would have an impact on the formation of schemas. Rather, it is more likely that neurochemical changes inherent within PD *lower the activation thresholds of preformed schemas*, thus making it easier for individuals with PD to develop depression and/or anxiety in response to the many stresses, changes and challenges associated with living and coping with the illness.

The cognitive model appears to be a promising explanation that is able to account for both the elevated levels of depression and anxiety in PD relative to other medical populations (i.e., lowered schema-activation threshold due to neurochemical changes), as well as why not all individuals with PD develop depression and/or anxiety (i.e., dependent on core beliefs shaped by early developmental experiences).

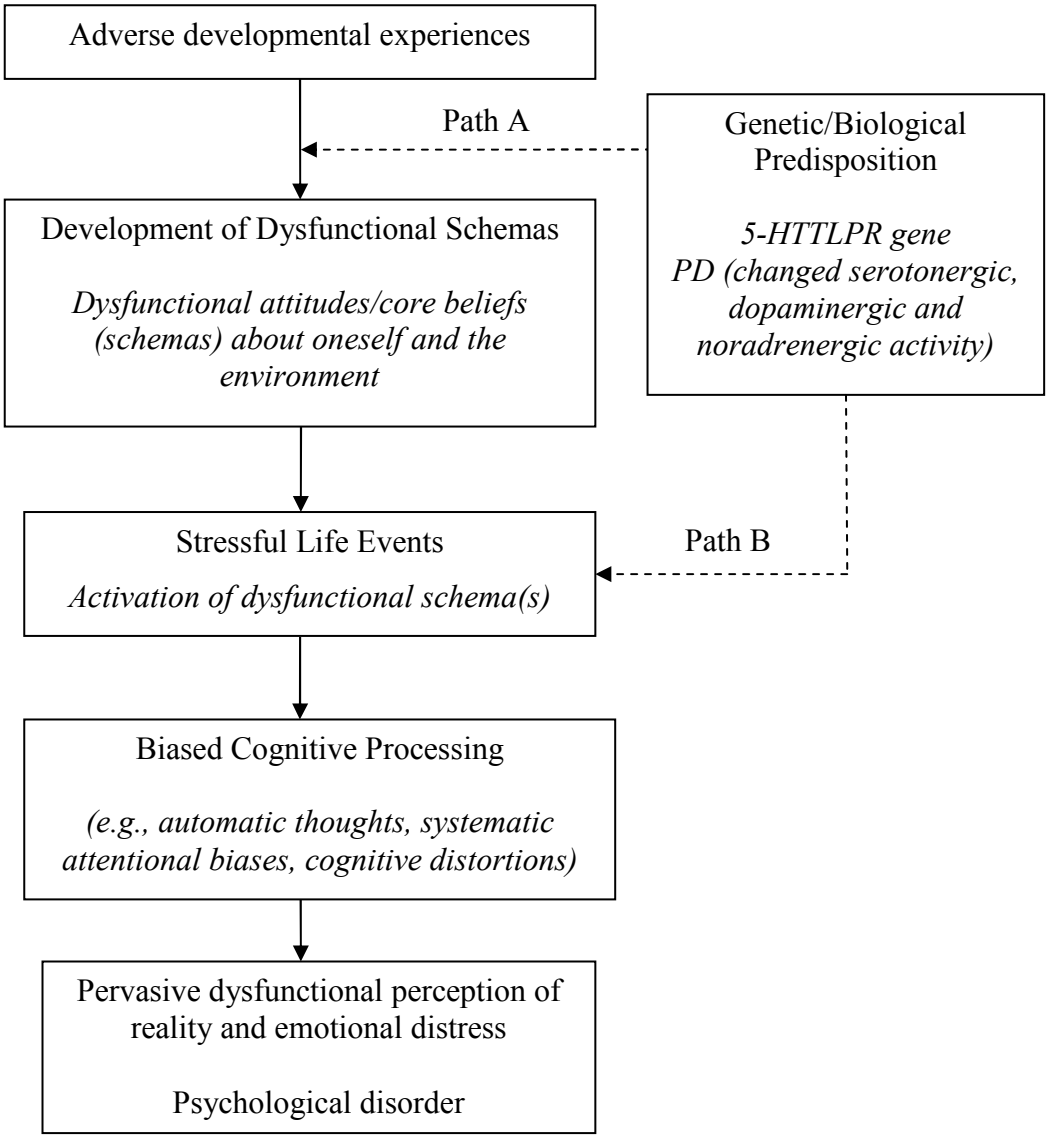


Figure 3. Cognitive Model of Psychopathology in Parkinson's Disease adapted from Beck (2008, p. 972).

Disorder-specific cognitive explanations follow the general cognitive model, however, each differ in terms of the underlying schemas postulated to be responsible for causing psychological distress.

3.2.1.1 Depressive schemas. In his pioneering work, Beck analysed the thoughts and dreams of his patients and noted a pervasive theme of negativity across their self-evaluations, evaluations of life and others, memories and expectations (Beck, 2008). Beck asserted that this negativity appeared to be the result of a

systematic cognitive bias in the way his patients processed and subsequently interpreted the world around them, and proposed that an underlying negative self-schema was ultimately responsible.

Developmental events that have been linked with adulthood depression most commonly involve the experience of some form of loss (Beck, 2008). In particular, parental loss in childhood has been commonly reported among those with severe depression (Beck). These early experiences of loss are proposed to lead to the development of negative core beliefs about oneself and the world, particularly around themes of helplessness (Abramsom, Seligman, & Teasdale, 1978) and hopelessness (Abramson, Metalsky, & Alloy, 1989). Common core beliefs observed in depression include 'I am useless', 'Nothing works out', 'Nobody cares about me' and "Things will never get better' (Westbrook et al., 2011). When activated in later-life following the experience of stressful events, these negative beliefs dominate cognitive processes and produce a systematic negative bias including; attentional bias to negative aspects of experiences, selective recall for negative aspects of experiences, blocking of positive events and memories, interpretation of everyday events in a negative light, and internalisation of negative occurrences (Garratt & Ingram, 2007; Westbrook et al.). Ultimately, what results is a pervasive and distorted negative perception of oneself, the world and the future which then triggers as well as maintains depression (Beck, 2008).

3.2.1.2 Anxiety schemas. Following successful establishment of CBT for depression, Beck, Emery and Greenberg proposed the first cognitive model of anxiety in 1985 (Beck, 2008). In this seminal formulation, Beck and colleagues posited that underlying all anxiety disorders are a set of distorted beliefs regarding personal vulnerability to some form of threat or danger (Clark, 1999). Each anxiety disorder is associated with a specific perceived threat. Salkoviskis (1985) suggested that at the centre of OCD is a set of distorted beliefs regarding responsibility for harming oneself or others. Clark (1986) proposed there is an underlying set of catastrophic misinterpretations regarding the dangers of bodily sensations in panic disorder. Underlying social anxiety disorder is suggested to be danger-oriented schemas regarding social interaction and negative evaluations from, and rejection by, others (Clark & Wells, 1995). For generalised anxiety disorder, it has been suggested

that beliefs about the threatening nature of ambiguity and uncertainty (Dugas, Gagnon, Ladoucer, & Freeston, 1998) or of worry itself (Wells & Carter, 1999) may underlie persistent worrying. When activated, these danger-oriented schemas produce perceptual, attentional and memory biases towards threat cues and lead to an overestimation of threat and danger (Beck, 2005). This pervasive perception of danger ultimately results in the feelings of fear, worry and apprehension that are seen in anxiety disorders, accompanied by a range of dysfunctional safety behaviours to minimise such fears accordingly (Salkovskis, 1991).

3.3 Cognitive Behavioural Therapy for Depression and Anxiety

Depression and anxiety commonly co-occur and there a number of similarities in the cognitive distortions and coping behaviours present in both conditions. Individuals with anxiety believe that some sort of undesirable event is about to occur and react to this belief with fear, worry and apprehension, while individuals with depression typically believe that an undesirable event has already occurred and that they are helpless and their lives hopeless (Beck, 2008). In both situations, the primary dysfunctional coping behaviour is withdrawal and/or avoidance (Westbrook et al., 2011). Thus, it is often helpful to address the two conditions together in treatment.

3.3.1 CBT Overview

CBT is a broad term referring to a family of therapies directly derived from the cognitive framework of psychopathology and employing a combination of cognitive and behavioural techniques (Martin, 2007). The central premise of cognitive theory is that psychological disorders are manifestations of underlying cognitive distortions. Thus, cognitive change is the proposed key to achieving symptomatic relief as well as the primary aim of any CBT treatment (Brewin, 1996).

CBT treatments are highly structured, time-limited and problem-oriented (Lipchik, Smitherman, Penzien, & Holyroyd, 2006). Sessions generally last between one to two hours and follow a strict agenda beginning with agenda setting, homework review, session content, goal setting, setting of homework assignments

and ending with a session summary. The structure of CBT serves to increase the efficiency of the treatment process, facilitates learning for the client, combats inertia, and allows each session to focus on specific problems and potential solutions (Wright, 2006). CBT is also centred on a highly collaborative therapeutic relationship. Both client and clinician are seen as equal contributors to therapy and the client is actively involved in all aspects of treatment from case formulation to selection of treatment strategies and goals (Westbrook et al., 2011). This collaborative method ultimately encourages clients to take an active role in the process of change (Wright).

The key treatment components of CBT are psychoeducation, cognitive therapy, behavioural interventions and between-session tasks (or homework). The collective aim of these strategies is to identify and challenge dysfunctional thinking and core beliefs. Psychoeducation is used to explain the cognitive model and associated concepts to the client. Cognitive therapy is used to directly target dysfunctional automatic thoughts and core beliefs. Behavioural experiments are used to test the validity of automatic thoughts and dysfunctional core beliefs (e.g., through behavioural experiments) as well as to target dysfunctional behaviours and shape healthy behaviours. Homework is used to consolidate learning of in-session content and skills and encourages clients to be active in the process of change. Research suggests that clients who consistently complete homework tasks are more likely to benefit from CBT (Burns & Nolen-Hoeksema, 1992).

3.3.1 Course of Treatment

CBT for depression and anxiety typically adheres to the following course of treatment; (1) identification of specific problems and goals for therapy, (2) case formulation, (3) simple cognitive and behavioural strategies, (4) identifying and challenging automatic thoughts, and (5) identification and modification of dysfunctional core beliefs (Westbrook et al., 2011).

3.3.1.1 Initial stages of therapy. The initial therapy sessions are concerned with conceptualising the client's problems, establishing specific treatment goals and providing some immediate symptomatic relief. Simple cognitive strategies such as distraction and counting thoughts, are introduced to temporarily reduce unwanted

cognitions and provide some relief from depression and anxiety (Westbrook et al., 2011). These strategies are also useful for helping clients begin to increase objectivity and distance themselves from their thoughts (Westbrook et al.). Behavioural techniques such as relaxation training are also frequently used in the early stages of therapy to provide relief from stress and tension and improve sleep quality. Behavioural activation is a third strategy that is often employed in the early stages of CBT for depression and anxiety to target inactivity and avoidance behaviours. Various activities are systematically planned across the client's day. Scheduling activities counteracts inertia and loss of motivation, prevents excessive rumination, as well as promotes feelings of pleasure, enjoyment and a sense of accomplishment on a daily basis (Rupke, Blecke, & Renfrow, 2006).

3.3.1.2 Cognitive therapy. The central therapeutic work in CBT for depression and anxiety is aimed at identifying and challenging automatic thoughts and dysfunctional core beliefs. Cognitive therapy is the primary strategy used to help clients modify dysfunctional thinking patterns (Lipchik et al., 2006). There are five steps involved; (1) monitoring and becoming aware of automatic thoughts, (2) identification of cognitive biases, (3) appraisal of cognitive biases, (4) developing more balanced perspectives, and (5) modifying core beliefs (Beck et al., 1979).

In the first stage, the cognitive paradigm is introduced through psychoeducation and the clinician helps the client to become aware of their automatic thoughts and the connections between cognitions, affect and behaviour. In the second stage, the client and clinician work together to identify cognitive biases or errors present in the clients' thinking. Cognitive biases include extreme thinking (e.g., all-or-nothing thinking, having unrealistic expectations), selective attention (e.g., picking out and dwelling on a single negative, dismissing positives and exaggerating negatives), relying on intuition and self-reproaching thinking (e.g., self-blame; Westbrook et al., 2011). The next stage is appraisal. In this step the client and clinician work together to challenge the validity of maladaptive thoughts by testing them and gathering evidence for and against the clients' thoughts. The aim of this stage is for clients to realise that their thoughts are subjective *opinions* that have been distorted because of the beliefs they hold rather than objective statements of truth (Westbrook et al.). In the next stage, a more balanced way of thinking is developed.

Using the evidence generated in the appraisal stage, the client is asked to generate an alternate, more objective, perspective of the situation. In the final stage, the client and clinician work together to identify the clients' core beliefs that are responsible for eliciting automatic thoughts. Once identified, core beliefs can be tested and challenged in much the same way as automatic thoughts (Wright, 2006).

3.3.1.3 Behavioural interventions. Behavioural tasks are an important component of CBT. Increasing evidence has shown that behavioural change is often directly related to a corresponding change in cognition (Chambless & Gracely, 1988; DeRubels et al., 1990). Thus, behavioural techniques employed in CBT focus on altering dysfunctional behaviour as a means of altering underlying maladaptive thought processes (Garrat & Ingram, 2007). In addition to tasks that target dysfunctional behaviours and shape more healthy behaviours (e.g., activity scheduling) behavioural techniques can also be used to test the validity of automatic thoughts and core beliefs in depression and anxiety (Westbrook et al., 2011). Specific techniques include behavioural experiments and exposure and response prevention (ERP). Behavioural experiments are learning experiences designed to test specific thoughts or assumptions and need to be controlled to ensure positive outcomes in order to prevent further reinforcement of the client's dysfunctional beliefs (Westbrook et al.). ERP is a common technique used for OCD (Westbrook et al.). ERP involves exposing the client to their feared situation and preventing the usual accompanying safety behaviour. In CBT, the aim of ERP is to test and challenge the validity of the client's thoughts and assumptions rather than to habituate the fear response as in more classic behavioural interventions (Westbrook et al.). As with behavioural experiments, ERP needs to be conducted in controlled settings to ensure a positive outcome so as to not reinforce dysfunctional beliefs.

3.3.1.4 Relapse prevention. In addition to targeting dysfunctional thoughts and beliefs, CBT focuses on enhancing the client's problem-solving skills as a means of preventing relapse. Individuals with depression (and to a lesser extent anxiety) have been shown to display deficits in problem-solving (Mynors-Wallis et al., 2000). Structured problem-solving techniques encourage clients to take an active role in the management of their depression and promote feelings of accomplishment and satisfaction. Structured problem-solving involves the identification of a problem that

the client is currently experiencing, generating a list of possible solutions and then narrowing it down to the most plausible option (Westbrook et al., 2011). Practicing structured problem-solving throughout therapy ultimately equips clients with the tools to be able to resolve problems on their own once therapy has ended and therefore protects against relapse (Lipchik et al., 2006).

3.3.2 Treatment Format

CBT can be delivered in a number of different formats and at varying levels of intensity. The NICE (2010) classify individual and group CBT as high intensity psychological interventions, while low intensity CBT interventions include guided self-administered CBT and computerised CBT (CCBT). Individual CBT is often the preferred format of therapy as it allows tailoring of treatment to meet individual needs. Clients work closely with a clinician and therefore have more privacy as well as the opportunity to build a stronger therapeutic relationship. Group CBT treatments consist of between 4 to 10 clients per group, are highly structured and facilitated by two therapists. Group CBT has a strong psychoeducational element and aims to equip clients with techniques and strategies to self-manage symptoms. Group CBT is particularly advantageous for improving social skills and increasing social support as it provides an opportunity for people experiencing similar struggles to share and work through their problems together. Low intensity CBT interventions are most suitable for people with milder psychological difficulties (NICE). Self-help and guided self-help forms of CBT involve providing the client with written materials to teach them to self-manage their condition(s). CCBT interventions are delivered using computer- or internet-based programmes and differ from self-help programmes in that they are interactive and require input from the client. CCBT can be used as a standalone treatment or as an adjunct to individual or group treatment (NICE).

3.4 Theoretical Rationale for CBT for Depression and Anxiety in PD

There are sound theoretical and clinical reasons for considering the application of CBT in PD populations. In a review of CBT for PD, Laidlaw (2008) highlighted several treatment characteristics that make CBT a ‘potentially very effective’ treatment option for psychological disturbances in PD. These include; (1) a

here-and-now focus on current concerns and difficulties, (2) ability to target illness-related concerns, (3) enhancement of problem-solving skills and ability to deal with increasingly difficult challenges with disease progression, and (4) enhancement of social engagement and support.

3.4.1 Present-Focused and Problem-Oriented Therapy

Older adults are significantly more 'set in their ways' and have stronger and more established personalities than younger adults (Steuer et al., 1984). Thus, the problem-oriented approach in CBT may be more appealing, relevant and engaging for older adults as it focuses on skill-building rather than personality change (Steuer & Hammen, 1983). In addition, older adults can present with histories of psychological difficulties spanning several decades, and Laidlaw (2006) states that there is often less therapeutic gain to be made by focussing on historical issues. Thus, the present-focused approach in CBT which targets current problems and maintenance factors may be more beneficial in providing symptomatic relief for older adults when compared with other forms of psychotherapy that place a larger emphasis on background issues (Laidlaw & McAlpine, 2008).

3.4.2 Illness-Related Concerns

Previous studies have found that illness-related concerns feature prominently in both depression and anxiety in PD (Brook & Doder, 2000). Higher rates of sadness, pessimism, and dysphoria have been observed in depression in PD and linked with hopelessness and helplessness in regards to having PD (McDonald et al., 2003). Similarly, predominant concerns in anxiety in PD have been found to focus on the unpredictability of motor symptoms, the uncertainty of prognosis, and the perceptions of others towards PD (Backer, 2000). While illness-related concerns are common and expected among those with medical illnesses, it has been suggested that individuals with depression and anxiety and comorbid medical illness tend to have distorted and/or exaggerated beliefs regarding their illness and/or their ability to cope. For example, Evans (2007) states that older people with depression and anxiety and comorbid physical illness tend to ruminate about physical limitations and develop exaggerated beliefs about their level of functional impairment which consequently affects their confidence. As a result, these individuals tend to become more passive and isolated which further contributes to depression and anxiety as well

as increases functional impairment. Similarly, rumination about the future and the prognosis of PD can be a significant source of depression and anxiety for many individuals with PD (Cole & Vaughan, 2005). However, it is often not the future in itself that is threatening or distressing but rather what the individual believes will occur. Individuals with depression and anxiety have been shown to have a grossly distorted image of future events as well as to underestimate their capacity to cope accordingly which is what ultimately contributes to emotional distress (Cole & Vaughan). Anxiety and panic over motor symptoms is another common feature in anxiety in PD. It has been suggested that an underestimation of one's capacity to cope with motor symptoms and bodily changes may underlie this panic (Evans).

While pharmacotherapy is able to bring about symptomatic relief (e.g., improve sleep and mood and reduce tension), illness-related concerns are largely unaddressed. The primary benefit of CBT over pharmacotherapy is its ability to directly address illness-related concerns and any cognitive distortions. Cognitive therapy can be used to identify and correct any distortions and/or exaggerations in thinking while behavioural experiments may be particularly useful to build confidence and show clients what they are capable of achieving in spite of physical limitations (Cole & Vaughan, 2005). CBT is able to help clients develop a realistic yet hopeful perspective of life with PD which acknowledges loss and limitations but at the same time encourages the highest possible level of functioning (Evans, 2007).

3.4.3 Problem Solving and Active Coping

Thompson (1996) states that transition points and loss are the two most common events which trigger depression for older adults. The progressive nature of PD means that individuals with PD will inevitably be faced with several transition points throughout their illness, have to encounter increasingly difficult challenges, and be confronted with the progressive loss of health and well-being. Thus, self-management skills are vital to prevent relapse. The problem-solving and active coping components of CBT have been suggested to be particularly helpful in this regard, by providing individuals with PD with the necessary skill set to be able to deal with inevitable future problems as they arise (Laidlaw & McAlpine, 2008).

3.4.4 Social Engagement and Support

Finally, social isolation and inadequate social support have been identified as significant risk as well as maintenance factors for depression among older adults (Dean, Kolody, & Wood, 1990; Glass, Mendes de Leon, Bassuk, & Berkman, 2006; Oxman & Hull, 1997). CBT may therefore be particularly useful for use in PD as it encourages social engagement through strategies such as behavioural activation and activity scheduling (Westbrook et al., 2011). The aim of these strategies is to increase positive reinforcement and foster a sense of pleasure, accomplishment and mastery. Engagement with others also creates the potential to build meaningful relationships and ultimately enhance social support. In particular, Thompson and colleagues (2000) state that group CBT interventions are highly suited for older adults who tend to experience less social contact than younger adults. Group CBT not only increases social contact for older adults but also reduces any stigma associated with depression and anxiety and psychological treatment as clients are able to meet others who are experiencing similar difficulties.

3.5 Empirical Rationale for CBT for Depression and Anxiety in PD

The empirical rationale for the use of CBT for depression and anxiety in PD populations is strong. In an examination of the feasibility of CBT for the treatment of depression in PD, Cole and Vaughan (2005) highlighted three main findings supporting the use of CBT as an alternate to pharmacological treatments for depression and anxiety in PD. First, CBT is equally effective as pharmacotherapy for depression and anxiety in primary populations. Second, there is considerable evidence supporting the safety and efficacy of CBT in older adult populations and third, an increasing body of research also suggests that CBT is effective with individuals with various chronic, motor and neurological diseases.

3.5.1 CBT versus Pharmacotherapy in Primary Populations

As discussed in Chapter 2.8, CBT is an established treatment for depression and anxiety that has demonstrated efficacy in primary populations. The National Institute of Health and Clinical Excellence (NICE; 2010a) currently reports a large effect (d = .89) for CBT for depression in primary populations against waitlist

controls. Similarly, CBT is currently recommended by the NICE (2010b) as the most effective psychological treatment for anxiety disorders, particularly GAD and panic disorder. A mean large effect (d = 1.09) on anxiety has been reported for CBT for GAD and panic disorder against waitlist controls at post-treatment (NICE).

In regards to the comparative efficacy of CBT and pharmacotherapy, the NICE (2010a, 2010b) reports a broad equivalence between the two treatment modes for the acute treatment of depression and anxiety in primary psychiatric populations. However, CBT is generally more effective over the long-term and in regards to relapse prevention. Treatment by antidepressants was found to be associated with an 82% increase in the risk of relapse of depression compared with CBT treatment (NICE). CBT has also been shown to be superior to TCAs and SSRIs in maintaining acute treatment gains for anxiety, with Heimberg and colleagues (1994) reporting that all participants who received CBT in their study were found to maintain treatment gains at 6-month follow-up compared to only half of the group treated with the antidepressant phenelzine.

Moreover, studies examining the efficacy of combined CBT and antidepressant treatment highlight a benefit for adding CBT to pharmacological regimens. Across nine studies, it was found that combined CBT and pharmacotherapy had a significant medium effect over pharmacological treatment alone (NICE, 2010). Combined treatment was also associated with a lower risk of treatment discontinuation. In contrast, six studies comparing combined antidepressant and CBT treatment with sole CBT interventions reported no significant between-group differences on BDI and Ham-D scores at post-treatment and one-month follow-up (NICE). Thus, while additional clinical benefits can be derived from adding CBT to pharmacological regimes, there appears to be no such benefit for adding antidepressants to CBT regimens.

Collectively, these findings indicate that while there is a broad equivalence between the efficacy of CBT and various pharmacological treatments for depression and anxiety in the acute phase of treatment, lower discontinuation rates associated with CBT along with demonstrated sustained long-term benefits suggest that CBT is a more beneficial treatment overall.

3.5.2 CBT for Depression and Anxiety in Older Adult Populations

An increasing empirical body of research also supports the use of CBT as a treatment for depression and anxiety in older adult populations. In the most recently published meta-analysis comparing various pharmacological and psychological treatments for depression in older adults aged over 60 years, Pinquart, Duberstein and Lyness (2007a) found that CBT was the most effective treatment for clinician-rated depression. A mean effect size of 1.12 at post-treatment was reported for CBT versus control across 26 studies, compared to a mean effect size of .69 for pharmacological treatments against a control across 77 studies. In addition, CBT was also found to be more effective for older adult depression than other forms of psychotherapy including psychodynamic therapy (d = .76), interpersonal therapy (d = .14) and supportive psychotherapy (d = .57; Pinquart, Duberstein, & Lyness, 2007b). CBT was also found to have a large long-term effect (i.e., 6-month follow-up or longer) on depression in older adults across four studies (d = .93). A higher drop-out rate was reported for CBT among older adults compared to general adult primary populations, however, with Pinquart and colleagues reporting average probability of discontinuation in CBT with older adults to be 29% across 25 studies.

Two further randomised controlled trials of CBT for older adult depression have since been published. Laidlaw and colleagues (2008) compared CBT against treatment as usual (TAU) for depression in a sample of 44 older adults aged 60 years and over with mild to moderate MDD. TAU was defined as standard clinical care. Significant reductions on all primary outcome variables were reported for both CBT and TAU at post-treatment, 3-month and 6-month follow-ups however, no significant differences were found between CBT and TAU across any of the measured time-points. Thus, contrary to the findings of Pinquart and colleagues' earlier meta-analysis, there was a broad equivalence between CBT and TAU. Examination of the percentage of participants meeting diagnostic criteria for MDD across each study time-point highlighted a benefit for CBT over TAU, however. At 6-month follow-up, 27% of CBT participants still met diagnostic criteria for MDD compared to 53% of TAU participants. Wilkinson and colleagues (2009) compared a brief group CBT intervention against TAU specifically for relapse prevention of depression in older adults aged 60 years and over. Overall, CBT was found to be associated with a 30% reduction in the risk of relapse of depression among older adults.

CBT has also been shown to be an effective treatment for older adult anxiety. In the most recent meta-analysis of CBT for anxiety (GAD, panic disorder, social anxiety disorder and anxiety DNOS) in older adults aged over 60 years, Hendriks, Voshaar, Keijsers, Hoogduin, and van Balkom (2008) reported a pooled standardised mean effect size of .44 for CBT compared to waitlist controls and .51 for CBT compared to active controls. Thus, on average, CBT demonstrated a significant moderate effect in reducing anxiety symptom severity in older adult populations. However, this reported effect does not appear to be as strong as has been demonstrated in general adult populations (i.e., $d = 1.09$; NICE, 2010b). While CBT has been shown to be of equal or higher efficacy than benzodiazepine, SSRI and TCA treatment for anxiety in primary populations, Pinquart and Duberstein (2007) found that SSRIs ($d = 1.68$) and benzodiazepines ($d = 1.76$) were both significantly more effective than CBT for the acute treatment of anxiety in older adults. At six-month follow-up, this difference was no longer statistically significant however and treatment gains were maintained for all pharmacotherapy and CBT groups. In respect to treatment discontinuation, Pinquart and Duberstein (2007) found no significant differences between drop-out rates for CBT (27%) and pharmacotherapy (22%), although a slightly higher attrition rate was associated with CBT.

Overall, these findings suggest that CBT is effective in alleviating anxiety in older adults. However, a number of researchers have suggested that the observed reduced efficacy of CBT in older adult populations highlights the need for specific adaptations of standard CBT for anxiety protocols to enhance learning for older adults (i.e., Ayers, Sorrell, Thorp, & Wetherell, 2007; Mohlman, 2004; Wolitzky-Taylor, Castriotta, Lenze, Stanley, & Craske, 2010).

3.5.3 CBT for Depression and Anxiety with Individuals with Chronic Illnesses

Finally, there is also evidence to suggest that CBT is an effective treatment for anxiety and, particularly, depression in individuals with various chronic illnesses including; chronic pain (e.g., Morley, Eccleston, & Williams, 1999), multiple sclerosis (e.g., Mohr, Boudewynn, Goodkin, Bostrom, & Epstein, 2001) stroke (e.g., Hackett, Anderson, & House, 2004), Type II diabetes (e.g., Gonzalez et al., 2010), HIV (e.g., Safren et al., 2009) and rheumatoid arthritis (e.g., Sharpe, Sensky, Timberlake, Ryan, & Allard, 2003).

Currently, the NICE (2010) recommends low-intensity CBT interventions (e.g., self-guided CBT and CCBT) for sub-clinical and mild depression, and both individual and group CBT for moderate, severe and complex depression in individuals with chronic physical illness. In a review of five RCTs of individual CBT versus standard care for depression in coeliac disease, multiple sclerosis and cancer (i.e., Addolorato et al., 2004; Manne et al., 2008; Mohr et al., 2000; Savard et al., 2006), the NICE reports a statistically significant moderate to large effect favouring CBT at post-treatment (d = .84). Further, individual CBT was associated with 37% reduction in the risk of non-remission at post-treatment relative to standard care. At 6-month follow-up, however, the effect of CBT over standard care was reduced to a small size (d = .07). In addition, group CBT has been found to have a significant moderate effect on depression (d = .54) over standard care at post-treatment across 10 studies in chronic illness populations including HIV, epilepsy, cancer, diabetes, multiple sclerosis and renal disease (i.e., Antoni et al., 2006; Chesney et al., 2003; Davis et al., 1984; Evans et al., 1995; Heckman & Carlson, 2007; Larcombe & Wilson, 1984; Lii, Tsay, & Wang, 2007). Group CBT was also associated with a 59% reduction in the risk of non-remission at post-treatment relative to standard care. However, there appears to be no significant difference between group CBT and other psychosocial interventions (e.g., health education and peer support) for depression in chronic illness populations including HIV, cancer and cardiovascular disease across five studies (i.e., Chesney et al.; Evans et al., Heckman et al., Kunik et al., 2008).

There have been fewer studies evaluating the use of CBT for the treatment of anxiety in chronic illness populations in comparison to depression. However, the available results are promising. For example, Kunik and colleagues (2001) compared a single 2-hour group CBT session with an educational intervention for the treatment of anxiety in older adults with chronic obstructive pulmonary disease (COPD). At 6-week follow-up, it was found that participants in the CBT group showed significantly greater reductions in anxiety as rated by the BAI compared to the control group. Similarly, a more recent study also evaluating CBT for anxiety in COPD (i.e., Kunik et al., 2008) found that an 8-week group CBT intervention was effective in reducing BAI scores at post-treatment. However, there was no significant difference between the CBT and control group (educational intervention). Shemesh and colleagues (2006) evaluated the use of individual CBT for the treatment of posttraumatic stress

symptoms in individuals with ischemic heart disease who have had a myocardial infarction. At 6-month follow-up, participants in the CBT intervention experienced a 57% improvement in anxiety symptoms on average, while those in the control condition showed no significant difference from pre-treatment to follow-up. Finally, Kostis, Rosen, Cosgrove, Shindler and Wilson (1994) examined the effect of combined exercise training, CBT and dietary control on depression and anxiety in individuals with congestive heart failure compared to a pharmacological intervention and placebo. At 12-week follow-up, statistically significant reductions in Ham-A scores and BDI depression scores were observed for the intervention group while in contrast, participants who received pharmacotherapy or placebo evidenced deterioration in anxiety and depression. Due to the multidisciplinary nature of the study intervention, however, it is not possible to conclude whether CBT was exclusively responsible for reducing anxiety and depression. Nevertheless, these results provide promising preliminary support for the efficacy of CBT in the treatment of anxiety across various chronic illnesses.

3.6 Potential Limitations and Modifications of CBT in PD

As it can be seen, there is a strong theoretical and empirical rationale for the use of CBT for the treatment of depressive and anxiety disorders in PD. However, there are several potential limitations of CBT that need to be addressed in order to optimise CBT for people with PD.

First, and arguably most importantly, cognitive changes and impairment inherent in PD need to be addressed. Cognitive modification is the core therapeutic strategy in CBT and requires clients to be able to directly assess and manipulate their cognitions. Therefore, CBT will not be suitable for all individuals with PD given the high occurrence of cognitive impairment in PD. Up to 30% of people with PD experience overt dementia while up to 50% are likely to experience mild cognitive impairment (Ferreri et al., 2006). Symptoms of cognitive impairment in PD can include impairments in executive functioning, visuospatial ability, attentional and language functioning (Camicioli & Fisher, 2004). In addition, small but significant declines in cognitive capacity are observed as part of the normal human ageing

process. Screening for cognitive impairment is therefore imperative to determine an individual's suitability for CBT, with individuals experiencing moderate or severe cognitive impairment not likely to fully benefit from CBT. Individuals with mild cognitive impairment may still benefit from CBT, but it may be necessary to implement various procedural modifications to enhance learning for clients including frequent repetition of key concepts, frequent summaries and reviews of content covered, and multimodal delivery of information (e.g., audio and visual; Evans). Psychoeducation material and homework tasks may similarly need to be summarised and reduced down to enhance learning for clients.

Other procedural modifications to accommodate PD symptoms also need to be considered. For example, individuals with PD often experience difficulties with fine motor skills due to tremor of the limbs and therefore tasks such as handwriting can be effortful. A reduction of in-session writing may be a useful modification. Verbal and non-verbal communication is also often affected in PD therefore the pace of therapy may need to be slowed. The structure of the therapy sessions may also need to be modified to allow for regular breaks to enable clients to attend to PD-related needs such as taking medications or relieving restless legs.

Finally, content modifications also need to be implemented in order to increase the relevance of the CBT programme to clients' problems and concerns. Given that the symptom profile of depression and anxiety in PD has been found to differ from that observed in general populations with a greater emphasis on illness-related concerns (McDonald et al., 2003), CBT in this population needs to also involve conceptual modifications to address health beliefs and beliefs about disability and living with PD. For example, it would be useful to modify any examples used in the standard CBT protocol to be PD-relevant. In addition, the inclusion of PD-specific activities and discussions which address common concerns in PD such as the fear of falling, anxiety regarding motor symptoms, eating in public, uncertainty regarding prognosis and the future may enhance the effectiveness of CBT in PD populations.

3.7 Cognitive Behavioural Therapy in Parkinson's Disease: An Empirical Review

In recognition of the potential of CBT in treating depression and anxiety in PD populations, several clinical studies of CBT in PD have emerged in recent times. Overall, the collective results of these studies suggest that CBT is a relevant and efficacious treatment for depression and anxiety as well as other psychological problems in PD. In the following section, a review of existing studies evaluating the use of CBT in PD populations is presented.

3.7.1 Overview of Studies of CBT in PD

There have been 21 published experimental studies of CBT for depression and/or anxiety in PD to date (see Table 10). Sixteen studies evaluated specific CBT interventions in PD while the remaining four incorporated CBT elements into educational programmes. Of the 16 specific interventions, 10 targeted individuals with PD with a clinical diagnosis of depression and/or anxiety. The remaining six studies evaluated the use of CBT for the treatment of depressive and/or anxiety symptoms in people with PD in general (i.e., participants did not necessarily have a clinical diagnosis of depression and/or anxiety). CBT interventions that have been tested in PD populations for depression and/or anxiety include individual CBT, group CBT, home-based self-help CBT and telephone-administered CBT. The majority have been preliminary studies employing case study (n = 4; 20%), case series (n = 4; 20%) or uncontrolled trial designs (n = 8; 40%). There has been one controlled trial of CBT in PD (5%), and two randomised controlled trials (RCT; 15%), although only one of these was designed specifically for clinical depression and/or anxiety in PD (i.e., Dobkin et al., 2011).

3.7.2 CBT for Clinical Depression and/or Anxiety in PD

There have been 11 studies evaluating the use of CBT for individuals with PD and a comorbid clinical diagnosis of depression and/or anxiety (i.e., Dobkin, Allen, & Menza, 2006; Dobkin, Allen, & Menza, 2007; Dobkin et al., 2011a; Dobkin et al, 2011b; Farabaugh et al., 2010; Feeney, Egan, & Gasson, 2005; Gupta, 2000; Heinrichs, Hoffman, & Hofmann, 2001; Laidlaw, Thompson, Dick-Siskin, & Gallagher- Thompson, 2003; Leroi & King, 2008; Mohlman et al., 2010).

Table 10
Experimental Studies of CBT in PD

First Author	Year	Design	Intervention	PD Specific?	Participants	Primary Outcomes
A'Campo	2010	RCT (Treatment vs. usual care)	Group education with CBT (8 sessions)		64 PD (35 Intervention; 29 Control)	Depression (SDS); Quality of life (PDQ-39);
Cole	2005	Case series	Self-help CBT (7 sessions)	Yes	5 PD with elevated GDS depression scores	Depression (BDI, GDS); Quality of life (PDQoL-Q)
Dobkin	2006	Case series	Individual CBT	Yes	3 PD with MDD	Depression (Ham-D, BDI); Negative cognitions (IQ); Anxiety (STAI); Social support (AIFQ)
Dobkin	2007	Uncontrolled trial	Individual CBT (10-14 sessions)	Yes	15 PD with MDD	Depression (Ham-D, BDI); Anxiety (STAI); Negative cognitions (IQ); Social support (AIFQ)
Dobkin	2011a	RCT (CBT vs. clinical monitoring)	Individual CBT (10 sessions)	Yes	80 PD with MDD, dysthymia or DDNOS (41 CBT; 39 Control)	Depression (Ham-D, BDI), Anxiety (Ham-A); Negative cognitions (IQ); Quality of life (SF-36); PD symptoms (UPDRS)
Dobkin	2011b	Uncontrolled trial	Telephone CBT (10 sessions)	Yes	21 PD with MDD, dysthymisa or DDNOS	Depression (Ham-D, BDI), Anxiety (Ham-A), Quality of life (SF-36), Negative cognitions (IQ)
Dreisig	1999	Controlled trial (CBT vs.TAU)	Individual CT (6 sessions)	No	79 PD (9 CT; 70 Control)	Depression (SDS, MDI), psychological symptoms (PPQ)
Ellgring	1993	Uncontrolled trial	Group CBT (5 to 8 sessions)	Yes	34 PD	Interviewer assessment
Farabaugh	2010	Uncontrolled trial	Individual CBT (12 sessions)	No	8 PD with MDD	Depression (Ham-D); Quality of life (SF-36); Negative cognitions (DAS, ATQ-R; Stress (PSS)

First Author	Year	Design	Intervention	PD Specific?	Participants	Primary Outcomes
Feeney	2005	Case series	Group CBT (8 sessions)	No	4 PD with depression and/or anxiety	Depression (BDI-II), anxiety (STAI)
Fitzpatrick	2010	Uncontrolled trial	Group MBCT (8 sessions)	No	12 PD	Qualitative analysis
Gupta	2000	Case study	Individual CBT	N/A	1 PD with MDD	Clinician's assessment
Heinrichs	2001	Case study	Group CBT	No	1 PD with social anxiety disorder	Anxiety (STAI; FAQ; LSAS)
Laidlaw	2003	Case study	Individual CBT	Yes	1 PD with MDD	Clinician's assessment
Leroi	2008	Uncontrolled trial	Individual CBT (6 to 10 sessions)	Yes	8 PD with depression and/or anxiety	Global Assessment Scale (GAS)
Macht	2007a	Case series	Individual CBT	Yes	3 PD	Clinician's assessment
Macht	2007b	Uncontrolled trial	Group education with CBT elements		151 PD	Depression (SDS); Quality of life (PDQ-39),
Mohlman	2010	Case study	Individual CBT/APT	No	1 PD with GAD	Anxiety (Ham-A, PSWQ; PSWQ, STAI); Depression (Ham-D, BDI)
Simons	2006	Uncontrolled trial	Group education with CBT (8 sessions)		22 PD	PD symptoms (UPDRS), Quality of life (PDQ-39); Depression (SDS);
Trend	2002	Uncontrolled trial	Individual rehabilitation with CBT (6 sessions)		118 PD	Depression and anxiety (HADS); Quality of life (Euroqol-5D)
Veazey	2009	Case series (CBT vs. Support)	Telephone CBT 8 phone sessions)	No	10 PD (5 CBT; 5 Control)	Anxiety (BAI); Depression (PHQ-9); Quality of life (PDQ-39)

Six studies focused specifically on the treatment of depression in PD, one study examined CBT as a treatment for social anxiety in PD (i.e., Heinrichs et al.), one evaluated the use of CBT in treating GAD in PD (i.e., Mohlman et al.), and three studies examined CBT in the treatment of comorbid depression and anxiety in PD (i.e., Feeney et al.; Laidlaw et al.; Leroi & King).

3.7.2.1 Case studies and case series. Four case studies and two case series of CBT for depression and/or anxiety in PD have been published. Gupta (2000) was the first to examine the effect of CBT for clinical depression in PD. He provided a brief anecdotal account of his experience in delivering individual home-based CBT to a 90 year old man with PD and MDD. Significant improvements in depression symptom severity and activity levels were reported following several CBT sessions, although how this improvement was measured was not reported. Similarly, Laidlaw and colleagues (2003) explored the effect of a PD-specific individual CBT intervention on depression in an individual with PD and MDD who was unresponsive to initial antidepressant medication. CBT was reported to reduce depression, anxiety and insomnia and significantly increase activity levels according to the clinician's judgement.

Two case studies of CBT for the treatment of anxiety disorders in PD have also been presented. Heinrichs and colleagues (2001) examined the use of a group CBT intervention in treating social anxiety in a 60 year old man with PD whose predominant social fears centred on others noticing his PD tremor and looking foolish in public. The intervention was a standard group CBT for social anxiety programme and the client with PD was entered into a group with four other individuals without PD. Main treatment components included repeated in vivo exposure in session, video feedback, didactic training and mirror exposure. At posttreatment, significant improvements on several measures of social anxiety were noted (e.g., LSAS, SPAI, FQ) as well as for the BDI and STAI, and these gains were all maintained at 6-month follow-up. Further, independent assessments using the ADIS-IV revealed that the client had subclinical social phobia at posttreatment and no clinical diagnosis of social phobia at 6-month follow-up. Mohlman and colleagues (2010) examined the effect of a combined individual CBT and Attention Process Training (CBT/APT) intervention in treating a 74 year old man with PD with GAD

and memory and attentional deficits. Main CBT components included standard cognitive restructuring, progressive muscle relaxation, and exposure. APT techniques were aimed at improving cognitive skills rather than anxiety. At posttreatment, the client no longer met clinical criteria for GAD and showed marked reductions on all anxiety measures (Ham-A, PSWQ, STAI, BAI) as well as reductions in depressive symptoms (Ham-D, BDI).

There have been two case series of CBT for depression and/or anxiety in PD. Feeney and colleagues (2005) examined the effect of a group CBT intervention for four individuals with PD and comorbid depression and anxiety. Minor procedural adaptations were implemented to accommodate motor symptoms but there were no conceptual modifications. At 1-month follow-up, three participants demonstrated clinically significant improvement in depression (BDI-II), although they did not recover. The remaining participant showed deterioration in depression at both post-treatment and follow-up. In regards to anxiety, two participants showed clinically significant improvement in anxiety (STAI) at 1-month follow-up, while the remaining two participants' anxiety symptom severity remained unchanged. Dobkin and colleagues (2006) evaluated the use of individual CBT for treating depression in three adults with PD and comorbid recurrent MDD. The intervention was adapted to address PD-specific issues and included training in stress management, behavioural activation, sleep hygiene, relaxation techniques and cognitive restructuring. At posttreatment, clinically significant reductions in depression (Ham-D and BDI) were observed for all three participants and these gains were maintained at 1-month follow-up. A notable improvement in negative and suicidal thoughts (IQ) was also observed. There was minimal change in anxiety symptoms (STAI) however the intervention primarily targeted depression.

Overall, the findings from these case studies and series support the efficacy of CBT in treating depression and anxiety in PD populations. It must be noted that reported effects may be overstated, however, due to limited sample sizes. Further, the generalisability of case studies and series is ultimately limited as the effect of an intervention on a single (or small number of) individual(s) may not be representative of all individuals with PD.

3.7.2.2 Uncontrolled trials. There have been four uncontrolled trials of CBT for depression in PD. Both Dobkin and colleagues (2007) and Farabaugh and colleagues (2010) evaluated the use of individual CBT for depression in individuals with PD and comorbid MDD, with the latter authors specifically targeting individuals with PD and MDD who had not responded to initial pharmacotherapy. Dobkin and colleagues' intervention was adapted to address PD-specific needs and concerns while Farabaugh and colleagues used a standard CBT protocol. At post-treatment, Dobkin and colleagues reported an 80% remission rate of depression based on Ham-D scores. A significant large effect on depression was observed (d = 2.53) and maintained at 1-month follow-up (d = 2.39). A significant decrease in negative thoughts (IQ) was also observed at both post-treatment and 1-month follow-up. A reduction in anxiety (STAI) was observed at post-treatment and 1-month follow-up; however this difference was not statistically significant. Similarly, Farabaugh and colleagues reported a significant linear decrease in mean Ham-D scores from pretreatment to posttreatment, although a slightly slower remission rate of depression (57%) was observed. Linear declines in negative cognitions (ATQ-R) and stress (PSS) were also reported although these differences were not statistically significant. Ham-D scores were also found to significantly and positively correlate with ATQ-R and PSS scores, suggesting that observed improvements in depression were in part related with reductions in stress and negative automatic thoughts.

Leroi and King (2008) evaluated a PD-specific individual CBT intervention for eight individuals with PD and a comorbid anxiety and/or depressive DSM-IV diagnosis. At posttreatment, improvements in both depression and anxiety as rated by the Global Attainment Scale were recorded for all participants. In addition, all participants no longer met full clinical criteria for depression and/or anxiety, with symptoms falling within the subclinical range following treatment.

The results of these uncontrolled trials provide support for the efficacy of CBT in treating depression in PD and have increased generalisability over the case studies and series described earlier. However, these findings must still be interpreted with caution as the sample sizes in these trials are still relatively limited (mean N = 10; range 8 to 15). Further, the use of uncontrolled research designs prevents an

examination of the effect of non-specific treatment factors (i.e., time, therapeutic alliance, placebo effect) on symptom improvement. However, both Dobkin and colleagues (2007) and Farabaugh and colleagues (2010) argued that simultaneous reductions in and significant correlations between depression and negative thoughts in their respective studies preliminarily indicates that symptomatic improvement may be directly related to the active cognitive modification component of CBT.

3.7.2.3 Randomised controlled trials. Dobkin and colleagues (2011) recently published the first RCT of individual CBT for clinical depression in PD. The authors compared an individual CBT programme for depression (MDD, dysthymia or DDNOS) against a control group who received clinical monitoring. The CBT programme was tailored to address PD-specific needs and included a stronger emphasis on behavioural and anxiety management than standard CBT for depression protocols. Participants in the CBT condition received 10 weekly sessions using a manualised protocol while those in the control condition were monitored closely and continued with existing treatment regimens over the corresponding period. No new treatments for depression were initiated for participants in the control condition. At post-treatment, a significant large effect on depression favouring CBT was reported (Ham-D; $d = 1.59$, BDI; $d = 1.1$) as well as a significant large effect on clinician-rated anxiety (Ham-A; $d = .98$). At 1-month follow-up, improvements in clinician and self-rated depression as well as anxiety were all maintained. Thus, the results of this seminal RCT provide strong support for the efficacy of CBT in treating depression as well as anxiety in PD populations.

Overall, there is good preliminary evidence for the efficacy of CBT in treating depressive and/or anxiety disorders in PD, given the lack of controlled research at present. All ten empirical studies of CBT for depressive disorders in PD reported statistically and/or clinically significant improvement in depression following treatment. All four studies targeting anxiety or comorbid depression and anxiety in PD reported clinically significant improvement in anxiety following CBT. In addition, significant improvement in anxiety was also observed in two CBT trials that primarily targeted depression. Finally, the vast majority of reported acute treatment gains were maintained at follow-up. While there are several inherent methodological limitations in each described study particularly around issues of

generalisability (i.e., restricted sample sizes) and internal validity (i.e., lack of controlled studies), together, these studies form a strong preliminary evidence base for the efficacy of CBT in treating depression and anxiety disorders in PD populations.

3.7.3 CBT for Depressive and/or Anxiety Symptoms in PD

In addition to CBT for depressive and/or anxiety disorders in PD, there is also preliminary evidence to suggest that CBT is effective for reducing depressive and/or anxiety symptoms in individuals with PD in general (i.e., people with PD who do not necessarily have a clinical diagnosis of depression and/or anxiety). Six empirical studies have been published; two case series (Cole & Vaughan, 2005; Macht, Pasqualini, & Taba, 2007), two uncontrolled trials (Ellgring et al., 1993; Fitzpatrick, Simpson, & Smith, 2010), one controlled trial (Dreisig, Beckmann, Wermuth, Skovlund, & Bech, 1999), and one small pilot RCT (Veazey, Cook, Stanley, Lai, & Kunik, 2009).

3.7.3.1 Case series. Cole and Vaughan (2005) examined the efficacy of a brief self-help CBT intervention for depression in 5 individuals with PD experiencing elevated depressive symptoms (as rated by the GDS). Participants were provided with a CBT self-help booklet written specifically for depression in PD and instructed to complete the seven modules in the booklet over seven weeks (spending 60-minutes on each session). At posttreatment, clinically significant improvement in depression (GDS) was reported for 4 of the 5 participants. Macht and colleagues (2007) provided individually-tailored CBT to 3 individuals with PD experiencing depressive and anxiety symptoms in regards to various aspects of PD including; uncertainty of prognosis, negative perception by others due to motor symptoms, sexual problems secondary to motor symptoms, and inability to handle unpredictable symptoms. Different CBT techniques were selected for each client based on the primary presenting problem. Macht and colleagues reported that CBT was successful in reducing depressive and anxiety symptoms in all three participants based on clinician judgement. In particular, CBT decreased social anxiety and increased acceptance of PD in one client, reduced the second client's anxiety about his sexual performance, and increased the third client's ability to cope with episodes of freezing of gait.

3.7.3.2 Uncontrolled trials. There have been two uncontrolled trials examining the efficacy of CBT for depressive and/or anxiety symptoms in individuals with PD. Ellgring and colleagues (1993) were the first to apply any form of CBT in a PD population. The authors conducted a series of PD-specific group seminars based on CBT techniques including stress management, cognitive restructuring, social skills training and relaxation training for 34 individuals with PD. An independent assessment a month following the seminars revealed significant reductions in overall depression and stress, improved social functioning and increased acceptance of PD among participants. Fitzpatrick and colleagues (2010) conducted a group mindfulness-based cognitive therapy (MBCT) intervention for 12 individuals with PD who had elevated scores on the Depression, Anxiety and Stress Scales (DASS; Lovibond & Lovibond, 1995). The MBCT course was based on a standard protocol. The aim of this study was not to assess the efficacy of MCBT but to provide a qualitative account of the experience of therapy for participants therefore the effect of MBCT on DASS scores was not reported. Overall, Fitzpatrick and colleagues concluded that MBCT was accepted by participants as a mode of treatment for psychological difficulties in PD and was particularly useful for enhancing social support and consolidating existing coping skills.

3.7.3.3 Controlled trials. There has been one published controlled trial of CBT for psychological functioning (including depressive symptoms) in PD. Dreisig and colleagues (1999) compared the effect of combined self-help and individual cognitive therapy (CT) against TAU on psychological functioning in 79 individuals with PD. Nine individuals with PD were selected to receive the intervention while the remaining 79 continued with TAU and served as a control. CT was individually tailored according to each participant's psychological profile as assessed by The Psychodiagnostic Profile (unknown author), however, no PD-specific modifications were included in the treatment protocol. At posttreatment, it was found that participants in the CT group experienced significant improvements in anxiety and hopelessness as rated by the Psychological Profile Questionnaire (PPQ; unknown author) when compared with controls. Considerable improvements in the PPQ alienation, recognition, contact, ability and self-centredness factors were also noted in comparison with the control group. Further, average improvement on the total

PPQ was significantly higher for the CT group. However, there are several limitations with this trial, most notably; small sample size for the intervention group, significantly unequal group sizes, lack of randomisation and unclear participant selection strategy, and use of non-validated diagnostic and outcome scales for depression. Thus, the findings of this study must be interpreted with caution.

3.7.3.4 RCTs. There has been one small RCT of CBT for depressive and/or anxiety symptoms in PD. Veazey and colleagues (2009) examined the efficacy of an individual telephone-based CBT intervention versus supportive telephone-based counselling for 10 individuals with PD who had elevated symptoms of depression or anxiety as assessed by the Patient Health Questionnaire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001) and BAI, respectively. The CBT intervention involved an initial face-to-face individual CBT session followed by eight weekly telephone sessions. The protocol for the telephone intervention was based on CBT techniques for older adults but was not PD-specific. Treatment components included psychoeducation, relaxation training, cognitive therapy, problem solving, activity scheduling, exposure and sleep-management. Participants in the comparison group received eight weekly telephone calls that were supportive rather than therapeutic in nature. At posttreatment, a medium effect on depression (PHQ-9) favouring CBT was observed (η^2 = .09) and this was maintained at 1-month follow-up (η^2 = .11). Similarly, a medium effect on anxiety (BAI) favouring CBT was observed at posttreatment (η^2 = .08), with a large effect observed at 1-month follow-up (η^2 = .50). Although an RCT design was used, the relatively small sample size in this study ultimately limits the validity and generalisability of reported results. Veazey and colleagues stated that unexpected difficulties in recruiting and retaining participants were experienced and contributed to the low sample size. This may indicate that telephone-based treatment is less preferable than more standard interventions, with Charidmou, Seamons, Seali and Schrag (2011) suggesting that face-to-face CBT interventions should be evaluated first before modified approaches. Nevertheless, the results of this study provide further support for the efficacy of CBT in PD.

Collectively, the findings presented suggest that CBT is effective not only for clinical populations, but also for the broader PD population. There is a high rate of psychological problems in PD and studies have shown that up to 76% of individuals

with PD report experiencing depressive symptoms at any given time (Veazey et al., 2005). Thus, CBT may be useful not only for treating depressive and/or anxiety disorders, but also for addressing broader psychological symptoms as a means of preventing the development of more severe psychological problems. However, as with the discussion of studies of CBT for clinical depression and anxiety in PD, it must be noted that small sample sizes (mean $N = 23$) and the predominance of case series and uncontrolled research designs in this area ultimately limits the generalisability and validity of reported findings.

3.7.4 Group Educational Programmes with CBT Elements in PD

In addition, there have been four studies evaluating the use of group educational programmes with CBT elements for broad psychological functioning in PD; one RCT (i.e., A'Campo et al., 2010) and three uncontrolled trials (i.e., Macht et al., 2007; Simons et al., 2006; Trend et al., 2002). Group educational programmes are distinct from group CBT interventions in that they are didactic in basis rather than based on the CBT model and use of Socratic questioning, include a range of other activities aside from CBT techniques, and aim to enhance general psychosocial well-being and quality of life rather than specifically target symptoms of depression and anxiety.

Trend and colleagues (2002) developed and evaluated the first group education programme for individuals with PD. Their intervention was an intensive multidisciplinary rehabilitation programme which included individual attention from various health professionals including a physiotherapist, occupational therapist, specialist PD nurse and speech therapist, as well as group activities including psychoeducation, talks by various PD experts and training in CBT relaxation techniques. At posttreatment, significant improvements in quality of life (EQ-5d) and depression (HADs) were observed. There was no significant change in HADs anxiety scores, however. Simons and colleagues (2006), Macht and colleagues (2007) and A'Campo and colleagues (2010) all evaluated the efficacy of a standardised psychosocial intervention for improving quality life, psychosocial functioning and depressive interventions in individuals with PD. The intervention was designed to specifically address psychosocial problems in PD and employed several CBT techniques (e.g., self-monitoring, activity scheduling and cognitive

restructuring) along with stress management, social skills training and a social competence intervention. A'Campo and colleagues compared their intervention with TAU while Macht and colleagues and Simons and colleagues had no control condition. At posttreatment, Macht and colleagues and Simons and colleagues reported no significant improvement in quality of life (PDQ-39) or depression (SDS). Macht and colleagues reported significant improvement in general psychological functioning (BELA-P) while Simon and colleagues did not. A'Campo and colleagues reported that participants in their intervention group showed improvement in quality of life (PDQ-39) and depression (SDS), however, there was no significant difference between intervention and control groups. The intervention group also showed greater improvement in general psychosocial functioning (BELA-P) than controls although, again, this difference was not statistically significant.

There are currently mixed findings in regards to the efficacy of group educational programs featuring CBT techniques in PD. Trend and colleagues (2002) reported significant improvement in depression and quality of life following intervention. However, the remaining three studies did not. Simon and colleagues (2006) reported significant improvement in psychological functioning following intervention although, again, Macht et al. (2007) and A'Campo et al. (2010) did not. However, it must be highlighted that these group programmes were not explicitly designed as clinical interventions. Baseline levels of depression were within the normal range for three of the four studies and within the mild range for the remaining study (i.e., Macht et al.). Similarly, baseline quality of life ratings all fell within the normal to mild range. Therefore, non-significant changes in depression and quality of life following intervention may likely represent a floor effect (i.e., significant improvement cannot be observed as baseline levels were already within normal range), rather than the non-efficacy of CBT. It may also be argued that as outcome levels remained within the normal range following treatment, CBT may have been effective in maintaining healthy levels of psychological functioning.

The findings presented suggest that CBT may be (1) efficacious for treating depressive and anxiety disorders in PD populations, (2) able to prevent the development of clinical depression and anxiety by reducing depressive and anxiety symptoms in individuals with subclinical symptoms, and (3) maintain normal mood

levels and healthy psychological functioning. However, it must be noted that the outcome literature for CBT for depression and anxiety in PD is still in relative infancy with the vast majority of existing empirical studies employing uncontrolled research designs with relatively small sample sizes. Thus, an assessment of the true magnitude of the treatment effect and clinical significance of changes is ultimately limited, as well as is the validity and generalisability of reported results. Nevertheless, these studies form a preliminary evidence base for the efficacy of CBT for depression and anxiety disorders in PD populations.

3.8 Direction for Future Research: Group CBT for Depression and Anxiety in Parkinson's Disease

There is growing support for the efficacy of CBT for the treatment of depressive and anxiety disorders in PD. In particular, there is strong support for the efficacy of individual CBT for depression and anxiety in PD, with eight of the ten CBT trials for clinical depression and/or anxiety in PD focusing on individual interventions. Group CBT remains understudied however despite being identified as a highly suitable treatment format for older adults experiencing psychological difficulties (i.e., Thompson et al., 2000). There are several practical and therapeutic advantages for group CBT in PD which warrant further investigation of this treatment modality in PD populations including; cost and time-effectiveness, normalisation and destigmatisation, and social and interpersonal learning.

3.8.1 Existing Studies of Group CBT for Depression and/or Anxiety in PD

While there have been a number of large group-based didactic programmes featuring CBT elements in PD, there have only been two studies of group CBT interventions specifically designed to treat individuals with PD with a clinical diagnosis of depression and/or anxiety; one case study (i.e., Heinrichs et al., 2001) and one case series (i.e., Feeney et al., 2005), for a total sample of five participants. The findings from these studies have been previously described and both preliminary indicate that group CBT may be efficacious in treating clinical depression and anxiety in PD. However, the very limited collective sample size and use of case

study designs ultimately restrict the meaningful conclusions that can be drawn from these studies.

3.8.2 Practical and Therapeutic Advantages of Group CBT

Despite the limited empirical evidence for the efficacy of group CBT in treating depressive and anxiety disorders in PD, there are two main reasons to consider the use of group treatment for individuals with PD with depression and anxiety; (1) group CBT is equally effective as individual CBT for the treatment of depression and anxiety in primary populations (NICE, 2010a; NICE, 2010b), and (2) group CBT offers several additional unique therapeutic benefits that are particularly suited to chronic illness and older adult populations (Thompson et al., 2000).

3.8.2.1 Therapeutic benefits. It is well documented that older adults and individuals with chronic illnesses experience increased stigma, withdrawal, social isolation and reduced social support primarily due to increased functional impairment (Husaini et al., 2004). Group therapy may therefore be particularly beneficial for such individuals, as it provides a context which promotes social interaction, mutual support, and reciprocal validation and facilitates enhancement of social skills (Morrison, 2001). Exposure to others who are experiencing similar difficulties can also help to reduce PD-related as well as mental illness-related stigma by providing an opportunity for group members to recognise common shared experiences among members and the universality of their concerns (Lewinsohn & Clarke, 1999). Paparella (2004) asserts that knowing that others share the same experiences of illness can be a powerful unifying force. Group CBT also offers the chance for social and interpersonal learning to occur which can enhance participants' grasp of cognitive concepts. For example, Tucker and Oei (2007) state that it is easier to recognise cognitive distortions in others thinking due to increased objectivity. This then facilitates re-examination of one's own cognitions and makes recognition of one's cognitive distortions easier. In such a way, group members can essentially become co-therapists for each other (Vinogradov & Yalom, 1994). Helping others can also promote positive feelings of mastery, competence and achievement (Himle, Van Etten et al., 2003). Further, the presence of others during therapy can enhance treatment compliance due to peer reinforcement (Fischer et al., 1998). These non-specific factors associated with group therapy have been found to

consistently produce significant improvements in treatment outcomes (e.g., Corey & Corey, 2002; Horvath & Bedi, 2002).

It must be noted that there are also several disadvantages associated with group compared to individual treatment, however. For example, there is a risk of low group cohesiveness, confrontation between group members, dominance by members with stronger personalities and development of subgroups (Morrison, 2001). Group CBT treatments are also frequently highly structured and there is minimal room for tailoring of treatment to accommodate specific client problems (Husaini et al., 2004). There is also lessened privacy which may prevent clients from disclosing more private, distressing or disturbing problems. Further, individuals receive less individual attention from clinicians which can result in less in-depth exploration of problems compared to individual treatment (Tucker & Oei, 2007). Group treatment may therefore not be suited for all individuals.

3.8.2.2 Practical benefits. In addition to the unique therapeutic benefits of group CBT, there are also several practical benefits, particularly for healthcare providers. Group CBT is more cost and time-effective than individual CBT and a greater number of clients can receive treatment at a time (Fals-Stewart, Marks, & Schafer, 1993; Himle et al., 2003). However, potential difficulties with scheduling of a common convenient appointment time for all group members may ultimately lead to higher attrition rates (Morrison, 2001).

Overall, there is a strong practical and therapeutic rationale for the delivery of CBT in a group format in PD. Several authors have suggested that group psychotherapy should be offered as a first-line treatment for depression in older adults, particularly for those who present with complaints related to social isolation and difficulty adjusting to loss (Husaini et al., 2004; Peterson & Halstead, 1998; Tucker & Oei, 2007). However, it is acknowledged that group treatment may not be suited for all individuals in light of the disadvantages raised. Morrison (2001) thus suggests that group CBT be offered as frontline treatment in a stepped-care system, whereby individual therapy can be offered to those who decline initial group therapy.

3.8.3 Direction for Future Research

There are clear therapeutic and practical advantages for group CBT for in PD, and there is some preliminary support for the efficacy of the group treatment modality for depression and anxiety in PD at present. However, the existing outcome literature for group CBT specifically for the treatment of depressive and/or anxiety disorders in PD is rudimentary at best. There have only been two published case studies and/or series for a total sample of 5 participants. While both studies reported clinically significant improvement in depression and anxiety following group CBT, the conclusions that can be drawn about the efficacy of group CBT is substantially restricted. Thus, there is a pressing need for controlled trials to provide a more reliable assessment of the magnitude of the treatment effect and clinical significance of group CBT for depression and anxiety in PD.

There are several phases involved in the experimental investigation of a psychological treatment. Briefly, these are; Phase I: Manual writing and pilot trial, Phase II: Preliminary trials (single site), Phase III: Large efficacy trials (multiple sites), and Phase IV: Effectiveness trials (application of intervention with demonstrated efficacy into real-world settings; Mohr et al., 2009). At present, existing evaluations of group CBT for depression and anxiety in PD are best classified as Phase I evidence. Therefore, the next step in establishing the efficacy of group CBT in PD would be to conduct preliminary trials. Preliminary trials assess the feasibility of treatment delivery, provide early efficacy evidence for an intervention as well as provide an estimate of the treatment effect to guide future larger efficacy trials (Rounsaville & Carroll, 2001).

There are several methodological considerations for conducting preliminary efficacy trials. Mohr and colleagues (2009) assert that, ideally, preliminary trials should be smaller-scale randomised controlled trials. The RCT is deemed the most powerful research design for treatment evaluation purposes and features two core elements; randomisation of participants to conditions and inclusion of control and/or comparison groups (Rounsaville & Carroll, 2000). Randomisation serves to minimise the effect of individual bias on treatment outcome (Chia, 2000). Control and/or comparison groups allow for an examination of the effect of non-specific factors on treatment outcome. In early efficacy studies, Mohr and colleagues suggest

comparison against a non-active control (e.g., no treatment, TAU or waitlist control) as it is an important first step to show that an intervention is more effective than doing nothing. Further, non-active control conditions control for traditional threats to internal validity (e.g., time, spontaneous remission, maturation, regression to the mean) while not affecting statistical power as harshly as active control conditions (Rounsaville & Carroll). This is particularly important in preliminary trials where sample sizes are generally small and maintaining adequate statistical power is essential for detecting treatment effects. It must be noted that non-active controls do not allow for an evaluation of the effects of non-specific treatment factors on outcome (e.g., attention, rapport, group cohesiveness); therefore conclusions regarding the efficacy of specific treatment components cannot be drawn. However, Mohr and colleagues state that non-specific control conditions are not necessary for Phase I or II research as the primary aim of these studies is to demonstrate a significant treatment effect to justify larger trials. Strict controls can therefore be counterintuitive to this aim as they significantly reduce statistical power and increase the risk of a Type II error (Mohr et al).

In addition to these methodological considerations, there is also a need for the development and evaluation of PD-specific group CBT protocols for depression and anxiety in PD, in order to optimise treatment for participants and maximise any treatment effects. The importance of modifying standard CBT protocols to accommodate the unique symptom profile of depression and anxiety in PD was discussed earlier in this chapter. Specifically, it was recommended that both procedural and conceptual modifications should be implemented. Procedural modifications are important to accommodate PD symptoms and to enhance the learning process for participants. Content modifications are important to address specific disease-related concerns which feature prominently in depression and anxiety in PD (e.g., fear of falling, anxiety regarding motor symptoms, uncertainty of prognosis etc.). The two existing studies of group CBT for depression and/or anxiety in PD both used standard CBT protocols in their respective studies and thus reported treatment effects of group CBT may have been attenuated. Thus, the next step in the evaluation process of group CBT for depression and anxiety in PD is a small-scale RCT of a PD-specific intervention against a non-active control condition.

3.9 Chapter Summary

There are compelling grounds to consider the use of CBT as an alternative to pharmacotherapy for depression and anxiety in PD populations. First, CBT is an established treatment that is equally effective as pharmacotherapy for the acute treatment of depression and anxiety in primary populations. Second, CBT is superior to pharmacotherapy in terms of long-term efficacy and side-effect reduction. Third, CBT has demonstrated efficacy in the treatment of depression and anxiety in older adult populations and there is also strong support for the efficacy of CBT with individuals with various chronic, motor and neurological diseases.

A growing body of research now also supports the efficacy of CBT for the treatment of depression and anxiety disorders in PD populations. There is particularly strong evidence for the efficacy of individual CBT interventions in PD, while group CBT interventions remain understudied despite clear therapeutic and practical advantages for older adult populations.

At present, the efficacy evidence for group CBT in PD is rudimentary at best, with only two published case studies/series for a total sample of five participants. The next step in establishing efficacy for group CBT for depression and anxiety in PD is a well-designed preliminary trial to guide future, larger efficacy trials. A small-scale randomised controlled trial comparing a PD-specific intervention against a non-active control will offer the best balance between experimental control and statistical power, and provide the most valid estimate of the magnitude of the treatment effect of group CBT for depression and anxiety in PD.

Chapter 5 presents the findings of the first randomised controlled trial of group CBT for depression and anxiety in PD. Before this, Chapter 4 presents an examination of the validity and reliability of the Depression Anxiety and Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995) in a PD sample. The DASS-21 is the primary outcome measure used in both Studies 3 and 4 however it has not been previously validated with individuals with PD. Thus, Chapter 4 examines the psychometric properties of the scale to support its use as a primary outcome measure in the subsequent studies of this thesis.

CHAPTER 4 |

Study II. An Examination of the Validity and Reliability of the Depression Anxiety and Stress Scale-21 in Parkinson's Disease

---

4.1 Introduction

The importance of selecting appropriate psychological measurement scales for both research and clinical use in Parkinson's populations was discussed in Chapter 1. Specifically, a differing symptom presentation of depression and anxiety in PD along with the high symptom overlap between the three conditions can often mean that scales developed for the general population may not be valid measures of depression and anxiety in PD (Schrag et al., 2007). Ultimately, use of inappropriate scales can invalidate research findings (Rea & Parker, 1997).

The Depression Anxiety and Stress Scales-21 (DASS-21; Lovibond & Lovibond, 1995) is the primary outcome measure for depression and anxiety used in both Studies 3 and 4 of this thesis. While the validity and reliability of the DASS-21 has been well established in both general clinical and non-clinical samples, there has been no prior investigation of the scales' psychometric and clinimetric properties in a Parkinson's sample.

The primary aim of this study was to provide a preliminary examination of the scale structure and reliability of the DASS-21 in a PD sample to support the use of the scale as a primary outcome measure in this research. The broader aim of this study was to provide information about the psychometric and clinimetric properties of the DASS-21 in PD to guide future researchers and clinicians considering use of the scale with individuals with PD.

4.2 Psychometric Scales for Depression and Anxiety in PD

Research into the evaluation and validation of screening and/or measurement instruments for depression and anxiety in PD is important for enhancing both clinical management and the quality of scientific research (Weintraub & Burn, 2011). There are currently no scales developed specifically to measure depression and anxiety in PD, thus clinical screening and research in PD largely relies on the use of psychometric scales developed for the general population (Schrag et al., 2007). There are two main considerations when using a general population psychometric in PD populations. First, given that a differing symptom presentation of depression and anxiety has been described in PD, scales developed for the general population may not always be a valid assessment of depression and anxiety among individuals with PD. Second, due to the symptom overlap between PD, depression, and anxiety, general population scales featuring a large number of items assessing the physical and somatic aspects of depression and anxiety can generally overestimate the presence and/or severity of depression and anxiety in PD as they do not differentiate between PD symptoms and symptoms of anxiety or depression (McDonald et al., 2003). Thus, it is important to examine the validity and reliability of general population scales in PD samples prior to research and/or clinical use.

Over the past five years, there has been significant advances in the number of general population scales measuring depression and anxiety that have been validated in PD. Scales that have now been validated in PD populations include the Hamilton Depression Rating Scale (Ham-D; Hamilton, 1960), Beck Depression Inventory (BDI-I; Beck et al., 1961), Geriatric Depression Scale (GDS; Yesavage et al., 1982) and Hospital Depression and Anxiety Scale (HADS; Snaith & Zigmond, 2000) for depression, and the Hamilton Anxiety Rating Scale (Ham-A; Hamilton, 1959), Beck Anxiety Inventory (BAI; Beck, Epstein, Brown, & Steer, 1988), HADS, and Geriatric Anxiety Inventory (GAI; Pachana et al., 2007) for anxiety (see Chapter 1.10.1 for a review of the different scales). Currently, PD taskforce reviews (Leentjens et al., 2012; Schrag et al., 2007) recommend the use of the BDI and BAI as clinical and research screening tools for depression and anxiety in PD due to their self-report nature and thus ability to enhance time-effectiveness over clinician-rated scales such as the Ham-D.

This study investigates the validity and reliability of the Depression Anxiety and Stress Scale-21 (Lovibond & Lovibond, 1995) as a measurement tool for depression and anxiety in a PD sample. Similar to the BDI and BAI, the DASS-21 is a self-report scale and thus has the benefit of being more time-effective than clinician-rated scales such as the Ham-D and Ham-A. Moreover, the DASS-21 assesses both depression and anxiety within the same measure and is available in the public domain while the BDI and BAI are not, and thus may be useful in enhancing both time- and cost-effectiveness for both research and clinical purposes.

The primary aim of this study was to provide evidence of the validity and reliability of the DASS-21 to support its use as a primary outcome measure throughout this thesis. As a secondary objective, this study also aimed to provide information about psychometric properties of the DASS-21 as a measurement tool for depression and anxiety in PD to guide future researchers and clinicians considering use of the scale within a PD sample.

4.3 The Depression Anxiety and Stress Scale-21

The DASS-21 is a 21-item short form of the 42-item DASS (Lovibond & Lovibond, 1995), and measures three negative affective states: Depression, Anxiety and Stress. The scale comprises 21 items assessing the experience of 21 negative psychological and/or physiological symptoms over the past week. Items are rated on a 4-point Likert scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much*). Examples of items for each dimension include "I felt downhearted and blue" (Depression), "I was worried about situations in which I might panic and make a fool of myself" (Anxiety) and "I tended to over-react to situations" (Stress). Possible scores for each dimension range from 0 to 21 with higher scores reflecting greater experience of symptoms on the respective scale.

The DASS-21 has displayed strong psychometric properties in both clinical and community samples. Excellent internal consistency for each of the three factors has been reported with alpha values ranging from .81 to .97 across numerous studies

(Henry & Crawford, 2005). The test-retest reliability of the DASS-21 over a two-week period was also reported by Brown et al. (1997) and found to be strong for all three factors with Depression (r = .71), Anxiety (r = .79) and Stress (r = .81). All correlations were significant at the .01 level.

Convergent validity of the DASS-21 was assessed by Henry and Crawford (2005) via comparisons with the Hospital Anxiety and Depression Scale (HADS; Zigmond & Snait, 1983), the Personal Disturbance Scale (PDS; Bedford & Foulds, 1978) and the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). The Depression factor correlated most strongly with PDS-Depression (r = .78) followed by the HADS-Depression factor (r = .66), providing evidence for convergent validity. Similarly, the Anxiety subscale was most strongly associated with PDS-Anxiety (r = .72) followed by HADS-Anxiety (r = .62). Stress was most strongly correlated with the PANAS Negative Affect factor (r = .67), which has been likened to a measure of stress by Brown et al., 2003. All correlations were significant at the .01 level.

Strong discriminant validity has also been observed with people with mood disorders and anxiety disorders scoring significantly higher on the DASS Depression and Anxiety factors, respectively, relative to other diagnostic groups (Antony, Bieling, Cox, Murrary, & Swinson, 1988). Moreover, the DASS-21 has been found to be a valid and reliable measure of anxiety, depression and stress in older primary care patients (i.e., Gloster et al., 2008) and with elderly patients with persistent pain (i.e., Wood et al., 2010).

There have been no studies validating the use of the DASS-21 in PD populations, and the scale has not been reviewed or recommended by previous Movement Disorder Society taskforce reviews for use in PD populations. However, the DASS-21 has been used by several authors to assess depression, anxiety and stress symptoms in people with Parkinson's in recent times (e.g., Bucks et al., 2010; Butler, McNamara, & Durso, 2010; McNamara, Stavitsky, Durso, & Harris, 2010). As noted earlier, careful selection of scales must be undertaken in order to accurately assess depression and anxiety symptoms in people with PD due to the considerable symptom overlap between the three conditions. In particular, scales featuring a large

number of physical or somatic symptoms tend to result in an overestimate of the severity of depression and anxiety in persons with PD. According to this criterion, it would appear that the DASS-21 is a suitable scale for use with PD patients. The scale contains only four somatic items: Item 2 (dry mouth), Item 4 (difficulty breathing), Item 7 (trembling) and Item 19 (increase/decrease in heart rate), with the remainder of items assessing cognitive, affective and behavioural symptoms. Moreover, of these somatic symptoms, only trembling is a characteristic feature of PD (dryness of the mouth may be experienced as a side-effect of anticholinergic medication in some patients, however, excessive saliva and drooling (sialorrhea) is more common). Thus, the DASS-21 appears to be a suitable scale for use in PD samples on face value. This study provides a preliminary investigation of the validity and reliability of the DASS-21 in PD.

4.4 Methodology and Data Analysis

4.4.1 Design and Procedure

Analyses for this study were based on the same data and sample as that for Study 4. Data were primarily collected for the purposes of Study 4 which was to examine mental health service utilisation in PD. A cross-sectional survey methodology was employed. A questionnaire package comprising the DASS-21 and six other scales was assembled and mailed out to all members of Parkinson's Western Australia (PWA) following ethical approval from both the Curtin University HREC and PWA research committee. A link to a web-based version of the questionnaire was provided for participants who preferred to submit their responses online. A gourmet teabag was included with each package to thank participants for their time. In addition, Parkinson's Associations across Australia were contacted and asked to post a link to the online questionnaire on their websites. The questionnaire was anonymous and no personally identifying details were collected. The information sheet clearly outlined that (i) submission of responses was deemed consent to use the individual's data in the study, and (ii) due to the anonymous nature of the survey, participants will not be able to request their responses be excluded from the research at a later date. Questionnaire packages were disseminated to PWA members in October 2012. Participants were given three months to return questionnaires. Data collection was completed in December 2012. In total, 950

questionnaire packages were sent out. Participants were given three months to return questionnaires. Data collection was completed in December 2012. Participant reponses on the DASS-21 were used in this study to examine scale structure and internal consistency.

4.4.2 Participants

4.4.2.1 Response rate. A total of 327 questionnaire responses were received between October and December 2012. The majority of responses were received from the PWA questionnaire mail-out (N = 302, response rate = 32%). An additional 25 responses were received through the online questionnaire however it is not possible to determine the source or response rate of online responses (i.e., PWA members submitting their responses online or members from other Parkinson's associations around Australia).

4.4.2.2 Participant characteristics. The sample comprised 327 Australian adults with Parkinson's disease. There were 205 males (63%) and 122 females (37%) with a mean age of 69.9 years. The majority of participants were of an Australian background (87.5%), currently married (70.6%) and no longer engaging in paid employment (84.1%). Average age of PD diagnosis was 62 years, average duration of PD was 8.14 years, and the vast majority of participants were currently on antiparkinsonian medications (93.3%). Other demographic characteristics of the sample appear in Table 11.

4.4.2 Statistical Power

The minimum recommended sample size for factor analysis is 300 (Tabachnick & Fidell, 2011). Thus, this study had sufficient power.

4.4.3 Psychometric and Clinimetric Properties

As the data used for this study was not collected specifically for the purpose of scale evaluation, a comprehensive investigation into the psychometric properties (e.g., sensitivity, specificity, convergent validity, discriminant validity, test-retest reliability) of the DASS-21 in PD was not possible. Three psychometric properties were tested in this study; internal consistency, criterion validity and discriminant validity. Internal consistency was assessed using Cronbach's alpha, with $\alpha \geq .70$

Table 11

Demographic Characteristics of the Sample (N = 327)

	M (*SD*)	Range
Age	69.6 (8.76)	47 to 93
PD Duration	8.14 (7.11)	<1 year to 46 years
Age of PD diagnosis	61.85 (10.94)	26 to 87
Number of children	2.66 (1.31)	0 to 8
	N	%
Gender		
Male	205	62.7
Female	122	37.3
Background		
Australian	286	87.5
British	29	8.9
New Zealander	4	1.2
European	4	1.2
USA	2	.60
Asian	2	.60
Relationship Status		
Married	231	70.6
In a relationship	18	5.5
Widowed	34	10.4
Not in a relationship (single, de-facto, divorced, separated)	44	13.5
Currently employed	54	16.5
Relatives with PD	108	33.0
On PD medication	305	93.3

considered acceptable. Criterion validity was assessed via comparison of DASS-21 scores between participants who reported an existing psychological diagnosis and those who had not, with the hypothesis that individuals with an existing psychological diagnosis would score significantly higher on all three DASS factors than those without. Discriminant validity was assessed via receiver operating characteristic (ROC) curves analysis to examine the accuracy of the DASS-21 in differentiating between individuals with and without an existing psychological diagnosis.

The clinimetric properties evaluated were in the study were acceptability, score distribution, and floor and ceiling effects, using the same methods as described by Leentjens et al. (2012) in their evaluation of the Ham-A, BAI and HADS in PD. Acceptability was assessed via examination of the proportion of missing responses, with less than 5% missing data considered acceptable (Smith et al., 2005). Score distribution was examined by comparing observed mean versus median scores, with a difference of <10% of the maximum possible score considered adequate (Leentjens et al.). Floor and ceiling effects were examined by the proportion of partcipants scoring the minimum and maximum scores, respectively, with <15% considered satisfactory (Leentjens et al.).

4.4.4 Scale Structure

Confirmatory factor analysis (CFA) using structural equation modelling (SEM) was used to verify the factor structure of the DASS-21 in the PD sample. The structure of the scale was compared against the proposed three-factor correlated structure specified by Lovibond and Lovibond (1995). CFA was conducted using EQS 6.1 for Windows (Build 85) (Bentler, 2005). Path diagrams of factor loadings were produced using IBM SPSS AMOS 16.0.

4.4.4.1 Assumption testing. There are four statistical assumptions underlying SEM; multivariate normality, linearity, absence of univariate and multivariate outliers and absence of multicollinearity.

Multivariate normality is the assumption that a set of variables have a combined multivariate normal distribution (Looney, 1995). Multivariate normality is of particular importance in SEM as the standard Maximum Likelihood estimation method in SEM assumes a multivariate normal distribution (Tabachnick & Fidell, 2011). Simulation studies have shown that Maximum Likelihood estimation procedures are not as accurate when a set of variables are multivariate non-normally distributed, particularly when sample sizes are less than 2,500 (Hu et al., 1992). In a set of variables with a multivariate normal distribution, each individual variable must also have a univariate normal distribution (Looney, 1995). Thus, each item was initially screened for univariate normality as a first step in establishing multivariate normality. If any individual item was not normally distributed, multivariate normality was assumed to be violated (Tabachnick & Fidell). Where all items

showed a univariate normal distribution, skewness and kurtosis values were then assessed. Kline (2010) asserts that multivariate normality can be assumed when skewness values are less than 3, and kurtosis values are less than 10.

Linearity refers to the assumption that pairs of items within a scale are linearly related. Linearity was tested by examining five pairwise scatterplots between randomly selected items as recommended by Tabachnick and Fidell (2011) who suggest that it is not feasible to examine all scatterplots between every possible pairwise combination of items within a scale to test for linearity. Univariate outliers were examined via inspection of standardised residuals for cases greater than 3.29 standard deviations above or below the mean. Multivariate outliers were assessed via inspection of the Mahalanobis Distance statistic and Cook's distance value for each case. Multicollinearity was assessed via examination of the zero-order correlation matrix among scale items for any correlations > .90 (Tabachnick & Fidell).

4.4.4.2 Estimation method. Maximum Likelihood was the estimation method employed. Where the assumption of multivariate normality was not met, the Yuan-Bentler correction (Yuan & Bentler, 1999) was applied to Maximum Likelihood estimates as part of the 'Robust methods' option in EQS 6.1. The Yuan-Bentler correction adjusts both the Maximum Likelihood χ^2 statistic as well as the standard errors associated with parameter estimates based on the extent of non-normality within a data set (Tabachnick & Fidell, 2011). Simulation studies have found that the Yuan-Bentler correction is the most accurate estimation method when data are not multivariate normally distributed and sample sizes are less than 2,500 (Hu et al., 1992).

4.4.4.3 Model fit. Model fit was assessed via three indices; the χ^2 statistic, the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). The χ^2 statistic provides an index of the fit between the sample covariance matrix and the estimated covariance matrix (Tabachnick & Fidell, 2011). A non-significant χ^2 statistic indicates a good fitting model (i.e., there is no significant discrepancy between the sample and estimated covariance matrices). However, the χ^2 statistic has been found to be particularly sensitive to sample size and violations of multivariate normality and can often result in a Type II error. In particular, when

sample sizes are greater than 200, trivial differences between the estimated and sample covariance matrices can lead to a false rejection of the null hypothesis (Tabachnick & Fidell). A relative χ^2 (or normed χ^2) statistic has been proposed to explicitly take into account sample size and is computed by dividing the χ^2 statistic by the degrees of freedom (df). A χ^2 to df ratio of less than 5 is suggested to indicate a good-fitting model (Schumacker & Lomax, 2004).

The CFI (Bentler, 1990) is an index of the discrepancy between the specified model and a null or independence model (i.e., a model in which all correlations are equal to zero). CFI values can range from 0 to 1 with values closer to 0 indicating a perfect fit between the specified model and an independence model. Thus, CFI values closer to 1 are desirable with Hu and Bentler (1999) suggesting that CFI values greater than .90 are indicative of an acceptable fit while CFI values greater than .95 indicate a good-fitting model.

The RMSEA statistic (Browne & Cudeck, 1993) is an estimate of the discrepancy between the specified model and a perfect (saturated) model. A RMSEA value of 0 indicates a perfect fit (i.e., the specified model is exactly the same as a saturated model). Conventional guidelines state that a RMSEA value between 0 and .05 indicates a 'close fit', .05 to .08 indicates an acceptable fit, while RMSEA values greater than .10 indicate a poor-fitting model.

4.5 Results

4.5.1 Missing Data and Acceptability

Of the 327 responses received, SPSS Missing Values Analysis revealed minimal missing data with no items or cases missing more than 0.6% of data. Thus, the DASS-21 demonstrated strong acceptability.

Little's MCAR test indicated that the data were missing completely at random, χ^2 (72) = 61.06, p = .818. Expectation Maximisation (EM) was employed to estimate missing data. While previous authors have suggested that EM-imputed data may be inappropriate for inferential statistics due to biased standard errors (Brown et

al., 2003), Tabachnick and Fidell (2011) assert that in cases where missing data is minimal (< 5%) and randomly distributed, as with the present study, analysis of EM-imputed data is permissible and preferable to the more conventionally employed method of mean substitution which underestimates correlation coefficients.

4.5.2 Score Distribution

Mean scores for each DASS-21 factor were higher than those reported by Lovibond and Lovibond (1995) in their sample of undergraduate psychology students. Based on normative data for the DASS-21 published by Henry and Crawford (2005), mean levels of depression (M = 5.26, SD = 5.08) corresponded to a 'Mild' clinical severity (81st percentile) while mean levels of anxiety (M = 5.28, SD = 3.99) corresponded to a 'Moderate' clinical severity (89th percentile). Average levels of stress (M = 5.65, SD = 4.69) were within the normal range (69th percentile). The distribution of scores for each factor was acceptable with the difference between observed mean and median for each subscale within 10% of the maximum possible scale score. There were no significant floor or ceiling effects with <15% of participants scoring the minimum and maximum possible score on each factor.

4.5.3 Scale Structure

4.5.3.1 Assumption testing. Tests for univariate normality via inspection of Kolmogorov-Smirnov statistics for each item within the DASS-21 indicated a violation of normality for all items (p < .05). Thus, the assumption of multivariate normality was not met for the data. All items were positively skewed although this is common when assessing psychopathological symptoms in a non-clinical sample (Lovibond & Lovibond, 1995). Logarithmic transformations were undertaken on all items as however transformation failed to produce normality and thus all original items were retained for analysis and the Yuan-Bentler corrected Maximum Likelihood estimation method was implemented in the subsequent SEM analyses to account for the multivariate non-normality of the data.

Linearity was assessed via examination of pairwise scatterplots between four randomly selected items (Items 3, 9, 18, 20). Scatterplots showed a positive linear relationship between all pairs of items and thus the assumption of linearity was met for the data. Ten univariate outliers were identified (0.14%) where cases exceeded

±3.29 standard deviations of the mean. To reduce the influence of extreme scores while maintaining an adequate sample size, extreme scores were changed to one value above the next highest score in the distribution for that variable as per Schinka and Velicer (2003). Seventeen multivariate outliers (0.24%) were identified where cases exceeded the Mahalonbis distance Chi Square critical value of $\chi^2(21) = 46.797$, $p = .001$, however Cook's distance values for all these cases were less than 1 indicating that all cases were not influential within the dataset. Thus, all cases were retained for analysis. The zero-order correlation matrix between all items showed that all correlations between items were less than .90, indicating no multicollinearity among the data.

4.5.5.3 Scale structure. Table 12 displays the CFA results testing the scale structure of the DASS-21 against Lovibond and Lovibond's (1995) three-factor correlated structure. Both Maximum Likelihood and Yuan-Bentler corrected Maximum Likelihood estimates are reported. As the assumption of multivariate normality was not met, CFA results are based on the Yuan-Bentler corrected estimates. The χ^2 statistic indicated that a three-factor correlated structure was a poor fit for the data, χ^2 (186) = 226.65, $p = .02$. However, given the problems with the χ^2 statistic discussed in Section 4.4.4.3.1, other indices of model fit were examined. The relative χ^2 (2.67), corrected-CFI (.94) and RMSEA (.051) values all indicated a close fit between the three-factor model and the data and thus Lovibond and Lovibond's factor structure was validated within the sample.

Table 12

Results of Confirmatory Factor Analyses for DASS-21 (n = 327)

Maximum Likelihood					Maximum Likelihood with Yuan-Bentler correction			
χ^2	*p*	Relative χ^2	CFI	RMSEA	χ^2	*p*	CFI	RMSEA
497.47	.000	2.67	.92	.072	226.65	.02	.94	.051

Factor loadings between items and factors appear in Figure 4. All items loaded strongly onto the hypothesised factor and exceeded the minimum cut-off criterion of .30 as per Tabachnick and Fidell (2011). The mean inter-correlation between factors was .78 which is consistent with the inter-correlations originally reported by Lovibond and Lovibond (1995) as well as in subsequent studies by Antony and colleagues (1998) and Henry and Crawford (2005), who each reported inter-correlations of about .75 across both clinical and non-clinical samples.

4.5.4 Reliability

The DASS-21 demonstrated strong reliability in the PD sample. Cronbach's alpha values of internal consistency for each factor were good to excellent, with $\alpha = .92$ (Depression), $\alpha = .77$ (Anxiety) and $\alpha = .88$ (Stress) and $\alpha = .94$ for the total scale.

4.5.5 Criterion Validity

The DASS-21 showed good evidence of criterion validity with participants reporting an existing psychological diagnosis scoring significantly higher on all three DASS-21 subscales compared with those without a diagnosis ($p < .05$). Sixty eight (21%) participants reported a current or past psychological diagnosis and the mean DASS-21 scores for this group were; DASS-D ($M = 8.37$), DASS-A ($M = 7.56$), DASS-S ($M = 8.04$) compared with DASS-D (M = 4.37), DASS-A ($M = 4.64$) and DASS-S ($M = 4.97$) for the group without an existing diagnosis.

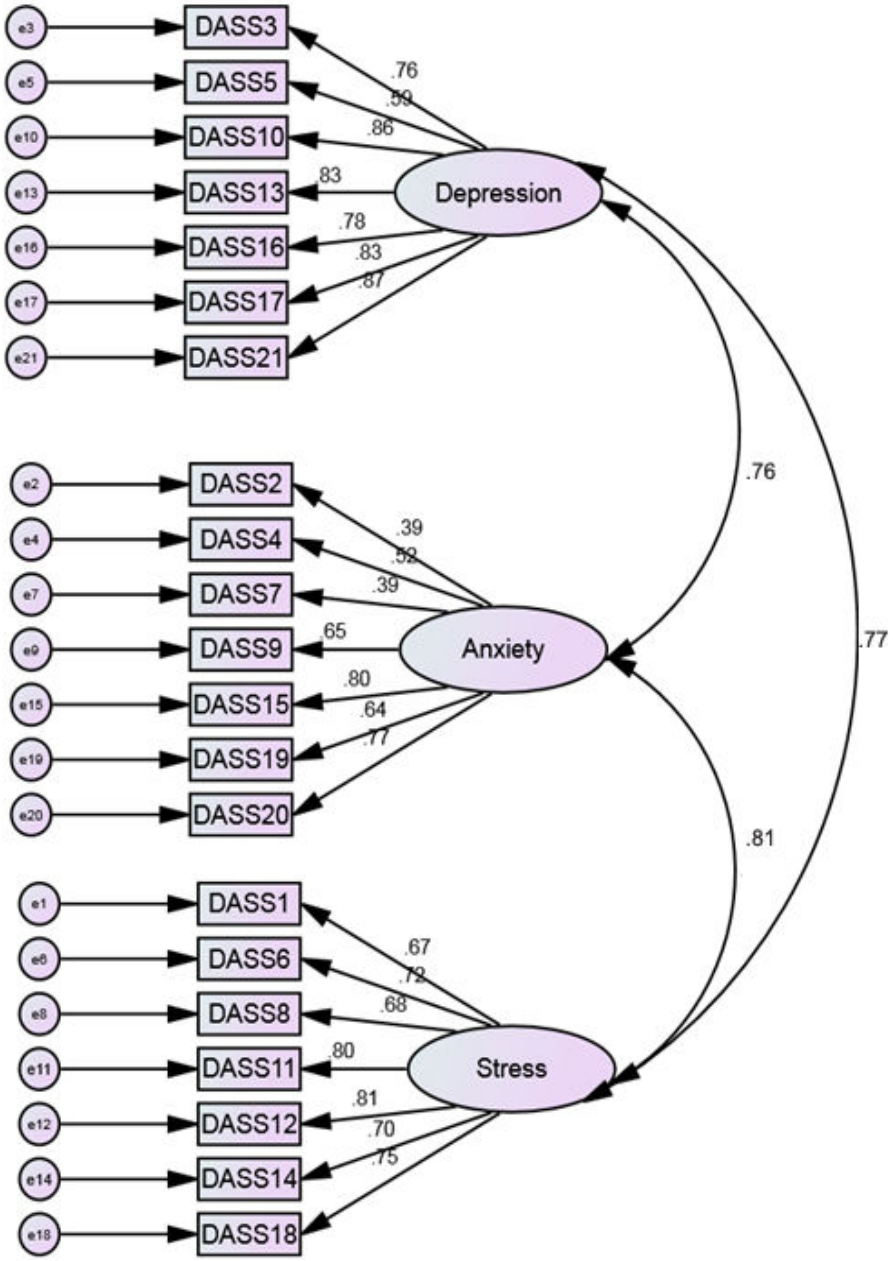


Figure 4. Factor Loadings for the DASS-21 Items and Factors

4.5.6 Discriminant Validity

ROC curves showed that the area under the curve was .70 for both depression and anxiety and .69 for stress, representing fair accuracy in discriminating between participants with and without an existing psychological diagnosis (see Figure 5).

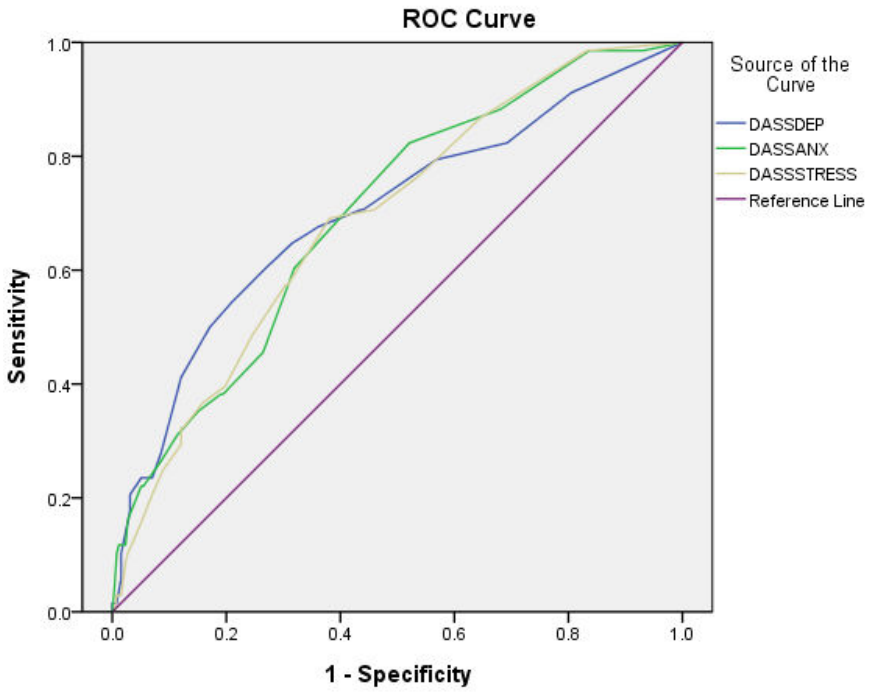


Figure 5. ROC Curve for DASS-21

4.7 Discussion

This study was the first to examine the scale structure, reliability and clinimetric properties of the DASS-21 in a Parkinson's sample and showed that overall, there is preliminary evidence for the reliability and validity of the DASS-21 as a measurement tool for depression and anxiety among individuals with PD.

Factorial validity was demonstrated through replication of Lovibond and Lovibond's (1995) three-factor correlated structure within the present sample. All three subscales demonstrated excellent internal consistency, and all items loaded onto the hypothesised construct. The two items with the lowest factor loadings (.39) were Items 2 (dry mouth) and 7 (trembling in the hands), both within the Anxiety factor. This finding suggests that these two symptoms may not be as strong indicators of anxiety in this population than within the general population and is likely related to PD. As noted in the introduction, dry mouth is typically not common in PD as rigidity of facial muscles often results in sialorrhea, or excessive saliva and drooling. Trembling is very common in PD and comprises one of the four cardinal

motor symptoms however because of this trembling may not be the most accurate indicator of anxiety among individuals with PD. Deletion of these two items slighty improved the reliability of the Anxiety scale from .77 to .80 however not to the extent to warrant serious consideration of item removal from the scale. Overall, all items of the DASS-21 appeared to be valid indicators of depression and anxiety within individuals with PD.

The distribution of scores was good for all three DASS-21 factors with no significant floor or ceiling effects observed. The latter finding is particularly important. Given the overlap between symptoms of PD, depression, and anxiety, there is a a concern that individuals with PD may score highly on measures of depression and anxiety developed for the general population, regardless of actual psychological status. This study showed that there were no problems with symptom overlap with the DASS-21. The score distribution in the present sample was consistent with that described by both Lovibond and Lovibond (1995) and Henry and Crawford (2005) in undergraduate and community samples, respectively. Moreover, no participant scored the maximum possible score (28) across all three subscales, suggesting that the DASS-21 is able to adequately discriminate between symptoms of depression, anxiety, and PD, and that PD symptoms do not confound or inflate the assessment of depression and anxiety among individuals with PD.

There was evidence of both criterion and discriminant validity within the present study. Participants who reported an existing psychiatric diagnosis had significantly higher scores on all three DASS-21 subscales compared to those without. ROC curves analysis provided preliminary support for the diagnostic accuracy of the DASS-21. ROC curves showed that the area under of the curve (AUC) for all three DASS-21 subscales was around .70, which corresponds to a 'fair' degree of diagnostic accuracy (Zweig & Campbell, 1993). Previous validation studies of other depression and/or anxiety instruments in PD have returned higher AUC values including .88 for the BDI against the SCID (Visser et al., 2006), and 76.6 for the BAI and 74.9 for the Ham-A against the MINI (Leentjens et al., 2012), suggesting that these scales may be more accurate screening tools than the DASS-21 for depression and/or anxiety in PD. However, it must be noted that because the data used for this study was not collected specifically for the purposes of scale evaluation,

accuracy was based on the ability of the DASS-21 to differentiate between participants with and without a self-reported existing psychological diagnosis (past or current), rather than comparison against a structured diagnostic interview. Participants with historic psychological diagnoses (e.g., 10 to 50 years prior) but no longer showing elevated symptoms would have been included in the 'postive psychological diagnosis' group and this may have acted as a possible confound in the ROC curve analysis. Moreover, DASS-21 scores were not directly compared with their relevant diagnostic categories (e.g., directly comparing DASS-D scores in participants with and without depression diagnoses) as information about specific psychological diagnoses was not collected and this is likely to have reduced the accuracy rate of the scale in this study. Future research is required to more accurately assess the accuracy of the DASS-21 against a gold-standard DSM-IV-TR diagnosis. This will also allow for an examination of the sensitivity and specificity of the DASS-21 and the determination of cut-off scores for research and clinical use. Nevertheless, it is encouraging to note that while DASS-21 scores were compared against a broad existing psychological diagnosis, AUC values for the DASS-21 scales (.70) were only slightly lower than that reported for the BAI (76.6) and Ham-A (74.9) which were directly compared with the MINI by Leentjens et al. (2012).

Current expert taskforce reviews have recommended the use of the BDI and BAI as measurement tools for depression and anxiety in PD due to their sound psychometric properties and self-report nature, which enhances time-effectiveness in both research and clinical settings relative to clinican-rated scales (Leentjens et al., 2012; Schrag et al., 2007). This study provides strong support for the use of the DASS-21 as an outcome measure for depression and anxiety in PD and as a potential alternative to the BDI and BAI. The DASS-21 demonstrated good validity and reliability within the present sample comparable to the psychometric properties reported for the BDI and BAI in PD. A particular strength of the DASS-21 relative to the BAI, however, appears to be its ability to provide an assessment of anxiety and depressive symptoms in PD that is not confounded or inflated by an overlap with PD symptoms. Only one item (Item 6: 'trembling in the hands') on the DASS-21 represented a symptom overlap between the three conditions, with the remainder of items comprising cognitive, behavioural or affective indicators of anxiety. This is in direct contrast with the BAI which contains nine items (43%) that may present a

potential confound in the assessment of anxiety among individuals with PD as items overlap with PD symptoms (i.e., numbness or tingling, feeling hot, wobbliness in legs, dizzy, unsteady, hands trembling, shaky, indigestion, hot/cold sweats). Moreover, the DASS-21 assesses both depression and anxiety within the same scale and is available in the public domain whereas the BDI and BAI are not, and thus may be more time- and cost-effective than the BDI and BAI.

4.7.1 Limitations and Direction for Future Research

While this study provides preliminary support for the validity and reliability of the DASS-21 in PD, a more comprehensive assessment of the psychometric and clinimetric properties of the scale in PD samples is required. As the data used in this study was not collected specifically for the purpose of psychometric evaluation, assessment of the critical properties such as sensitivity, specificity, convergent validity, and test-retest reliability of the scale, was not possible.

Future researchers should aim to replicate the results of the current study in a larger and more representative sample of individuals with PD to confirm the reliability and validity of the DASS-21 in PD. In particular, a study directly comparing the DASS-21, BDI and BAI among a single sample would provide useful insight into the comparative utility of the DASS-21 against the currently recommended scales for use in PD. Future research is also required to more accurately assess the accuracy of the DASS-21 against a DSM-IV-TR diagnosis.

4.7 Chapter Summary

An emphasis has been placed on selecting appropriate psychological measurement scales for use in PD populations. Scales developed for the general population may not always constitute valid measures in PD and selection of inappropriate scales can ultimately invalidate research findings. Overall, this study showed that the DASS-21 appears to be a valid and reliable instrument for use in PD. There was evidence of the factorial validity, criterion validity, discriminant validity and internal reliability of the scale, supporting the use of the DASS-21 as a primary outcome measure throughout the remainder of this thesis.

CHAPTER 5 |

Study III. A Randomised Controlled Trial of Group Cognitive Behavioural Therapy for Depression & Anxiety in Parkinson's Disease

---

5.1 Introduction

A growing body of research now supports the efficacy of individual Cognitive Behavioural Therapy (CBT) interventions for depression and anxiety in Parkinson's disease (PD). However, Group CBT remains understudied despite strong therapeutic and practical advantages that are particularly suited for older adult and chronic illness populations.

This chapter presents the findings of the first randomised controlled trial of a group CBT intervention for the treatment of depression and anxiety in a PD sample. The first half of the chapter provides an outline of the design and methodology of the study while the latter half presents the results of the clinical trial and a discussion of the findings and clinical implications.

Overall, both statistically and clinically significant reductions in depression, anxiety, stress and negative cognitions were observed over both the acute and follow-up study period and provide strong preliminary support for the efficacy of group CBT in the treatment of depression and anxiety in PD. Significant recruitment difficulties were experienced, however, which limits the validity of results as well as suggesting that significant barriers to seeking psychological treatment may be in place in this population.

5.2 Methodology

5.2.1 Research Design and Study Setting

This study was a randomised controlled trial (RCT) comparing a group CBT intervention targeting comorbid depression and anxiety to a waitlist control. The study took place at the Curtin University Psychology Clinic in Bentley, Western Australia. Two waves of treatment were conducted. Wave I took place between July and December 2010 and Wave II took place between August and October 2011. Measurements were taken at pre-treatment, post-waitlist (for participants in the Waitlist condition), post-treatment, 1-month and 6-month follow-ups (see Figure 6). All aspects of the study conformed to CONSORT requirements (Moher, Schulz, & Altman, 2001).

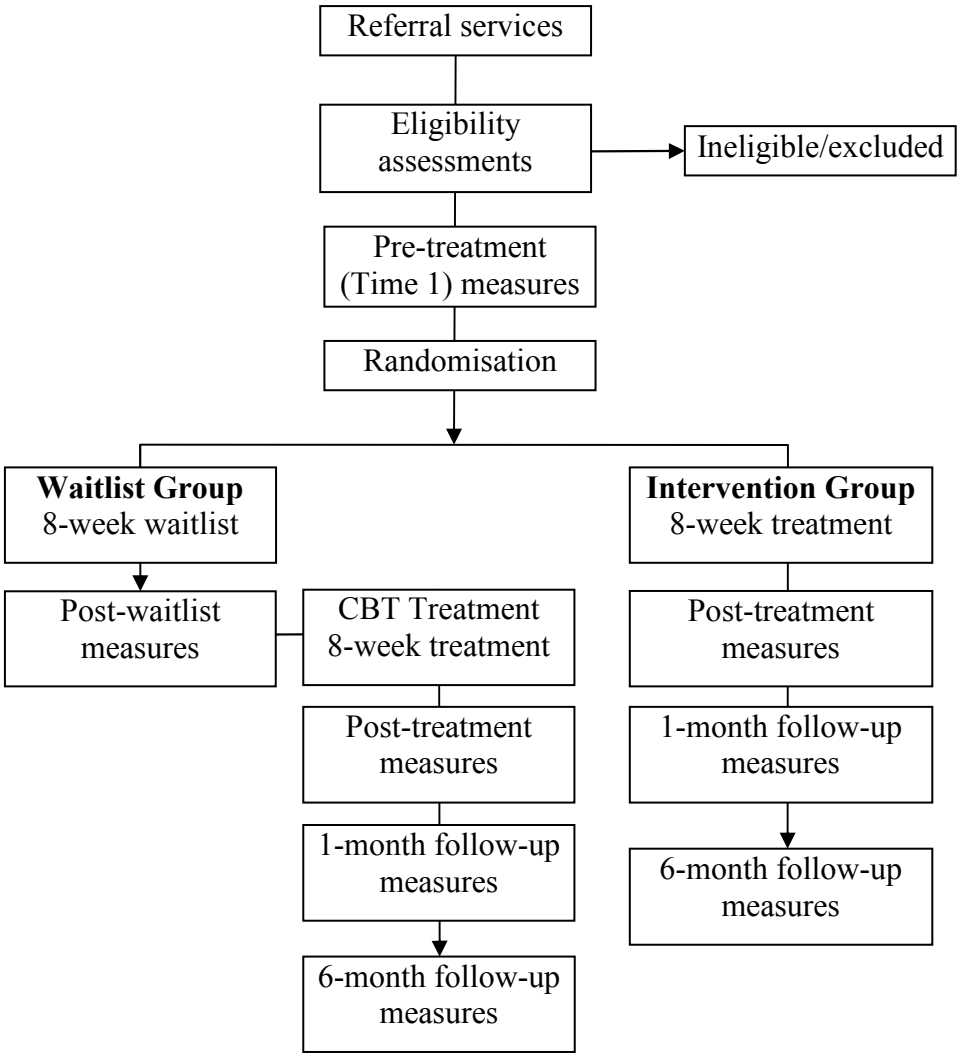


Figure 6. Research Design of the Randomised Controlled Trial

5.2.2 Participants

5.2.2.1 Inclusion and exclusion criteria. Participants were Australian adults aged 18 years or over with Parkinson's disease and a current diagnosis of depression and/or anxiety. Inclusion criteria included; (1) a minimum 6-month period post-diagnosis of PD, (2) a DSM-IV-TR diagnosis of at least one depressive and/or anxiety disorder, (3) stabilised use of antiparkinsonian medications (if on any) for at least three months, and (4) stabilised use of antidepressant medications (if on any) for at least three months. Exclusion criteria included cognitive impairment, concurrent psychological treatment, current diagnosis of a DSM-IV-TR psychotic disorder and a high suicide risk.

5.2.2.2 Participant flow. Figure 7 outlines the participant flow in the study. A total of 45 individuals expressed interest in the study. Sixteen decided not to continue after receiving further information about the treatment. Reasons for discontinuation included; residence outside of the Perth metropolitan area ($N = 3$), holiday plans coinciding with treatment dates ($N = 2$), inability to leave the house due to advanced disease ($N = 1$) or no reason given ($N = 10$). Twenty-nine participants were screened for eligibility. Eleven participants were found to be ineligible due to; cognitive impairment (4 participants; 36%) and no clinically significant (i.e., a DSM-IV-TR diagnosis of) depression and/or anxiety (7 participants; 64%). Eighteen adults met eligibility criteria for the study and comprised the intention-to-treat sample. These participants were randomly allocated to either Intervention or Waitlist conditions. During Wave I of treatment, one Intervention ($N = 7$) and one Waitlist group ($N = 7$) were conducted. Significant recruitment difficulties were experienced during Wave II. There were insufficient participants to run an Intervention and Waitlist group and so all eligible participants were assigned to the Intervention group ($N = 4$). Sixteen participants completed treatment (89%) while two (11%) withdrew due to scheduling difficulties (1 participant, 50%) and cognitive difficulties (1 participant, 50%).

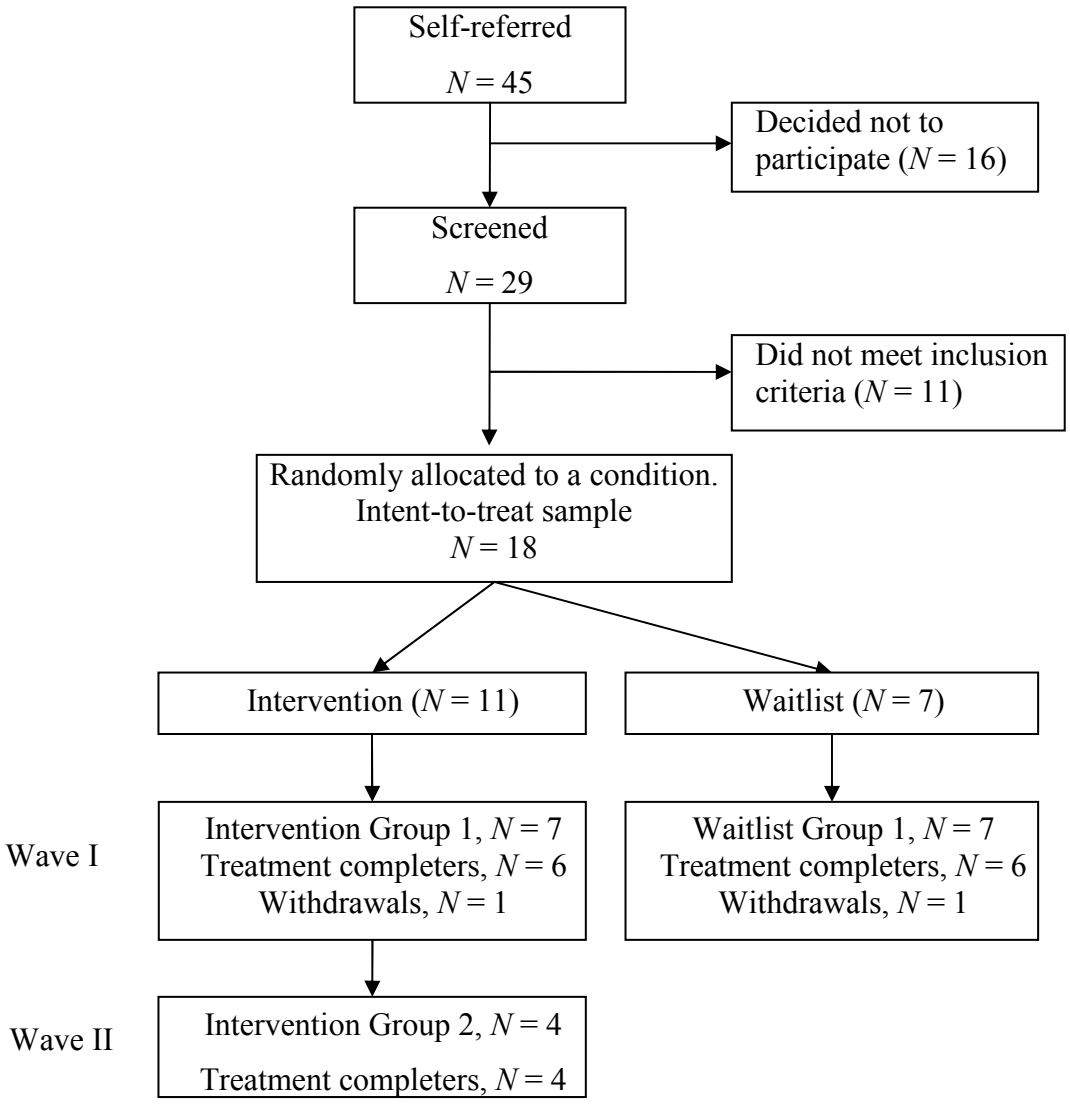


Figure 7. Flow Diagram of Participant Recruitment and Allocation

5.2.2.3 Demographic Characteristics of the intent-to-treat (ITT) sample. Of the total ITT sample, there were 12 males (67%) and 6 females (33%) with a mean age of 66 years (range: 52 to 76 years). Mean duration of PD was 5 years (range: 8 months to 20 years). Average severity of PD was Hoehn and Yahr Stage II Eighty eight percent ($N = 16$) of participants were currently taking antiparkinsonian medications. There were no significant differences between demographic characteristics of participants in the Intervention and Waitlist conditions. Other demographic characteristics of the ITT sample appear in Table 13.

Table 13

Demographic Characteristics of the Intent-to-Treat Sample

	ITT *N* = 18	Intervention *N* = 11	Waitlist *N* = 7
Sex, *N* (%)			
Male	12 (67%)	9 (82%)	3 (43%)
Female	6 (33%)	2 (18%)	4 (57%)
Demographic Characteristics			
Mean age *(SD)*	66 (8.26)	68 (7.72)	62 (8.34)
Employed, *N* (%)	2 *(*11.1%)	1 (9%)	1 (14%)
Number of children, *N*	1.70	2	1.20
PD Characteristics			
Age of onset, *M (SD)*	61 (8.29*)*	63	58
PD duration, *M* years	5 years	5 years	4 years
Currently taking PD medications, *N* (%)	16 (88%)	10 (91%)	6 (86%)

5.2.3 Procedure

5.2.3.1 Ethical and registration procedures. Ethical approval from Curtin University's Human Research Ethics Committee was sought and granted prior to any contact with participants (Approval number: HR 142/2009). The study was also registered with the Australian New Zealand Clinical Trials Registry (ACTR number: ACTRN12610000455066).

5.2.3.2 Recruitment. Several recruitment strategies were used. Print advertisements for the study were run in several editions of the Parkinson's Association of Western Australia's (PWA) member newsletter and three community newspapers (Have-A-Go, The Post Newspaper, and the Canning Times). A media release calling for participants was published by Curtin University and targeted an extensive network of online, radio, print and television agencies. PWA specialist nurses were asked to distribute information packs about the study to their patients. Information packs were also distributed at a state-wide Parkinson's Clinic based at

Fremantle Hospital. In addition, the trial was registered on the Michael J Fox Foundation's Fox Trial Finders website, an international registry of clinical trials being conducted in the PD area with over 10 000 members. Interested individuals self-referred and were sent an information pack and consent form. Those who returned consent were then assessed for eligibility.

5.2.3.3 Assessment. Eligibility for treatment was determined in a two-stage process, first involving a telephone screening followed by a clinical assessment for individuals identified as tentatively suitable. All assessments were conducted by Curtin University clinical psychologist trainees (either clinical psychology Masters or Doctoral candidates) at the Curtin University Psychology Clinic, under the supervision of experienced clinical psychologists. The primary researcher did not conduct any of the clinical assessments to reduce selection bias.

All self-referred individuals were telephone screened using a semi-structured interview comprised of four components; (i) a cognitive status assessment using the Telephone Interview for Cognitive Status-30 (Brandt, Spencer & Folstein, 1988), (ii) a screen for initial signs of psychopathology using the Mini International Neuropsychiatric Interview-Screen (Sheehan, Janavas, & Baker, 2006), (iii) a screen for psychosis, and (iv) a screen for any suicidal risks both using the relevant modules of the Mini International Neuropsychiatric Interview 6.0 (Sheehan & Lecrubier, 2009). Suitable individuals were defined as those showing initial signs of any depressive and/or anxiety disorder, while exhibiting no cognitive impairment, no current psychosis, and no suicidality. Individuals identified as tentatively suitable candidates were then invited to attend a clinical assessment at the Curtin Psychology Clinic while those found ineligible were referred to other appropriate sources of help if requested. Clinical assessments involved a structured diagnostic interview using the Structured Clinical Interview for DSM-IV (First et al., 1996) to determine any psychiatric diagnoses. All individuals identified as meeting DSM-IV-TR criteria for at least one anxiety or depressive disorder were offered a place in the study. All eligible participants accepted and at this stage were asked to complete pre-treatment questionnaires as baseline data.

5.2.3.4 Randomisation. A block randomisation procedure stratified by timing was implemented to allocate participants to conditions. Randomisation was performed following recruitment of sufficient participants for an Intervention and Waitlist group (approximately 10 to 14 participants). For Wave I, a 1:1 ratio was used to allocate participants to conditions. A randomisation list was computer generated by a person external to the study to limit any potential selection bias. Participants were then informed of their group allocation and associated treatment start dates. Participants in the Waitlist condition were advised of a period of symptom monitoring preceding treatment, while those assigned to the Intervention condition commenced treatment within a week of the clinical assessments. Due to significant recruitment difficulties, all eligible participants were assigned to the Intervention group in Wave II.

5.2.3.5 Treatment and therapists. Participants in both Intervention and Waitlist conditions received the same treatment. Treatment consisted of eight sessions run over eight consecutive weeks with each session lasting two hours. Each group was facilitated by two therapists. There were four therapists in total; one clinical psychologist and three clinical psychologist trainees. All therapists received weekly supervision and training with a clinical psychologist who reviewed video recordings of each session to ensure treatment fidelity and adherence to protocol.

5.2.3.6 Data collection. Table 14 displays the measurement points for the Intervention and Waitlist groups. For the Intervention groups, measurements were taken at four time points, whereas measurements were taken at five time points for the Waitlist participants. Completion of all outcome measures was voluntary.

5.2.4 Treatment Protocol

The treatment used in the study was an adaptation of the Mood Management Course developed by the Centre for Clinical Interventions in Western Australia (MMC; Nathan et al., 2001). The MMC is a structured, time-limited, evidence-based CBT group programme targeting comorbid depression and anxiety, and has been found to be effective in primary psychiatric outpatient populations (Nathan, McEvoy, & Rees, 2004). The original MMC programme is delivered over 10

Table 14

Measurement Time Points for the CBT and Waitlist Groups

	CBT		Waitlist	
	Measurement	Week	Measurement	Week
Time 1	Pretreatment	0	Pretreatment	0
Time 2	Posttreatment	8	Post-Waitlist	8
Time 3	1-month F-Up	12	Posttreatment	16
Time 4	6-month F-Up	32	1-month F-Up	20
Time 5			6-month F-Up	40

consecutive weekly sessions with a one month follow-up session. However, the MMC has been successfully delivered in eight sessions with clients with PD (e.g., Feeney et al., 2005) and this format was adopted for the present study.

5.2.4.1 Treatment structure. The study treatment was an 8-week programme with each session of 2-hour duration. Each session involved a number of activities and discussions with main treatment components including psychoeducation, relaxation training, cognitive modification, problem solving and behavioural activation. Participants were assigned between-session tasks (or homework) every week and were also provided with a handout booklet at every session with more comprehensive information about that session's activities.

5.2.4.2 Protocol adaptations. A number of procedural and content adaptations were made to the original MMC protocol to accommodate participants' PD symptoms as well as to address disease-specific issues and concerns, respectively. Procedural modifications included a significant reduction of in-session writing to accommodate difficulties with fine motor skills as well as the inclusion of regular breaks throughout each session. Participants were also free to take medications in-session when needed and encouraged to move around the room as they desired to relieve restless limbs while clinicians still engaged them in session. Content modifications were made to examples given in the original MMC in order to make them more age and disease appropriate. Specific PD sections were also

incorporated into the protocol. These included; the role of PD, loss and stress in depression and anxiety, PD symptoms as a trigger for panic and anxiety, the fear of falling, and preparing for disease progression. In addition, the graded exposure component of the original MMC protocol was removed from the study protocol as the focus was primarily on a cognitive approach to treatment. Table 15 outlines the content for each session used in the study treatment as well as shows the main adaptations made to the original MMC protocol.

Table 15

Outline of Treatment Protocol Session Content

Session	Content
1	Introductions. Programme overview. Psychoeducation: Focus on the role of PD, loss and stress in depression and anxiety. Goal setting.
2	Change process and decisional balance Behavioural activation Pacing: Scheduling around the on-off effect in PD
3	Calming technique The ABC connection Thought diaries Automatic thoughts Unhelpful thinking styles with specific PD examples
4	Calming technique Disputation Balanced thinking
5	Calming technique More disputation
6	Calming technique Physical sensations as triggers PD symptoms as triggers for anxiety The fear of falling Active coping
7	Calming techniques Flashcards Preparing for the future/disease progression
8	Calming technique Progress review Self-management plan Maintaining goals and staying well

5.2.5 Screening Measures

Measures used during telephone screening of participants were the Telephone Interview for Cognitive Status-30 (Brandt, Spencer, & Folstein, 1988), Mini International Neuropsychiatric Interview-Screen (Sheehan, Janavas, & Baker, 2006), and the Mini International Neuropsychiatric Interview (Sheehan & Lecrubier, 2009), while the Structured Clinical Interview for DSM-IV (First et al., 1996) was used in the clinical interviews.

5.2.5.1 Telephone Interview for Cognitive Status-30 (TICS-30). The Telephone Interview for Cognitive Status and its abbreviated forms (i.e., TICS-Modified, TICS-40 and TICS-30) are a range of measures designed specifically to assess cognitive functioning over the phone and were developed based on the 'gold standard' measure of cognitive functioning, the Mini Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975).

The TICS-30 is the briefest form of the range of TICS interviews and was used in the present study to screen participants for cognitive impairment. The TICS-30 was selected primarily due to the availability of clinical severity cut-offs for the measure that have not been developed for the original TICS. The measure contains eight items assessing various cognitive abilities including orientation, concentration, short-term memory, language, praxis and mathematical skills. Examples of items include "What year is this?", "Count backwards from 20 to 1", "Please spell the word 'world' backwards' and a 10-word recall task. Items 1 (state full name), 10 (finger tapping) and 11 (word opposites) from the original TICS are omitted in the TICS-30. There is no time limit to complete questions although the TICS-30 can generally be administered and completed in 5 to 10 minutes.

Total TICS-30 scores can range from 0 to 30 with lower scores indicating more severe cognitive impairment. Severity ratings for the TICS-30 have been developed to match ratings established for the MMSE (i.e., Fong et al., 2009), and are as follows: 0-12 (severe cognitive impairment), 13-17 (mild impairment), and 18-30 (unimpaired cognitive ability). Participants were required to score 18 or higher (i.e., exhibit no cognitive impairment) in order to be eligible for the study.

There is limited information about the psychometric properties of the TICS-30. However, Fong and colleagues (2009) demonstrated that scores on the TICS-30 correlated highly with those on the MMSE, (intraclass correlation coefficient = .80) and suggested that it is a useful alternative to the MMSE. The TICS-30 has also been used successfully as a screen for cognitive impairment in a clinical study with dementia patients (i.e., Breitner & Welsh, 1995) as well as an epidemiology study investigating cognitive impairment in 856 adults aged 70 and over (i.e., Langa et al., 2005). More broadly, the original TICS has been shown to strongly correlate with the MMSE (r = .94) (de Jager, Budge, & Clarke, 2003; Desmond, Tatemichi, & Hanzawa, 1994; Grodstein et al., 2000; Plassman, Newman, Welsh, Helms, & Breitner, 1994), as well as show high sensitivity and specificity in detecting cognitive impairment in patients with Alzheimer's disease (Brandt et al., 1988), post-stroke patients (Barber & Stott, 2004), and community dwelling seniors aged 70-85 years (Espeland et al., 2011).

5.2.5.2 Mini International Neuropsychiatric Interview-Screen (MINI-Screen). The MINI-Screen is a brief 21-item screening tool which detects initial signs of psychopathology. Each MINI-Screen item is a basic identifier of a psychological condition and corresponds to a specific Mini International Neuropsychiatric Interview (MINI) diagnostic category. For example, Item 1 ('Have you been consistently depressed or down, most of the day, nearly every day, for the past two weeks?') corresponds to MINI Module A which examines Major Depressive Episodes. Each MINI-Screen item is scored on a 'YES/NO' basis. For each item answered yes, the corresponding MINI module is administered to further investigate symptoms, although relevant sections of other DSM-based diagnostic interviews can also be used.

The MINI-Screen was used in the present study to identify individuals presenting with initial signs of depression and/or anxiety during telephone screening. Participants were required to answer 'yes' to at least one screening question indicative of a potential anxiety (Items 7-14 and 17) or depressive disorder (Items 1-3) in order to be eligible for a clinical interview.

5.2.5.3 Mini International Neuropsychiatric Interview (MINI). The third measure used in the telephone screens was the MINI, which is a brief structured diagnostic interview investigating 16 Axis-I psychological disorders in accordance with the DSM-IV-TR. In this study, only MINI Modules B (Suicidality) and K (Psychotic disorders) were administered. Both modules were administered to every participant to exclude those with a high suicide risk and/or psychosis. Participants were ineligible if they were identified as having high current suicidality (score > 17) or any current psychotic disorder. The MINI has demonstrated high interrater reliability with correlations between the number and type of diagnoses as rated by two independent interviewers ranging from .75 to 1 with a mean of .93 (Sheehan et al., 1998). Test-retest reliability of MINI diagnoses are also sound with a mean of .76 over a 2 day period (Sheehan et al.).

5.2.5.4 Structured Clinical Interview for DSM-IV – Patient Edition (SCID-I/P). All clinical assessments were conducted using relevant sections of the SCID-I/P by Curtin University Clinical Psychology Masters/Doctoral candidates. The primary researcher did not conduct any of the clinical assessments to reduce selection bias.

The SCID-I/P is a comprehensive structured diagnostic interview which assesses the range of Axis-I psychological disorders as outlined in the DSM-IV-TR. Only relevant sections of the SCID-I/P were administered according to each participant's MINI-Screen symptom profile in order to lessen any burden on participants. However, clinicians were also able to administer other sections if their clinical judgment suggested a presenting condition that was not detected on the MINI-Screen. The SCID is considered the 'gold standard' instrument for determining a primary psychiatric diagnosis in both research and clinical settings (First et al., 1996). SCID diagnoses have been shown to be moderately to highly agreeable with diagnoses made using comparable structured interviews such as the MINI with correlation coefficients ranging between .43 to .90 (First et al.). In addition, excellent interrater reliability for the SCID-I/P has been demonstrated with Ventura, Liberman, Green, Shaner and Mintz (1998) reporting a mean Cohen's kappa of .85 for 30 independent raters (range = .71 - .91).

5.2.6 Primary Outcome Measures

The primary outcomes measured in the study were depression, anxiety, stress, quality of life and negative cognitions. Depression, anxiety and stress were measured using the respective scales of the Depression, Anxiety and Stress Scale-21 (Lovibond & Lovibond, 1995), PD-related quality of life was assessed using the Parkinson's Disease Questionnaire-39 (Jenkinson, Peto, Fitzpatrick, & Greenhall, 1995) and negative cognitions were measured using the Cognitions Checklist (Beck, Brown, Eidelson, & Riskind, 1987).

5.2.6.1 Depression, Anxiety and Stress Scale-21 (DASS-21). The DASS-21 is a 21-item short form of the 42-item DASS, and measures three negative affective states: Depression, Anxiety and Stress. Participants were asked to indicate the extent to which they experienced 21 negative psychological and/or physiological symptoms over the past week on a 4-point Likert scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much*). Examples of items for each dimension include "I felt downhearted and blue" (Depression), "I was worried about situations in which I might panic and make a fool of myself" (Anxiety) and "I tended to over-react to situations" (Stress). Possible scores for each dimension ranged from 0 to 21 with higher scores reflecting greater experience of symptoms on the respective scale. Severity ratings for each DASS-21 factor were assessed based on the corresponding percentile rank of each subscale score as established by Henry and Crawford (2005). Chapter 4 provided a preliminary investigation or the psychometric and clinimetric properties of the DASS-21 as a measure for depression and anxiety in PD and showed strong support for the validity and reliability of the DASS-21 in PD.

5.2.6.2 Parkinson's Disease Questionnaire-39 (PDQ-39). The PDQ-39 is a PD-specific scale designed to assess the impact of PD on patient perceived quality of life. The scale comprises 39 items assessing subjective quality of life over eight domains: Mobility, Daily Living, Emotional Well-being, Stigma, Social Support, Cognitions, Communication and Bodily Discomfort. Participants were asked to rate the extent to which they experienced various PD-related impediments to living over the past month on a 5-point Likert scale ranging from 0 (*never*) to 4 (*always or cannot do at all*). Examples of items include "Felt frightened or worried about falling over in public?" and "Felt embarrassed in public due to having Parkinson's

disease?". A domain score ranging from 0 (*no problem at all*) to 100 (*maximum level of problem*) is calculated for each factor as well as a total PDQ index score, also ranging from 0 (*no problem at all*) to 100 (*maximum level of problem*).

Excellent internal consistency for the PDQ-39 has been reported with alpha values ranging from .72 to .95 for the eight factors with a mean of .83 (Hagell & Nygren, 2007). Test-retest reliability of the eight subscales over two weeks has also been established as high with correlation coefficients ranging from .76 to .93 for the eight factors with a mean of .86 (Hagell & Nygren). In addition, the PDQ-39 has also shown evidence of high convergent validity with various other measures of health-related quality of life including the PD Quality of Life Questionnaire (r = -.91), Unified PD Rating Scale - Activities of Daily Living (r = .69) and the Schwab and England Scale (r = .60) (Martinez-Martin et al., 2007).

5.2.6.3 Cognitions Checklist (CCL). The CCL is a measure of the frequency of depressive and anxious cognitions and was used in the study to assess any changes in participants' negative thinking patterns across the study period. The scale comprises 26 items, 14 reflecting depressive cognitions and 12 reflecting anxious cognitions. Examples of items include "No one cares whether I live or die" (Depression) and "Something will happen to someone I care about" (Anxiety). Participants were required to rate the frequency in which they currently experience each thought in the CCL on a 5-point Likert scale ranging from 0 (*never*) to 4 (*always*). Total scores can range from 0-56 for depression and 0-48 for anxiety, with higher scores indicating a greater presence of depressive and anxious cognitions, respectively. In this study, CCL scores were expressed as a percentage ranging from 0 to 100% to reflect the frequency of depressive and anxious cognitions. Percentages for each individual were calculated by dividing individual scores by the maximum possible subscale score. Internal consistency of the CCL has been reported as high with α = .90 for the Anxiety subscale and α = .92 for Depression (Beck et al., 1987). Test-retest reliability of the scale has also been established as good with r = .79 over a six week period (Beck et al.). Evidence of convergent validity has also been shown with moderate to strong correlations between the Anxiety scale and the Ham-A (r = .54) and the CCL Depression scale and the Ham-D (r = .62; Beck et al.).

5.2.7 Credibility/Expectancy Questionnaire (CEQ)

An additional questionnaire was used to examine participants' expectations of treatments. The CEQ is a brief 6-item measure of treatment credibility and was administered to participants as part of the pre-treatment battery of questionnaires. The scale consisted of two subscales; Credibility and Expectancy. The Credibility factor reflects a cognitive-based process and assessed the extent to which participants *thought* the Group CBT treatment was believable, convincing and logical. The Expectancy factor reflects an affective-based process and measured the degree to which participants *felt* the study treatment would result in any improvement. The CEQ employs two Likert rating scales, a 9-point scale ranging from 1 (*not at all*) to 9 (*very much*) for Items 1-3 and 5 and an 11-point scale ranging from 0% (*not at all*) to 100% (*very much*) for Items 4 and 6. Separate factor scores for Credibility and Expectancy are derived by summing the corresponding individual item scores. Each factor score can range from 3 to 27, with higher scores indicating greater credibility or expectancy. Internal consistency for both CEQ factors has been shown to be high, with alpha values ranging from .79 and .86 for credibility and .81 to .90 for expectancy (Devilly & Borkovec, 2000). The CEQ also has good test-retest reliability with r = .82 (expectancy) and r = .75 (credibility) over a one-week period (Devilly & Borkovec).

5.3 Hypotheses

5.3.1 Effects of Group CBT versus Waitlist on Symptomatology

H1: The Intervention group will show statistically significant improvement in depression (DASS-D) between pretreatment (Time 1) and posttreatment (Time 2), whereas the Waitlist group will show no significant changes between pretreatment (Time 1) and post-waitlist (Time 2).

H2: The Intervention group will show statistically significant improvement in anxiety (DASS-A) between pretreatment (Time 1) and posttreatment (Time 2), whereas the Waitlist group will show no significant changes between pretreatment (Time 1) and post-waitlist (Time 2).

H3: The Intervention group will show statistically significant improvement in stress (DASS-S) between pretreatment (Time 1) and posttreatment (Time 2), whereas the Waitlist group will show no significant changes between pretreatment (Time 1) and post-waitlist (Time 2).

H4: The Intervention group will show statistically significant changes in quality of life (PDQ-39) between pretreatment (Time 1) and posttreatment (Time 2), whereas the Waitlist group will show no significant changes between pretreatment (Time 1) and post-waitlist (Time 2).

H5: The Intervention group will show statistically significant reduction in the frequency of depressive cognitions (CCL-D) between pretreatment (Time 1) and posttreatment (Time 2), whereas the Waitlist group will show no significant changes between pretreatment (Time 1) and post-waitlist (Time 2).

H6: The Intervention group will show statistically significant reduction in the frequency of anxious cognitions (CCL-A) between pretreatment (Time 1) and posttreatment (Time 2), whereas the Waitlist group will show no significant changes between pretreatment (Time 1) and post-waitlist (Time 2).

5.3.2 Effects of Group CBT on Symptomatology

H7: The Intervention group will show statistically significant changes in all outcomes (DASS-D, DASS-A, DASS-S, PDQ-39, CCL-D, CCL-A) from baseline (Time 1) to posttreatment (Time 2).

H8: The Intervention group will show statistically significant changes in all outcome (DASS-D, DASS-A, DASS-S, PDQ-39, CCL-D, CCL-A) from baseline (Time 1) to one-month follow-up (Time 3).

H9: The Intervention group will show statistically significant changes in all outcome (DASS-D, DASS-A, DASS-S, PDQ-39, CCL-D, CCL-A) from baseline (Time 1) to six-month follow-up (Time 4).

H10: Group CBT will be equally effective in reducing outcomes (DASS-D, DASS-A, DASS-S, PDQ-39, CCL-D, CCL-A) for participants who commenced treatment immediately (i.e., Intervention group) and participants who commenced treatment after the waiting period (i.e., Waitlist group).

5.4 Data Analysis

5.4.1 Statistical Hypothesis Testing

Multilevel linear mixed-effects modelling (MLM; Bryk & Raudenbush, 1987; Holden, Kelley, & Argarwal, 2008) was used to test statistical hypotheses (Hypotheses 1 to 10). All MLM analyses were performed using the 'MIXED' procedure in SPSS 19.0.

MLM is a regression based approach which can model average trajectory of change over time and provides a more powerful means of analysing nested and clustered data when compared with more conventional procedures for the comparison of group means (e.g., the ANOVA family of analyses; Van Der Leeden, 1998). For data collected in groups or clusters, MLM recognises that change in outcome over time is affected by both a fixed effect (e.g., treatment) as well as random effects at both individual as well as group levels, and is able to explicitly account for this multilevel random variation (Bryk & Raudenbush, 1992). Moreover, MLM recognises that data collected in hierarchical structures are likely to be correlated and therefore does not require independence of observations (Bryk & Raudenbush). Other benefits include that MLM is less sensitive to participant attrition and missing data, robust to unequal group sizes and can account for unequally spaced data collection points (Holden et al., 2008). Ultimately, MLM is provides a more accurate estimation of group means when sample sizes are small (Verbeke & Molenbergs, 2000) which is particularly important for preliminary trials.

In its simplest form, MLM models trajectory of change over time based on the following formula:

$$Y = \beta 0 + \beta 1X + \varepsilon$$

where: Y = outcome
X = time
β0 = intercept
β1 = slope (rate of change)
ε = random error

Thus, change over time is represented as a linear function of baseline scores (intercept), fixed effects (rate of change) and random effects (error). In the mixed-effects MLM model, additional error terms are also included to reflect random effects at each level of the hierarchical model. The fixed effect is the primary interest in clinical trials. Random effects are considered covariates and are adjusted for accordingly when determining the effect of the fixed effect on outcome, in much the same way as covariates are controlled for in ANCOVA (Bryk & Raudenbush, 1992).

5.4.1.1 Assumption testing. There are three assumptions underpinning MLM, all which pertain to residuals rather than cases; (1) normality of residuals, (2) equal and constant variances of residuals, and (3) independence of residuals (Pinheiro & Bates, 2000). Each of the assumptions must be tested at each level of the MLM model as well as across levels prior to analysis (Snijders & Bosker, 1999). Normality of residuals was tested using the Shapiro-Wilk statistic (suitable for when group sizes are less than 50; Tabachnick & Fidell, 2007), along with visual inspection of histograms and Quantile-Quantile plots. Equality of variances of residuals was tested via inspection of scatterplots of standardised residuals versus predicted values. Independence of residuals was testing using bivariate correlations within levels as well as across levels.

5.4.1.2 Model 1: Intervention versus Waitlist from Time 1 to Time 2. Hypotheses 1 to 6 were tested using a series of two-level MLM analyses (Participants nested within Treatment Condition). Six separate analyses were conducted, one for each outcome variable (DASS-D, DASS-A, DASS-S, PDQ-39, CCL-D, CCL-A). The data used for Model 1 was from the entire sample ($N = 18$).

All analyses were tested against an alpha level of .05 for statistical significance. No explicit adjustments were made for multiple comparisons as MLM implicitly adjusts for multiple comparisons within the analysis (Gelman, Hill, & Yajima, 2012).

Each MLM analysis included four predictors; Time (fixed), Time (random), Condition (fixed) and the fixed interaction between Time and Condition (Time x Condition). The fixed effect of Time provides a mean estimate of the rate of change (slope) in outcomes from Time 1 and Time 2 for all participants. The random effect of Time provides an indication of any individual variation around the mean slope for the sample (i.e., whether participants significantly differed from the average rate of change in the sample). The Condition (fixed) effect provides a comparison of any differences in baseline levels of outcomes between the Intervention and Waitlist groups. The Time x Condition interaction was the primary variable of interest in each analysis. A significant Time x Condition interaction effect indicates a differential rate of change in outcomes between the Intervention and Waitlist conditions from Time 1 to Time 2. Thus, it was predicted that there would be a significant Time x Condition interaction effect for all outcomes, with the Intervention group experiencing statistically significant improvement between Time 1 and Time 2 while the Waitlist group did not.

5.4.1.3 Model 2: Overall Effects of Group CBT on Symptoms from Pretreatment to Six-Month Follow-Up. Hypotheses 7 to 9 were tested using a series of two-level MLM analyses (Measurement Occasion nested within Participants) to examine average trajectory of change from pretreatment to 6-month follow-up for the Intervention group. Data from Waves I and II were collapsed to assess the efficacy of the CBT programme for both Intervention groups ($N = 11$). All analyses were tested against an alpha level of .05 for statistical significance.

Each MLM analysis included two predictors; Time (continuous, random) and Measurement Occasion (categorical, fixed). Of interest in this analysis was the fixed effect of Measurement Occasion (pretreatment, posttreatment, 1-month follow-up and 6-month follow-up). A statistically significant slope at any measurement point for an outcome indicated that there was a statistically significant rate of change between pretreatment and the respective time point. Post-hoc pairwise comparisons

were also conducted to examine any significant rate of change between subsequent measurement points (e.g., between posttreatment and 1-month follow-up, and 1-month follow-up and 6-month follow-up). It was predicted that there would be a significant slope at every time point for every outcome demonstrating acute and sustained treatment gains for the CBT programme.

5.4.1.4 Model 3: Effect of Group CBT on Symptoms – Immediate versus Delayed Treatment Commencement. Hypothesis 10 was tested using a series of two-level MLM analyses (Participants nested within Condition) examining any significant differences between the rates of change in outcomes for participants who commenced treatment immediately (i.e., the Intervention group) and participants who had a delayed treatment start (i.e., Waitlist group). Model 3 used data from all participants in the ITT sample ($N = 18$). All analyses were tested against an alpha level of .05 for statistical significance.

Average trajectory of change was modelled between Time 1 (pretreatment) and Time 4 (6-month follow-up). For participants in the Waitlist group, post-waitlist scores were used as Time 1 scores as they provided a more recent assessment of participants' symptoms prior to treatment commencement as well as allowed direct comparison of the rate of change in outcomes over a 32-week period from the start of treatment to 6-month follow-up for all participants.

Each MLM analysis included four predictors; Time (fixed), Time (random), Group (fixed) and the fixed interaction between Time and Group (Time x Group). It was predicted that there would be a significant fixed effect of Time for all outcomes whereas there would be non-significant Time (random) and Time x Condition (fixed) effects indicating that all participants experienced a significant rate of change in symptoms over the study period and that this rate of improvement was equivalent for all participants whether they commenced treatment immediately or after an eight week waiting period.

5.4.1.5 Statistical power. To determine whether the MLM analyses were sufficiently powered, an a priori power analysis was computed to calculate the required sample size to establish a power level of .80. The current study sample size

was then compared to the a priori sample size to determine whether power at a .80 level had been achieved. There were two steps involved in estimating the a priori sample size required for the study. First, an a priori power analysis for an analysis of covariance (ANCOVA) was computed using G*Power 3.1.3 (Franz, Erdfelder, Buchner, & Lang, 2009) as there are currently no tests and/or statistical programmes available to directly estimate a priori sample size for MLM analyses. This sample size was then multiplied by the *design effect formula* (Kish, 1965) which is an adjustment that is made for MLM analyses (i.e., analysis using clustered data).

The power analysis was computed based on MLM Model 1 as it is the primary model of interest in the study, and for DASS-D as the outcome as it is the primary outcome variable. The following parameters were used in the estimation of the a priori sample size required for an ANCOVA; $\alpha = .05$, power = .80, number of groups = 2 (Intervention and Waitlist), number of covariates = 1 (Time), and effect size = 1.12 as reported in a meta-analysis of CBT for depression in older adults by Pinquart and colleagues (2007) at posttreatment compared with a waitlist control. The required sample size was $N = 21$.

The design effect (D_{eff}) was then computed using the following formula:

$$D_{eff} = 1 + p(n - 1)$$

where: n = participants per group

p = intracluster correlation

$$= \frac{\text{between - individuals variance}}{\text{total variance}}$$

To calculate the intracluster correlation (ICC) for DASS-D, an unconditional means MLM model was run. The unconditional means model includes no fixed predictors and provides an estimate of the within-individuals and between-individuals variance which can then be used to calculate the ICC. For DASS-D, the between-individuals variance was estimated at 10.39 and the within-individuals variance was 8.70 (see Appendix A). The ICC for DASS-D was therefore .54,

indicating a high degree of dependency within the data (ICC = 0 indicates independent data) as well as justified the use of MLM. Substituting the ICC into the design effect formula, the design effect was equal to 4.24. This was multiplied by the a priori sample size for an ANCOVA ($N = 21$) resulting in a total required sample size of 89 participants to sufficiently power a MLM analysis at a .80 level.

5.4.2 Effect Size Calculations

Effect sizes (Cohen's *d*) were calculated using the change scores method which was described earlier in Chapter 2.6.1.

5.4.3 Clinically Significant and Reliable Change

Clinically significant and reliable change calculations were computed to assess the clinical relevance of any change that occurred over the course of treatment. The methodology outlined by Jacobson and Truax (1991) was used. According to the authors, treatment efficacy can be indexed by the degree to which participants return to normal functioning subsequent to treatment. Four possible outcomes are proposed; Recovered, Improved but not recovered, Unchanged and Deteriorated. Treatment efficacy is assessed by the proportion of individuals in each group following treatment, with effective treatments deemed those which result in a large proportion of 'recovered' patients. Determining which group an individual belongs depends on two factors; (i) the clinical significance of change and, (ii) the magnitude and reliability of any change as assessed by the Reliable Change Index.

5.4.3.1 Clinically significant change. Clinically significant change is proposed to occur when participants belonging to a clinical population at the beginning of treatment are no longer part of that population at posttreatment and follow-up(s). Jacobson and Truax (1991) specify three methods in which this may be assessed depending on the availability of data such as clinical and general population norms (see original article for details). Following the authors' recommendations, Method C was used to assess clinically significant change in the study as it is the least arbitrary and all the required norms are available for the DASS-21.

Method C posits that in order for clinically significant change to have occurred, participants' level of functioning subsequent to therapy must place them

closer to the mean of the general population than the mean of clinical population. The midpoint between the general population mean and clinical population mean is calculated for each outcome and used as a cut-off against which participants' posttreatment and follow-up scores are compared. Participants whose scores exceed this cut-off are considered to have changed to a clinically significant degree.

The following formula was used to calculate the cut-off for clinically significant change:

$$c = \frac{s_0 M_1 + s_1 M_0}{s_0 + s_1}$$

where: M_1 = mean (clinical population)
M_0 = mean (non-clinical population)
S_1 = *SD* (clinical population)
S_0 = *SD* (non-clinical population)

5.4.3.2 Reliable change index. The Reliable Change Index (RCI) assesses the magnitude of any change that has occurred during the course of therapy. Jacobson and Truax (1991) assert that when the RCI is greater than 1.96, it is unlikely that real change has not occurred. RCIs for each participant were calculated using the following formula:

$$\text{RCI} = \frac{x_1 - x_2}{\sqrt{2(SE)^2}}$$

where: x_1 = participant pretreatment score
x_2 = score at comparison point
SE = standard error of measurement
$= s_1\sqrt{1 - r_{xx}}$

Table 16 displays the relevant data used to calculate clinically significant and reliable change statistics for each of the DASS factors. Non-clinical normative data was taken from Crawford, Caylely, Lovibond, Wilson and Hartley (2011) and based on 497 adults with a mean age of 42.14 (*SD* = 17.93, range 18 to 86). Clinical normative data for the DASS were taken from Antony, Bieling, Cox, Enns and

Swinson (1998) as these were the only normative data available for clinical populations. These norms were developed based on a sample of 258 ouptatients with MDD and/or anxiety (panic disorder, OCD, social anxiety) with a mean age of 44.9 years. Reliability coefficients for each of the DASS-21 factors were taken from Henry and Crawford (2005).

Table 16

Data Used to Compute Clinically Significant Change for the DASS-21

	DASS-D	DASS-A	DASS-S
Non-clinical mean, M_0	2.21	1.48	3.79
Clinical mean, M_1	14.98	9.36	12.15
Non-clinical SD, S_0	3.60	2.60	4.10
Clinical SD, S_1	4.59	5.39	4.92
Reliability, r_{xx}	.88	.82	.90
Standard error of measurement, *SE*	1.87	2.09	1.45
Cut-off for clinically significant change, *c*	7.82	4.04	7.59

5.4.3.3 Determination of outcome group. Participants' clinically significant change results and RCIs for each of the DASS factors were combined to determine their treatment outcome at posttreatment and follow-ups. Table 17 displays Jacobson and Truax's (1991) criteria for each outcome. Clinically significant change calculations were not computed for PDQ-39 and CCL scores as these are not clinical measures and there are no available clinical and/or population normative data.

Table 17

Criteria for Determination of Clinically Significant Change Treatment Outcomes

Outcome	Clinically significant change (exceed cut-off?)	RCI
Recovered	Yes	> 1.96
Improved but not recovered	No	> 1.96
Unchanged	No	- 1.96 < 0 > 1.96
Deteriorated	No	< - 1.96

5.5 Results

5.5.1 Preliminary Analyses

5.5.1.1 Missing data. Sixteen of 18 participants assigned to a treatment condition completed treatment (attrition rate = 11%). All treatment completers completed the relevant measurements at posttreatment and follow-ups. There were no missing data among responses for treatment completers. For the two individuals who withdrew from treatment, the Last Observation Carried Forward (LOCF) method was used to estimate posttreatment and follow-up data. That is, participants' pretreatment scores were carried forward to posttreatment and follow-ups and thus no change was assumed over the study period for treatment dropouts. The LOCF method was selected as it is the most conservative approach for estimating missing data in clinical trials and protects against overestimation of treatment effects (Mohr et al., 2001).

5.5.1.2 Statistical power. The required sample size to adequately power MLM Model 1 at a .80 level was 89 participants (see Section 4.4.1.5 for calculation details). This is equivalent to 44 participants per condition. The total sample size for Model 1 was 18 therefore the current study was underpowered and reported statistical results should be interpreted as tentative findings at present.

5.5.2 Diagnostic and Baseline Characteristics

5.5.2.1 Diagnostic information. Table 18 provides a summary of the diagnostic information for participants. There was a higher rate of anxiety than depression among the ITT sample. Seventeen of the 18 participants met DSM-IV-TR criteria for at least one anxiety disorder (94%) while seven participants had at least one depressive disorder (39%). Eleven participants had only anxiety diagnoses (61%), one had only a diagnosis of depression (5%), while six participants had comorbid diagnoses of depression and anxiety (33%). The most common diagnosis was GAD, followed by panic attacks and/or disorder, then major depressive disorder. The average number of diagnoses per participant was 1.78 (range: 1 to 4).

Table 18

Diagnostic Information for the ITT sample, Intervention and Waitlist groups

	ITT (N = 18)	Intervention (N = 11)	Waitlist (N = 7)
Generalised anxiety	12 (66%)	8 (73%)	4 (57%)
Panic attacks and/or panic disorder	7 (39%)	4 (35%)	3 (43%)
Major depressive disorder	6 (33%)	2 (18%)	4 (57%)
Dysthymia	6 (33%)	3 (27%)	3 (43%)
Social anxiety disorder	4 (22%)	1 (9%)	3 (43%)
Posttraumatic stress disorder	1 (5%)	0	1 (14%)

5.5.2.2 Current medications. Table 19 displays the current antiparkinsonian, psychiatric and other medications taken by participants. Eighty-nine percent of participants were currently on antiparkinsonian medications. Half of the participants were currently on psychiatric medications and 50% were also on additional medications for other comorbid health conditions. On average, each participant in the study was taking 3 to 4 different medications daily during the study period.

Table 19

Current Medications utilised by Participants

	ITT (N = 18)	Intervention (N = 11)	Waitlist (N = 7)
Antiparkinsonian			
Dopamine agonists, N (%)	8 (44%)	6 (55%)	2 (29%)
Levodopa, N (%)	15 (83%)	10 (91%)	5 (71%)
Neuroprotective, N (%)	2 (11%)	2 (18%)	0
Psychiatric			
SSRIs	9 (50%)	4 (36%)	5 (71%)
Benzodiazepines	1 (5%)	1 (9%)	0
Other	1 (%)	1 (9%)	0
Other health conditions, N (%)	9 (50%)	6 (55%)	3 (43%)
Total medications per person, M	3.67	3.85	3.46

5.5.1.3 Pretreatment outcomes. Table 20 displays the pretreatment data for the ITT sample, as well as Intervention and Waitlist groups. For the entire sample, average pretreatment severity of depression was Moderate, anxiety was Severe, and stress was Moderate, as rated by the DASS-21. PD was perceived to have a low to moderate negative impact on quality of life (35%). On average, participants experienced depressive thoughts 23% of the time, and anxious thoughts 21% of the time. Clinically, the Intervention group had more severe anxiety symptoms at pretreatment while the Waitlist group had more severe depression. The Intervention group also experienced more frequent depressive and anxious thoughts than Waitlist participants. There were no statistically significant differences between the Intervention and Waitlist groups on all pretreatment outcomes, however. There were also no statistically significant correlations between demographic and PD variables (age, gender, PD severity, current antidepressant treatment) and any of the outcomes. Therefore, demographic and PD variables were not controlled for as covariates in the subsequent MLM analyses.

Table 20

Pretreatment Scores for ITT sample, Intervention and Waitlist groups

	ITT		Intervention		Waitlist	
	M	Severity	*M*	Severity	*M*	Severity
Primary Outcomes						
DASS-D	10.44	Moderate	10.09	Moderate	10.71	Severe
DASS-A	9.06	Severe	9.64	Extremely Severe	8.57	Severe
DASS-S	9.78	Moderate	10.64	Moderate	10.00	Moderate
Secondary Outcomes						
PDQ-39	35%	Low to Moderate	36%	Low to Moderate	28%	Low to Moderate
CCL-D	30%		31%		25%	
CCL-A	32%		32%		29%	
CEQ-C	17.5	Moderate	17.55	Moderate	17.43	Moderate
CEQ-E	16.33	Moderate	16.64	Moderate	15.86	Moderate

5.5.1.4 Treatment credibility and expectancy. Mean perceived credibility of the group CBT treatment and expectancy of improvement following treatment were both in the Moderate range. There were no significant differences between the credibility and expectancy ratings for the Intervention and Waitlist groups. There were statistically significant correlations between PD severity and both CEQ-C (r = -.61, p = .008) and CEQ-E factors (r = -.50, p = .033), with participants with greater severity of PD reporting lower treatment credibility and expectancy ratings. There were no other significant correlations between CEQ factors and other demographic and PD or outcome variables.

5.5.3 MLM Model 1: Intervention versus Waitlist from Time 1 to Time 2

Model 1 examined the average trajectory of change in outcomes from Time 1 (pretreatment) to Time 2 (posttreatment and post-waitlist) and assessed any differences in the rate of change between the Intervention and Waitlist participants.

5.5.3.1 Assumption testing. Residuals for all outcomes were normally distributed according to the Shapiro-Wilk statistic (p > .05), except for the Level-1 CCL-A residuals (p = .045). Inspection of the normality histogram and skewness and kurtosis statistics for Level-1 CCL-A residuals showed that residuals were near-normally distributed, however, with only a minimal negative skew (-.023) and slight platykurtic distribution (i.e., negative kurtosis), suggesting no advantage to transformation (Tabachnick & Fidell, 2007). Residual plots for each outcome showed equal scatter above and below the standardised mean indicating constant variances. There were no significant correlations between Level-1 residuals, between Level-2 residuals or between Level-1 and 2 residuals indicating independence of residuals within as well as across levels. Outputs for all assumption tests appear in Appendix B.

5.5.3.2 Change in outcomes. Table 21 provides an overview of the results and effect sizes for changes in outcomes from Time 1 (pretreatment) to Time 2 (posttreatment/post-waitlist).

5***.5.3.2.1 Hypothesis 1.*** H1 predicted that participants in the Intervention group would experience significant improvement in depression between Time 1 and

Time 2 whereas participants in the Waitlist would show no significant change. This hypothesis was supported. A significant Time x Condition interaction effect was observed for DASS-D indicating a differential rate of change in depressive symptoms between the Intervention and Waitlist groups, F (1, 16) = 8.31, p = .011, d = 1.12. On average, participants who received CBT experienced a significant large reduction in symptoms at a rate of .49 points per week between pretreatment and posttreatment, t (16) = -4.31, p = .000, whereas the Waitlist group experienced no significant change in depressive symptoms from pretreatment to post-waitlist, t (16) = .04, p = .81.

Table 21

Model 1: Results of the MLM analyses and Effect Sizes for Average Rate of Change in Primary Outcomes from Time 1 to Time 2

		Intervention (n = 11)	Waitlist (n = 7)		
Outcome	Time	Mean (SD)	Mean (SD)	*p-value**	*d**
DASS-D	1	10.09 (3.73)	10.71 (5.41)	.011	1.12
	2	7.64 (2.77)	11.00 (5.20)		
DASS-A	1	9.64 (2.01)	8.57 (4.61)	.025	.89
	2	6.73 (2.90)	8.14 (4.85)		
DASS-S	1	10.64 (3.26)	10.00 (4.28)	.828	.08
	2	8.82 (1.83)	8.43 (4.50)		
PDQ-39	1	36.03 (12.62)	28.48 (16.15)	.095	.56
	2	32.82 (12.95)	32.88 (14.50)		
CCL-D	1	31.22 (15.50)	24.49 (14.12)	.009	1.26
	2	18.02 (15.94)	28.83 (9.86)		
CCL-A	1	32.01 (10.51)	29.46 (14.00)	.009	.92
	2	23.67 (11.27)	33.04 (15.38)		

*p-value for Time x Condition interaction effect

5.5.3.2.2 Hypothesis 2. H2 predicted that participants who received CBT would experience a significant improvement in anxiety at posttreatment whereas those in Waitlist would show no significant change at post-waitlist. This hypothesis was also supported with a significant Time x Condition interaction effect also observed for DASS-A scores, F (1, 16) = 6.06, p = .025. On average, participants who received CBT experienced a significant reduction in anxiety symptoms at a rate of .42 points per week between pretreatment and posttreatment, t (16) = -5.30, p = .000, d = .99, while participants in the Waitlist group experienced no significant change from pretreatment to post-waitlist, t (18) = -1.08, p = .30.

5.5.3.2.3 Hypothesis 3. H3 predicted that participants in the Intervention group would experience a significant reduction in stress between pretreatment and posttreatment while those in the Waitlist group would show no significant change. H3 was partially supported. A significant main effect for Time (fixed), F (1, 31) = 9.04, p = .005, and a non-significant Time x Condition interaction effect, F (1, 31) = .05, p = .83, was observed for DASS-S scores indicating that on average all participants experienced a significant and equivalent reduction in stress between Time 1 and 2. Thus, while participants who received CBT did experience a significant reduction in stress between pretreatment and posttreatment as predicted, t (31) = -2.59, p = .015, participants in the Waitlist group also experienced an equivalent reduction in stress over the waiting period, t (31) = -1.78, p = .05. The differential rate of change in depressive and anxiety symptoms between the Intervention and Waitlist groups is clearly visible in Figure 8. For Stress, both Intervention and Waitlist groups experienced a significant reduction in symptoms between Time 1 and Time 2 which is reflected in the relatively parallel slopes.

5.5.3.2.4 Hypothesis 4. H4 predicted that participants who received CBT would show a significant improvement in quality of life between pretreatment and posttreatment while those in the Waitlist group would show no significant change. H4 was not supported as there were no significant Time, F (1, 13) = .01, p = .923, or Time x Condition effects, F (1, 13) = 3.24, p = .095, for PDQ-39 scores indicating no significant change in quality of life for both Intervention and Waitlist groups.

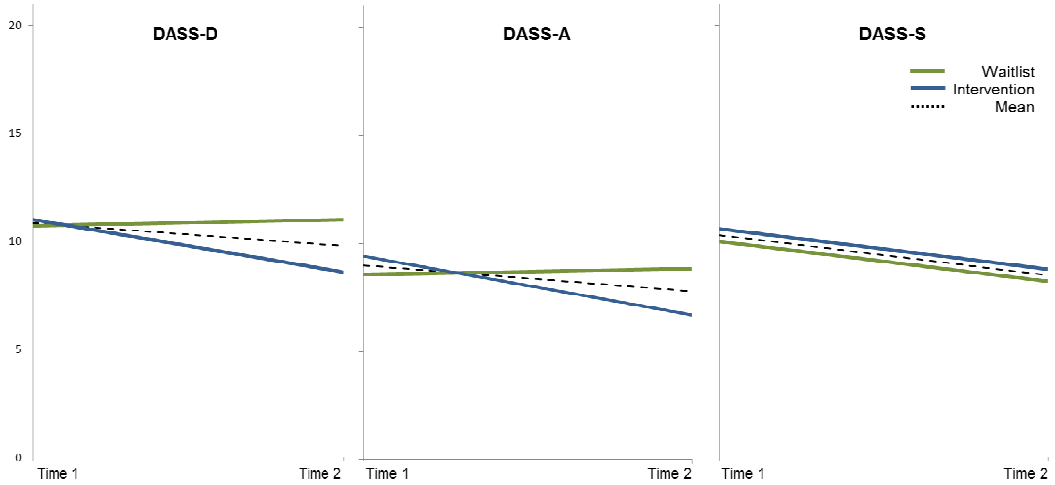


Figure 8. Average trajectory of Change in Primary Outcomes for CBT and Waitlist Participants Between Time 1 (pretreatment) and Time 2 (posttreatment/post-waitlist)

5.5.3.2.5 Hypothesis 5. It was predicted in H5 that participants in the Intervention group would show a significant reduction in the frequency of depressive thoughts (CCL-D) between Time 1 and 2 while those in the Waitlist group would not. H5 was supported. A significant Time x Condition interaction effect was found for CCL-D scores, F (1, 17) = 8.86, p = .009, d = 1.26, indicating a differential rate of change in depressive thoughts between the Intervention and Waitlist groups. Participants who received CBT experienced a mean 13.2% reduction in the frequency of depressive thoughts following treatment, t (17) = -3.59, p = .002. Participants in the Waitlist group experienced a mean 4.4% increase in the frequency of depressive thoughts over the waiting period however this change was not significant, t (17) = .94, p = .36.

5.5.3.2.6 Hypothesis 6. H6 predicted that participants who received CBT would show a significant reduction in the frequency of anxious thoughts (CCL-A) between Time 1 and 2 while those in the Waitlist group would not. H6 was supported with a significant Time x Condition interaction effect observed, F (1, 16) = 8.75, p = .009. Participants who received CBT experienced a mean 8.45% reduction in the frequency of anxious thoughts, t (16) = -3.32, p = .004, while those in the Waitlist group experienced a mean 3.58% increase in anxious thoughts over the waiting period, t (16) = 1.14, p = .273, however again this change was not

statistically significant. Figure 9 provides a visual representation of the differences in the rate of change in PDQ-39, CCL-D and CCL-A between Time 1 and Time 2.

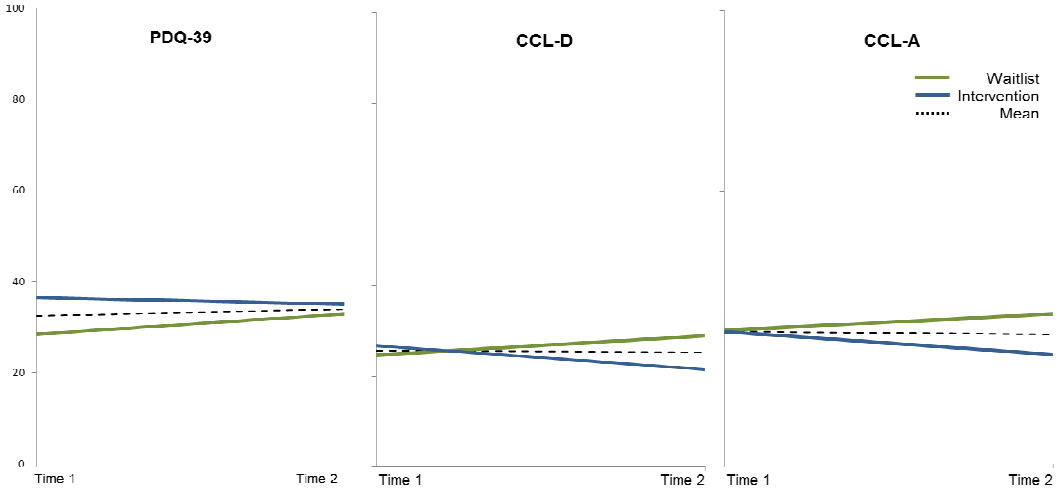


Figure 9. Average Trajectory of Change in Secondary Outcomes for Intervention and Waitlist Groups between Time 1 and Time 2

5.5.4 Model 2: Overall Effects of Group CBT on Symptoms from Pretreatment to Six-Month Follow-Up

Model 2 examined the average trajectory of change in outcomes over the entire study period for the participants in the Intervention groups ($N = 11$).

5.5.4.1 Assumption testing. Residuals for all outcomes were normally distributed according to the Shapiro-Wilk statistic ($p > .05$). Residual plots for each outcome showed constant variances of residuals. There were no significant correlations within or across Level-1 and 2 residuals. Outputs for all assumption tests appear in Appendix C.

5.5.4.2 Change in outcomes. Table 22 displays the results and effect sizes for changes in primary and secondary outcomes in Model 2. There was a significant main effect of Time for DASS-D, F (3, 24) = 10.32, p = .000, DASS-A, F (3, 24) = 13.83, p = .000, DASS-S, F (3, 22) = 9.40, p = .000, CCL-D, F (2, 23) = 6.91, p = .002 and CCL-A, F (3, 27) = 11.59, I = .000, indicating a statistically significant rate of change in depression, anxiety, stress and depressive and anxious thoughts between pretreatment and six-month follow-up. There was no significant change in quality of life over the study period, F (3, 20) = 2.05, p = .14.

Table 22

Model 2: Results of the MLM analyses for Average Rate of Change in Primary Outcomes for the Intervention Group from Pretreatment to Six-Month Follow-Up

Outcome	Time	Mean (SD)	*p-value*	*d*
DASS-D	Pretreatment	10.09 (3.73)		
	Posttreatment	7.64 (2.77)	.001	.75
	1-month f-up	5.91 (3.27)	.000	1.19
	6-month f-up	3.82 (2.12)	.000	2.07
DASS-A	Pretreatment	9.64 (2.01)		
	Posttreatment	6.73 (2.90)	.000	1.17
	1-month f-up	5.82 (3.16)	.000	1.44
	6-month f-up	3.82 (3.03)	.000	2.26
DASS-S	Pretreatment	10.64 (3.26)		
	Posttreatment	8.82 (1.83)	.031	.69
	1-month f-up	6.91 (2.51)	.000	1.28
	6-month f-up	5.45 (2.98)	.001	1.66
PDQ-39	Pretreatment	36.03 (12.62)		
	Posttreatment	32.82 (12.95)	.096	.25
	1-month f-up	30.54 (11.99)	.024	.45
	6-month f-up	32.05 (16.26)	.259	.27
CCL-D	Pretreatment	31.22 (15.50)		
	Posttreatment	18.02 (15.94)	.016	.84
	1-month f-up	16.78 (11.80)	.000	1.05
	6-month f-up	18.83 (10.45)	.002	.94
CCL-A	Pretreatment	32.01 (10.51)		
	Posttreatment	23.67 (11.27)	.003	.77
	1-month f-up	20.08 (14.68)	.000	.94
	6-month f-up	16.31 (11.08)	.000	1.45

5.5.4.2.1 Hypothesis 7. It was predicted in H7 that the Intervention group would show statistically significant changes in all outcomes at posttreatment. H7 was supported for all outcomes except for the PDQ-39. Significant large reductions in depression (d = .75), anxiety (d = 1.17) and depressive thoughts (d = .84) and significant moderate reductions in stress (d = .69) and anxious thoughts (d = .77) were observed at posttreatment.

5.5.4.2.2 Hypothesis 8. H8 predicted that participants in the Intervention group would show statistically significant improvement and/or maintain acute treatment gains on all outcomes at one-month follow-up**.** H8 was supported for all outcomes. Significant large effects were observed for all DASS (depression; d = 1.19, anxiety; d = 1.44, stress; d = 1.28) and CCL factors (depressive thoughts; d = 1.05; anxious thoughts; d = .94). A significant moderate improvement in quality of life was also observed at 1-month follow-up (d = .45).

5.5.4.2.2 Hypothesis 9. It was predicted in H9 that participants in the Intervention group would show statistically significant improvement and/or maintain acute treatment gains on all outcomes at six-month follow-up. H9 was supported for all outcomes except for PDQ-39. There was no significant change in quality of life from pretreatment to six-month follow-up. All posttreatment gains for DASS and CCL factors were maintained at six-month follow-up with significant large effects observed for all measures (DASS-D; d = 2.07, DASS-A; d = 2.26, DASS-S; d = 1.66, CCL-D; d = .94, CCL-A; d = 1.45).

Moreover, post-hoc pairwise comparisons also showed significant mean differences between posttreatment and 1-month follow-up for DASS-D and DASS-S, and significant mean differences between 1-month follow-up and 6-month follow -up for all three factors (see Appendix D). Therefore, treatment benefits were not only observed at posttreatment and maintained at subsequent follow-ups, but continued to improve at a statistically significant rate in the period following therapy, with the greatest improvement observed at 6-month follow-up.

Figure 10 displays the average rate of change in outcomes from pretreatment to six-month follow-up for participants in the Intervention group. A significant linear

decline in DASS and CCL scores is clearly visible although it must be noted that the slopes for CCL-D and CCL-A are not as steep as those observed for the DASS indicating less improvement in secondary outcomes.

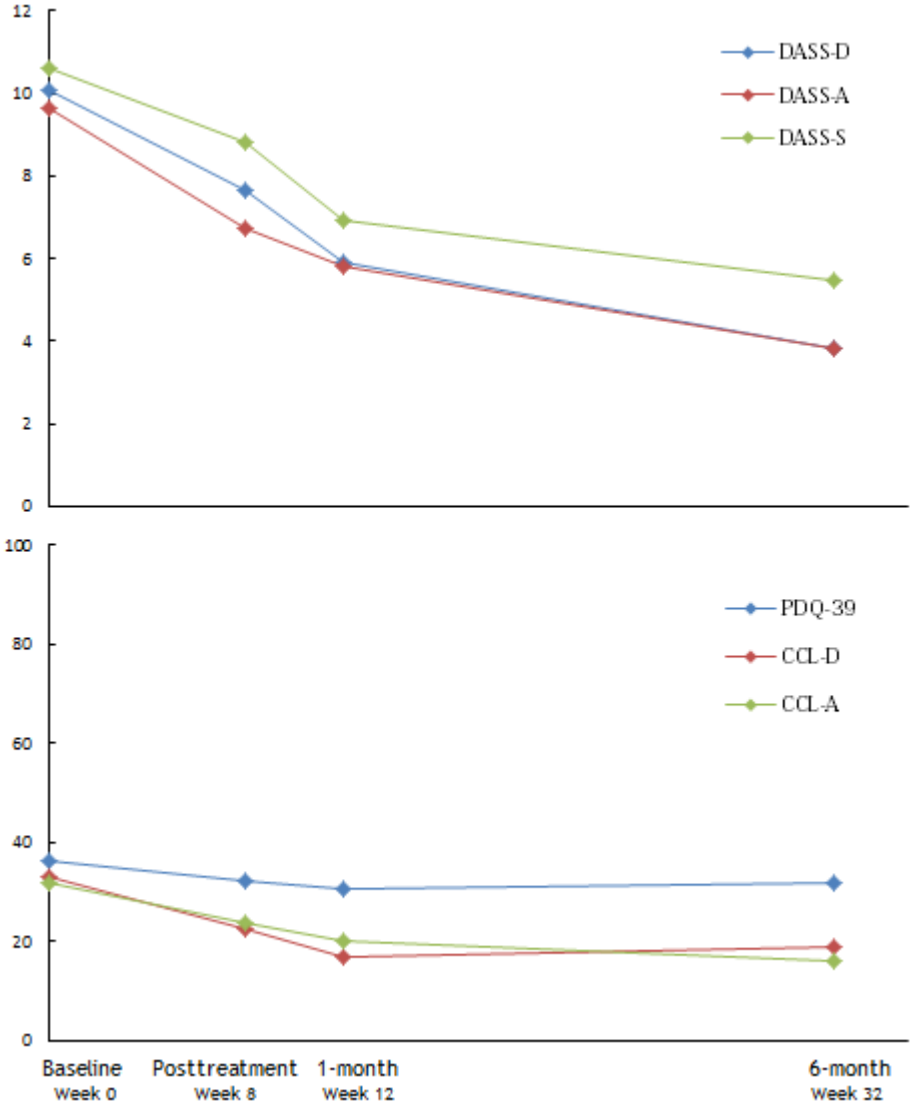


Figure 10. Average Trajectory of Change in Primary and Secondary Outcomes from Pretreatment to Six-month Follow-up for the Intervention Group

5.5.5 Model 3: Effect of Group CBT on Symptoms – Immediate versus Delayed Treatment Commencement

Model 3 examined the trajectory of change in outcomes from pretreatment to 6-month follow-up for the entire ITT sample and examined any differential rates of change in outcomes between participants who commenced treatment immediately

(i.e., Intervention group) and participants who had a delayed treatment start (i.e., Waitlist group). Table 23 displays the results of the MLM analyses for Model 3.

Table 23

Model 3: Results of the MLM analyses for Average Rate of Change in All Outcomes from Time 1 to Time 4

	DASS-D			DASS-A		
	β	SE	sig	*β*	SE	sig
Intercept	10.58	1.68	.000	8.28	1.36	.000
Time (fixed)	-.21	.03	.000	-.15	.02	.000
Time (random)	.008	.005	n.s.	.002	.002	n.s.
Condition x Time (fixed)	-	-	n.s.	-	-	n.s.
Intervention x Time	-.18	.04	.000	-.17	.03	.000
Waitlist x Time	-.26	.05	.000	-.13	.03	.001
	DASS-S			PDQ-39		
	β	SE	sig	*β*	SE	sig
Intercept	8.53	1.30	.000	31.11	5.10	.000
Time (fixed)	-.16	.02	.000	-.15	.09	n.s.
Time (random)	.005	.003	n.s.	.07	.05	n.s.
Condition x Time (fixed)	-	-	n.s.	-	-	n.s.
Intervention x Time	-.15	.03	.000	-.10	.11	n.s.
Waitlist x Time	-.17	.04	.001	-.24	.14	n.s.
	CCL-D			CCL-A		
	β	SE	sig	*β*	SE	sig
Intercept	24.53	5.25	.000	27.49	5.01	.000
Time (fixed)	-.35	.09	.000	-.38	.09	.000
Time (random)	.01	.00	n.s.	.02	.00	n.s.
Condition x Time (fixed)	-	-	n.s.	-	-	n.s.
Intervention x Time	-.32	.11	.007	-.44	.12	.000
Waitlist x Time	-.41	.14	.006	-.29	.14	.046

5.5.5.1 Assumption testing. MLM assumptions of normality of residuals, constant variance and independence of residuals within and across levels were all met. Outputs for all assumption tests appear in Appendix E.

5.5.5.2 Hypothesis 10. It was predicted in H10 that the group CBT treatment would be equally effective in reducing outcomes for participants who commenced treatment immediately and participants who commenced treatment after the waiting period. H10 was supported for all outcomes as on the DASS and CCL factors, a significant main effect of Time (fixed) was observed for all variables while there was a non-significant Time x Condition interaction effect for all factors. This result indicates that there was a statistically significant rate of change in depression, anxiety, stress, depressive thoughts and anxious thoughts between pretreatment and six-month for the entire sample, and this rate of change did not differ significantly between groups. For the PDQ-39, there was no significant main effect for Time (fixed) and no significant Time x Condition interaction effect indicating that all participants did not experience significant improvement in quality of life. Thus, the group CBT intervention had a consistent effect on outcomes regardless of treatment start time.

Figure 11 displays the rates of change in all outcomes for the Intervention and Waitlist groups. As it can be seen, the slopes for DASS-D, DASS-S, PDQ-39 and CCL-D are relatively parallel while the slopes for DASS-A and CCL-A are essentially identical between the Intervention and Waitlist groups. Thus, overall, all participants experienced equivalent and significant reductions in depression, anxiety and stress regardless of whether they commenced treatment immediately or after an eight-week waiting period.

5.5.6 Clinically Significant and Reliable Change

Table 24 displays the results of the clinically significant change analyses for each of the DASS factors at posttreatment, 1-month and 6-month follow-ups based on the Jacobson and Truax (1991) method. There was a clear trend for all three factors where higher rates of clinically significant change (i.e., Improved or Recovered) were observed over each progressive measurement point. This is consistent with the results of the Model 2 MLM analyses which showed that

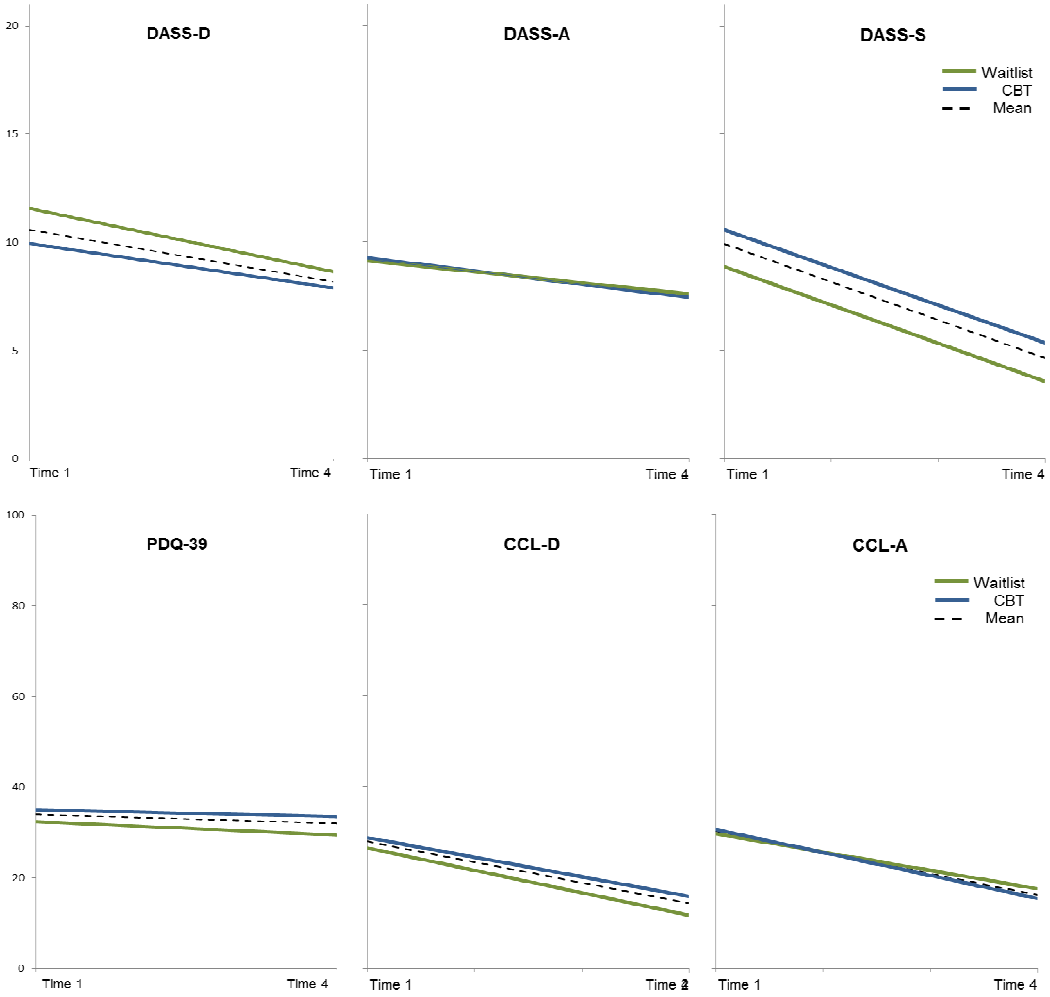


Figure 11. Average Trajectory of Change in Outcomes for Intervention and Waitlist Participants between Pretreatment and Six-Month Follow-Up

symptoms continued to improve during the period following therapy and the greatest improvement for all primary outcomes was observed at 6-month follow-up. At 6-month follow-up, 89% of participants showed clinically significant improvement in depression, 83% showed clinically significant improvement in stress, and 56% showed clinically significant improvement in anxiety. The lowest rate of clinically significant improvement was for anxiety, although more than half of participants evidenced clinically significant improvement at 6-month follow-up. One participant showed a clinically significant increase in stress between pretreatment and posttreatment however by 6-month follow-up, the participants' severity of stress was within the normal range. No other participants experienced any deterioration in depression, anxiety or stress at any time point.

Table 24

Results of Clinically Significant and Reliable Change Analyses

	DASS-D			DASS-A			DASS-S		
	Post	1m	6m	Post	1m	6m	Post	1m	6m
Recovered	0	28%	67%	6%	17%	39%	11%	28%	39%
Improved	11%	11%	22%	0	6%	17%	11%	22%	44%
Unchanged	89%	61%	11%	94%	78%	44%	72%	50%	17%
Deteriorated	0	0	0	0	0	0	6%	0	0
Total CSC*	11%	39%	89%	6%	23%	56%	22%	50%	83%

*Post= posttreatment, 1m = 1-month follow-up, 6m = 6-month follow-up, CSC = clinically significant change (i.e., total percentage of participants who showed clinically significant positive change)

5.6 Discussion

This study was the first randomised controlled trial of group CBT for depression and anxiety in PD. In support of the growing body of evidence for the efficacy of CBT in treating depression and anxiety in PD, statistically and clinically significant improvements in depression, anxiety, and stress over the treatment period and all treatment gains were maintained at six month follow-up.

5.6.1 Main Findings and Implications

5.6.1.1 Feasibility. Overall, group CBT appeared to be a feasible treatment approach for depression and anxiety for participants in the study, with an 89% treatment completion rate (11% attrition rate) and participants attending a mean 7 out of 8 sessions (88%). This attrition rate is comparable with that recently reported in the first RCT of individual CBT for depression in PD (10%; Dobkin et al., 2011) and significantly lower than the 41% mean dropout rate reported across the four RCTs of antidepressants for the treatment of depression in PD to date (range: 14% to 73%; Anderson et al., 1980; Menza et al., 2009; Rabey et al., 1996; Wermuth et al., 1998).

Moreover, this finding is consistent with previous research showing that antidepressant treatment is associated with a 75% relative risk of discontinuation compared with CBT in primary populations (NICE, 2010) and supports the feasibility of CBT in treating depression and anxiety in PD.

However, while the completion rates for study participants are positive, it must be noted that the small sample size and recruitment difficulties encountered in the study may suggest that the group treatment modality is not as feasible as and/or less preferred than individual therapy by those with PD. Prior research has found that often times, individuals with PD are reluctant to be around others with more advanced stage disease or to learn about additional complications of the illness that they are not yet experiencing, and many refuse to attend support groups for the same reason (Chaudhuri et al., 2007). Thus, the feasibility of group CBT in PD requires further exploration.

5.6.1.2 Acute treatment gains. This study was the first to provide a controlled examination of the efficacy of CBT for depression and anxiety over the acute treatment period. At the end of the eight-week acute phase of treatment, participants who received CBT experienced significant improvements in depression, anxiety and stress and a significant reduction in the frequency of both depressive and anxious thoughts. In contrast, participants in the waitlist control showed no significant change in depression, anxiety or depressive and anxious thoughts, although a significant improvement in stress was observed. There was no significant change in quality of life for either group.

The significant improvement in depression and anxiety observed over the acute phase of treatment adds significant support to the growing body of evidence for the efficacy of CBT for treating depression and anxiety in PD. Effect sizes were large for both depression (d =1.12) and anxiety (d = .89) relative to control and consistent with posttreatment effect size estimates recently reported by Dobkin and colleagues (2011) for individual CBT for depression in PD (depression; Ham-D, d = 1.57; BDI, d = 1.1; anxiety; Ham-A, d = .98), and warrant further investigation of this presently understudied treatment modality.

Significant improvement in stress over the acute treatment period was also observed for participants who received CBT (*d* = .57), however, participants in the Waitlist condition also experienced a significant reduction in stress over the corresponding period (*d* = .37). A possible explanation may be related to the well documented *waitlist effect* (Hesser, Weise, Rief, & Andersson, 2011). It has been demonstrated that participants assigned to waitlist controls in clinical trials often show a significant decrease in symptoms over the waiting period. In a study comparing change in psychological symptoms in 67 psychiatric outpatients and 231 psychiatric inpatients over a 3-month waiting period prior to receiving treatment, Arrindell (2001) reported that significant small to moderate reductions (*d* = .07 to .29) were observed on a range of popular psychological rating scales including the Symptom Checklist-90-Revised, BDI and STAI.

Several factors have been suggested to potentially underlie the waitlist effect including; retest effects, reduced test-anxiety, social desirablity and natural resolution of symptoms (Jorm et al., 1989). Two explanations of the waitlist effect are particularly relevant to this study. As suggested by Devilly and McFarlane (2009), the process of psychological assessment in the initial stages of clinical trials to determine participant eligibility may be therapeutic in itself and can result in a small reduction in symptoms. This is because through the assessment process, participants are provided an opportunity to speak with a professional regarding concerns that they may have not spoken about to anybody prior and this disclosure along with professional attention alone can effect symptom change (Henderson et al., 1981). Relatedly, confirmation of a psychological disorder may also relieve stress in that participants are provided with a logical explanation for any mood or behavioural changes that were previously unexplained (Devilly & McFarlane). This understanding of one's own symptoms along with knowledge that one will be receiving professional help (expectancy effects) has also been shown to result in small to moderate reductions in symptoms (Hesser et al., 2011).

In regards to secondary outcomes, a significant and large reduction in negative thinking was observed for participants who received CBT (CCL-D; *d* = 1.26, CCL-A; *d* = .92) over the acute treatment period while there was no change in the frequency of depressive and anxious thoughts for the control group. This

simultaneous reduction in DASS-D and DASS-A and CCL-D and CCL-A scores in participants who received CBT while no such change was observed in control participants is encouraging in that reduction in symptoms was associated with a reduction in negative thinking, which is consistent with the cognitive mediation hypothesis.

Finally, no significant improvement in quality of life was observed for participants who received CBT or those in the waitlist condition. This finding is consistent with previous CBT in PD studies also employing the PDQ-39 as an outcome measure, where no significant improvement on PDQ-39 scores were also reported following treatment (e.g., A'Campo et al., 2010; Macht et al., 2007; Simons et al., 2006; Veazey et al., 2009). There are two possible explanations for this finding. First, it must be noted that pretreatment PDQ-39 levels were within the low range (M = 32.46, SD = 14.84). Therefore, it may be the case that a lack of significant change in quality of life may reflect a floor effect (i.e., change to a significant degree cannot occur as baseline levels are already within a normal range). Second, another possible explanation may be directly related to the broad nature of the PDQ-39 measure. The PDQ-39 is a general measure of PD-related quality of life and features a significant number of questions measuring physical and/or somatic difficulties associated with living with PD (e.g., 'How often have you had difficulty walking 100 metres?', 'Had difficulty dressing yourself?', 'Had difficulty cutting up your food?'). Reductions in depression and anxiety are not likely to affect these physical aspects of life with PD and may explain the lack of significant change in quality of life ratings in the present study as well as previous studies in the literature.

5.6.1.3 Long-term treatment benefits. This study was also the first to examine the long-term effects of group CBT on psychological symptomatology in PD. To date the maximum length of follow-up for any CBT intervention in PD has only been one month. Follow-up analyses showed significant reductions in depression, anxiety and stress symptoms as well as significant declines in the frequency of depressive and anxious thoughts at both 1-month and 6-month follow-ups. At 6-month follow-up, statistically significant and large effect sizes were observed for each of the DASS factors; Depression (d = 2.07), Anxiety (d = 2.26) and Stress (d = 1.66), as well as both of the CCL factors; Depressive cognitions (d =

.94) and Anxious cognitions (d = 1.45). Moreover, statistically significant reductions in symptoms were also observed between each time point indicating that symptoms continued to improve following therapy. Again, there was no significant change in quality over life from pretreatment to 6-month follow-up however. It must be noted that follow-up analyses were based on uncontrolled data, however. Due to ethical requirements as well as the timeframe of the study, the waiting period for the control participants was limited to only eight weeks, with Waitlist participants receiving CBT following the completion of post-waitlist measures. Thus, reported effect sizes for follow-up measurements may be overstated and must be interpreted with caution.

Nevertheless, these results provide strong preliminary support for the long-term efficacy of CBT in treating depression and anxiety in PD. Significant long-term effects are arguably more important than acute treatment effects as long-term effects attest to the durability of a treatment as well as strongly indicate that a treatment effect is real (Durham et al., 2005). This study showed that six-months following completion of treatment, effect sizes for depression and anxiety were larger than all posttreatment effect sizes for both pharmacological and non-pharmacological treatments reported in the meta-analysis in Chapter 2. However, as noted earlier, this comparison must be made with caution due to the uncontrolled nature of follow-up effect sizes in the current study.

Nevertheless, the follow-up results in this study are especially encouraging given that one of the most pertinent criticisms of existing pharmacological regimes for depression and anxiety in PD relates to the questionable long-term utility of such treatments. It is widely acknowledged that pharmacological treatments of depression and anxiety are associated with high rates of relapse and significant ongoing treatment is required to maintain any acute treatment gains. As noted in Chapters 1 and 3, the National Institute of Health and Clinical Excellence (2010) currently recommend between 2 to 4 years of continuation therapy (same medication and dosage) in order to maintain acute treatment gains and prevent relapse for the treatment of major depression in older adults. In contrast, CBT has demonstrated long-term efficacy in the treatment of both depression and anxiety in primary populations following standard 12-week interventions (NICE) and the results of this trial provide preliminary support for the long-term utility of CBT with clients with

PD. The long-term utility of CBT has been attributed to the focus on self-management and problem solving in CBT as well as the development of skills and techniques that enable clients to address any problems that may arise following cessation of therapy. Overall, this study supports the assertion that while there is a broad equivalence in the efficacy of CBT and pharmacotherapy in the acute phase of treatment, the long-term utility of CBT may indicate that it is a more beneficial treatment for depression and anxiety on the whole.

Finally, the finding that DASS and CCL scores were both reduced at a comparable rate over each measurement point indicates that change in depressive and anxious symptoms was associated with a reduction in depressive and anxious thoughts. This finding adds to a growing number of studies also demonstrating simultaneous reductions in depression and negative thoughts following CBT in participants with PD (e.g., Dobkin et al., 2007; Dobkin et al., 2011; Farabaugh et al., 2010) and may suggest that symptomatic improvement may be directly related to the active cognitive modification component of CBT, ultimately showing support for the cognitive mediation hypothesis.

5.6.1.4 Clinical Significance. Clinical significance analysis showed a clear trend with higher rates of clinically significant change observed over each progressive measurement point. Interestingly, while statistical testing showed significant reductions in primary outcomes across each time-point, clinically significant analyses revealed that the majority of participants did not evidence clinically significant change in depression, anxiety or stress at posttreatment. By 6-month follow-up, however, the vast majority of participants showed clinically significant improvement in Depression (89%) and Stress (83%) and just over half showed clinically significant improvement in Anxiety (56%). Thus, CBT appeared to have a delayed effect with the full benefits of therapy manifesting in the period following treatment completion.

Delayed treatment effects have been previously observed in other trials of CBT for various psychological conditions (Booth & Rachman, 1992; O'Malley et al., 1996; Petry, Weinstock, Ledgerwood, & Morasco, 2008; Sarin, Wallin, & Widerlov, 2011; Sensky et al., 2000) as well as has long been documented in the process of

psychotherapy in general (Elkin, Pilkonis, Docherty, & Sotsky, 1988). In terms of the mechanisms underlying delayed treatment effects in psychotherapy, Kubie (1972) speculated that because psychotherapy is an ongoing process, observable change and maturation is likely to manifest only after all formal therapy has been terminated. Likewise, Rachman (1992) posits that CBT likely sets in motion a process of change that only manifests into observable change over time. Moreover, Rachman asserts that therapeutic changes in CBT frequently occur after, rather than during, treatment sessions, through the consolidation of skills, techniques and knowledge gained through therapy. This early work is also consistent with more recent research suggesting that the true benefits of CBT are commonly not observed until after the acute treatment period when clients have completed therapy, acquired the full set of skills necessary to elicit change, and become more proficient in applying those skills into their everyday lives (Westbrook et al., 2011). It has also been suggested that delayed treatment effects in CBT may reflect the time it takes to modify long-standing schemas (Sarin et al.).

Overall, the rates of clinically significant improvement, particularly for depression and stress, at 6-month follow-up are very promising and further attest to the durability of the study treatment. It must be noted that the rate of clinically significant improvement for anxiety was observably lower than that for depression and stress and may be directly related with the characteristics of the study sample and treatment protocol. First, the predominant diagnoses in the sample were anxiety (94%) rather than depressive disorders (39%) and pretreatment severity of anxiety was Severe compared with Moderate pretreatment levels of depression. Thus, there was a higher and more severe rate of anxiety than depression in the sample. This pattern of diagnoses is not typical of the presentation of depression and anxiety in PD, where a higher occurrence of depression has been widely demonstrated (Reijinders et al., 2008). The study intervention featured more depression-based activities and specific anxiety modules (e.g., graded exposure) were also removed from the original protocol which may have contributed to the lower rate of clinical improvement in anxiety among participants. Therefore, the inclusion of more anxiety-specific treatment components may have resulted in a higher rate of improvement in anxiety. Nevertheless, the majority of participants evidenced clinically significant improvement in all primary outcomes across the study period,

thus supporting the clinical utility of the study intervention. It must be acknowledged however that as normative data used to calculate clinically significant change results (i.e., Antony et al., 1988; Crawford et al., 2011) were based on a younger sample than study participants (mean age 44.9 years in norms vs. 62 for the study), clinically significant change analyses are not as accurate as it would be had there been data available to directly compare the study sample with clinical and non-clinical data for older adults.This is a limitation of the study.

5.6.1.5 Immediate vs. delayed treatment start. The final key finding in this study relates to the effect of immediate and delayed treatment start. No significant differences were found between the trajectory of change for participants who commenced CBT immediately following assessments and participants who commenced treatment after the waitlist period. This finding is especially encouraging as it supports the consistency and real-world applicability of the study intervention in that results were equivalent across the three treatment groups, four therapists and over the three different treatment time periods.

5.6.2 Limitations

While the results of this study support the efficacy of group CBT for the treatment of depression and anxiety in PD, there are several limitations which restrict the validity of reported results – the most pertinent limitation being the small sample size and associated issue of insufficient statistical power. In Chapter 3, the existing research base evaluating the utility of CBT for depression and anxiety in PD was criticised due to small sample sizes and related methodological limitations regarding reliability, validity and generalisability. This study was designed specifically to rectify sample size issues and aimed to provide the first methodologically sound evaluation of group CBT in PD. Although the current sample is the largest for a group CBT intervention in PD at present, it is acknowledged that a total sample of 18 participants is not sufficient to adequately power an RCT and ultimately restricts the confidence with which results can be meaningfully interpreted. Although it is encouraging that significant large effect sizes were detected given the small sample size, the degree to which these findings can be generalised beyond the current sample is restricted.

It must be noted that the small sample size in the current study is directly linked with significant and unexpected recruitment difficulties. Despite widespread recruitment efforts including online, print and radio adverts along with referrals from various health professionals over a 28-month period from June 2010 to October 2012 (see Section 4.2.3.2 for an outline of recruitment strategies), the response rate for the study was less than 1%. While reported findings in this study are based on two waves of treatment, recruitment was conducted for four planned treatment waves. The response to the initial call for participants for Treatment Wave 1 was promising and 14 participants were randomised to either Intervention or Control. Based on this response, it was envisaged that four treatment waves would be sufficient to recruit the number of participants required to adequately power the study. However, there were no expressions of interest for Treatment Waves 2 and 4. Response to Treatment Wave 3 was also poor, with an insufficient amount of participants to conduct an Intervention and Waitlist group. Due to time limitations associated with the completion of the PhD programme, it was decided in October 2012 that further recruitment was not feasible and the available data was analysed.

Similar recruitment difficulties have also been encountered by other researchers examining the utility of CBT in PD. Veazey and colleagues (2009) reported that of an initial pool of 54 adults with PD who screened positive for anxiety and/or depression attending an outpatient specialty neurology clinic in the US, only 14 participants volunteered to take part in the their CBT trial. Four participants did not meet inclusion criteria resulting in an overall sample of 10. The authors stated that the difficulty in recruiting and retaining participants for their trial was highly unforeseen. Moreover, examination of the literature suggests that low sample sizes are common in studies examining the use of CBT in PD. Across the 16 existing studies evaluating specific CBT interventions in PD, sample sizes have ranged from only 1 (i.e., Gupta, 2000; Heinrichs et al., 2001; Laidlaw et al., 2003; Mohlman et al., 2010) to 80 (i.e., Dobkin et al., 2011), with a mean size of only 12 and median of 5.

More broadly, it would appear that this low response rate is also evident in clinical trials of other treatments for anxiety and/or depressive disorders in PD. Although higher than those reported for trials of CBT, sample sizes across the eight RCTs of various pharmacological treatments for anxiety and/or depression in PD

patients have ranged from only 12 (Leentjens et al., 2003) to 115 (Richard et al., 2012., 2009), with a mean of 31. Moreover, recruitment difficulties have also been reported in antidepressant trials in PD. Leentjens and colleagues examined the effect of the SSRI sertraline for depression in PD and had to terminate their trial due to a lack of interest from the public. The authors reported that in spite of intensive recruitment efforts over a 30-month period, only 12 people expressed interest in participating.

This low response rate for clinical trials of anxiety and depression in PD may indicate that there are barriers to seeking psychological treatment among individuals with PD. There have been no previous studies examining barriers to psychological treatment in PD however the underutilisation of mental health services in older adult populations is widely acknowledged (Gurland et al., 1996; Hatfield, 1999; Mickus, Colenda, & Hogan, 2000; Robertson & Mosher-Ashley, 2003; Speer & Schneider, 2003). Several salient barriers to initiating psychological care have been reported among older adults including stigma, negative attitudes regarding mental illness, financial issues, deteriorating health as well as issues regarding accessibility (Woodward & Pachana, 2009), and may have underlay recruitment difficulties experienced in the study.

Other limitations in the study must also be noted. First, the absence of an active control condition (e.g., attention-matched or alternative psychological intervention) inhibits an examination of the effect of non-specific factors on participant change across the study period. While it is encouraging that reductions in depressive and anxious symptomatology over the study were associated with comparable reductions in depressive and anxious thoughts, observed improvements cannot be solely attributed to the study intervention at this stage. It may be possible that non-specific treatment factors such as social support and therapeutic alliance may have also contributed. However, as discussed in Chapter 3, Mohr and colleagues (2009) assert that in early efficacy studies, it is sufficient to demonstrate efficacy a non-active control to show that an intervention is more advantageous than doing nothing. Efficacy against active control conditions must be demonstrated in further stages of evaluation.

Second, due to ethical and time limitations, the control period for participants in the waitlist condition was only eight weeks. Thus, follow-up analyses reported in this study are based on uncontrolled data and must be interpreted with caution. Large effect sizes were reported at 6-month follow-up for all outcomes except for PDQ-39 however these effects may be overstated (Butler et al., 2005). Finally, the sample predominantly comprised participants in the early stages of PD, with relatively unaffected mobility, no treatment-related dyskinesia, no cognitive impairment, high quality of life and who were relatively independent. Thus, the degree to which CBT may be effective with individuals with PD in the latter stages of disease and more pronounced motor and cognitive difficulties is not known.

5.6.3 Directions for Future Research

Overall, this study adds strong support to the growing body of evidence for the efficacy of CBT in treating depression and anxiety in PD. However, there are still several phases of research and evaluation to be conducted before CBT can be established as an effective treatment approach for depression and anxiety in PD. Chapter 3 outlined the phases involved in the experimental investigation of psychological therapies (see Mohr et al., 2009). Existing research for group CBT in PD was best classified as Phase I efficacy evidence (manual writing and pilot trial). This study can best be classified as Phase II evidence for the efficacy of CBT for depression and anxiety in PD (preliminary trials). However, due to the limitations of this study, it is recommended that future researchers continue with conducting preliminary trials to provide a more methodologically sound estimate of the effect of group CBT in PD. Larger sample sizes would provide a more valid estimate of effect size, although the detection of significant and large effect sizes in this study is promising in light of the small number of participants. Future trials should also consider implementing a longer control period in order to provide a more reliable assessment of the long-term utility of group CBT for depression and anxiety in PD.

Following this, the next step in establishing the efficacy of group CBT for depression and anxiety in PD would be to conduct Phase III research. Phase III research involves large efficacy trials across multiple sites with active control conditions. There are several important research questions that need to be addressed through Phase III trials. First, the effect of non-specific treatment factors on

participant change must be examined. Trials directly comparing group CBT with an alternate psychological intervention are needed to provide insight into whether the active components of CBT (i.e., cognitive mediation) or non-specific factors (e.g., attention, support, therapeutic alliance etc.) are responsible for change in outcomes.

Second, trials directly comparing CBT and pharmacotherapy for depression and anxiety in PD are needed. Given that pharmacotherapy currently represents the first-line treatment for depression and anxiety in PD, it is important to directly examine if CBT is more beneficial than current treatment mainstays. At present, it would appear that CBT may be more effective than current first-line SSRI treatments for the acute treatment of depression and anxiety in PD based on the findings of the meta-analysis in Chapter 2, however, a direct comparison will allow a more meaningful conclusion to be drawn. Further, it has been argued that the major benefit of CBT over pharmacotherapy relates to its long-term utility however empirical evidence of this is lacking in PD populations at present.

Third, trials directly comparing group CBT with individual CBT will be useful to examine whether there are any differences in efficacy between the two treatment modalities. Thus far, individual CBT has been the treatment modality of choice for researchers evaluating CBT for depression and/or anxiety in PD with 80% of studies of CBT in PD focusing on Individual interventions while group CBT remains understudied. Comparison of effect size estimates between the current study and Dobkin and colleagues' (2011) study suggests that group CBT may be equally efficacious as individual CBT for depression and anxiety in PD and warrants further investigation of this treatment modality, especially given the clear practical and therapeutic benefits of group therapy for older adults as well as individuals with chronic illness.

Last, there is also a pressing need for studies specifically investigating the treatment of anxiety disorders in PD. As noted in discussion of the meta-analysis in Chapter 2, there currently are no RCTs of any treatment interventions specifically for anxiety in PD at the present time. Existing randomised controlled trials of psychological and pharmacological interventions for anxiety in PD have all focused on depression as the primary outcome with the alleviation of anxiety considered a

secondary benefit. This study highlights the prevalence and severity of anxiety disorders in PD and calls out for appropriate research and clinical attention. While depression has been the main focus of psychological researchers in PD, previous research has shown that there are additional and unique concerns and problems associated with anxiety in PD, that are unrelated to depression, and that have a significant impact on quality of life and well-being (Rahman et al., 2008). Thus, research solely focusing on the treatment of anxiety in PD is required.

Finally, in addition to continuing empirical investigations of CBT for depression and anxiety in PD, there is a pressing need for research investigating mental health service utilisation in PD populations. While ongoing development and evaluation of optimal treatment options for depression and anxiety is essential to ensure that depressive and anxiety disorders are most effectively managed in PD, such treatments are only valuable to the extent that they are utilised by the individuals they are designed to help. Significant recruitment difficulties encountered in this and several previous studies, coupled with the low participation rate in treatment trials for depression and anxiety in PD in general, suggest that there may be pertinent barriers to seeking psychological care within PD populations. Current research has identified several salient barriers to seeking psychological care among older adults however there has been no specific study of mental health service utilisation among PD populations. Therefore, there is a pressing need for research in this area to provide a clearer insight into any factors that may be acting as obstacles to quality psychological care in PD.

5.7 Chapter Summary

This chapter presented the findings of the first randomised controlled trial of group CBT for the treatment of depression and anxiety in PD. Results supported the growing body of evidence for the efficacy of CBT in PD and especially highlighted the potential of the group therapy treatment modality for individuals with PD.

The current interest in CBT treatments within PD stems from widespread criticisms of existing pharmacological regimes for depression and anxiety in PD.

This study adds growing support for CBT as a potentially more effective and well-tolerated treatment approach than first-line SSRI interventions for depression in PD over both the acute and follow-up period. Ongoing development and evaluation of group CBT is needed in light of the limitations of the study, nonetheless the results of this preliminary trial show high promise for the utility of group CBT in treating depression and anxiety in PD.

Ultimately, however, effective treatments are only valuable to the extent that they are utilised by their target population. Significant recruitment difficulties experienced in the study along with a low participation rate in other treatment trials for depression and anxiety in PD suggest that there may be pertinent barriers to seeking psychological treatment among PD populations. This area of research is yet to be explored and would be an instrumental first step in improving the provision of quality psychological care for individuals with PD. The next chapter explores barriers to seeking psychological treatment in PD in greater depth.

CHAPTER 6 |

Study IV. An Exploratory Study of Barriers to Seeking Mental Health Treatment in Parkinson's Disease

6.1 Introduction

Significant recruitment difficulties encountered in Study 3 led to the hypothesis that pertinent barriers to mental health treatment may be in place in Parkinson's populations. This chapter presents the findings of a cross-sectional study exploring barriers to seeking mental health treatment among a sample of 327 Australian adults with Parkinson's disease (PD). The overarching objective of this study was to examine patterns of mental health service utilisation among participants and to identify any barriers to seeking that exist in the population of people with PD.

6.2 Overview of Barriers to Seeking Psychological Treatment

It has long been recognised that mental health services are largely underutilised (Kessler et al., 2005). Comparisons between the rates of psychological disorders and mental health service utilisation show a clear discrepancy between clinical prevalence and service usage statistics. According to the Australian Bureau of Statistics (ABS; 2007), approximately 7.3 million Australian adults, or 45% of the Australian adult population, will be affected by a psychological disorder in their lifetime, with approximately 3.2 million (20%) affected by a psychological condition in any given 12-month period. The vast majority of Australian adults will not receive any form of professional psychological help, however, with research suggesting that between 65 and 80% of people who would benefit from psychological help are not seeking it (Mackenzie, Knox, Gekoski, & Macaulay, 2004). Between 2006 and 2007, the ABS (2007) reported that approximately 2.1 million Australian adults with a psychological illness did not seek any mental health treatment despite acknowledging a perceived need for professional help.

Many factors have been proposed to contribute to the underutilisaiton of mental health services and individual pathways leading to the decision to seek or not seek treatment are highly idiosyncratic. Broadly, the Theory of Planned Behaviour (Azjen, 1991) suggests that help-seeking behaviour can be conceptualised as a complex process shaped by the interaction between four factors; (1) intentions to seek treatment, (2) personal attitudes regarding mental illness and treatment, (3) perception of others' view of mental illness and treatment (subjective norm), and (4) perception of the ease or difficulty of accessing treatment (perceived behavioural control; see Figure 12).

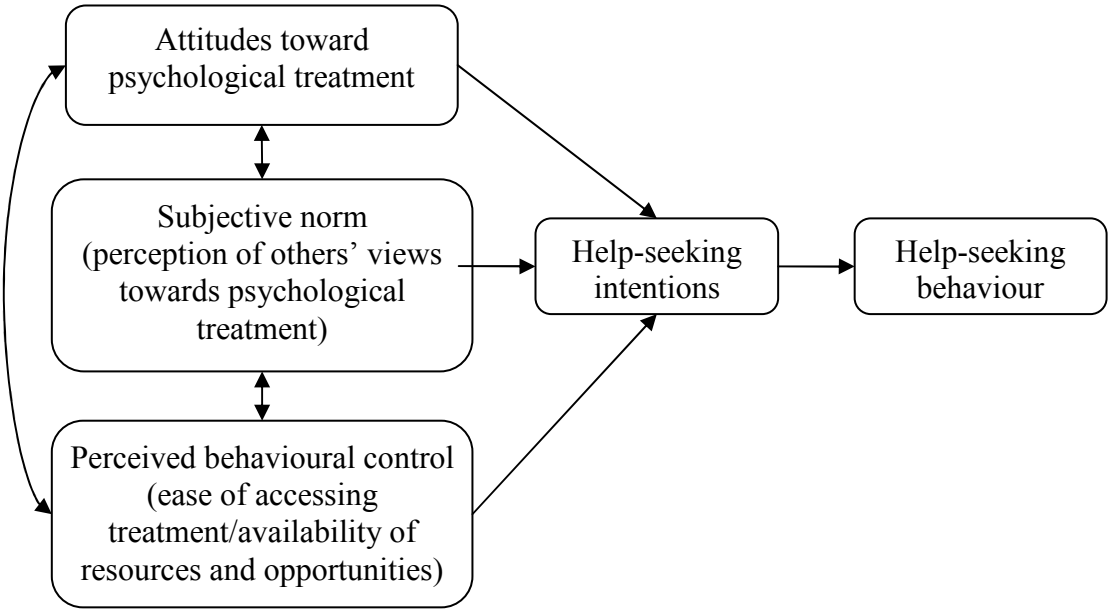


Figure 12. Psychological Help-Seeking Process as Explained by the Theory of Planned Behaviour (Azjen, 1991)

When dealing with voluntary behaviours, *intention* to perform a given behaviour is the strongest predictor of actual behaviour (Azjen, 1991). Thus, help-seeking behaviour is most accurately predicted from an individual's intentions to seek psychological treatment. Intentions to seek psychological treatment are in turn shaped by the individual's attitudes toward treatment, the subjective norm, and their perceived ability to access treatment, with positive attitudes regarding mental health and treatment, positive societal views toward psychological treatment and adequate resources and opportunities associated with a higher likelihood of seeking psychological treatment (Mackenzie, et al., 2004).

Consistent with this formulation, studies exploring the underutilisation of mental health services have reported that the majority of barriers to seeking psychological treatment fall into two broad categories; *practical barriers,* which are obstacles relating to the accessibility and availability of resources, and *attitudinal barriers*, which are cognitive factors such as beliefs and attitudes which hinder help-seeking (Aupperle, Lifchus, & Coyne, 1998; Nada-Raja, Morrison, & Skegg, 2003).

6.2.1 Practical Barriers to Mental Health Treatment

Practical barriers to seeking mental health treatment are environmental factors affecting the feasibility and accessibility of treatment, and include organisational and systemic factors as well as personal variables (Pepin, Segal & Coolidge, 2009). Factors at the organisational and systemic level that influence mental health treatment utilisation include the availability and provision of services, training, availability and funding of qualified clinicians, treatment cost, health insurance reimbursement policies, and waiting list times (Parslow & Jorm, 2000). Personal factors contributing to the feasibility of seeking treatment include socioeconomic status, income, current financial situation, personal health insurance coverage, overall health condition, and time and transport availability (Barney, Griffiths, Jorm, & Christensen, 2006).

According to Azjen (1991), having adequate access to resources and opportunities to perform an intended behaviour strongly enhances the likelihood of executing that behaviour. On a psychological level, having adequate access to resources and opportunities is proposed to enhance an individual's confidence about their ability to successfully complete the intended behaviour and in turn facilitates actual behaviour (Bandura, 1991). According to Pepin and colleagues (2009), practical barriers to seeking psychological treatment operate predominantly on the personal rather than systemic level in the majority of developed countries where adequate mental health facilities and professionals are widely available to the general public. Consistent with this, Robb, Chen, and Haley (2002) reported that personal financial issues are the most commonly reported practical barrier to initiating psychological treatment for adults in developed countries, with a significant association between socioeconomic status and help-seeking for psychological problems clearly established (Komiya et al., 2000; Parslow & Jorm, 2000). Related

to personal financial situation, McAlpine and Mechanic (2000) found that among 235 adults with schizophrenia or bipolar disorder, health insurance coverage was the strongest predictor of mental health service usage. Participants with health insurance were found to be between 2.5 and 7 times more likely to access specialty mental health services compared with those without coverage. Ultimately, these findings have important implications for policymakers to ensure that mental health services are accessible and affordable by the general public.

6.2.2 Attitudinal Barriers to Treatment

While practical concerns relating to cost and health insurance can limit access to psychological care for some individuals, it has been suggested that the predominant barriers to seeking psychological care within developed countries are largely attitudinal rather than practical in nature (Sareen et al., 2007). Attitudinal barriers are intrinsic cognitive factors which prevent people from seeking psychological treatment, and include personal beliefs, attitudes, values and knowledge (Cepeda-Benito & Short, 1998; Pepin et al., 2009). Common attitudinal barriers to mental health treatment include a lack of knowledge and/or awareness regarding mental illness, negative perceptions of psychological treatment and their utility and/or effectiveness, mental illness-related stigma, self-concealment and negative help-seeking attitudes (Barney et al., 2006; Komiya et al., 2000).

Large-scale cross-sectional studies have demonstrated that knowledge of and attitudes toward mental illness and professional psychological treatment are generally poor and/or negative among the wider public. In a cross-sectional study examining awareness of and attitudes to depression among 900 Australian adults, Highet, Hickie and Davenport (2002) highlighted a significant lack of awareness and knowledge deficit regarding depression and other mental health problems in the general population. Only half of participants surveyed were able to correctly identify the symptoms of depression, almost two-thirds (64%) underestimated the lifetime prevalence of depression in Australia, and only 2% of participants identified depression and psychological disorders to be a major health concern in Australia. Attitudes towards seeking professional psychological help were also generally poor with the majority of participants (60%) indicating a preference to turn to families or friends rather than mental health professionals as a first-line source of help.

Studies investigating attitudinal barriers to seeking psychological help have identified two predominant attitudinal barriers to seeking psychological treatment in particular; mental illness-related stigma and negative help-seeking attitudes.

6.2.2.1 Stigma. Mental illness-related stigma refers to negative beliefs and attitudes regarding psychological illness and individuals with such illnesses (Conner et al., 2010). Two forms of mental illness-related stigma have been defined; public stigma and self-stigma (Corrigan, 2004). Public stigma is synonymous with the lay definition of stigma which is the negative perception of mental illness and people with mental illnesses by others in a community (Conner et al.), while self-stigma describes the negative perception of oneself by individuals with mental illnesses as they internalise negative public stereotypes (Corrigan, 1998).

Studies investigating public beliefs about mental illness have found that an unfavourable stigma is generally attached to individuals with psychological disorders. In a previous study, mental health stigma was found to be greater than the stigma associated with having a medical condition and of comparable stigma as criminal activity (Roeloffs et al., 2003). Similarly, in a review of 62 studies investigating lay beliefs about mental illness, Angermeyer and Dietrich (2006) found that the majority of the general public viewed people with psychological disorders to be weak, in need of help and dependent on others (Angermeyer, Beck, & Matschinger, 2003), unpredictable and unstable (Crisp, Gelder, Rix, Meltzer, & Rowlands, 2000), and to a lesser extent, violent and dangerous (Borinstein, 1992; Gaebel & Baumann, 2003; Stuart & Arboleda-Florez, 2001). Members of the general public also reported feelings of unease, uncertainty and fear towards individuals with mental illnesses as well as a tendency to distance themselves from such individuals in social contexts (Jorm, Angermeyer, & Katschnig, 2000). Public stigma typically results in negative actions against individuals with mental illnesses including stereotyping, prejudice, exclusion, and discrimination (Corrigan, 2004).

Negative public perceptions of mental illness can in turn result in the development of self-stigmatising attitudes in individuals with mental illness. Corrigan, Watson and Barr (2006) assert that individuals with mental illness can often internalise negative societal views and subsequently develop unfavourable

views of themselves. Most commonly, self-stigmatising individuals with mental illness can often view themselves as weak, inadequate and socially inferior as a result of prevailing negative attitudes (Vogel, Wade, & Haake, 2006). Self-stigma has also been associated with a significant decrease in self-esteem, self-efficacy, self-worth and general psychological well-being (Link, Struening, Neese-Todd, Asmussen, & Phelan, 2001; Markowitz, 1998; Ritsher, Otilingam, & Grajales, 2003). In addition, self-stigma also manifests as feelings of shame, embarrassment, secrecy and the need for self-concealment (Corrigan, 2004).

Research exploring the link between mental illness-related stigma and mental health service utilisation has shown that both perceived public stigma and self-stigma are significant barriers to seeking psychological care (Conner et al., 2010). In terms of public stigma, it has been suggested that individuals with mental illness who believe that others will view and/or respond to them negatively because of their psychological status (i.e., *perceived public stigma*) may avoid seeking treatment in order to evade negative judgement from others (Komiya et al., 2000; Vogel et al., 2006; Vogel, Wester, Wei, & Boysen, 2005). Cooper, Corrigan and Watson (2003) refer to this phenomenon as 'label avoidance' which is the tendency to deny psychological problems and avoid treatment in order to avoid being labelled with the negative characteristics associated with having a mental illness. Consistent with this, a number of empirical studies have reported that the views and reactions of other people is a significant contributory factor in the decision to seek psychological treatment (Chadda, Agarwal, Singh, & Raheja, 2001) and can often act as a deterrent to seeking psychological care for a significant number of people with mental illness.

Self-stigma has been found to act as a significant barrier to seeking psychological care for a similar reason to perceived public stigma however rather than attempting to avoid negative reactions from others, it has been hypothesised that self-stigmatising individuals may avoid seeking treatment in order to preserve or maintain a positive self-image (Vogel et al, 2006). Seeking professional help for mental health issues may be seen by self-stigmatising individuals as a threat to one's self-esteem in that requiring help from another person is internalised as a sign of weakness, inferiority or failure (Fisher et al., 1982). These individuals may thus avoid or delay seeking treatment to prove to themselves that they are not weak, with

Vogel and colleagues suggesting that the admission of needing help may be perceived as more detrimental than the experience of psychological symptoms in itself for self-stigmatising individuals. Consistent with this, several empirical studies examining self-stigma and help-seeking behaviour have reported that people were less likely to seek help when they anticipated that help-seeking would make them feel inferior or incompetent (Karabenick & Knapp, 1991).

While both perceived public stigma and self-stigma have been associated with treatment non-utilisation, self-stigma is generally considered to be a stronger barrier to seeking psychological treatment (Schomerus, Matschinger, & Angermeyer, 2009). For example, Bayer and Peay (1997) examined factors contributing to the likelihood of seeking professional mental health treatment in a community sample of 142 adults and found that personal attitudes towards seeking treatment were a stronger predictor of treatment use than subjective norms. Similarly, in a more recent large-scale internet-based study of 10,962 participants, Van Voorhees and colleagues (2006) reported personal attitudes towards mental health treatment were stronger predictors of perceived need for treatment than the opinion of others. Likewise, Barney and colleagues (2006) found that self-stigma was the strongest predictor of reduced likelihood of seeking help from a wide range of mental health professionals including general practitioners, counsellors, psychologists, psychiatrists and complementary practitioners. Thus, individual beliefs regarding psychological treatment and its perceived consequences appear to play a more pivotal role in the help-seeking decision-making process than approval or disapproval from others.

6.2.2 Help-seeking attitudes. Studies exploring treatment underutilisation have focused particularly on the role of help-seeking attitudes in predicting mental health service use. Help-seeking attitudes can be described as a multidimensional set of personal beliefs reflecting an individual's overall disposition towards seeking professional psychological care (Currin, Hayslip, Schneider, & Kooken, 1998). According to Mackenzie and colleagues (2004), an individual's overall attitude towards seeking psychological help is represented by three factors; their psychological openness, help-seeking propensity and indifference to stigma. Psychological openness refers to the degree to which an individual is receptive to psychological experiences, whether positive or negative. Help-seeking propensity

describes the individual's overall willingness and ability to seek professional help, and indifference to stigma refers to the extent to which the individual is not affected by others' views regarding seeking psychological treatment. A person with positive psychological help-seeking attitudes is described as one who exhibits high levels of psychological openness and help-seeking propensity while showing low concern over others' reactions to their help-seeking behaviour (Mackenzie et al.).

A growing body of research has found that help-seeking attitudes are the strongest and most consistent predictor of treatment utilisation or non-utilisation, with a strong positive correlation reported between help-seeking attitudes and mental health service utilisation (e.g., Deane & Todd, 1996; Diala et al., 2000; Komiya et al., 2000; Rickwood & Braithwaite, 1994; Vogel et al., 2005). For example, in a study exploring the influence of help-seeking attitudes on the underutilisation of mental health services among 206 community-dwelling adults, Mackenzie, Gekoski and Knox (2006) found that help-seeking propensity (i.e., an individual's willingness to seek professional psychological help) was the strongest unique predictor of intentions to visit a mental health professional over other factors including past use of services and psychiatric symptomatology. Similarly, in a recent large-scale epidemiological survey of 21 000 adults living in six European countries, Ten Have and colleagues (2010) found that individuals who were open about their emotional and psychological problems (i.e., 'would feel comfortable talking about personal problems') were 1.8 times more likely to have used mental health services. Most significantly, it was found that individuals who displayed a propensity to seek psychological help (i.e., 'would go for professional help in case of a serious emotional problem') were 3 times more likely to have utilised professional psychological services than those with more negative help-seeking attitudes.

6.3 Barriers to Seeking Mental Health Treatment among Older Adults

Of particular relevance to barriers to psychological treatment in PD is the literature on mental health service utilisation in older adults. While the underutilisation of mental health services in the general population is concerning, statistics show that older adults with psychological disorders are even less likely to receive specialty mental health care (Gurland et al., 1996; Hatfield, 1999; Robertson

& Mosher-Ashley, 2003; Schneider, 1997). Early studies based on data from the United States estimated that between only 3 and 8% of adults aged 65 and over reported visits to mental health professionals in the preceding year (Lasoski, 1986; Lebowitz et al., 1997). More recent studies have reported an increase in the rate of mental health service utilisation among contemporary older adults; however, younger adults are still more than twice as likely to seek professional psychological help (Robb et al., 2003). Moreover, among older adults who do utilise mental health services, there is a general tendency to exclusively consult general medical practitioners and concentrate solely on the treatment of physical and somatic aspects of mental illness (Mickus, Colenda, & Hogan, 2000; Woodward & Pachana, 2009).

As with barriers to psychological care in the general population, both practical and attitudinal barriers to seeking psychological help have been described in older adult populations. However, attidunal factors have been identified as the most salient barriers to psychological care among older adults and include significant knowledge deficits and negative mental illness-related attitudes (Hayslip, Maiden, Thomison, & Temple, 2010; Robertson & Mosher-Ashley, 2003).

6.3.1 Attitudinal Barriers to Seeking Treatment among Older Adults

Negative attitudes towards mental illness and psychological treatment have long been recognised among older adults. Early studies found that older adults exhibited less psychological openness than younger adults. For example, Hayslip, Ritter, Oltman and McConnel (1980) reported that the majority of older adults did not view mental health as an important need while Waxman and colleagues (1984) found that older adults generally held lower opinions of the effectiveness of psychological interventions. Early studies also identified a significant lack of knowledge regarding psychological treatment among older adults. For example, a substantial proportion of surveyed older adults indicated that all mental health treatment is conducted in ‘insane asylums’ (e.g., Woodruff et al., 1988) or custodial institutions (e.g., Lasoski, 1986). A lower help-seeking propensity for psychological problems has also been reported among older adults. Ray, Raciti and MacLean (1992) explored help-seeking decisions among a sample of 110 adults aged over 65 and found that only 15% of participants indicated they would go directly to a mental health professional for help with psychological problems, with the majority opting to

seek support within their social network or to work through their difficulties on their own. The authors also found that older adults tended to blame themselves for their psychological problems and thus believed it was their responsibility to deal with their troubles on their own.

In addition, mental illness-related stigma has been found to be a particularly pertinent barrier to seeking psychological treatment among older adults (Hayslip et al., 2010; Sirey, Bruce, Alexopoulos, Perlik, Friedman, & Meyers, 2001). The World Health Organisation and World Psychiatric Association have both acknowledged that stigma and discrimination against older adults with psychological illnesses is widespread and has significant negative consequences for older adults' self-esteem, quality of life as well as help-seeking behaviours (Depla et al., 2005; Link et al., 2001). Similarly, the United States Surgeon General report identified mental illness-related stigma as a 'powerful obstacle' to seeking psychological care among older adults (US Department of Health and Human Services, 1999).

Both perceived public stigma and self-stigma have been reported in older adult populations. In a comparison of mental illness beliefs between a group of undergraduate students and community dwelling adults aged 60 years and over, Segal, Coolidge, Mincic and O'Riley (2005) found that older adults perceived individuals with psychological disorders to be significantly more embarrassing, socially undesirable and socially unskilled than the younger group. In particular, self-stigmatising attitudes regarding mental illness are suggested to be widespread among older adults (Depla et al., 2005). Early studies found that older adults tended to regard seeking treatment for psychological problems as a sign of personal failure, weakness and/or spiritual inadequacy (Currin et al., 1998; Woodruff et al., 1988) and that engagement in psychological treatment is seen as a 'disgrace' (Kahn, 1975). Studies have also found that older adults indicated they would feel shameful, fearful and embarrassed if they were to have a mental illness (Hatfield, 1999).

It has been suggested that widespread negative societal views prevalent prior to the deinstitutionalisation of mental illness may underlie these stigmatising and negative help-seeking attitudes among older adults (Morris, 2001). In support, more recent studies have found that both knowledge of mental illness and help-seeking

attitudes in contemporary older adult samples are significantly more positive than those reported 14 years prior (e.g., Currin et al., 1998). There is also evidence of a decline in mental illness-related stigma among contemporary older adults (e.g., Sirey et al., 2001). Moreover, recent studies have also found that there are no longer significant differences between the help-seeking attitudes of younger and older adults (e.g., Segal et al., 2005) or even, that older adults report more positive help-seeking attitudes than younger adults (e.g., Mackenzie et al., 2006). In a study of psychological help-seeking attitudes and treatment beliefs among 1341 community dwelling adults aged 55 and older, Mackenzie, Scott, Mather and Sareen (2008) reported that more than 80% of participants had positive attitudes towards seeking professional psychological help and more than 70% had positive treatment beliefs. Similarly, Sirey and colleagues compared perceived public stigma of mental illness between older and younger outpatients with major depressive disorder and reported lower levels of perceived public stigma among participants aged 65 and over. However, perceived public stigma was a significant predictor of treatment discontinuation among older participants while it was not significantly associated with treatment use in younger participants. Thus, while a decrease in mental illness-related stigma has been observed among older adults in recent times, stigma remains a significant barrier to psychological care for older individuals.

6.3.2 Practical Barriers to Seeking Psychological Treatment for Older Adults

In addition to attitudinal barriers, several practical obstacles also affect the accessibility of psychological treatment for older adults. The most significant of these barriers has been suggested to be comorbid chronic illnesses (Choi & Gonzalez, 2001; Mohr et al., 2006), which is particularly relevant to PD populations.

6.3.2.1 Chronic illness. Chronic illnesses are markedly prevalent among older adults. According to Chodosh and colleagues (2005), approximately 79% of community dwelling older adults over the age of 70 report having at least one chronic illness. There are several elements of having a chronic illness that can act as potential barriers to seeking psychological help for older adults, including both practical (e.g., increased functional impairment, transportation issues, costs of additional treatment) and attitudinal factors (e.g., an overshadowing concern for physical symptoms; Greenberg, 2004; Mohr et al., 2006).

In terms of the practicality of accessing treatment for psychological problems, increased functional impairment can make it difficult to travel to treatment facilities. Lasoski (1986) asserts that due to increased physical limitations, older adults often require the assistance of others for transportation and difficulties with arranging transport can hinder treatment imitation and/or lead to discontinuation. The cost of additional treatment may also be a significant obstacle to seeking psychological care for many older adults with comorbid chronic and psychological illness (Katon, 2000). A multitude of studies have shown that older adults with depression have significantly higher medical costs than older adults without a psychological diagnosis (e.g., Callahan et al., 1994; Ciechanowski, Katon, & Russo, 2000; Katon et al., 1990; Simon, Von Korff, & Barlow, 1995). These costs are even higher for older adults with comorbid chronic and psychological conditions with Sullivan, Simon, Spertus and Russo (2002) showing that older adults with congestive heart failure and depression incurred between 26 to 29% higher medical costs than older adults with congestive heart failure alone over a 3-year period.

Attitudinal variables associated with having a chronic illness may also hinder initiation of psychological treatment among older adults. It has been shown that the majority of the general public regard physical illnesses a higher priority than psychological disorders. For example, in an Australian survey of 900 adults, Highet and colleagues (2002) found that when questioned over the "major health problem(s) in Australia at present", 98% of respondents indicated a physical illness. Thus concerns for physical illness often overshadow treatment-seeking for any psychological complications in individuals with comorbid medical and psychological diagnoses. This overshadowing concern for physical symptoms has also been observed on behalf of treating medical physicians with Himelohoch, Weller, Wu, Anderson and Cooper (2004) observing that the majority of physicians prioritised medical problems during time-limited encounters. Similarly, an early study by Maguire (1985) found that general physicians working with cancer patients admitted that they would not generally discuss psychological or emotional difficulties and assumed that a patient requiring psychological help would consult them. When patients did raise emotional concerns, Maguire noted that physicians often employed 'distancing strategies' including switching the topic of conversation, prematurely reassuring or ignoring cues. Maguire also suggested that a fear of stigmatisation from

medical professionals can as a potential barrier to seeking psychological treatment among individuals with chronic illness, with cancer patients reluctant to disclose any psychological problems to their primary physician as they believed it would make them appear 'weak willed', 'crazy' or 'not strong enough' to cope with their cancer. Thus, attitudinal variables on behalf of both patients and doctors can often serve as significant barriers to psychological treatment for individuals with comorbid physical and psychological illnesses.

6.3.2.2 Organisational barriers. In addition to chronic illness-related barriers, there are also several structural and organisational obstacles to accessing psychological care for older adults. These include; a shortage of geriatric mental health services, lack of qualified mental health professionals trained to work with older adults and a lack of referrals by medical physicians to existing mental health facilities (Crabb & Hunsley, 2006; Qualls et al., 2002).

According to Woodward and Pachana (2009), there is a severe shortage of specialist geriatric mental health services in Australia. This shortage is also mirrored globally, with Lima, Levav, Jacobsson and Rutz (2003) stating that geriatric mental health services across Europe are lacking and/or underdeveloped with only 65% of European nations offering specialist mental health services for older adults. In contrast, all European countries have specialist psychological services for children despite older adults comprising a larger proportion of the population. Corrigan, Watson, Warpinski and Gracia (2004) suggest that the lack of specialist mental health services for older adults is directly related to a lack of funding for such services and reflects unequal resource allocation and systemic discrimination against mental health care for older adults by policymakers and government bodies.

Discrimination has also been suggested to be evident in the structure of training programmes for psychological and psychiatric professionals (Woodward & Pachana, 2009). In a review of Australian postgraduate clinical psychology programmes, Kneebone (1996) reported that only 3% of a standard two-year Masters programme was dedicated to mental health problems in older adults. Similarly, Lima and colleagues (2003) found that only 10% of the psychiatry residency programme in Europe involved training in older adult psychopathology. The shortage of qualified

professionals may also in part be related to negative attitudes regarding geriatric mental health among health professionals themselves (Snowdon, Ames, Chiu, & Wattis, 1995). Studies have shown that trainee professionals including medical, psychology, and nursing graduates generally indicate that working with older people is their least preferred area of specialty (Lee, Volans, & Gregory, 2003). Finally, ageist attitudes regarding psychological illness in older adults among medical physicians and mental health professionals can also act as a barrier to psychological care for older adults. According to Ferguson and Koder (1998), only 8% of all general practitioner (GP) referrals to psychologists in Australia comprise adults over the age of 50, with GPs generally preferring to treat older people with psychological difficulties in primary care using pharmacotherapy due to belief that cognitive, personality and behaviour change through psychological intervention is less likely to be successful in older people who are more 'set in their ways' and have stronger and more established personalities than younger adults (Steuer et al., 1984).

6.4 The Present Study: An Exploration of Barriers to Seeking Mental Health Treatment in PD

The research presented in the preceding section provides a broad understanding of the factors that may be preventing people with PD experiencing psychological difficulties from seeking professional help. Specifically, limited knowledge regarding mental illness and contemporary treatment options, negative help-seeking attitudes, mental illness-related stigma as well as various factors associated with chronic illness and concerns for physical health have all been identified as significant obstacles to seeking psychological care among older adults. However, specific investigations into mental health service utilisation among individuals with PD are lacking in the literature at the present moment and are duly needed to provide a clearer insight into any factors that may be contributing to mental health service underutilisation in this population.

There are several unique aspects of clinical management in PD that may be contributing to the undertreatment of psychological complications. First, due to the traditional conceptualisation of PD as a motor disorder, an overshadowing concern

for physical sympoms has been previously observed on behalf of both treating medical physicians and individuals with PD themselves (Frisina et al., 2008). Relatedly, there is also a general lack of awareness that an extensive range of non-motor symptoms also comprise part of the clinical picture of PD, with Chaudhuri and Schapira (2009) stating that up to 62% of non-motor complications are not declared to PD physicians as patients are unaware that such symptoms are linked to PD. Underrecognition and underreporting of psychological symptoms thus place a greater onus on medical physicians to detect any comorbid psychological complications. However, unlike other medical conditions that can be primarily managed by a general practioner, the primary health providers for people with PD are neurologists, whose expertise lie in treatment of the motor manifestations of PD. Thus, again, there is an overshadowing emphasis on the treatment of physical symptoms during medical consultations in PD with Shulman and colleagues (2002) reporting that over half of a sample of 101 PD neurologists in their study had never discussed psychological complications in PD with their patients. Finally, as the primary symptoms of PD are related to motor dysfunction, individuals with PD often experience greater functional and/or physical impairment compared with people with other chronic illnesses and this may impact on their ability to physically access mental health services.

There have only been two studies investigating mental health service utilisation in PD. Qureshi, Amspoker, Calleo, Kunik and Marsh (2012) examined general health care utilisation among a sample of 273 male veterans with PD and reported that only 12.8% of the sample had reported any visits to a mental health outpatient facility during the study period. The rate of mental health service utilisation was higher among a subsample of participants who currently met ICD-9 diagnostic criteria for a depressive disorder at 32.3% however it would still remain that over two-thirds of participants with a depressive disorder were not currently engaged in any form of professional treatment, thus confirming the underutilisation of mental health services in PD. This study was primarily aimed at investigating general health care utilisation in PD, however, as well as used a highly selective and unrepresentative sample (i.e., veteran males with PD) which ultimately restricts the generalisability of findings beyond the study sample.

Most recently, Dobkin and colleagues (2013) published a large-scale study examining several purported barriers to mental health care utilisation among a sample of 883 individuals with PD in the United States. In regards to future treatment, the three most frequently perceived barriers were concerns in relation to high out of pocket costs, sensitivity issues, and a lack of local services. The most common reasons for not seeking treatment in the past were low mental health literacy/problem recognition, and again cost, and sensitivity concerns. This study was the first to examine barriers to mental health service utilisation in a PD sample and provided valuable insight into factors that may be preventing treatment usage. However, the authors' analysis was limited to describing the frequency with which each purported barrier was endorsed in the sample and examining predictors of each barrier, rather than examining the predictive relationship between each barrier and service utilisation or non-utilisation. Moreover, important attitudinal barriers to seeking mental health care among older adults such as stigma and negative help-seeking attitudes were not assessed.

The present study is the first to examine mental health service utilisation among an Australian PD sample. The aim of the study was to explore factors contributing to willingness to seek professional psychological treatment and to identify any significant barriers to treatment that may have underlay recruitment difficulties experienced in Study 3.

6.5 Methodology

6.5.1 Research Design

This study was a cross-sectional survey exploring patterns of mental health utilisation and barriers to treatment of depression and anxiety among a PD sample.

6.5.2 Participants and Procedure

A non-probability convenience sample was used. A questionnaire package was assembled and mailed out to all members of Parkinson's Western Australia (PWA) following ethical approval from both the Curtin University HREC and PWA research committee. In total, 950 questionnaire packages were sent out. The

questionnaire package consisted of a cover letter, participant information sheet, questionnaire and reply-paid envelope. The information sheet outlined the nature of the research and invited PWA members to participate by completing and returning the enclosed questionnaire. A link to a web-based version of the questionnaire was provided for participants who preferred to submit their responses online. A gourmet teabag was included with each package to thank participants for their time. In addition, Parkinson's Associations across Australia were contacted and asked to post a link to the online questionnaire on their websites. The questionnaire was anonymous and no personally identifying details were collected. The information sheet clearly outlined that (i) submission of responses was deemed consent to use the individual's data in the study, and (ii) due to the anonymous nature of the survey, participants will not be able to request their responses be excluded from the research at a later date. Questionnaire packages were disseminated to PWA members in October 2012. Participants were given three months to return questionnaires. Data collection was completed in December 2012.

6.5.3 Measures

The questionnaire package used in the study consisted of seven components:

1. A demographic and medical history questionnaire
2. DASS-21 (Lovibond & Lovibond, 1995)
3. PDQ-39 (Jenkinson et al., 1995)
4. Inventory of Attitudes towards Seeking Mental Health Services (Mackenzie, Knox, Gekoski, & Macaulay, 2004)
5. Needs Survey (Weinberger, Nelson, & Roth, 2011)
6. Depression Stigma Scale (Griffiths, Christensen, Jorm, Evans, & Groves, 2004)
7. Self-Stigma of Depression Scale (Barney, Griffiths, Christensen, & Jorm, 2010)

The demographic and medical history questionnaire and adaptation of the Needs Survey used in the study appear in Appendix F. All other scales are available in the public domain.

6.5.3.1 Demographic and medical history questionnaire. The demographic and medical history questionnaire consisted of four sections. Section A asked about demographic information (e.g., age, gender, relationship status, employment and children). Section B contained questions relating to participants' PD history including age of diagnosis, relatives with PD, current symptoms and current PD medication. Section C examined general medical history and Section D asked about participants' psychiatric history and treatment preferences including past/current diagnoses, current psychiatric medications, usage of mental health services and preferred treatment modality (i.e., pharmacotherapy or psychotherapy). Willingness to seek mental health treatment was also assessed by the question 'Would you be willing to see a mental health professional (e.g., psychiatrist, psychologist, counsellor) for help with psychological problems?'.

6.5.3.2 DASS-21 and PDQ-39. Chapter 4 provides a detailed description of the DASS-21 and its validity and reliability in PD. The PDQ-39 was described in detail in Chapter 5.2.6.2.

6.5.3.3 Inventory of Attitudes towards Seeking Mental Health Services (IASMHS). The IASMHS is a 24-item scale measuring attitudes towards seeking professional psychological help and was developed based on Azjen's (1991) Theory of Planned Behaviour (TPB) specifically for the prediction of mental health service utilisation. The scale comprises three subscales measuring the three components of TPB, namely, Psychological Openness (attitudes), Indifference to Stigma (social norms) and Help-Seeking Propensity (perceived behavioural control).

Two subscales of the IASMHS were used to assess help-seeking attitudes in the present study; Psychological Openness and Help-Seeking Propensity. The Indifference to Stigma subscale was not used as two other more comprehensive stigma measures were also included in the study. The Psychological Openness factor comprises eight items measuring an individual's openness to acknowledging and experiencing psychological problems e.g., "There are certain problems which should not be discussed outside of one's immediately family". The Help-Seeking Propensity factor comprises eight factors measuring the degree to which an individual is willing and able to seek help for psychological problems from a mental health professional

e.g., “I would have a very good idea of what to do and who to talk to if I decided to seek professional help”. Items are rated on a 5-point Likert scale ranging from 0 (disagree) to 4 (agree). Possible scores for each factor range from 0 to 32, with higher scores indicating more positive help-seeking attitudes. Both subscales of the IASMHS demonstrated excellent internal consistency within the present sample with α = .77 (Help-Seeking Propensity) and α = .83 (Psychological Openness).

6.5.3.4 Needs Survey. The Needs Survey by Weinberger and colleagues (2011) was originally developed to examine perceived barriers to treatment of psychological distress in prostate cancer patients and was adapted for PD in the present study. The measure comprises 35 items examining attitudes to the treatment of mental health problems in addition to a primary medical condition and was used to provide insight into whether chronic illness-related barriers may be contributing to low mental health service usage rates in PD populations. The Needs Survey assesses nine categories of barriers: Weakness (e.g., “It is a sign of weakness to talk with a mental health professional about emotional distress”), Health/Life Benefits (e.g., “I can afford to pay for treatment for mental health problems”), Efficacy (e.g., “I believe that treatment for emotional problems will help me”), Dependency (e.g., “I don’t want to become dependent on psychiatric medication”), Doctor’s Reaction (e.g., “Most doctors want to hear about any problems a patient is having in addition to those related to Parkinson’s”), Stigma (e.g., “I don’t want to get treatment for mental health problems because my family and friends will think I am crazy”), Access/Logistics (e.g., “I would rather not seek help for emotional problems because it is too difficult getting around to see yet another doctor”), Side Effects (e.g., “I worry about becoming too sedated from psychiatric medications”) and Miscellaneous/Concern for physical illness (e.g., “Getting help for emotional problems will take away time and energy that I need to spend coping with PD”).

The Needs Survey was selected for the present study as it was the only measure available in the literature which examined treatment of mental health problems in addition to a primary medical condition. Therefore, in addition to general practical (e.g., access, logistics, health benefits) and attitudinal barriers (e.g., stigma, weakness, efficacy), the survey also examined chronic/medical illness-related barriers such as the perception that patients’ primary physical illness may be more

important than their psychological distress, concerns about the medical physician's reactions, and concerns regarding drug/treatment interactions.

In this study, the Needs Survey was administered using a 5-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree) rather than the dichotomous 'Yes/No' nature in the original questionnaire. Total scores for each factor were computed by summing the relevant items, dividing summed scores by the maximum score for each factor and multiplying by 10 to produce a rating ranging between 0 and 10, with higher scores indicating greater concern for the respective factor.

6.5.3.5 Depression Stigma Scale (DSS). The DSS is an 18-item scale measuring stigma toward depression and comprises two subscales; Personal Stigma and Perceived Stigma. The Perceived Stigma subscale was used to measure participants' perceived public stigma towards depression and anxiety in the present study. The scale consists of nine items assessing beliefs about the way depression and mental illness is perceived by others. Examples of items include "Most people believe that people with depression are dangerous" and "Most people believe that depression is a sign of personal weakness". Items were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Total subscale scores ranged from 5 to 45 with higher scores indicating a higher level of perceived public stigma. The Perceived Stigma subscale of the DSS has shown evidence of sound psychometric properties with reports of excellent internal consistency ($\alpha = .82$; Griffiths et al., 2004) and good test-retest reliability over a 5-week period in both community ($r = .67$) and clinical samples ($r = .73$; Griffiths et al.). The DSS-Perceived Stigma subscale also demonstrated good internal consistency within the present sample ($\alpha = .76$).

6.5.3.6 Self-Stigma of Depression Scale (SSDS). The SSDS is a 16-item scale measuring the extent to which an individual internalises negative stereotypes about depression/mental illness across four factors; Shame, Self-Blame, Social Inadequacy, and Help-Seeking Inhibition. Three subscales of the SSDS (Shame, Self-Blame and Social Inadequacy) were used to assess how participants would feel about themselves if they had depression or anxiety. The Help-Seeking Inhibition subscale was excluded as the IASMHS provided a more comprehensive assessment

of help-seeking attitudes. Each subscale of SSDS consisted of four items. Examples of items include "If I had depression or anxiety, I would feel ashamed" (Shame), "If I had depression or anxiety, I think I would only have myself to blame" (Self-blame), and "If I had depression or anxiety, I would feel inadequate around other people" (Social inadequacy). Items were rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Total subscale scores ranged from 4 to 20 with higher scores indicative of a higher degree of self-stigma. Within the present sample, the three SSDS subscales showed strong evidence of internal consistency with α = .87 (Shame), α = .84 (Self-Blame), and α = .72 (Social Inadequacy).

6.6 Data Analysis

6.6.1 Confirmatory Factor Analysis

As all scales used in this study apart from the PDQ-39 have not previously been validated in PD samples, confirmatory factor analyses (CFA) were conducted to verify the factor structure of each scale within the sample. CFA was conducted using structural equation modelling (SEM) using EQS 6.1.. Principal Components Analysis (PCA) was used to examine the structure of the Needs Survey and DSS as these scales do not measure an underlying latent variable. PCA was conducted using SPSS 19.0.

6.6.1.1 Structural equation modelling. SEM was used to verify the factor structure of the IASMHS and SSDS in the current sample. Maximum Likelihood was the estimation method employed. The Yuan-Bentler correction (Yuan & Bentler, 1998) was applied to Maximum Likelihood estimates where the assumption of multivariate normality was not met. Model fit was assessed via three indices; the χ^2 statistic, CFI and RMSEA (see Chapter 4.4.4.3).

6.6.1.2 Principal components analysis. To test the structure of the Needs Survey and DSS within the current sample, two separate PCAs were run using the Principal Components method of extraction with Varimax rotation with Kaizer normalisation. In each PCA, the number of components to be extracted was specified beforehand in accordance with the *a priori* structure posited by each scale's

developers. Adequacy of fit was assessed by inspection of component loadings to determine whether each item loaded onto the hypothesised component.

6.6.2 Predictors of Willingness to Seek Future Psychological Treatment in PD

Predictors of willingness to use mental health services were examined using a sequential logistic regression analysis. Logistic regression provides an examination of the impact of a set of independent variables on a dichotomous outcome (Tabachnick & Fidell, 2011). Sequential logistic regression is analogous to hierarchical multiple regression whereby order of entry of predictors is selected based on theoretical grounding.

6.6.2.1 Assumption testing. Logistic regression is more flexible than standard regression analyses and requires fewer assumptions. Specifically, normality, linearity and homoscedasticity of predictors are not required, however, independence of observations, absence of outliers and multicollinearity and an adequate cases to predictors ratio are still required (Tabachnick & Fidell, 2011). In addition, logistic regression also requires the assumption of *linearity in the logit* which refers to a linear relationship between continuous predictors and the logarithmic transformation of the dependent variable (Tabachnick & Fidell).

The ratio of cases to predictors was computed by dividing the sample size by the number of predictors in the final regression model. Coakes and Steed (2003) suggest a 1:20 ratio to ensure cross-validity of results. Independence of observations was not formally assessed but assumed as part of the design of the study whereby respondents completed the questionnaire at home and thus responses were not likely to be influenced by other participants. Univariate outliers were examined via inspection of standardised residuals for cases greater than 3.29 standard deviations above or below the mean. Multivariate outliers were assessed through inspection of the Mahalanobis Distance statistic and Cook's distance value for each case. As the logistic regression procedure in SPSS does not automatically compute Mahalanobis distance values, Mahalanobis distance scores were computed using leverage values using the following formula:

$$\text{Mahalanobis distance} = (N - I) \times \left(\frac{leverage - 1}{N} \right)$$

(Tabachnick & Fidell, 2011).

Multicollinearity was assessed via examination of the zero-order correlation matrix among continuous predictors for any correlations > .90. Further, a multiway frequency analysis was conducted to examine any significant sources of multicollinearity among discrete predictors as recommended by Tabachnick and Fidell (2011). Linearity in the logit was tested using the Box-Tidwell approach (Hosmer & Lemeshow, 2000).

6.6.2.2 Model testing. Willingness to seek professional mental health treatment (Yes/No) served as the dependent variable. Predictor and control variables and order of entry of independent variables appear in Table 25. An initial logistic regression was run including all predictor and control variables. Variables that did not contribute significantly to the prediction of Willingess to seek professional mental health treatment were then removed from the model and a second logistic regression was rerun with only significant predictors. By removing redundant predictors, both model fit and statistical power are improved (Burns & Burns, 2008). No specific hypotheses regarding the contribution of individual predictors were made as this was an exploratory study.

6.7 Results

6.7.1 Preliminary Analyses

6.7.1.1 Response rate. A total of 327 questionnaire responses were received between October and December 2012. The majority of responses were received from the PWA questionnaire mail-out (N = 302, response rate = 32%). An additional 25 responses were received through the online questionnaire however it is not possible to determine the source or response rate of online responses (i.e., PWA members submitting their responses online or members from other Parkinson's associations around Australia).

Table 25

Predictors and Control Variables for Sequential Logistic Regression Analysis Predicting Willingness to use Psychological Services

Step 1: Control Variables	Age (categorical)
	Gender
	Background
	Relationship status
	Employment status
	PD duration
	PDQ-39
	DASS-D
	DASS-A
	DASS-S
Step 2: Predictor Variables	Past use of psychological services
	Previous psychological diagnosis
	Current antidepressant treatment
	Psych talk
	DSS-Perceived public stigma
	SSDS-Shame
	SSDS-Self-blame
	SSDS-Social Inadequacy
	IASMHS-Psychological Openness
	IASMHS-Help-Seeking Propensity
	NS-Concerns for PD
	NS-Cost
	NS-Doctor's reaction
	NS-Access/logistics
	NS-Side Effects
	NS-Weakness
	NS-Dependency
	NS-Efficacy

6.7.1.2 Statistical power. A post-hoc power analysis was conducted to determine the statistical power of the study. According to Peduzzi and colleagues (1996), the minimum number of cases required for a logistic regression analysis at a .80 power level can be computed using the formula:

$$N = \frac{10k}{p}$$

where: k = number of predictors

p = the smallest of the proportions of negative or positive cases in the population

The final number of predictors *(k)* = 8 and p = .294 (i.e., 29% of participants indicated they would not be willing to use psychological services in the future). Therefore the required sample size was 10(8) / 0.294 = 272. The study sample size exceeds this value thus it can be concluded that this study was sufficiently powered at a .80 level.

6.7.1.3 Missing data. Of the 327 questionnaire responses received, Missing Values Analysis revealed minimal missing data with no variables or cases missing more than 2.3% of data. Little's MCAR test indicated that the data were missing completely at random, χ^2 (4079) = 4444.11, $p > .05$. Expectation Maximisation (EM) was employed to estimate missing data.

6.7.1.4 Scale structure. Confirmatory factor analysis showed that the IASMHS, SSDS, DSS and Needs Survey were all valid measures within the sample (see Table 26). The Yuan-Bentler corrected Maximum Likelihood estimation method was used in the SEM analyses for the IASMHS and SSDS as the assumption of multivariate normality was violated for both scales.

The IASMHS is originally a three-factor scale measuring attitudes towards seeking professional psychological help across three dimensions; Psychological Openness, Help-Seeking Propensity and Indifference to Stigma. However, only two subscales of the IASMHS were used in this study (Help-Seeking Propensity and Psychological Openness). Thus, while Mackenzie and colleagues (2004) proposed a

three-factor correlated structure, a two-factor correlated structured was specified in the SEM analysis. Results showed that the two-factor correlated structure was a good fit for the sample (corrected CFI = .90, RMSEA = .053).

Table 26

Results of Confirmatory Factor Analyses for DASS-21, IASMHS, SSDS and DSS

	Maximum Likelihood					Maximum Likelihood with Yuan-Bentler correction			
	χ^2	*p*	Relative χ^2	CFI	RMSEA	χ^2	*p*	CFI	RMSEA
IASMHS									
Two-factor correlated	232.25	.000	2.26	.90	.06	152.64	.001	.90	.053
SSDS									
Three-factor correlated	217.31	.000	4.26	.92	.10	133.26	.000	.93	.080

*IASMHS = Inventory of Attitudes towards Seeking Mental Health Services, SSDS = Self-Stigma of Depression Scale

Similarly, the SSDS is originally a four-factor scale measuring the self-stigma of depression across four dimensions; Shame, Self-Blame, Social Inadequacy and Help-Seeking Inhibition. Three scales of the SSDS were used in the present study (Shame, Self-Blame and Social Inadequacy) thus a three- rather than four-factor correlated structure was specified. The CFA results indicated that the three-factor model was an acceptable fit for the data (corrected CFI = .93, RMSEA = .08).

The scale structures of the DSS and Needs Survey were examined through PCA. Multivariate normality was violated for both scales with all items in each scale violating the assumption of univariate normality ($p < .05$), however, assumptions regarding the distribution of variables are not strictly enforced in PCA (Tabachnick & Fidell, 2011). Both scales were deemed appropriate for factoring with Bartlett's χ^2 (1, 630) = 3769.91, $p = .000$ and KMO = .84 for the Needs Survey and Bartlett's χ^2 (1, 36) = 1096.63, $p = .000$ with KMO = .84 for the DSS.

The DSS was developed as an 18-item two-component scale measuring Personal Stigma of depression and Perceived Public Stigma of depression (Griffiths et al., 2008). Only the Perceived Public Stigma scale of the DSS was used in the current study thus a one-component solution was specified for extraction in the PCA. Results showed that a one-component solution was an acceptable model for the data accounting for 44.53% of variance and with all items loading strongly on to the one component with a mean item-factor loading of .65. The Cronbach's alpha value for the total scale was good with $\alpha = .76$.

The Needs Survey was written as a 36-item questionnaire measuring barriers to mental health treatment among men with prostate cancer across nine categories (Weinberger et al., 2011). The original Needs Survey consisted of 36 dichotomous 'agree/disagree' items and the authors primarily used descriptive statistics to describe the frequency of responses to each item among the sample. In this study, responses were assessed on a 5-point Likert scale and item scores for each category were summed to create nine general and medical barriers to seeking mental health treatment. To assess the validity of using the Needs Survey in this manner, a PCA specifying nine components for extraction was run.

Results indicated that a nine-component model fit the data with nine components with Eigenvalues > 1 extracted and collectively accounting for 57.50% of variance in the data. The majority of items were grouped together as expected although there was a moderate degree of cross-loadings evident. Eight items loaded poorly onto the hypothesised component (loadings < .30). Cronbach's alpha values for the Access/Logistics and Concern for PD components were unacceptable ($\alpha < .50$), however this may likely be related to the very small number of items (i.e., 2) within each of these components. Nunnally (1978) states that Cronbach's values are dependent on the number of items within a scale and that scales with a small number of items often result in very low Cronbach's values. Cronbach's alpha values for the remaining six components ranged from low reliability ($\alpha = .54$; Stigma) to acceptable ($\alpha = .73$; Doctor's Reaction). Appendix G displays the component-item loadings and Cronbach's alpha values for the Needs Survey. Overall, the Needs Survey appears to be an acceptable measure of general and medical barriers to seeking psychological help in PD although further item refinement is necessary.

Overall, all scales appeared to be acceptable measures of their purported constructs within the present sample. As only partial subscales of the IASMSHS, SSDS and DSS were used in this study, future research will need to investigate the structure and psychometric properties of each scale in its entirety. However, the current results provide strong support for the use of these scales in the study.

6.7.2 Participant Characteristics

The sample consisted of 205 males (62.7%) and 122 females (37.3%) with a mean age of 69.9 years. The majority of participants were of an Australian background (87.5%), currently married (70.6%) and no longer engaging in paid employment (84.1%). Average age of PD diagnosis was 62 years, average duration of PD was 8.14 years, and the vast majority of participants were currently on antiparkinsonian medications (93.3%). Other demographic characteristics of the sample appear in Table 11 in Chapter 4.2.2.2.

6.7.3 Psychological Symptoms

Consistent with previous research in PD, there was a higher severity of both depressive and anxiety symptoms within the sample relative to the general population. Based on normative data for the DASS-21 published by Henry and Crawford (2005), mean levels of depression (M = 5.26, SD = 5.08) corresponded to a 'Mild' clinical severity (81st percentile) while mean levels of anxiety (M = 5.28, SD = 3.99) corresponded to a 'Moderate' clinical severity (89th percentile). Average levels of stress (M = 5.65, SD = 4.69) were within the normal range (69th percentile).

To assess the frequency of clinically relevant symptoms of depressive and anxiety symptoms within the sample, DASS-D and DASS-A scores were dichotomised into two groups based on severity ratings provided by Lovibond and Lovibond (1995). DASS-D scores $\leq$ 4.5 and DASS-A scores $\leq$ 3.5 corresponded to 'Normal' levels of depression and anxiety, while DASS-D scores > 4.5 and DASS-A scores > 3.5 corresponded to 'Clinically relevant' levels of symptoms. Based on this classification, 43.1% (N = 141) of the sample displayed clinically relevant symptoms of depression while 58.7% (N = 192) had clinically relevant symptoms of anxiety.

6.7.4 Rates of Psychological Disorders

The prevalence of psychological disorders (past or current) within the sample was lower than the commonly cited statistic of between 30 to 50% in PD (Burn, 2002). Twenty-one per cent of participants ($N = 68$) reported having a current or previous psychological disorder, of which major depressive disorder was the most common diagnosis ($N = 49$, 15%) followed by panic disorder ($N = 15$, 4.59%).

6.7.5 Quality of Life

On average, participants perceived PD to have a low to moderate negative impact on quality of life ($M = 31.08$, $SD = 18.43$). To investigate the determinants of poor quality of life in PD, a standard multiple regression analysis (MRA) was conducted including 17 common motor, autonomic, cognitive and psychological symptoms of PD as predictors of quality of life.

6.7.5.1 Assumption testing. Preliminary tests for normality, linearity and homoscedasticity were conducted via inspection of the standardised residual plot for the MRA model. The shape and distribution of residuals in the plot showed relatively equal scatter about zero indicating that the assumptions of normality, linearity and homoscedasticity were met. Standardised residuals for all cases were within ± 3.29 standard deviations of the mean indicating no univariate outliers. One multivariate outlier was identified where the Mahalanobis distance value (43.76) exceeded the Chi Square critical value of $\chi^2(17) = 40.79$, $p = .001$, however the Cook's distance value for this case was less than 1 indicating that the case was not influential within the data set and was thus retained. All other Cook's distance values were also less than 1 further indicating no influential cases within the data. All zero-order correlations between predictors were less than .90 indicating no multicollinearity or singuarlity amongst variables. Further inspection of tolerance and Variable Inflation Factor (VIF) values confirmed the absence of multicollinearity with tolerance values > .2 and VIF values > 1 for all variables.

6.7.5.2 Model results. Collectively, all 17 symptoms accounted for 58.3% of variance in quality of life, $F(17, 325) = 25.37$, $p = .000$. Consistent with existing studies in the literature (i.e., Behair et al., 2005; Carod-Artal et al., 2008; Rahman et al., 2008), all unique significant predictors of poor quality of life within the sample

were non-motor symptoms namely; Confusion, Anxiety, Stress, Depression and Incontinence. All four cardinal symptoms did not significantly contribute to poor quality of life (see Table 27).

Table 27

Predictors of Quality of Life in Parkinson's Disease (N = 327)

Predictor	*β*	*r*	*sr*	*p*
Bradykinesia	.03	.13	.03	n.s.
Rigidity	.08	.18.	.07	n.s.
Tremor	.01	.08	.01	n.s.
Postural instability	.05	.23	.05	n.s.
Dizziness	.08	.31	.07	n.s.
Sweating	.06	.28	.05	n.s.
Bladder frequency	.04	.11	.03	n.s.
Bladder urgency	.01	.16	.01	n.s.
Headaches	.02	.26	.02	n.s.
Incontinence	.12	.31	.10	.009
Pain	.04	.28	.04	n.s.
Memory problems	.02	.25	.02	n.s.
Confusion	.17	.38	.15	.000
Fatigue	.02	.21	.01	n.s.
Depression	.15	.60	.09	.024
Anxiety	.22	.63	.12	.002
Stress	.24	.64	.12	.001

n.s. = non-significant a the .05 level

6.7.6 Mental Health Service Utilisation

Just under half of participants reported that that their primary PD specialist physician (neurologist or GP) had spoken to them regarding depression, anxiety and other psychological conditions that can occur in PD (*N* = 159, 48.6%). The majority of participants (51.4%) had never had a discussion regarding psychological symptoms in PD with their primary PD physician.

Over a quarter of the sample were currently taking antidepressant medications (*N* = 85, 26%). SSRIs were the most frequently administered class of antidepressants (54.1%) with Zoloft (sertraline, *N* = 25, 29.4%) and Avanza (mirtazapine, *N* = 21, 24.7%) the most commonly reported medications among the sample. Forty-percent (*N* = 34) of those currently on antidepressants reported taking a TCA despite the known high side effect profile of this class of medications in PD. Most interestingly, of those who listed an antidepressant among their current medications, 74% (*N* = 63) answered 'no' to the question 'Are you currently taking any psychiatric medications?

Table 28 displays the patterns of mental health service utilisation for the sample over the past month, year and five years as well as lifetime usage. Only 8% of participants were currently engaged in mental health treatment. The lifetime usage of mental health services was 24%. Psychologists were reported as the most commonly utilised mental health professional across each surveyed time period, followed by psychiatrists, counsellors then general practitioners.

6.7.7 Willingness to Seek Future Mental Health Treatment

The majority of participants indicated that they would be willing to seek mental health treatment in the future if needed (*N* = 231, 70.6%). Again, there was a significant difference between age groups in willingness to seek future mental health treatment. Participants under 65 years were the most receptive towards seeking future treatment with 87.2% (*N* = 75) indicating that they would be willing to seek professional help if required. Just under three-quarters of participants aged between 65 and 74 (72.5%, *N* = 103) showed positive intentions towards seeking future mental health treatment while just over half of participants aged over 75 years indicated that they would be willing to seek help from a mental health professional in the future (53.5%, *N* = 53).

Table 28

Patterns of Mental Health Service Utilisation among the Sample (N = 327)

	N	%
Mental health treatment in past month	**28**	**8.00%**
GP	3	.90%
Psychiatrist	7	2.10%
Psychologist	13	4.00%
Counsellor	4	1.20%
Mental health treatment in past year	**53**	**16.00%**
GP	5	1.53%
Psychiatrist	14	4.28%
Psychologist	25	7.65%
Counsellor	5	1.53%
Mental health treatment in past five years	**59**	**18.00%**
GP	5	1.53%
Psychiatrist	17	5.20%
Psychologist	30	9.17%
Counsellor	7	2.10%
Mental health treatment in lifetime	**80**	**24.00%**
GP	6	1.83%
Psychiatrist	21	6.42%
Psychologist	40	12.23%
Counsellor	8	2.44%

6.7.8 Help-Seeking Attitudes and Stigma

Scores on the Help-Seeking Propensity factor of the IASMHS were also high indicating a positive attitude towards seeking professional help for psychological problems among the sample (M = 24.10, SD = 6.69). Mean scores were even more positive than the means reported by Mackenzie and colleagues (2004) in their validation sample of 297 undergraduate students (M = 20.61, SD = 5.07). However, scores on the Psychological Openness factor of the IASMHS were considerably lower (M = 15.61, SD = 8.82) indicating that participants were less open to acknowledging and experiencing psychological problems. Consistent with recent

research showing a decrease in mental-illness related stigma among the contemporary cohort of older adults, Perceived Public Stigma (M = 25.92, SD = 6.00) as well as scores for the three self-stigma of depression factors (Shame, M = 9.51, SD = 3.60; Self-Blame, M = 10.98, SD = 3.48; Social Inadequacy, M = 12.38, SD = 2.92) were all lower than the respective means reported in validation samples for each scale (see Barney et al., 2010; Griffiths et al., 2004).

6.7.9 Practical, Medical, PD-related and other General Barriers to Treatment

Table 29 displays the means and standard deviations for each of the Needs Survey categories. The three most pertinent concerns for participants were related to Dependency (e.g., 'I do not want to become dependent on a therapist or antidepressant medication'), Side Effects (e.g., 'I worry about becoming too sedated from psychiatric medication') and Efficacy (e.g., 'I believe that treatment for emotional problems will help me; reverse coded). Stigma and concern regarding Doctor's Reaction were of lowest concern among the sample.

Table 29

Means and Standard Deviations for Needs Survey Subscales

	M	*SD*
Weakness	4.03	1.70
Cost	3.97	1.44
Efficacy	4.91	1.75
Stigma	2.12	1.08
Access	3.86	2.15
Side Effects	5.19	1.87
Doctor's Reaction	2.49	1.34
Dependency	6.88	2.10
Concern for PD	3.38	1.91

6.7.10 Predictors of Willingness to Use Mental Health Services

A logistic regression analysis was used to examine predictors of willingness to use psychological services among the sample. Willingness to seek professional mental health treatment served as the binary categorical dependent variable.

6.7.10.1 Assumption testing. There are five assumptions underlying logistic regression; ratio of cases to predictors, independence of observations, absence of outliers, absence of multicollinearity and linearity in the logit.

The final logistic regression model had 8 predictors and a sample of 327 equalling a case to predictor ratio of 1:41. This ratio exceeds the minimal ratio of 1:20 specified by Coakes and Steed (2003) to ensure cross-validity of results. Twenty-one univariate outliers (4.62%) were identified where cases exceeded 3.29 standard deviations above or below the mean. To reduce the influence of extreme scores on the data while maintaining an adequate sample size, extreme scores were changed to one value above the next highest score in the distribution for that variable as recommended by Schinka and Velicer (2003). Multivariate outliers were assessed through inspection of Cook's and Mahalanobis distance statistics for each case. The highest Cook's distance value (.28) was less than 1 and all Mahalanobis distance values were less than the Chi Square critical value of $\chi^2(8) = 26.125$ indicating no multivariate outliers (see Appendix H).

Examination of the zero-order correlation matrix between predictors in the final model revealed no correlations greater than .90 indicating no multicollinearity amongst variables. A multiway frequency analysis was conducted to examine any significant sources of multicollinearity among discrete predictors. All parameter estimates between discrete predictors were also less than .90 indicating absence of multicollinearity among discrete variables. Outputs for tests for multicollinearity appear in Appendix I. Linearity in the logit was assessed using the Box-Tidwell approach. Interaction terms between each continuous variable in the final logistic regression model and their natural logarithm were computed in SPSS then added to the logistic regression alongside the original continuous variables. All interaction terms were non-significant thus satisfying the assumption of linearity in the logit. Outputs for the regression model testing linearity in the logit appear in Appendix J.

6.7.10.2 Initial logistic regression model. An initial logistic regression analysis was run including 20 predictors as outlined in Table 24 to identify significant predictors for inclusion in the final analysis. The Chi-square omnibus test showed that the 20 predictors in combination reliably distinguished between individuals who were willing and unwilling to seek professional psychological help in the future, $\chi^2(20) = 96.69$, $p = .000$. The accuracy of prediction rate for the model was 78%. Eight predictors were identified as significant predictors of willingness to use psychological services in the future; Age(categorical), Current antidepressant usage, Discussion with primary PD physician regarding psychological symptoms in PD, Lifetime treatment, IASMHS-Help Seeking Propensity, SSDS-Social Inadequacy, NS-Weakness and NS-Efficacy.

6.7.10.3 Final logistic regression model. A final logistic regression analysis was then run including only the eight significant predictors identified in the initial analysis. By removing redundant predictors, both model fit and statistical power are improved (Burns & Burns, 2008). The Chi-square omnibus test of the final model was statistically significant, $\chi^2(8) = 78.33$, $p = .000$, indicating that the predictors in combination reliably distinguished between individuals who were willing and unwilling to use psychological services in the future. The model was able to correctly predict participants' willingness to use psychological services 77% of the time. Thus, eliminating 11 predictors from the initial model only reduced the predictive power of the model by 1%. Table 30 displays the results of the final logistic regression model.

6.7.10.3.1 Barriers to seeking mental health treatment. Two significant barriers to seeking psychological treatment were identified (i.e., predictors associated with a reduction in the likelihood of being willing to seek psychological treatment; odds ratio < 1); increasing age and higher scores on the NS-Weakness factor. Participants aged between 65 and 74 years were 58% less likely than participants aged < 65 years to be willing to seek future psychological treatment. Similarly, participants aged over 75 years were 76% less likely to be willing to utilise psychological services in the future than participants aged < 65 years. Finally, as participants increasingly endorsed beliefs that seeking treatment represented personal weakness (i.e., an increase on the NS-Weakness factor by 1), the odds of being willing to seek future psychological treatment were reduced by 12.4%.

6.7.10.3.2 Facilitators of willingness to seek mental health treatment.

Six significant facilitators of psychological treatment-seeking were identified (odds ratio > 1); previous treatment, current antidepressant use, help-seeking propensity, social inadequacy, beliefs regarding the efficacy of treatment, and having had a discussion regarding psychological symptoms in PD with a PD physician.

The most substantial predictors of positive willingness to seek future treatment were all practical factors. Participants who were currently taking antidepressant medication and who had received some form of mental health treatment in the past had a 3.3 and 3.1 times increase in the odds of being willing to seek future treatment respectively. The odds of being willing to seek future treatment were also increased 2.2 times for participants whose primary PD physician had spoken to them about psychological complications that can manifest in PD relative to those whose PD doctors had not.

Table 30

Regression Coefficients, Standard Errors, Wald Statistics, Odds Ratios and Significance Levels for the Final Logistic Regression Model (N = 327)

	B	S.E.	Wald χ^2	Odds Ratio	*p*
Age(categorical)	-	-	11.15	-	.004
65 to 75 years*	-.864	.41	4.49	.42	.034
Over 75 years*	-1.41	.43	10.96	.24	.001
Currently taking antidepressants	1.16	.38	9.24	3.19	.002
Previous treatment (lifetime)	1.19	.41	8.23	3.28	.004
Spoken to primary PD physician regarding psychological symptoms in PD	.20	.10	.45	2.22	.50
IASMHS-Help-seeking propensity	.05	.02	6.45	1.06	.011
SSDS-Social inadequacy	.14	.05	658	1.15	.010
NS-Weakness	-.13	.05	7.72	.88	.005
NS-Efficacy	.122	.05	7.07	1.13	.008

*reference category = participants aged under 64 years

In terms of attitudinal factors, higher help-seeking propensity, more positive beliefs regarding the efficacy of mental health treatment and higher scores on the SSDS-Social inadequacy subscale were all also associated with an increased likelihood of being willing to seek future treatment. As participants held increasingly positive beliefs regarding the efficacy of psychological treatment (i.e., a 1-point increase on the NS-Efficacy subscale), the odds of being willing to seek future treatment were increased by 13%. Similarly, as scores on the SSDS-Social Inadequacy factor increased by 1, the odds of being willing to seek future treatment were also increased by 15%. Thus, based on the maximum possible score of 20 for the SSDS Social Inadequacy factor, those who *completely* equated depression and anxiety with social inadequacy had a 300% increase in the odds of being willing to seek future psychological care (i.e., 20 x 15%). Finally, as scores on the IASMHS-Help Seeking Propensity factor increased by 1, the odds of an individual being willing to seek future mental health treatment were increased by 5%. Thus, based on the maximum possible score of 32 for the Help-Seeking Propensity subscale, participants who showed *complete* propensity towards seeking help had a 160% increase in the odds of being willing to seek future psychological treatment.

6.8 Discussion

Significant recruitment difficulties encountered in Study 3 led to the hypothesis that pertinent barriers to psychological treatment may be in place in PD populations. This study was conceptualised specifically to address this research question and was the first to specifically explore mental health service usage in PD. In support of the original hypothesis, only 8% of a sample of 327 adults with PD were currently engaged in some form of professional mental health treatment despite elevated levels of depressive and anxious symptoms, thus confirming the underutilisation of mental health services in PD. Several salient barriers, and more positively, facilitators to seeking mental health care were identified among the sample and have important implications for researchers, doctors and policymakers alike. This section provides a discussion of the study's key findings and implications, limitations and direction for future research.

6.8.1 Psychological Symptoms in PD

The interest in depression and anxiety in PD stems from the marked prevalence of both conditions in PD relative to the general population as well as other medical populations. The prevalence of psychological disorders (past or current) within the present sample at 21% was lower than the commonly cited statistic of between 40 to 50% in the literature (Burn, 2002), however it must be noted that prevalence in this study was based on *existing clinical diagnoses* whereas epidemiological studies explicitly assess psychological symptoms within large PD samples to determine prevalence estimates. The underdiagnosis of psychological conditions in PD is widely acknowledged (Okun & Watts, 2002) and therefore it is likely that the true prevalence of depression and/or anxiety within the sample is higher than reported. Inspection of the mean levels and frequency of clinically significant depressive and anxiety symptoms within the sample supports this hypothesis. Forty-three percent of participants had clinically relevant symptoms of depression while 59% displayed clinically relevant anxiety symptoms. Moreover, the mean level of depressive symptoms within the sample corresponded to an 81st percentile in terms of severity while mean levels of anxious symptoms corresponded to an 89th percentile of severity. Thus, there was an elevated level of both depressive and anxious symptoms within the sample relative to the general population and it is likely that a high number of participants meet the clinical criteria for either a depressive and/or anxiety disorder but have not been formally diagnosed.

Nevertheless, the conservative estimate at 21% is still two to seven times greater than the 10% prevalence rate of depression (Blazer, 2002; Hunkeler et al., 2006) and 3.5 to 9% rate of anxiety (Walsh & Bennett, 2001) in general older adult populations which ultimately only serves to reinforce the significance of psychological disorders in PD and the need for appropriate clinical attention, especially given the negative impact of both conditions on quality of life as demonstrated in this as well as previous studies in the literature (e.g., Behair et al., 2005; Carod-Artal et al., 2008; Gulati et al., 2004; Hely et al., 2005; Kupio et al., 2000; Rahman et al., 2008).

6.8.2 Patterns of Mental Health Service Utilisation

In regards to mental health service usage, only 8% of participants were currently engaged in some form of professional psychological treatment, which is consistent with Qureshi and colleagues' (2012) recent finding of a 12% rate of current mental health service utilisation among 273 male veterans with PD. Thus, in spite of elevated levels of depressive and anxious symptoms among the sample, treatment usage was disproportionately lower. The lifetime treatment usage rate was 24% which is also consistent with a previous estimate of 20% for lifetime mental health treatment in PD by Frisina and colleagues (2008). However, it may be possible that the rate of mental health service utilisation obtained in this study represents an underestimate of actual service utilisation. Over a quarter of the sample listed an antidepressant in their current medications (26%), yet only 8% of the sample explicitly reported current mental health treatment. This finding suggests that participants may not perceive consultations with their GP/neurologist as a form of mental health treatment.

Two demographic variables were significantly associated with lifetime mental health service usage; younger age and female gender. Mental health service usage significantly declined across each progressively increasing age group, with just under half (48.8%) of participants under the age of 65 having consulted a mental health professional at some point compared with only 10% of the over 75s. This finding is consistent with a significant body of research showing that while older adults tend to underutilise mental health services in general, 'older-older' adults are even significantly less likely to receive any form of professional mental health treatment (Mackenzie et al., 2006). For example, in a study of 12 810 individuals who had begun treatment through the Texas pubic mental health system in 1999, Karlin and Norris (2006) noted that adults over the age 60 comprised only 5% of all treatment initiators, and that within this subsample, 82% were adults aged between 60 and 75. It has been suggested that heavily salient and negative societal views regarding psychological treatment prior to the deinstitutionalisation of mental illness are responsible for fostering negative attitudes toward mental health treatment among older generations, and ultimately reflected in the very low rates of service use among this subsample (Morris, 2001).

The finding that females are more receptive to seeking mental health treatment is also consistent with a large body of previous research (e.g., Crabb & Hunsley, 2006; Klap et al., 2003; Olfson & Pincus, 1996; Schonert-Reichl & Muller, 1996). In this study, just under half of all female participants reported having had engaged in some form of professional mental health treatment compared with less than a quarter of male participants. Gender differences in attitudes and willingness to utilise mental health services have been observed as early as the beginning of adolescence and linked with stigma, gender roles and social norms (Chandra & Minkovitz, 2006).

Clinical variables significantly associated with lifetime treatment usage included previous psychological diagnosis, current antidepressant usage, higher severity of depressive, anxious and stress symptoms and lower PD-related quality of life, all which make intuitive sense. Higher levels of subjective distress and higher perceived need are widely acknowledged as the strongest predictors of actual service use (Currin et al., 1998) while it would appear pragmatic that previous psychological diagnosis and current antidepressant use would be associated with previous professional treatment as professional consultation would be required in order to ascertain both a diagnosis as well as a prescription for antidepressants.

Most interestingly, contrary to the literature asserting that older adults are significantly less likely to consult with specialty mental health professionals (Unutzer, 2002), participants who had received treatment reported clinical psychologists as the most frequent treatment providers across every surveyed time period (currently, past year, five years and lifetime). However, it is not clear whether psychologists were directly consulted by participants or whether treatment was facilitated via referral from initially-consulted general medical physicians. Studies examining the use of different mental health providers among older adults have mostly been based on initial consultations, where general medical physicians are largely favoured as a first point of contact for older adults (Holvast et al., 2012). Thus, it is a possibility that participants initially approached general physicians with mental health concerns who then facilitated treatment through a psychologist.

Nevertheless, the finding that psychologists were the most frequent treatment providers among participants who had received treatment is certainly not a unique or novel discovery. Several studies examining mental health treatment preferences among older adult samples have reported a preference for psychotherapy over pharmacological treatments for mental health problems. For example, in a cross-sectional survey of 1602 older adults aged 65 and over across 18 US primary care clinics, Gum and colleagues (2006) reported that the majority of participants showed a preference for counselling (57%) over medication therapy (43%) for the treatment of emotional problems. Similarly, in a PD-specific qualitative study examining attitudes toward different treatments for depression among 33 participants, Oehlberg and colleagues (2008) reported a more favourable impression of the efficacy of psychotherapy for depression in PD relative to antidepressants as well as potent concerns regarding side-effects. These results were mirrored among the present sample, with 64% of participants disagreeing with the statement 'I prefer medication to psychotherapy for emotional problems'. Moreover, 73% of participants agreed with the statement 'I worry about interactions between psychiatric medication and my Parkinson's medication'. Thus, given a choice of services, it is not surprising that psychologists were the most frequent treatment providers among the sample.

6.8.3 Predictors of Willingness to Seek Future Mental Health Treatment

The Theory of Planned Behaviour (Azjen, 1991) proposes that actual behaviour can be most accurately predicted from an individual's intentions to perform the given behaviour, with a strong positive association observed between the two. Thus, one may have expected that willingness to seek mental health treatment among the sample would be low in light of the low rates of actual service usage. On the contrary, however, it was very encouraging to note that over 70% of participants indicated that they would be willing to seek future professional mental health treatment if needed.

This finding is consistent with an emerging trend in the gerontology literature showing a significant positive shift in attitudes towards mental health treatment among contemporary older adults (e.g., Mackenzie et al., 2006; Robb et al., 2003; Segal et al., 2001). In an early study of attitudes toward professional mental health treatment among 110 older adults aged 65 years and over, Ray and colleagues (1992)

reported that only 15% of participants indicated that they would go directly to a mental health professional for help with psychological problems. However, Mackenzie and colleagues (2008) more recently assessed willingness to seek professional treatment for mental health problems among a sample of 1341 older adults aged 55 years and over and reported that 83.7% of participants indicated that they would be willing to 'seek professional help if they had serious emotional problems'. Thus, the proportion of older adults willing to seek professional mental health treatment had increased five-fold over the 16 years between the two studies.

Currin and colleagues (1998) propose that the positive shift in attitudes towards mental health treatment among contemporary older adults can be directly attributed to generational and societal differences between progressive cohorts of older adults. Negative societal views regarding psychological treatment prevalent prior to the deinstitutionalisation of mental illness are posited to underlie negative attitudes toward mental health treatment among 'older-older' adults (Morris, 2001), while the subsequent deinstitutionalisation of mental illness in later years coupled with advances in education, science and technology have promoted more acceptance and positive attitudes towards seeking psychological treatment among 'younger-older' adults (Currin et al.). In support, several studies have reported a significant discrepancy in attitudes towards mental health treatment between older adults aged between 60 and 79 and 'older-older' adults over 80 years (Crabb & Hunsley, 2006). This same pattern of results was also found in the current study with a significant difference in willingness to utilise mental health services identified between 'younger-older adults' (< 65 years), 'older adults' (65 to 74), and 'older-older adults' (> 75 years), with a significant decline in willingness to seek psychological treatment observed over each increasing age group.

In summary, this study supports the trend of a positive shift in attitudes regarding mental health treatment among older adults although it must be noted that the proportion of participants with PD receptive to seeking future psychological treatment in this study (71%) was somewhat lower than has been reported for general older adult samples (84%; Mackenzie et al., 2008). Thus, while attitudes towards seeking treatment among the sample were generally positive, it would appear that there was less willingness to seek psychological treatment among the PD sample,

consistent with previous research asserting that older adults with chronic illnesses are less likely to seek treatment for mental health problems (Choi & Gonzalez, 2001; Lazarus et al., 1991; Mohr et al., 2006). Several factors have been implicated in this phenomenon including increased functional impairment, increased costs for additional treatment and an overshadowing concern for physical illness. Interestingly however, the logistic regression analysis revealed that none of the PD-specific variables (e.g., PD duration, PD-related quality of life, NS-Concerns for PD, NS-Doctor's Reaction, NS-Cost) served as significant barriers to willingness to seek professional psychological treatment among the sample. Only two predictors were significantly negative associated with willingness to seek future psychological care within the sample; increasing age and higher perceptions that professional help reflected personal weakness.

6.8.3.1 Barriers to seeking mental health treatment. Increasing age was the most significant barrier to seeking mental health treatment in this study. Both 'older adults (65 to 74 years)' and 'older-older adults (75+ years)' were significantly less likely than participants aged under 65 years to be willing to seek professional psychological treatment. Being over 75 years of age was an especially pertinent barrier to seeking mental health treatment and associated with a 76% reduction in the odds of being willing to seek future treatment. This finding suggests that while attitudes towards seeking mental health treatment have significantly improved among older adults, age still remains an important barrier to seeking mental health care particularly for 'older-older' adults (Currin et al., 1998). In support, in a large-scale Canadian study of 59 302 older adults, Crabb and Hunsley (2006) found that adults aged between 45 and 64 years were four times more likely than participants aged over 75 to have had consulted a mental health professional. Similarly, participants aged between 65 and 74 were also 1.7 times more likely than participants aged over 75 to have had previously consulted a mental health professional at some point.

It may be argued that a range of factors commonly associated with advancing age including longer duration and higher severity of PD as well as increasing comorbid health complications and functional disability may potentially underlie the relationship between increasing age and decreased willingness to seek psychological treatment, however, PD duration, PD severity and presence of other health conditions

did not significantly predict willingness to seek treatment in the logistic regression analysis. Moreover, age remained a significant negative predictor of willingness to seek mental health treatment after controlling for all other predictors in the model, thus suggesting a robust relationship between increasing age and willingness to seek psychological treatment that is likely a function of generational differences in perceptions of mental illness and help-seeking (Currin et al., 1998). This finding has important practical implications. Given that unhelpful views of mental illness are proposed to underlie negative attitudes towards mental health treatment among older generations, educational campaigns targeting this population may prove useful in dispelling inaccurate assumptions.

The other significant barrier to seeking psychological treatment among the sample was the NS-Weakness factor. As participants increasingly endorsed beliefs that engaging in treatment for mental health problems reflected personal weakness, the odds of being willing to seek future mental health treatment were reduced by 12.4%. A reluctance to seek formal mental health treatment in order to maintain a self-image of strength has been previously described in a number of studies with Vogel and colleagues (2006) explaining that for certain individuals, the admission of being in need of professional help may be perceived to be more detrimental than the experience of psychological distress in itself. Older-older adults in particular have been found to display the highest levels of self-reliance over all other age groups in spite of increased rates of disability, chronic illness and bereavement (Nygren et al., 2005). Again, generational differences in perceptions of seeking and receiving assistance have been suggested to play a significant role (Currin et al., 1998). Thus, self-reliance among older-older adults can somewhat constitute a double-edged sword with Crabb and Hunsley (2006) questioning whether such attributes are positive protective factors equipping older adults with the strength to cope with emotional distress on their own, or significant impediments preventing older-older adults from seeking and receiving the appropriate mental health care.

6.8.3.2 Facilitators of willingness to seek mental health treatment.

It is encouraging to note that the logistic regression analysis identified more significant facilitators of willingness to seek mental treatment rather than barriers. Facilitators of treatment-seeking were predictors that increased the likelihood of a

participant being willing to seek future treatment. Low or negligible levels of a facilitator variable did not reduce the likelihood of treatment-seeking intentions so much as had no significant effect on the odds.

6.8.3.2.1 Treatment experience. Consistent with a multitude of previous studies, the strongest facilitators of willingness to seek professional mental health treatment in this study were related to treatment experience (Lasoski & Thelen, 1987; Speer, Williams, West, & Dupree, 1991). Current antidepressant usage and lifetime mental health treatment were both associated with a three-fold increase in the likelihood of a participant being willing to seek professional treatment in the future. In relation to why this relationship exists, it has been suggested that actual treatment experience offers older adults a chance to directly dispel any misconceptions regarding what mental health treatment involves, hence fostering positive attitudes about treatment and enhancing confidence and familiarity with such services, which all in turn enhances willingness to utilise such services again if needed at some point in the future (Currin et al., 1998). In support, in a study with 248 older adults, Connor and colleagues (2010) found a significant relationship between no treatment history and negative attitudes regarding mental health treatment. Similarly, Deane and Todd (1996) found that participants who had prior experience with a professional had significantly more positive intentions to seek professional help in the future as well as less treatment fearfulness compared to those with no treatment history.

Ultimately, while an individual's treatment history is not a factor that can be altered by researchers or physicians, this finding has important implications for future treatment use. Given the strong relationship between treatment experience and willingness to seek future treatment, doctors should encourage their patients to make use of and become familiar with such services to ultimately enhance the likelihood of an individual being willing to seek treatment again in the future should they have any further complications.

6.8.3.2.2 Discussion with primary PD physician. This study also highlighted another important role of the primary PD physician in facilitating mental health treatment usage. Second to treatment experience, having had a discussion about

psychological symptoms in PD with a primary PD physician was the next most substantial predictor of positive willingness to seek future psychological treatment. For participants who had had such a discussion with their PD doctors, the odds of being willing to seek future psychological care were increased 2.2 times relative to those who had not. Unfortunately, however, the majority of participants (51.4%) reported that their primary PD physician had never discussed with them the range of psychological complications that can often present in PD. This statistic is consistent with the findings of an earlier study by Shulman, Taback, Rabinstein and Weiner (2002) who surveyed 101 individuals with PD and reported that over half stated that they had never discussed nor received any information about non-motor symptoms from their primary PD physician. Given that significant awareness of the importance of psychological and other non-motor symptoms of PD has emerged over the past decade, this finding is somewhat disappointing and suggests that increased awareness of non-motor symptoms among researchers and physicians has not translated into increased clinical attention over the past 10 years.

It is also interesting to note that while having had a discussion with a PD physician regarding psychological symptoms increased the odds of being willing to seek future treatment, concern over the primary PD physician's reaction towards disclosure of mental health problems (NS-Doctor's Reaction factor) was among one of the lowest concerns for participants. This likely suggests that a discussion with the PD physician serves to facilitate awareness of psychological symptoms in PD for participants and that it is not necessarily the doctor's approval that participants are seeking. Indeed, a significant lack of awareness in regards to non-motor symptoms in PD has been previously described among individuals with PD and directly related to failure on behalf of PD doctors to inform patients of such symptoms (Chaudhuri, 2003). In summary, in light of the myriad of negative outcomes associated with untreated non-motor symptoms in PD, it is imperative that PD physicians take the time to address the full spectrum of motor and non-motor symptoms with patients.

6.8.3.2.3 Stigma. In terms of attitudinal variables, self-stigma in relation to social inadequacy was the strongest attitudinal facilitator of treatment-seeking willingness in this sample. That is, the more a participant believed that having depression and/or anxiety reflected social inadequacy on their behalf, the greater the

odds were of being willing to seek future treatment. While this finding is in direct contrast with the literature positing that self-stigma often serves as a powerful *barrier* to initiating psychological treatment in the general population (Barney et al., 2006), it is consistent with the results of a recent investigation by Conner and colleagues (2010), also investigating intentions to seek mental health treatment among a sample of older adults aged over 60 years, and also reporting that participants with higher levels of internalised stigma were significantly more likely to show positive intentions to seek mental health treatment. Thus, there may be a differential effect of self-stigma on treatment-seeking intentions between the general population and older adults including people with PD. Connor and colleagues speculated that it may be a greater perceived need among self-stigmatising older adults which leads them to seek treatment. Indeed, it would seem plausible that older adults who internalise the negative stereotypes of depression and/or anxiety are likely to experience higher levels of distress, lower self-esteem and self-efficacy (Corrigan et al., 2006) and thus show a greater perceived need for treatment.

It must be noted however that the two other subscales of the SSDS (Self – Blame and Shame), although not significantly predictive of willingness to seek psychological treatment, were negatively associated with treatment-seeking intention. Thus participants who blamed themselves for, and who were ashamed about having depression and/or anxiety were *less likely* to be willing to seek treatment, while it was only participants who believed that having depression and/or anxiety affected their social ability were at a higher likelihood of being willing to seek treatment. It is well documented that the majority of people – both younger and older adults – show a preference to seek help for emotional problems initially from within their social network (Ray et al., 1992). At the same time, it is also well documented that older adults tend to experience less social contact than younger adults as well as are more likely to have diminished social networks (Thompson, 2000). Thus, limited social opportunities coupled with feelings of social inadequacy are likely to make it difficult for some older adults to confide in family or friends, thus increasing the likelihood of seeking help from a professional. Moreover, in line with Connor and colleagues' (2010) greater perceived need explanation, social isolation and inadequate social support have been identified as significant risk as well as maintenance factors for depression among older adults (Glass et al., 2006).

Thus, it may be the case that feelings of social inadequacy lead to increasing social isolation and more severe depression, ultimately leading to a greater perceived need for professional help.

Perceived public stigma was not significantly predictive of willingness to seek future psychological treatment, consistent with several previous studies (e.g., Barney et al., 2006; Bayer & Peay, 1997; Van Voorhees et al., 2006), and ultimately supports the notion that it is individual beliefs regarding psychological treatment and its perceived consequences that play a more pivotal role in the help-seeking decision-making process rather than approval or disapproval from others.

6.8.3.2.4 Efficacy and help-seeking propensity. Finally, higher beliefs regarding the efficacy of mental health treatment and higher help-seeking propensity were the other two significant attitudinal facilitators of willingness to seek professional treatment. Both findings make intuitive sense. Participants who believed that mental health treatment would be beneficial for them were more likely to be willing to seek such services if needed. Similarly, participants who indicated that they had the capacity, were able, and were receptive to seeking treatment were more likely to be willing to seek actual treatment in the future if needed. In particular, the finding that help-seeking propensity was associated with an increase in the likelihood of being willing to seek future psychological treatment is consistent with a growing body of research reporting a significant association between help-seeking attitudes and treatment utilisation (e.g., Deane & Todd, 1996; Diala et al., 2000; Komiya, Good, & Sherrod, 2000; Morgan et al., 2003; Rickwood & Braithwaite, 1994; Ten Have et al., 2010; Tijhuis, Vogel et al., 2005). On the whole, this finding is very positive given that both beliefs regarding the efficacy of treatment and help-seeking propensity can be improved through educational campaigns, although it is very encouraging to note that levels of help-seeking propensity among the sample were already within a high range.

6.8.4 The Underutilisation of Mental Health Services in PD: Is a Lack of Awareness the Underlying Explanation?

The results of this study showed that contrary to expectations, contributory factors in the help-seeking decision process for older adults with PD do not

significantly differ from general older adult populations. The two significant barriers to seeking mental health treatment in this sample were increasing age and perceptions that treatment was associated with weakness, both of which have been well-documented barriers to initiating mental health care among general older adults. Treatment experience, higher help-seeking propensity and beliefs about the efficacy of treatment and higher self-stigma related to social inadequacy were all identified as facilitators of willingness to seek treatment and have all also been previous documented in older adult samples.

In contrast to the literature asserting that individuals with chronic physical illnesses are less likely to seek help for psychological complications due to factors such as increased functional impairment, an overshadowing concern for physical illness, increased medical costs, less time availability and concern over the reaction of the medical physician, this study found that the majority of PD-related factors did not significantly affect participants' willingness to seek mental health treatment. The only PD-specific variable to significantly predict willingness to use mental health services was having had a PD physician-initiated discussion regarding psychological symptoms in PD. Second to treatment experience, having had a discussion with a PD physician was the most important facilitator of mental health service usage among the sample, over help-seeking propensity, beliefs regarding efficacy and self-stigma.

It was suggested earlier that such a discussion likely facilitates awareness regarding psychological complications in PD for participants which then facilitates treatment-seeking. Studies have demonstrated a significant lack of awareness regarding psychological and other non-motor symptoms among people with PD. Chaudhuri and Schapira (2009) state that up to 62% of non-motor complications are not declared to PD physicians as patients and carers alike are unaware that such symptoms are linked to PD. Thus, psychological and non-motor symptoms are largely underrecognised and underreported by patients and consequently underdiagnosed and undertreated, which only reemphasises the integral role of the PD physician in informing patients of the full spectrum of symptoms in PD. Moreover, the discrepancy between rates of diagnosed psychological disorders and severity of depressive and anxious symptoms within the current sample is also indicative of underreporting and underdiagnosis of psychological conditions in PD.

It has been suggested that there exists a general assumption among PD neurologists that non-motor symptoms will be managed in the community by a GP or family physician and thus time-limited consultations are reserved for the assessment and discussion of motor symptoms (Chaudhuri et al., 2005). Even if this is case and should primary PD physicians not be actively involved in the treatment of non-motor symptoms, physicians still have a responsibility to discuss the full range of potential motor and non-motor symptoms in PD with patients. Moreover, Chaudhuri and colleagues (2006) assert that even if not actively involved in their treatment, PD physicians are generally the most suitably qualified to identify psychological complications in PD as they would be more skilled in distinguishing between PD motor symptoms and symptoms of depression and anxiety than a non-specialist, especially given the high overlap between the three conditions.

Ultimately, given that the current study as well as previous studies in the literature have shown that psychological and other non-motor symptoms are consistently rated by people with PD to be more distressing and debilitating than motor symptoms (e.g., Behair et al., 2005; Carod-Artal et al., 2008; Rahman et al., 2008), it would be useful for PD physicians to adopt a more holistic treatment approach with patients.

6.8.5 Direction for Future Research: Examining the Gap between Willingness and Actual Service Use

This study originally set out to identify barriers that may be preventing individuals with PD with psychological complications from seeking professional help. Although no formal hypotheses were postulated as this was an exploratory study, several barriers were anticipated based on the relevant literature on older adults, particularly that negative attitudes towards seeking mental health treatment may be underlying low service usage. It was therefore welcoming to note that the majority of participants displayed positive help-seeking attitudes and were willing to seek psychological treatment in the future if deemed necessary. However, it would appear that a positive shift in attitudes towards mental health treatment among contemporary older adults has not translated into increased service usage. Despite generally positive attitudes and willingness to seek professional mental health treatment among the sample, rates of actual service usage were disproportionately

lower in the presence of elevated depressive and anxious symptoms. Thus, there appears to be a significant gap between intentions and actual behaviour. This area of research has not as yet been explored in PD and would be a highly worthwhile avenue of work for future researchers.

6.8.5.1 The role of perceived need? Existing studies examining the gap between intentions to utilise and actual usage of mental health services in general adult populations have highlighted the role of an important mediating factor; perceived need (Katz, Kessler, Frank, Leaf, & Lie, 1997). Perceived need refers to an individual's subjective assessment as to whether professional treatment is required for a given problem (Mojtabai, Olfson, & Mechanic, 2002) and has been found to be the most significant and strongest predictor of actual treatment usage (Currin et al., 1998; Mackenzie et al., 2010). Thus, an individual may hold very positive attitudes toward mental health treatment and may have similar positive intentions regarding seeking treatment, such as within the current sample, but if the individual does not consider themselves as in need of professional treatment, actual treatment initiation is highly unlikely.

Older adults with depression especially have been found to be less likely to perceive a need for treatment even when experiencing significant depressive symptoms, or even when diagnosed with a clinical disorder compared with younger adults (Black, Rabins, German, McGuire, & Roca, 1997). For example, using data from the 1997 US HealthCare for Communities Telephone Survey conducted with 9 585 respondents, Klap, Unroe and Unutzer (2003) reported that only 4% of older adults aged over the age of 65 perceived a need for mental health care. Among older adults who met criteria for a probable psychological disorder and thus whom had an objective need for treatment (as assessed using the Composite International Diagnostic Interview), only 28% perceived a need for professional treatment. Thus, there is a generally low perception of need for mental health treatment among older adults both with and without an objective need for treatment.

Again, stigma and negative attitudes regarding psychological treatment have been implicated in the low perceived need for mental health services among older adults (Garrido, Kane, Kaas, & Kane, 2009). However, a decrease in mental illness-

related stigma and positive shift in attitudes towards psychological treatment observed among contemporary older adults has not translated into significantly increased perceived need for treatment (Mackenzie et al., 2010). Klap and colleagues (2003) and Katz and colleagues (1998) identified low problem-recognition among older adults as a significant underlying factor, which again only serves to highlight the integral role of medical physicians in detecting signs and symptoms of psychological disturbance and actively encouraging older adults to seek formal treatment.

A longitudinal study specifying and testing a path model capturing the complex relationship between demographic and clinical variables, help-seeking attitudes, stigma, resources, intentions, perceived need and actual service usage would be instrumental in improving current understanding of the decision process underlying mental health service usage.

6.8.6 Limitations

Finally, there are several limitations in this study that must be noted. First, due to the cross-sectional nature of the study, causal inferences cannot be made. Second, the convenience method of sampling employed restricts the generalisability of reported findings to all individuals with PD. Third, due to the self-report nature of the study, response bias cannot be ruled out. It is a possibility that individuals who chose not to complete and return the questionnaire were not interested in the research topic (i.e., psychological treatment in PD) and thus the positive attitudes towards mental health treatment observed among the study sample may be overstated. Fourth, although it was deduced that a lack of awareness regarding psychological symptoms in PD may significantly underlie low treatment rates, awareness of psychological symptoms in PD was not directly assessed. Future research should consider directly assessing awareness by listing a range of motor and non-motor symptoms and asking participants to select all symptoms which they believe to be a part of PD.

6.9 Chapter Summary

The underutilisation of mental health services among the general population as well as older adult populations is well documented. This study was the first to examine mental health service utilisation among a sample of 327 Australian adults with PD and was conceptualised specifically to provide insight into recruitment difficulties encountered in Study 2. Consistent with speculation that the underutilisation of mental health services by people with PD was likely responsible for recruitment difficulties in Study 2, it was found that only 8% of participants were currently engaged in some form of professional mental health treatment despite elevated levels of both depressive and anxious symptoms.

While service usage statistics were very low, it was encouraging to note that the majority of the sample showed positive help-seeking attitudes and were receptive to seeking future mental health treatment if deemed necessary. The logistic regression analysis revealed that factors involved in the help-seeking decision-process for participants with PD did not differ significantly from what has been described for older adults in general, with age, perceptions of weakness, help-seeking propensity, beliefs about efficacy and self-stigma all important factors in the help-seeking process.

Most importantly, this study highlighted the integral role of the PD physician in facilitating mental health treatment for individuals with PD. Given traditional classifications of PD as a motor disorder, a significant proportion of individuals with PD are unaware of the myriad of non-motor complications that can also manifest in PD. Lack of awareness consequently leads to underrecognition and underreporting of such symptoms, which results in underdiagnosis and undertreatment. Given recent widespread recognition of the prevalence and negative impact of psychological and other non-motor symptoms in PD among researchers and doctors, it would be useful for this knowledge to translate into a more holistic treatment approach for patients that takes into account treatment of psychological symptoms.

CHAPTER 7 | General Discussion

7.1 Introduction

The overarching aim of this research was to make a significant contribution to the existing knowledge base in relation to the treatment of depressive and anxiety disorders in Parkinson's disease. Four studies were conducted, each offering a unique scientific contribution to this field of knowledge. A comprehensive discussion of each study's findings, implications, limitations and direction for future research is presented within the respective study chapters. This final chapter provides a general discussion of the unique contributions of the present work to the current state of knowledge in relation to depression and anxiety in PD, along with an outline of clinical and future research recommendations, beginning with a restatement of the main findings of this research.

7.2 Summary of Research Findings

7.2.1 Study 1: A Meta-Analysis of Randomised Placebo-Controlled Treatment Trials for Depression and/or Anxiety in PD

Study 1 was the first broad meta-analysis of randomised placebo-controlled treatment trials for depression and/or anxiety in PD. This study systematically integrated the existing empirical treatment literature on depression and anxiety in PD and aimed to identify the most viable treatment modality for depression and anxiety in PD at the present time. This meta-analysis was distinguished from existing meta-analyses for depression in PD in that it was the first to review both pharmacological and non-pharmacological treatment interventions, as well as the first meta-analysis of any kind for treatments for anxiety in PD.

There were three key findings in this study. First, Study 1 supported previous research asserting that on the whole, there is a lack of empirical evidence to support

the widespread use of antidepressants in PD at the present time (i.e., Antonini et al., 2000; Chung et al., 2003, Klaasen et al., 1995). The pooled effect of antidepressant therapies in general (d = .71, 95% CI = -1.33 to 3.08) and the pooled effect for the current first-line SSRI treatments for depression in PD (d = .57, 95% CI = -1.33 to 2.47) were both non-significant. However, it must be noted that the moderate magnitude of these pooled effects suggests that antidepressant therapies do have a positive effect on depression in PD relative to placebo, even if not at a statistically significant level. Because of the very limited number of available placebo-controlled RCTs in the literature at present (N = 5), it is likely that the non-significance of the pooled effect for antidepressants in PD reflects a Type II error. Ultimately, there is a need for more controlled research to resolve the amibiguity surrounding the efficacy of antidepressant therapies in PD at present.

The second main finding of Study 1 was related to the potential of psychotherapy, specifically, Cognitive Behavioural Therapy (CBT) in treating depression and anxiety in PD. A recent randomised controlled trial of individual CBT in PD (i.e., Dobkin et al., 2011) resulted in the largest effect on depression in PD over all other interventions in the meta-analysis (d = 1.57, 95% CI = 1.06 to 2.07) and also resulted in a large secondary effect on anxiety symptoms (d = 1.03, 95% CI = .57 to 1.50). Further exploration of CBT as a treatment for depression and anxiety in PD is thus strongly warranted.

The final finding from Study 1 concerned the limited state of the current empirical treatment literature on depression and anxiety in PD. Despite increasing awareness of the negative impact of psychological complications in PD over the past decade and a half, there remains a dearth of empirical research in the area of depression and anxiety treatment in PD, with only eight randomised placebo-controlled trials of interventions for depression in PD available for analysis. There were no RCTs of any treatments for anxiety in PD. This lack of research ultimately restricted the drawing of any definitive conclusions regarding the efficacy of different treatment modalities for depression and anxiety in PD and highlighted further empirical studies in this area as an important direction for future research.

7.2.2 Study 2: A Preliminary Examination of the Validity and Reliability of the Depression Anxiety and Stress Scale-21 in Parkinson's Disease

Study 2 examined the scale structure and psychometric properties of the DASS-21 in a PD sample to support its use as a primary outcome measure in Studies 3 and 4, as well as to provide information about the utility of the scale as a clinical assessment tool for use in PD in general. A convenience sample of 327 Australian adults with PD completed the DASS-21 as part of a wider battery of questionnaires for Study 4. DASS-21 responses from this sample were used as data for Study 2.

Overall, Study 2 provided preliminary evidence for the validity and reliability of the DASS-21 in PD. Factorial validity was demonstrated through replication of Lovibond and Lovibond's (1995) three-factor correlated structure within the study sample. Cronbach's alpha values of internal consistency for each factor were good to excellent with α = .92 (Depression), α = .77 (Anxiety) and α = .88 (Stress). The distribution of scores was good for all three factors with no significant floor or ceiling effects observed. There were no significant problems with symptom overlap between depression, anxiety and PD, with only one item (Item 6: trembling) presenting a possible confound in the assessment of depression and anxiety among individuals with PD. Criterion and discriminant validity were both demonstrated. Participants who reported an existing psychiatric diagnosis had significantly higher scores on all three DASS-21 subscales compared to those without, and all three scales showed a fair degree of accuracy in differentiating between the two groups (area under the curve = .70). Overall, Study 2 provided strong support for the use of the DASS-21 as an outcome measure in the present work as well as in research and clinical settings involving individuals with PD in general, although a more comprehensive examination of psychometric and clinimetric properties is needed.

7.2.3 Study 3: A Randomised Controlled Trial of Group Cognitive Behavioural Therapy for Depression and Anxiety in Parkinson's Disease

Study 3 was the first randomised waitlist-controlled trial of group CBT for depression and anxiety in PD. This study aimed to make a direct contribution to the empirical treatment literature on depression and anxiety in PD by evaluating the efficacy of an 8-week PD-specific group CBT intervention. The results of this trial were positive and provided preliminary support for the efficacy of CBT in treating

depression and anxiety in PD. At the end of the eight-week treatment, participants who received CBT experienced significant improvements in depression, anxiety and stress, while the only significant change observed for participants in the waitlist control was a small improvement in stress. Posttreatment effect sizes for depression (d = 1.12) and anxiety (d = .89) were both large and consistent with effect size estimates reported by Dobkin and colleagues (2011) for individual CBT in PD. Follow-up analyses showed significant reductions in depression, anxiety and stress symptoms as well as significant declines in the frequency of depressive and anxious thoughts at both 1-month and 6-month follow-ups. At 6-month follow-up, statistically significant and large effect sizes were observed for each of the DASS factors; Depression (d = 2.07), Anxiety (d = 2.26) and Stress (d = 1.66), as well as both of the CCL factors; Depressive cognitions (d = .94) and Anxious cognitions (d = 1.45). Overall, Study 3 provided support for the efficacy of group CBT for depression and anxiety in PD.

Despite these positive results, significant recruitment difficulties encountered during Study 3 ultimately reduced the validity and generalisability of the study's findings. Despite widespread recruitment efforts over a 28-month period, only 18 individuals with PD took part in the trial. Examination of the literature revealed that similar recruitment difficulties had been encountered by previous researchers evaluating both pharmacological and non-pharmacological treatments for depression in PD. This observation led to the speculation that individuals with PD experiencing psychological difficulties may not be seeking professional treatment, ultimately resulting in the conceptualisation of Study 4.

7.2.4 Study 4: An Exploratory Study of Barriers to Seeking Psychological Treatment in People with PD

Study 4 was the first to explore mental health service utilisation and barriers to psychological treatment in an Australian PD population. A cross-sectional survey methodology was employed and responses were received from 327 adults with PD. This study confirmed the underutilisation of mental health services among the PD population. Despite clinically significant symptoms of depression and/or anxiety in up to 59% of the sample, only 8% of participants were currently engaged in some form of professional treatment. As a positive however, attitudes towards and

intentions regarding seeking future psychological treatment were generally positive among the sample, with 70% of participants indicating that they would be willing to seek professional treatment. Significant predictors of willingness to seek mental health treatment among the sample were largely the same as those previously reported for older adults in general. Treatment experience, higher help-seeking propensity and beliefs about the efficacy of treatment and higher self-stigma in relation to social inadequacy were all associated with an increase in the likelihood of a participant being willing to seek treatment, while increasing age and perceptions that treatment-seeking is associated with personal weakness were associated with a reduction in the likelihood of being willing to seek treatment. The most significant and unique finding of Study 4 was that participants whose PD physicians had discussed with them the range of psychological symptoms that can present in PD were 2.2 times more likely to be willing to seek future psychological treatment, ultimately highlighting the integral role of primary PD physicians in facilitating mental health treatment.

The next part of this chapter integrates the findings presented in this thesis and presents a general discussion of key results, fundamental issues, and implications for researchers, practitioners and individuals with PD alike.

7.3 Depression and Anxiety in PD: Contribution of Research Findings to the Current State of Knowledge

Over the past 25 years, scientific interest into psychological and other non-motor complications in PD has significantly increased, with a five-fold increase in the number of scientific articles on depression and anxiety in PD published between 1986 and 2011 (Weintraub & Burn, 2011). Although initially considered secondary aspects of PD, the clinical significance of depression, anxiety and other psychiatric disturbances in PD is now widely acknowledged, with the recent emergence of a movement towards the reconceptualisation of the classic definition of PD to incorporate cognitive and psychiatric symptoms as core elements of the disease (i.e., Stern, Lang, & Poewe, 2012) perhaps the most significant acknowledgement of the importance of psychological complications in PD.

In a recent review of the current state of knowledge regarding depression and anxiety in PD, Weintraub and Burn (2011) outlined five key areas of research in the field of psychological disturbances in PD. The following is a review of each of these areas along with an outline of the contribution of the current research to scientific knowledge in each area.

7.2.1 The Clinical Significance of Depression and Anxiety in PD

There has been much work into the epidemiology and clinical significance of depression and anxiety in PD. While the marked prevalence of depression and anxiety in PD has long been recognised, recent longitudinal studies have shown that the clinical significance of psychological and cognitive disorders in PD is even greater than initially thought, with most psychiatric disturbances in PD having a prevalence of well over 50% (Weintraub & Burn, 2011). The current research adds further support to the vast literature attesting to the clinical significance of depression and anxiety in PD. Among a non-clinical sample of 327 Australian adults with PD in Study 4, 43% of participants had clinically relevant symptoms of depression, 59% displayed clinically relevant anxiety symptoms, and mean levels of depressive and anxiety symptoms within the sample corresponded to 81st and 89th percentile rankings in terms of severity, respectively. Rates of existing (past or current) psychiatric diagnoses among the sample were lower at 21% however this figure is likely lower than the true prevalence of psychological conditions among the sample given that the underdiagnosis of psychological conditions is widely acknowledged (Okun & Watts, 2002).

In particular, this research adds to an emerging number of studies highlighting the significance of anxiety disorders in PD (e.g., Dissanayaka et al., 2010; Leentjens et al., 2012). To the author's knowledge, this is the largest assessment of the prevalence of anxiety symptoms within an Australian PD sample to date. Across both clinical (Study 3) and non-clinical samples (Study 4), there was a greater frequency as well as higher severity of anxiety among participants. Within the clinical sample, 17 of 18 participants (94%) met DSM-IV-TR criteria for at least one anxiety disorder and pretreatment severity of anxiety was 'Severe' corresponding to a >99th percentile ranking. Depressive disorders were significantly lower within the sample (39%) and pretreatment severity of depressive symptoms

was Moderate. Among the non-clinical sample, 59% of the sample of 327 participants displayed clinically relevant symptoms of anxiety compared with 43% for depression. This result is consistent with the findings of a recent and the largest study of anxiety symptoms in PD to date by Negre-Pages and colleagues (2010) who also reported a higher prevalence of clinically relevant anxiety symptoms (51%; HADS-A > 7) among a sample of 450 of French adults with PD than depressive symptoms (40%; HADS-D > 7). Thus, while much of the literature on psychiatric disturbances in PD has primarily focused on depression in PD, the current findings add to an emerging body of research strongly highlighting the study of anxiety disorders as an important and independent area of research in PD.

7.2.2 The Clinical Impact of Depression and Anxiety in PD

A second key area of research in the psychological PD literature has been focused on investigating the correlates of depression, anxiety and other non-motor symptoms in PD to provide insight into the clinical impact of these conditions in PD. A multitude of studies have shown that depression and anxiety are strongly associated with a number of negative outcomes including excess disability, lower health status, poorer PD outcomes, higher caregiver burden, and risk of institutionalisation (i.e., Behair et al., 2005; Carod-Artal et al., 2008; Chaudhuri & Martinez-Martinez, 2008; Den Oudsten et al., 2007; Hagell et al., 2002; Hinnell et al., 2011; Rahman et al., 2008; Schrag et al., 2000). In particular, a body of research has demonstrated that non-motor and psychological symptoms are consistently rated as more detrimental to quality of life and well-being than motor symptoms (Rahman et al., 2008; Soh et al., 2011), even in the most advanced stages of disease where motor symptoms have fully progressed (i.e., Hely et al., 2005).

The current research adds further empirical support to this knowledge base. Study 4 replicated the findings of existing studies showing that it is non-motor, and particularly, psychological symptoms, that are the strongest determinants of poor quality of life in PD. Across 17 common motor, autonomic, gastrointestinal, cognitive and psychological symptoms of PD, the only significant predictors of poor quality of life among participants were all non-motor symptoms namely; Confusion, Anxiety, Stress, Depression and Incontinence. The four cardinal motor symptoms of PD (rigidity, tremor, postural instability and bradykinesia) had no significant impact

on quality of life. While this is certainly not a novel finding, it is an important one. There have been many empirical investigations into the determinants of quality of life in PD conducted in locations across the world including Australia (Hely et al., 2005), India (Behair et al., 2005), the United Kingdom (Hinnell et al., 2011; Rahman et al., 2008; Schrag et al., 2000), Norway (Karlsen, 1999; 2000), and Finland (Kupio, 2000). All of these studies have reported the same finding – that depression is the most significant contributory factor to poor quality of life in PD. The consistency of this finding across different measures of quality of life and depression and different study designs and participants is remarkable and only further highlights the importance of depression in PD and the need for appropriate clinical and research attention.

In addition, Study 4 again highlighted the clinical significance and impact of anxiety in PD and the need for appropriate clinical and research attention. In the multiple regression analysis, anxiety symptoms (DASS-A) were found to be a stronger unique predictor of poor quality of life among participants (*sr* = .12) than depressive symptoms (*sr* = .09). In a previous investigation of quality of life in PD, Rahman and colleagues (2008) demonstrated that anxiety symptoms significantly accounted for a further 17% of unique variance in quality of life in addition to the variance already explained by depressive symptoms. This was the first study to recognise the additional contribution of anxiety to health-related quality of life in PD. To the author's knowledge, the present study was the first to show that anxiety symptoms may have a more detrimental effect on subjective well-being than depressive symptoms in PD, which serves to reinforce the need for more research into anxiety disorders in PD.

7.2.3 Aetiology of Depression and Anxiety in PD

Continuing investigations into the aetiology of depression and anxiety in PD are of utmost importance for the development of optimal treatment interventions. Currently, there is a general consensus among researchers that depressive and anxiety disorders likely manifest in PD as a result of a complex interaction between neurochemical changes inherent within the PD degenerative process and environmental stressors associated with living and coping with a chronic and progressively disabling illness (Poewe & Seppi, 2001; Serra-Mestres & Ring, 2002),

however, no model accounting for this process has been proposed. Previous broad psychological explanations for the aetiology of psychological disorders in PD have suggested that depression and anxiety in PD are likely to develop as a reactive consequence to the many life changes, lossess and stressors associated with living and coping with a chronic illness, however this explanation lacks an account of the role of the PD neurochemical changes in the development of psychopathology. Other previous research has proposed that neurochemical changes inherent within PD are likely to place individuals with PD at greater vulnerability for developing depression and anxiety however it has not been suggested as to how this vulnerability operates.

In Chapter 3.2.1, the Cognitive Model was outlined as a potential explanation for the occurrence of psychological disturbances in PD. It was proposed that neurochemical changes in PD are likely to lower the activation thresholds of latent, dysfunctional schemas thereby making it easier for individuals with PD to develop depression and/or anxiety in response to the many stresses, changes and challenges associated with living and coping with PD. The cognitive model appears to be a promising explanation that is able to account for both the elevated levels of depression and anxiety in PD relative to other medical populations (i.e., lowered schema-activation threshold due to PD-related neurochemical changes) as well as why not all individuals with PD develop depression and/or anxiety (i.e., dependent on individual core beliefs shaped by early developmental experiences and reaction to stressful experiences in later life). Empirical tests are needed to test the validity of this aetiological model, however, it is acknowledged that this may be difficult to accomplish as there is no clear method of directly and objectively measuring schema activation thresholds.

7.2.4 Validation of Screening Instruments for Depression and Anxiety in PD

The fourth key area of psychological research in PD identified by Weintraub and Burn (2011) was in relation to screening instruments for depression and anxiety in PD. The authors stated that research into the evaluation and validation of screening instruments for depression and anxiety in PD is important for enhancing both clinical management and the quality of scientific research. Over the past five years particularly, there have been significant advances in the number of validated rating scales for depression and anxiety in PD. Scales that have now been validated

in PD populations include the Ham-D, BDI-II, GDS and HADs for depression, and the Ham-A, BAI, HADs and GAI for anxiety.

The current research contributed to this area of knowledge by providing evidence of the validity and reliability of the DASS-21 as a screening tool for depression, anxiety and stress in a PD population. Currently, expert taskforces in PD recommend the use of the BDI and BAI as clinical screening tools for depression and anxiety in PD due to their self-report nature and thus ability to enhance time-effectiveness (i.e., Leentjens et al., 2012; Schrag et al., 2007). Study 4 showed that the DASS-21 may be a suitable alternative to the BDI and BAI in PD. The DASS-21 showed strong evidence of factorial validity, internal consistency, criterion validity, and diagnostic accuracy, comparable to the psychometric properties reported for both the BDI and BAI in PD populations. A particular strength of the DASS-21 appears to be its ability to provide an assessment of anxiety and depressive symptoms in PD that is not confounded or inflated by an overlap with PD symptoms, with only one item (Item 6: 'trembling in the hands') on the DASS-21 representing a symptom overlap between the three conditions. This is in direct contrast with the BAI which contains nine items (43%) that may present a potential confound in the assessment of anxiety among individuals with PD as items overlap with PD symptoms (i.e., numbness or tingling, feeling hot, wobbliness in legs, dizzy, unsteady, hands trembling, shaky, indigestion, hot/cold sweats). Moreover, the DASS-21 has the additional benefits of being more time- and cost-effective than the BDI and BAI as it assesses both depression and anxiety within the same scale and is available in the public domain, and thus may be particularly suitable for use in large-scale, epidemiological or longitudinal research. Further research is required to provide a more comprehensive examination of the psychometric and clinimetric properties of the DASS-21 in PD but at this stage it would appear that the DASS-21 is a reliable and valid measure of depression and anxiety in PD.

7.2.5 Treatment of Depression and Anxiety in PD

Given the significance and impact of depression and anxiety in PD, research into the treatment of these conditions in PD is arguably the most important area of work. However, Weintraub and Burn (2011) state that scientific knowledge in this area remains the most limited and described the paucity of controlled research in this

area a significant 'source of frustration'. The current research added two unique contributions to the existing knowledge regarding the treatment of depression and anxiety in PD.

Study 1 provided the first meta-analysis of both pharmacological and non-pharmacological treatments for depression in PD, as well as the first meta-analysis of any kind for anxiety in PD. This study offered three unique contributions to the literature. First, this study was the first meta-analysis to provide a controlled pooled effect size estimate for antidepressant therapies for depression in PD. While there have been four prior meta-analyses assessing the efficacy of antidepressant therapies for depression in PD to date (Klaassen et al., 1995; Rocha et al., 2013; Skapinakis et al., 2010; Weintraub et al., 2005), none of these reviews calculated a pooled effect size of antidepressant therapies in PD. There was insufficient empirical data to do so at the time of the two earlier reviews (i.e., Klaassen et al.; Weintraub et al.), while the two most recent meta-analyses of antidepressants (Rocha et al., 2013; Skapinakis et al., 2010) calculated and reported risk ratios for antidepressant response in PD rather than standardised treatment effects. Study 1 reported a moderate but non-significant pooled effect for both antidepressant therapies in general in PD (d = .71, 95% CI = -1.33 to 3.08) and current first-line SSRI treatments (d = .57, 95% CI = -1.33 to 2.47).

The finding that both antidepressants in general and SSRI therapies have a non-significant pooled effect on depression in PD relative to placebo is consistent with all three prior meta-analyses as well as previous systematic reviews in PD (i.e., Chung et al., 2007). However, while earlier reviews suggested that this result indicates that the widespread use of antidepressants in PD is largely unjustified, the magnitude of the pooled effect obtained in this study suggests that antidepressant therapies show promise in the treatment of the depression in PD. A pooled effect size of .71 is of moderate to large magnitude and indicates that individuals with PD treated with antidepressants do experience a reduction in depressive symptoms compared with placebo, even if this effect is statistically non-significant. At this stage, it is likely that the non-significance of the pooled effect for antidepressants in PD reflects a Type II error due to the very limited number of available placebo-controlled RCTs in the literature at present. Consequently, there is a need for more

controlled research to resolve the amibiguity surrounding the efficacy of antidepressant therapies in PD at present.

However, although antidepressant therapies do show promise in terms of symptom reduction, there still remains potent concerns regarding polypharmacy, adverse drug interactions and harmful side effects. Thus, Study 1 also systematically evaluated the efficacy of non-pharmacological treatment interventions for depression in PD as these offer a safer alternative, and was the first meta-analysis to include both pharmacological and non-pharmacological treatment interventions for depression in PD. The comparison of pharmacological and non-pharmacological interventions highlighted the potential of non-pharmacological treatments as viable alternatives to current mainstay antidepressant therapies. Two trials of non-pharmacological interventions for depression in PD resulted in large and statistically significant effects on depressive symptoms relative to placebo; Omega-3 supplementation (d = .92, 95% CI = .15 to 1.69; Da Silva et al., 2008) and individual CBT (d = 1.57, 95% CI = 1.06 to 2.07). The trial of individual CBT in particular resulted in the largest effect on depression in PD over all other interventions in the analysis and highlighted the potential of this treatment modality for use with individuals with PD.

Finally, Study 1 was also the first meta-analysis of any kind for the treatment of anxiety in PD. The dearth of empirical research on the treatment of anxiety disorders in PD was again highlighted in this study, with no RCTs of any treatment intervention for anxiety in PD identified. Data from four depression trials reporting the secondary effect of treatment on anxiety were used to examine the efficacy of pharmacological and non-pharmacological treatments for anxiety in PD at present. The results for this analysis mirrored those reported for depression. Antidepressant therapies in general (d = 1.13, 95% CI = -.67 to 2.94) and SSRI treatments (d = .85, 95% CI = -.40 to 2.09) both had large but statistically non-significant effects on anxiety. Again, rather than indicate that antidepressants are not effective for anxiety in PD, this result shows that pharmacological treatments are promising in the treatment of anxiety in PD but there is a need for more research to establish a more valid assessment of treatment effect. Again, the potential of CBT was highlighted in this second analysis. The individual CBT trial by Dobkin and colleagues (2011) also

resulted in a significant and large secondary effect on anxiety in PD (*d* = 1.03; 95% CI = .57 to 1.50). CBT was the only intervention to result in large and statistically signficant reductions in both depresion and anxiety in PD. Thus, while the main focus of the empirical literature on the treatment of depression and anxiety in PD has been on pharmacological treatments, the results of this meta-analysis strongly suggest that future research needs to also be directed at the development and evaluation of CBT interventions in PD.

Following from the findings of the meta-analysis and particularly the potential of CBT in the treatment of depression and anxiety in PD, the second contribution of the present research to current knowledge regarding the treatment of depression and anxiety in PD was Study 3. This study was the first controlled examination of a group CBT intervention for depression and anxiety in a PD sample. While increasing evidence of the efficacy of individual CBT for depression and/or anxiety in PD has emerged in recent times, group CBT treatments remain understudied despite clear practical and therapeutic advantages that are particularly suited for older adults and individuals with chronic illnesses. Study 3 thus aimed to make a direct contribution to the empirical treatment literature on depression and anxiety in PD by evaluating the efficacy of an 8-week PD-specific group CBT intervention. The results of this trial provided preliminary support for the efficacy of CBT in treating depression and anxiety in PD and showed significant and large reductions in both depression (*d* = 1.12) and anxiety (*d* = .89) at postreatment relative to waitlist control, comparable with the results repored by Dobkin and colleagues (2011) for individual CBT for depression in PD (depression; Ham-D, *d* = 1.57; BDI, *d* = 1.1; anxiety; Ham-A, *d* = .98).

In particular, this study highlighted the potential long-term efficacy of CBT in the treatment of depression and anxiety in PD. To date in the literature, the maximum length of follow-up for a CBT study has only been one month. Study 3 showed that all acute treatment gains for the Intervention group were maintained and continued to improve at 6-month follow-up (*d*s = .94 to 2.26). This result is especially encouraging given that one of the most pertinent criticisms of existing pharmacological regimens for depression and anxiety in PD relates to the questionable long-term utility of such treatments and high relapse rates. The long-

term utility of CBT has been attributed to the focus on self-management and problem solving as well as the development of skills that enable clients to address any problems that may arise following cessation of therapy. Overall, this research supports the assertion that while there is a broad equivalence in the efficacy of CBT and pharmacotherapy in the acute phase of treatment, the long-term utility of CBT may indicate that it is a more beneficial treatment for depression and anxiety in PD on the whole. It is hoped that this research will inspire future researchers to continue with empirical investigations into the utility of CBT in PD.

7.2.6 A Sixth Area for Psychological Research in PD: Understanding the Underutilisation of Mental Health Services

Finally, in addition to the contribution of the current research to the five existing key areas in relation to depression and anxiety in PD, this research identified a novel area of research that has yet to be extensively explored in PD; understanding the underutilisation of mental health services among individuals with PD. Much of the present research and clinical work into depression and anxiety in PD has been focused on understanding underlying causes to ultimately develop effective treatments. While ongoing development and evaluation of optimal treatment options for depression and anxiety is essential to ensure that depressive and anxiety disorders are most effectively managed in PD, it must be reiterated that such treatments are only valuable to the extent that they are utilised by the individuals they are designed to help. Study 3 raised speculation regarding the underutilisation of mental health services among individuals with PD; despite widespread recruitment efforts over a 28-month period, only 18 eligible individuals with PD volunteered to take part in the clinical trial. Study 4 then confirmed the underutilisation of mental health services among individuals with PD. Despite elevated symptoms of depression and anxiety, only 8% of a sample of 327 Australian adults with PD were currently engaged in some form of professional treatment.

While previous research has suggested that stigma, negative help-seeking attitudes, increased functional disability, financial concerns and overshading concern for physical illness can often act as significant barriers to seeking psychological treatment for older adults, Study 4 showed that this was not the case within the present sample. It was a welcoming finding to note that attitudes and intentions

towards seeking professional psychological treatment were generally very positive among participants with 70% of participants indicating that they would be willing to seek mental health treatment in the future. Similarly, help-seeking attitudes were high among the sample while mental illness-related stigma was low and concerns regarding additional costs or PD-related factors were not a significant issue for the majority of participants. Thus, there appeared to be another factor underlying the underutilisation of mental health services among the sample. It was hypothesised that the underutilisation of mental health services in PD may stem from a lack of awareness on behalf of individuals with PD. Previous studies have demonstrated a significant lack of awareness regarding psychological symptoms among people with PD that is directly linked with failure on the part of PD physicians to discuss non-motor symptoms (Chaudhuri & Schapira, 2009; Shulman et al., 2002). Indeed, it was found that the majority of participants' primary PD physician had never discussed with them the range of psychological and other non-motor symptoms that can present in PD. However, the logistic regression analysis showed that when PD physicians had initiated a discussion regarding psychological symptoms with patients, participants were 2.2 times more likely to be willing to seek future psychological treatment, ultimately highlighting the integral role of PD physicians in raising awareness and facilitating mental health treatment for patients. Further research is required to directly assess awareness of psychological symptoms in PD and its influence on mental health treatment utilisation however it is hoped that this seminal study will pave the way for future researchers in this area.

Overall, although significant advances in both research and clinical efforts into addressing depression and anxiety in PD have been observed over the past 25 years, there is still significant room for improvement in optimising the clinical management of depression and anxiety in PD. The next section outlines several clinical recommendations based on the findings of this research that may be helpful in improving the provision of psychological treatment to individuals with PD.

7.3 Clinical Recommendations

Currently, there are no best practice guidelines or procedures in place to aid PD physicians in diagnosing and treating depression and anxiety in PD. The following are stepped recommendations based on the findings of this research.

7.3.1 Step 1: Facilitating Awareness of Depression and Anxiety in PD

PD physicians need to take an active role in raising patient awareness in regards to depression, anxiety and other non-motor symptoms in PD. Ideally, this should be done as close to initial diagnosis as possible to promote understanding that PD is *more than just* a motor disorder from the outset. Previous research has shown that one of the primary reasons individuals with PD fail to disclose non-motor symptoms to PD neurologists is because they are not aware that such symptoms are linked with PD (Chaudhuri, 2003). Facilitating awareness would be best achieved through a discussion with patients and their caregivers. Along with outlining the range of non-motor symptoms, physicians should also encourage patients to report non-motor symptoms as they experience them. Study 4 showed that participants whose primary PD physician had initiated a conversion regarding the range of psychological complications that can manifest in PD were 2.2 times more likely to be willing to seek mental health treatment.

Given that the time-limited nature of neurological consultations in PD has been previously described (Weller et al., 2004), it would also be acceptable to provide patients with educational materials outlining the range of psychological and other non-motor symptoms of PD, how to recognise them, and emphasising that reporting of non-motor symptoms is as important as reporting motor symptoms in PD. It may also be useful to include materials emphasising the importance of treating psychological symptoms and how their treatment can improve other aspects of PD including cognition, independence, motor functioning and quality of life in light of Study 3 findings that beliefs regarding efficacy of treatment also significantly increase the likelihood of treatment-seeking. Materials promoting the utility and benefits of treatment may also serve to dispel any misconceptions and/or negative beliefs regarding mental health treatment among older-older adults.

7.3.2 Step 2: Screening for Depression and Anxiety in PD

Screening for depression and anxiety in PD should be conducted with all individuals with PD, and not just with patients who report psychological symptoms. Study 4 showed a discrepancy between level of severity of depressive and anxiety symptoms among the sample and rates of clinical diagnoses supporting the assertion that the majority of cases of depression and anxiety in PD are undetected (McDonald et al., 2003). Screening for depression and anxiety in PD can be easily accomplished. Okun and Watts (2002) suggested that PD physicians ask patients to complete self-rating scales in the waiting room before an appointment. Screening using rating scales is quick, convenient and can be highly effective in detecting signs of psychological disturbance in PD (Okun & Watts). Scores on these scales can then be used to determine whether patients require a more comprehensive clinical assessment. Selection of appropriate scales for use with persons with PD is essential, however. A recent Movement Disorder Society task review identified the BDI as the most appropriate clinical screening tool for depression in PD due to its self-report nature and previous validation in a PD sample. Study 2 showed that the DASS-21 is also a valid measure in PD. Moreover, the DASS-21 assesses both depression and anxiety as well as stress symptoms and is available in the public domain thus enhancing both time- and cost-effectiveness.

7.3.3 Step 3: Clinical Assessment of Depression and Anxiety in PD

PD physicians should be involved in the assessment process for depression and anxiety in PD. A comprehensive assessment process is crucial for detecting depression and anxiety in PD especially given the symptom overlap between the three conditions. While this assessment will most likely be conducted by a mental health professional or general practitioner rather than the PD neurologist, PD specialists still should play an active role in this process. The DSM-IV-TR operates on an exclusive diagnostic approach and advises that symptoms than can be *clearly* and *fully* accounted for by a general medication be excluded from any psychological diagnosis and it has been suggested that PD neurologists are the most suitably qualified professionals to make this distinction (Chaudhuri et al., 2006). Thus, even if not primarily responsible for conducting assessment or treatment, PD neurologists need to work closely with the assessing professional in order to enhance the accuracy of diagnosis.

7.3.4 Step 4: Treatment of Depression and Anxiety in PD

SSRI treatments should not automatically be considered the treatment of choice for depression and anxiety in PD and individuals with PD should be giventreatment options. The preference for administering pharmacological treatments for depression and anxiety among PD physicians is widely documented (Palanci et al., 2011). However, Study 1 showed that there is currently no empirical evidence to suggest that SSRIs are more beneficial than placebo for the treatment of depression or anxiety in PD. Moreover, Study 4 showed that in contrary to physician preferences, 64% of participants with PD indicated a preference of psychotherapy over pharmacological treatments for psychological complications. This finding is particularly important given that matching treatment to patient preference has been shown to enhance treatment outcome (Oehlberg et al., 2008; Sotsky et al., 1991), service utilisation (Dwight-Johnson, Unutzer, Sherbourne, Tang, & Wells, 2001), and patient satisfaction (Bedi et al., 2000). Thus where possible, physicians should offer patients a choice of pharmacological and non-pharmacological treatments.

Physicians should consider the potential of CBT as alternative to pharmacological interventions for depression and anxiety in PD. Study 1 highlighted CBT as a potential treatment of choice for depression in PD, with a recent RCT of individual CBT resulting in the largest effect size for depression over all other interventions. Study 3 provided further empirical support for this finding. After eight weeks of treatment, participants who received CBT treatment showed significant large improvements in both depression and anxiety while participants in the waitlist condition showed no significant change. Effect size estimates were larger than has been reported for pharmacotherapy for depression and anxiety in older adult populations (Pinquart & Duberstein, 2007) and may indicate that CBT is more efficacious than pharmacotherapy for depression and anxiety in PD. Moreover, Study 3 showed that Group CBT was a feasible and accepted treatment approach with only an 11% attrition rate compared to rates of 14 to 73% in antidepressant trials in PD. When considering that the major criticisms of current mainstay antidepressant treatments in PD are related to a lack of efficacy, aversive side effects and high relapse rates, it would appear that CBT has the potential to constitute a more beneficial treatment option on the whole if similar rates of efficacy to those reviewed in this research can be found in future trials.

7.4 Recommendations for Future Research

Comprehensive recommendations and directions for future research for each study were presented in the respective chapters. These recommendations are summarised in the following section.

7.4.1 Treatments for Depression and Anxiety in PD

Continuing research and development into optimal treatments, both pharmacological and non-pharmacological, for depression and anxiety is duly needed. From this research are four specific recommendations for future researchers.

1. **Resolve the ambiguity surrounding the efficacy of SSRIs in PD.** There is a pressing need for more controlled trials of SSRIs for depression and anxiety in PD. Given that SSRIs currently constitute the first-line and most widely used treatments for depression and anxiety in PD, it is important to resolve the present ambiguity regarding the efficacy of this class of medications to ensure that individuals with PD are being offered the most optimal first-line treatment.

2. **Conduct specific research into the treatment of anxiety in PD.** Treatment trials specifically for anxiety in PD are duly needed. While the empirical literature for depression treatments in PD is steadily increasing, there remains no RCTs of any pharmacological or non-pharmacological treatments for anxiety in PD. There are core components of anxiety disorders that are distinct from depression and that require specific clinical attention.

3. **Continue with preliminary trials of CBT for depression and anxiety in PD.** Preliminary data indicates that CBT is an efficacious treatment approach for depression and anxiety and in PD however in light of the limitations of Study 3, it is recommended that future researchers continue with conducting preliminary trials with a larger sample to provide a more reliable estimate of the effect of group CBT in PD. Future preliminary trials should also implement a longer control period to provide a more reliable assessment of long-term utility.

4. **Conduct active comparison trials of CBT for depression and anxiety in PD.** Following preliminary trials, the next step in establishing the efficacy of group CBT for depression and anxiety in PD would be to conduct large efficacy trials across multiple sites with active control conditions. Active control conditions should include: (1) alternate psychological interventions (to examine the effect of non-specific treatment factors on change), (2) SSRIs (to allow a direct comparison of the efficacy of group CBT relative to current first-line treatments) and (3) individual CBT (to examine any significant differences in efficacy between the two modalities).

7.4.2 Barriers to Seeking Psychological Treatment in PD

While ongoing development and evaluation of optimal treatment options for depression and anxiety is essential to ensure that depressive and anxiety disorders are most effectively managed in PD, such treatments are ultimately only valuable to the extent that they are utilised by the targeted population. Therefore ongoing research into the underutilisation of mental health services in PD is also crucial. Future researchers in this area should:

1. **Replicate Study 4 in a random sample of PD participants.** While Study 4 had an adequate sample size, the convenience sampling method restricts the representatitveness and generalisability of findings. Replication of the study in a larger and more representatitve sample of individuals with PD will provide a more valid assessment of any barriers to seeking psychological treatment among individuals with PD.

2. **Directly assess the influence of lack of awareness of psychological symptoms in PD on willingness to seek mental health treatment.** This research found that it is a lack of awareness regarding psychological symptoms in PD that contributes to lessened willingness to seek treatment. A direct assessment is needed to draw more valid conclusions. Future research should directly assess awareness by listing a range of motor and non-motor symptoms and asking participants to select all symptoms which they believe

to be a part of PD, then examining the impact of levels of awareness on willingness to seek treatment.

3. **Investigate the gap between attitudes and willingness to use mental health services, and actual service utilisation.** This research showed that despite positive intentions to use mental health services, actual service usage statistics are disproportionately lower suggesting the presence of a mediating factor that was not included in the present analysis. Perceived need was identified as the potential mediating factor. A longitudinal study specifying and testing a path model capturing the complex relationship between demographic and clinical variables, help-seeking attitudes, stigma, resources, intentions, perceived need and actual service usage would be instrumental in furthering current understanding of the decision process underlying mental health service usage.

7.4.3 Validation of Psychometric Scales in PD

Finally, there is also some work to be done in the area of validation of psychometric scales in PD. Specifically, future researchers should:

1. **Replicate the factor structure of the DASS-21 in a larger PD sample.** While the sample size in Study 2 exceeded the minimum required for factor analysis, Tabachnick and Fidell (2011) recommend larger sample (N = 500 to 1000) to allow for more reliable estimation of correlation coefficients.

2. **Conduct a more comprehensive examination of the psychometric and clinimetric properties of the DASS-21 (e.g., sensitivity, specificity, convergent validity, test-retest reliability etc.).** As the data for Study 2 was not collected specifically for the purpose of scale evaluation, full evaluation of the psychometric and clinimetric properties of the DASS-21 was not possible. In particular, a study directly comparing the DASS-21, BDI and BAI among a single sample would provide useful insight into the comparative utility of the DASS-21 against the currently recommended scales for use in PD.

3. **Investigate the scale structure and psychometric properties of the full IASMHS, SSDS and DSS scales.** Preliminary evidence for the reliability and validity of the IASMHS, SSDS and DSS was presented in Study 4. However, as only partial subscales of these measures were used in this research, investigation of the structure and properties of each scale in its entirety was not possible. Future researchers will need to administer and evaluate the structure of the full IASMHS, SSDS and DSS in PD.

4. **Consider item and scale refinement of the Needs Survey to improve internal consistency.** Finally, there is a need for some work to be done in relation to scale and item refinement in the Needs Survey if future researchers would like to continue using the measure in inferential analyses. Using Principal Components Analysis, Study 4 showed that, overall, the NS items are relatively reliable indicators of the components that Weinberger and colleagues (2011) suggested especially considering that items were not generated based on a rigorous theoretical grounding, however there is room for improvement. A number of items loaded poorly onto the specified component and a degree of cross-loadings was present, which ultimately contributed to the low-to-moderate Cronbach's alpha values for each component. Item refinement will thus be useful in minimising cross-loadings and improving internal consistency.

7.6 Closing Words

When one thinks of Parkinson's disease, the image that is conjured is typically dominated by physical and motor ailments depicting a loss of control of one's own body – trembling limbs, a stooped posture, shuffling gait and involuntary, jerky movements. As described by Michael J. Fox, *'Every unwanted movement in my hand or arm, every twitch that I cannot anticipate or arrest, is a reminder that even in the domain of my own being, I am not calling the shots.'*

Throughout this thesis, cognitive and psychological symptoms of PD have been directly compared with motor symptoms and at times it would seem that the argument is made that there is an overemphasis on motor symptoms in PD. But this is not at all the message of this research. Rather, this research is about helping people with PD to enhance control over their bodies and lives and to be better equipped to cope with motor restrictions.

There is currently no cure for Parkinson's, meaning that progressive motor disability is an inescapable truth of this disease. But there are effective treatments for depression and anxiety. It is sincerely hoped that the research presented in this thesis will provide some inspiration for researchers continuing to advance knowledge in relation to the treatment of depression, anxiety and other psychological disturbances in PD.

To close this thesis are two further quotes from Michael J. Fox, both ultimately highlighting the importance of cognitive and emotional control in PD:

'I have no choice about whether or not I have Parkinson's.. [but] I have nothing but choices about how I react to it'

'If I let it affect everything, it's gonna [sic] own everything. I don't deny it or pretend it's not there, but if I don't allow it to be bigger than it is, then I can do anything else.'

References

A'Campo, L. E. I., Wekking, E. M., Spliethoff-Kamminga, N. G. A., Cessie, S. L., & Roos, R. A. C. (2010). The benefits of a standardized patient education program for patients with Parkinson's disease and their caregivers. *Parkinsonism and Related Disorders, 16,* 89-95.

Aarsland, D., & Cummings, J. L. (2002). Depression in parkinson's disease. *Acta Psychiatrica Scandinavica, 106,* 161-162.

Abbott, R. D., Ross, G. W., White, L. R., Tanner, C. M., Masaki, K. H., Nelson, J. S., Curb, J. D., & Petrovitch, H. (2005). Excessive daytime sleepiness and subsequent development of parkinson's disease. *Neurology, 65*(9), 1442-1446.

Abramson, L. Y., Seligman, M. E. P., & Teasdale, J. D. (1978). Learned helplessness in humans: Critique and reformulation. *Journal of Abnormal Pscyhology, 87,* 49-74.

Abramson, L. Y., Metalsky, G. I., & Alloy, L. B. (1989). Hoplessless depression: A theory-based subtype of depression. *Psychological Review, 96*(2), 358-372.

Addolorato, G., De Lorenzi, G., Abenavoli, L., Capristo, E., & Gasbarrini, G. (2004). Psychological support counselling improves gluten-free diet compliance in coeliac patients with affective disorders. *Alimentary Pharmacology and Therapeutics, 20*(7), 777-782.

Allain, H. (2000). Depression in Parkinson's disease. *British Medical Journal, 320,* 1287-1290.

Alexander, G. E., & Crutcher, M. D. (1990). Functional architecture of basal ganglia circuits: Neural substrates of parallel processing. *Trends in Neurosciences, 13*(7), 266-271.

Alexopoulous, G. S. (1990). Clinical and biological findings in late-onset depression. In A. Tasman, S. M. Goldfinger, & C. A. Kaufmann (Eds.), *American psychiatric press review of psychiatry* (pp. 19-48). Washington: American Psychiatric Press.

Alves, G., Forsaa, E. B., Pedersen, K. F., Dreetz Gjerstad, M., & Larsen, J. P. (2008). Epidemiology of parkinson's disease. *Journal of Neurology, 225*(5), 18-32.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: American Psychiatric Association.

Andersen, J., Aabro, E., Gulmann, N., Hjelmsted, A., & Pdersen, H. E. (1980). A controlled trial of the effect of Nortriptyline in patients with Parkinson's disease treated with L-dopa. *Acta Neurologica Scandinavia, 62,* 210-219.

Angermeyer, M. C., & Dietrich, S. (2006). Public beliefs about and attitudes towards people with mental illness: A review of population studies. *Acta Psychiatrica Scandinavica, 113,* 163-179.

Angermeyer, M. C., Beck, M., & Matschinger, H. (2003). Determinants of the public's preference for social distance from people with schizophrenia. *Canadian Journal of Psychiatry, 48,* 663-668.

Antoni, M. H., et al. (2006). How stress management improves quality of life after treatment for breast cancer. *Journal of Consulting and Clinical Psychology, 74*(6), 1143-1152.

Antonini, A., et al. (2006). Randomized study of sertraline and low=dose amitriptyline in patients with Parkinson's disease and depression: Effect on quality of life. *Movement Disorders, 21*(8), 1119-1122.

Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment, 10*(2), 176-181.

Arrindell, W. A. (2001). Changes in waiting-list patients over time: Data on some commonly-used measures. Beware! *Behaviour Research and Therapy, 39,* 1227-1247.

Asnis, G. (1977). Parkinson's disease, depression, and ECT: a review and case study. *The American Journal of Psychiatry, 134,* 191-195.

Aupperle, P. M., Lifchus, R., & Coyne, A. C. (1998). Past utilization of geriatric outpatient services by a cohort of patients with major depression. *The American Journal of Geriatric Psychiatry, 6*(4), 335-339.

Australian Bureau of Statistics. (2007). *National Survey of Mental Health and Wellbeing: Summary of Results.* ABS.

Avila, A., Cardona, X., Martin-Baranera, M., Maho, P., Sastre, F., & Bello, J. (2003). Does nefazodone improve both depression and Parkinson disease? A pilot randomized trial. *Journal of Clinical Psychopharmacology, 23,* 509-513.

Awerbuch, G, I., & Sandyk, R. (1994). Autonomic functions in the early stages of parkinson's disease. *International Journal of Neuroscience, 74,* 9-16.

Ayers, C. R., Sorrell, J. T., Thorp, S. R., & Wetherell, J. L. (2007). Evidence-based psychological treatments for late-life anxiety. *Psychology and Aging, 22,* 8-17.

Azjen, I. (1991). The theory of planned behaviour. *Organizational Behavior and Human Decision Processes, 50*(2), 179-211.

Backer, J. H. (2000). Stressors, social support, coping, and health dysfunction in individuals with Parkinson's disease. *Geronotological Nursing, 26*(11), 6-16.

Bagby, R. M, Ryder, A. G., Schuller, D. R., & Marshall, M. B. (2004). The Hamilton Depression Rating Scale: Has the gold standard become a lead weight? *American Journal of Psychiatry, 161,* 2163-2177.

Baker, M., & Graham, L. (2004). The journey: Parkinson's disease. *British Medical Journal, 329,* 611-614.

Bandura, A. (1991). Social cognitive theory of self-regulation. *Organizational Behaviour and Human Decision Processes, 50,* 248-287.

Barber, M., & Sott, D. J. (2004). Validity of the Telephone Interview for Cognitive Status (TICS) in post-stroke subjects. *Geriatric Psychiatry, 19,* 75-79.

Barney, L. J., Griffiths, K. M., Jorm, A. F., & Christensen, H. (2006). Stigma about depression and its impact on help-seeking intentions. *Australian and New Zealand Journal of Psychiatry, 40,* 51-54.

Barney, L. J., Griffiths, K. M., Christensen, H., & Jorm, A. F. (2010). The self-stigma of depression scale (SSDS): Development and psychometric evaluation of a new instrument. *International Journal of Methods in Psychiatric Research, 19*(4), 243-254.

Barone, P., et al. (2006). Pramipexole versus sertraline in the treatment of depression in Parkinson's disease. *Journal of Neurology, 253,* 601-607.

Barone, P., Poewe, W., Albrecht, S., Debiuvre, C., Massey, D., Rascol, O., Toloso, E., & Weintraub, D. (2010). Pramipexole for the treatment of depressive symptoms in patients with Parkinson's disease: A randomised, double-blind, placebo-controlled trial. *The Lancet Neurology, 9,* 573-580.

Bayer, J., K., & Peay, M. Y. (1997). Predicting intentions to seek help from professional mental health services. *Australian and New Zealand Journal of Psychiatry, 31*(4), 504-513.

Beck, A. T., Brown, G., Steer, R. A., Eidelson, J. I., & Riskin, J. H. (1987). Differentiating anxiety and depression: A test of the cognitive content-specifity hypothesis. *Journal of Abnormal Psychology, 96*(3), 179-183.

Beck, A. T., et al. (1961). An inventory for measuring depression. *Archives of General Psychiatry, 4,* 561-571.

Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: Psychometric properties. *Journal of Consulting and Clinical Psychology, 56,* 893-897.

Beck, A. T. (2008). The evolution of the cognitive model of depression and its neurobiological correlates. *The American Journal of Psychiatry, 165*(8), 969-977.

Beck, A. T. (2005). The current state of cognitive therapy. *Archives of General Psychiatry, 62,* 953-959.

Behair, M., Srivastava, A. K., & Pandey, R. M. (2005). Quality of life in patients with parkinson's disease. *Parkinsonism and Related Disorders, 11*(4), 221-226.

Ben-Shlomo, Y., & Sieradzan, K. (1995). Idiopathic parkinson's disease: Epidemiology, diagnosis and management. *The British Journal of General Practice, 45*(394), 261-268.

Benlter, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*(2), 238-246.

Bentler, P. (2005). *EQS for Windows (Version 5.6).* Encino, CA: Multivariate Software.

Bhugra, D. (1989). Attitudes towards mental illness. *Acta Psychiatrica Scandinavica, 80,* 1-12.

Black, K. J. (2011). A new (old) treatment option for depression in Parkinson's disease. *The American Journal of Psychiatry, 168*(10), 1015-1016.

Black, B. S., Rabins, P. V., German, P., Roca, R., McGuire, M., & Brant, L. J. (1998). Use of formal and informal sources of mental health care among older African-American public-housing residents. *Psychological Medicine, 28*(3), 519-530.

Blankertz, L. (2001). Cognitive components of self esteem for individuals with severe mental illness. *American Journal of Orthopsychiatry, 71*(4), 457-465.

Blazer, D. (2002). *Depression in late life* (3rd ed.). New York: Springer.

Blazer, D., Hughes, D. C., & George, L. K. (1987). The epidemiology of depression in an elderly community population. *The Gerontologist, 27*(3), 281-287.

Bloem, B. R., Grimbergen, Y. A. M., Cramer, M., Willemsen, M., & Zwinderman, A. H. (2001). Prospective assessment of falls in Parkinson's disease. *Journal of Neurology, 248*(11), 950-958.

Bonnet, A. M., & Hoeuto, J. L. (1999). Pathophysiology of parkinson's disease. *Biomedicine and Pharmacotherapy, 53,* 117-121.

Booth, R., & Rachman, S. (1992). The reduction of clasutrophia.*Behaviour Research and Therapy, 30*(3), 207-221.

Borek, L. L., Amick, M. M., & Friedman, J. H. (2006). Non-motor aspects of parkinson's disease. *Central Nervous System Spectrums, 11*(7), 541-554.

Borenstein, M., Hedges, L. V., & Rothstein, H. (2007). *Meta-analysis – Fixed effects versus random effects.* Biostat Inc., Tech. Rep.

Borenstein, M., Hedges, L. V., Higgins, J. P. T., & Rothstein, H. R. (2010). A basic introduction to fixed-effect and random-effects models for meta-analysis. *Research Synthesis Methods, 1*(2), 97-111.

Borinstein, A. B. (1992). Public attitudes towards persons with mental illness. *Health Affairs, 11*(3), 186-196.

Braak, H., Ghebremedhin, E., Rub, U., Braztke, H., & Tredici, K. D. (2004). Stages in the development of parkinson's disease-related pathology. *Cell Tissue and Research, 318,* 121-134.

Brandt, J., Spencer, M., & Folstein, M. (1988). The telephone interview for cognitive status. *Neuropsychiatry, Neuropscyhology, and Behavioural Neurology, 1*(2), 111-117.

Breitner, J.C., & Welsh, K. A. (1995). Diagnosis and management of memory loss and cognitive disorders among elderly persons. *Psychiatry Services, 46*, 29–35

Brewin, C. R. (1996). Theoretical foundations of cognitive-behaviour therapy for anxiety and depression. *Annual Review of Psychology, 47,* 33-57.

Brockwell, S. E., & Gordon, I. R. (2001). A comparison of statistical methods for meta-analysis. *Statistics in Medicine, 20*(6), 825-840.

Brooks, D. J., & Doder, M. (2000). Depression in parkinson's disease. *Current Opinion in Neurology, 14,* 466-470.

Brown, P, & Marsden, C. D. (1998). What do the basal ganglia do? *The Lancet, 351,* 1801-1804.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. Bollen, J. Long (Eds.). *Testing Structural Equation Models.* Newbury Park, CA: Sage.

Brunello, N., et al. (2003). Noradrenaline in mood and anxiety disorders: Basic and clinical studies. *International Clinical Psychopharmacology, 18*(4), 191-202.

Bryk, A. S., & Raudenbush, S. W. (1987). Application of hierarchical linear models to assessing change. *Psychological Bulletin, 101,* 147-158.

Bucks, R. S., Cruise, K. E., Skinner, T. C., Loftus, A. M., Barker, R. A., & Thomas, M. G. (2010). Coping processes and health-related quality of life in Parkinson's disease. *International Journal of Geriatric Psychiatry, 26*(3), 247-255.

Burn, D. J. (2002). Beyond the iron mask: Towards better recognition and treatment of depression associated with parkinson's disease. *Movement Disorders, 17,* 445-454.

Burn, D. J., et al. (2012). Parkinson's disease motor subtypes and mood. *Movement Disorders, 27,* 379-386.

Burns, D. D., & Nolen-Hoeksema, S. (1992). Therapeutic empathy and recovery from depression in cognitive-behavioural therapy: A structural equation model. *Journal of Consulting and Clinical Psychology, 60*(3), 441-449.

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

Butler, P. M., McNamara, P., & Durso, R. (2010). Deficits in the automatic activation of religious concepts in patients with Parkinson's disease. *Journal of the International Neuropsychological Society, 16*(2), 252-261.

Callahan, C. M., Hui, S. L., Nienafer, N. A., Musick, B. S., & Tierney, W. M. (1994). Longitudinal study of depression and health services use among elderly primary care patients. *American Geriatric Society, 42,* 833-838.

Camicioloi, R. M., Korzan, J. R., Foster, S. L., Fisher, N. J., Emery, D. J., Bastos, A. C., & Hanstock, C. C. (2004). Posterior cingulate metabolic changes occur in

parkinson's disease patients without dementia. *Neuroscience Letters, 354*(3), 177-180.

Carod-Artal, F. J., Ziomkowski, S., Mesquita, H. M., & Martinez-Martin, P. (2008). Anxiety and depression: Main determinants of health-related quality of life in Brazilian patients with parkinson's disease. *Parkinsonism and Related Disorders, 14,* 102-108.

Carpenter, L. L., Milosavljevic, N., Schecter, J. M., Tyrka, A. R., & Price, L. H. (2005). Augmentation with open-label atomoxetine for partial or nonresponse to antidepressants. *The Journal of Clinical Psychiatry, 66*(10), 1234-1238.

Cepeda-Benito, A., & Short, P. (1998). Self-concealment, avoidance of psychological services, and perceived likelihood of seeking professional help. *Journal of Counseling Psychology, 45,* 58-64.

Chadda, R. K., Agarwal, V., Singh, M. C., & Raheja, D. (2001). Help seeking behaviour of psychiatric patietns before seeking care at a mental hospital. *International Journal of Social Psychiatry, 47*(4), 471-478.

Chambless, D. L., & Gracely, E. J. (1989). Fear of fear and the anxiety disorders. *Cognitive Therapy and Research, 13,* 9-20.

Chan, D. K. Y., Dunne, M., Wong, A., Hu, E., Hung, W. T., & Beran, R. G. (2001). Pilot study of prevalence of parkinson's disease in Australia. *Neuroepidemiology, 20,* 112-117.

Chan, D. K. Y., Cordato, D., Karr, M., Ong, B., Lei, H., Liu, J., & Hung, W. T. (2005). Prevalence of parkinson's disease in Sydney. *Acta Neurologica Scandinavica, 111,* 7-11.

Chandra, A., & Minkovitz, C. S. (2006). Stigma starts early: Gender differences in teen willingness to use mental health services. *Journal of Adolescent Health, 38*(6), 754.

Charidimou, A., Seamons, J., Seali, C., & Schrag, A. (2011). The role of cognitive-behavioural therapy for patietns with depression in Parkinson's disease. *Parkinson's Disease, 2011,* 1-8.

Charney, D. S., Woods, S. W., Krystal, J. H., Heninger, G. R. (1990). Serotonin function and human anxiety disorders. *Annals of the New York Academy of Sciences, 600,* 558-572.

Chaudhuri, K. R. (2003). Nocturnal symptom complex in parkinson's disease and its management. *Neurology, 61*(3), 17-23.

Chaudhuri, K. R., Yates, L., & Martinez-Martin, P. (2005). The non-motor symptom complex of Parkinson's disease: A comprehensive assessment is essential. *Current Neurology and Neuroscience Reports, 5,* 275-283.

Chaudhuri, K. R., Healy, D. G., & Schapira, A. H. V. (2006). Non-motor symptoms of parkinson's disease: Diagnosis and management. *The Lancet Neurology, 5,* 235-245.

Chaudhuri, K. R., & Martinez-Martin, P. (2008). Quantitation of non-motor symptoms in parkinson's disease. *European Journal of Neurology, 15*(2), 2-8.

Chaudhuri. K. R., & Schapira, A. H. V. (2009). Non-motor symptoms of parkinson's disease: Dopaminergic pathophysiology and treatment. *The Lancet Neurology, 8,* 464-474.

Chaudhuri, K. R., et al. (2013). A proposal for a comprehensive gradation of Parkinson's disease severity combining motor and non-motor symptom assessments: Meeting an unmet need. *Plos One, 8*(2), e57221.

Chen, P., Kales, H. C., Weintraub, D., Blow, F. C., Jiang, L., & Mellow, A. M. (2007). Antidepressant treatment of veterans with Parkinson's disease and depression: Analysis of a national sample. *Journal of Geriatric Psychiatry and Neurology, 20,* 161-165.

Chen, R. (2010). Repetitive transcranial magnetic stimulation as treatment for depression in Parkinson's disease. *Movement Disorders, 25*(14), 2272-2273.

Chesney, M. A., Chambers, D. B., Taylor, J. M., Johnson, L. M., & Folkman, S. (2003). Coping effectiveness training for men living with HIV: Results from a randomized clinical trial testing a group-based intervention. *Psychosomatic Medicine, 65*(6), 1038-1046.

Chia, K. S. (2000). Randomisation: Magical cure for bias? *Annals Academy of Medicine, 29*(5), 563-564.

Chodosh, J. et al. (2005). Meta-analysis: Chronic disease self-management programs for older adults. *Annals of Internal Medicine, 143*(6), 427-438.

Choi, N. G., & Gonzalez, J. M. (2001). Geriatric mental health clinicians' perceptions of barriers and contributors to retention of older minorities in treatment: An exploratory study. *Clinical Gerontologist, 28*(3), 3-25.

Chou, K. L., Hurtig, H. I., Jaggi, J. L., Baltuch, G. H., Pelchat, R. J., & Weintraub, D. (2005). Electroconvulsive therapy for depression in a Parkinson's disease patient with bilateral subthalamic nucleus deep brain stimulators. *Parkinsonism and Related Disorders, 11*(6), 403-406.

Chung, T. H., Dean, K. H. O., Ghazi-Noori, S., Rickards, H., & Clarke, C. E. (2003). Systematic review of antidepressant therapies in Parkinson's disease. *Parkinsonism and Related Disorders, 10,* 59-65.

Ciechanowski, P. S., Katon, W. J., & Russo, J. E. (2000). Impact of depressive symptoms on adherence, function and costs. *Archives of Internal Medicine, 160*(21), 3278-3285.

Clark, D. M., Beck, A. T., & Alford, B. A. (1999). *Scientific Foundations of Cognitive Theory and Therapy of Depression.* New York: John Wiley.

Clark, D. M. (1999). Anxiety disorders: Why they persist and how to treat them. *Behaviour Research and Therapy, 37,* 5-27.

Clark, D. M. (1986). A cognitive approach to panic. *Behaviour Research and Therapy, 24*(4), 461-470.

Clark, D. M., & Wells, A. (1995). *A Cognitive Model of Social Phobia.* In R. G. Heimberg, M. R. Liebowitz, D. A. Hope, F. R. Scheider (Eds). Social phobia: diagnosis, assessment and treatment. New York: The Guildford Press.

Clark, D. M., & Currie, K. C. (2009). Depression, anxiety and their relationship with chronic diseases: A review of the epidemiology, risk and treatment evidence. *Medical Journal of Australia, 190*(7), 54-60.

Coakes, S. J., & Steed, L. G. (2003). *SPSS: Analysis without anguish version 11.0 for windows.* Queensland, Australia: John Wiley & Sons.

Cole, K., & Vaughan, F. L. (2005). The feasibility of using cognitive behaviour therapy for depression associated with parkinson's disease: A literature review. *Parkinsonism and Related Disorders, 11*, 269 – 276.

Conner, K. O., et al. (2010). Mental health treatment seeking among older adults with depression: The impact of stigma and race. *The American Journal of Geriatric Psychiatry, 18*(6), 531-543.

Cooper, C., Bebbington, P., King, M., Brugha, T., Meltzer, H., Bhugra, D., et al. (2007). Why people do not take their psychotropic drugs as prescribed: Results of the 2000 National Psychiatric Morbidity Survey. *Acta Psychiatrica Scandinavica, 116*, 47–53.

Cooper, A., Corrigan, P. W., & Watson, A. C. (2003). Mental illness stigma and care seeking. *Journal of Nervous and Mental Disease, 191,* 339-341.

Corey, M. and Corey, G. (2002). *Groups: process and practice*. Pacific Grove, CA: Brooks/Cole.

Corrigan, P. W. (1998). Building teams and programs for effective rehabiliations. *Psychiatric Quarterly, 69*(3), 193-209.

Corrigan, M. H., Denahan, A. Q., Wright, E., Ragual, R. J., & Evans, D. L. (2000). Comparison of pramipexole, fluoxetine, and placebo in patients with major depression. *Depression and Anxiety, 11*(2), 58-65.

Corrigan, P. W., Watson, A. C., Warpinski, A. C., & Gracia, G. (2004). Stigmatizing attitudesa about mental illness and allocation of resources to mental health services. *Community Mental Health Journal, 40*(4), 297-307.

Corrigan, P. W. (2004). How stigma interferes with mental health care. *American Psychologist, 59*(7), 614-625.

Corrigan, P. W, Watson, A. C., & Barr, L. (2006). The self-stigma of mental illness: Implications for self-esteem and self-efficacy. *Journal of Social and Clinical Psychology, 25*(8), 875-884.

Crabb, R., & Hunsley, J. (2006). Utilization of mental health care services among older adults with depression. *Journal of Clinical Psychology, 62,* 299-312.

Crisp, A. H., Gelder, M. G., Rix, S., Meltzer, H. I., & Rowlands, O. J. (2000). Stigmatisation of people with mental illnesses. *The British Journal of Psychiatry, 177,* 4-7.

Cummings, J. L. (1992). Depression and parkinson's disease: A review. *The American Journal of Psychiatry, 149*(4), 443-454.

Currin, J. B., Hayslip, B., Schneider, L. J., & Kooken, R. A. (1998). Cohort differences in attitudes toward mental health services among older persons. *Psychotherapy, 35*(4), 506-518.

Da Silva, T. M., et al. (2008). Depression in Parkinson's disease: A double-blind, randomized, placebo-controlled pilot study of omega-3 fatty-acid supplementation. *Journal of Affective Disorders, 111,* 351-359.

De Jager, C. A., Budge, M., M., & Clarke, R. (2003). Utility of TICS-M for the assessment of cognitive function in older adults. *Internal Journal of Geriatric Psychiatry, 18,* 318-324.

De Lau, L. M. L., Bornebroek, M, Witteman, C. M., Hofman, A., Koudstaal, P. J., & Breteler, M. M. B. (2005). Dietary fatty acids and the risk of Parkinson disease: The Rotterdam study. *Neurology, 54*(12), 2040-2045.

De Lau, L. M. L., & Breteler, M. M. B. (2006). Epidemiology of parkinson's disease. *The Lancet Neurology, 5,* 525-535.

De Rijk, M. C., Tzourio, C., Breteler, M. M. B., Dartigues, J. F., Amaducci, L., Lopez-Pousa, S., Manubens-Bertran, J. M., Alperovitch, A., & Rocca, W. A. (1997). Prevalence of parkinsonism and parkinson's disease in Europe: the EUROPARKINSON collaborative study. *Journal of Neurology, Neurosurgery and Psychiatry, 62,* 10-15.

De Vriese, S. R., Christophe, A. B., & Maes, M. (2003). Lowered serum n-3 polyunsaturated fatty acid (PUFA) levels predict the occurrence of postpartum depression: Further evidence that lowered n-PUFAs are related to major depression. *Life Sciences, 73*(25), 3181-3187.

Dean, A., Kolody, B., & Wood, P. (1990). Effects of social support from various sources on depression in elderly persons. *Journal of Health and Social Behaviour, 31*(2), 148-161.

Deane, F. P., & Todd, D. M. (1996). Attitudes and intentions to seek professional psychological help for personal problems or suicidal thinking. *Journal of College Student Psychotherapy, 10*(4), 45-59.

Deloitte Access Economics. (2011). *Living with Parkinson's Disease – update.* Authors.

Depla, M. F. I. A., de Graaf, R., van Weeghel, J., & Heeren, T. J. (2005). The role of stigma in the quality of life of older adults with severe mental illness. *International Journal of Geriatric Psychiatry, 20,* 146-153.

DerSimonian, R., & Kacker, R. (2007). Random-effects model for meta-analysis of clinical trials: An update. *Contemporary Clinical Trials, 28*(2), 105-114.

DerSimonian, R., & Laird, N. (1986). Meta-analysis in clinical trials. *Controlled Clinical Trials, 7*(3), 177-186.

Desmond, D. W., Tatemichi, T. K., & Hanzawa, L. (1994). The telephone interview for cognitive status (TICS): Reliability and validity in a stroke sample. *The International Journal of Geriatric Psychiatry, 9,* 803-807.

Devilly, G. J., & Borkovec, T. D. (2000). Psychometric properties of the credibility/expectancy questionnaire. *Journal of Behavior Therapy and Experimental Psychiatry, 31*, 73 – 86.

Devilly, G. J., & McFarlane, A. C. (2009). When waitlists are not feasible, nothing is a thing that does not need to be done. *Journal of Consulting and Clinical Psychology, 77*(6), 1159-1168.

Devos, D., et al. (2008). Comparison of desipramine and citalopram treatments for depression in Parkinson's disease: A double-blind, randomized, placebo-controlled study. *Movement Disorders, 23*(6), 850-857.

Diala, C., Mutaner, C., Walrath, C., Nickerson, K. J., LaVeist, T. A., & Leaf, P. J. (2000). Racial differences in attitudes toward professional mental health care and in the use of services. *American Journal of Orthopsychiatry, 70*(4), 455-464.

Dimtrov, D. M., & Rumrill, P. D. (2003). Pretest-posttest designs and measurement of change. *Work, 20,* 159-165.

DiNardo, P. A., Peter, A., Barlow, & David, H. (1990). *Comorbidity of mood and anxiety disorders.* Washington DC, USA: American Psychiatric Association.

Dissanayaka, N. N. W., et al. (2010). Anxiety disorders in Parkinson's disease: Prevalence and risk factors. *Movement Disorders, 25*(7), 838-845.

Dissanayaka, N. N. W., et al. (2011). Factors associated with depression in Parkinson's disease. *Journal of Affective Disorders, 132,* 82-88.

Dissanayaka, N. N., O'Sullivan, J. D., Silburn, P. A., & Mellick, G. D. (2011). Assessment methods and factors associated with depression in Parkinson's disease. *Journal of the Neurological Sciences, 310,* 208-210.

Dobkin, R. D., Allen, L. A., & Menza, M. (2006). A cognitive-behavioural treatment package for depression in Parkinson's disease. *Psychosomatics, 47*(3), 259-263.

Dobkin, R. D., Allen, L. A., & Menza, M. (2007). Cognitive-behavioural therapy for depression in Parkinson's disease: A pilot study. *Movement Disorders, 22*(7), 946-952.

Dobkin, R. D., Menza, M., Allen, L. A., Gara, M. A., Mark, M. H., Tiu, J., Bienfait, K. L., & Friedman, J. (2011). Cognitive behaviour therapy for depression in Parkinson's diseae: A randomized controlled trial. *The American Journal of Psychiatry, 168*(10), 1066-1074.

Dobkin, R. D., Menza, M., Bienfait, K. L., Gara, M., Marin, H., Mark, M. H., Dicke, A., & Friedman, J. (2011). Depression in Parkinson's disease: Symptom improvement and residual symptoms after acute pharmacologic management. *The American Journal of Geriatric Psychiatry, 19*(3), 222-229.

Dobkin, R. D., et al. (2011). Telephone-based cognitive-behavioural therapy for depression in Parkinson's disease. *Journal of Geriatric Psychiatry and Neurology, 24*4), 206-214.

Dobkin, R. D., Rubino, J. T., Friedman, J., Allen, L. A., Gara, M. A., & Menza, M. (2013). Barriers to mental health care utilization in Parkinson's disease. *Journal of Geriatric Psychiatry and Neurology, 25,* 105-116.

Dreisig, H., Wermuth, L., Skovlund, S., & Bech, P. (1999). Psychologic effects of structured cognitive psychotherapy in young patients with Parkinson disease: A pilot study. *Nordic Journal of Psychiatry, 53*(3), 217-221.

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

Durham, R. C., et al. (2005). *Long-term outcome of cognitive behavior therapy clinical trials in central Scotland.* Health Technology Assessmen

Dwork, A. J., Balmaceda, C., Fazzini, E. A., MacCollin, M., Cote, L., & Fahn, S. (1993). Dominantly inherited, early-onset parkinsonism. *Neurology, 43,* 69-74.

Eapen, V., & Ghubash, R. (2004). Help-seeking for mental health problems of children: Preferences and attitudes in the United Arab Emirates. *Psychological Reports, 94,* 663-667.

Egede, L. E., Zheng, D., & Simpson, K. (2002). Comorbid depression is associated with increased health care use and expenditures in individuals with diabetes. *Diabetes Care, 25.*

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *British Medical Journal, 315,* 629-634.

Ehmann, T. S., Beninger, R. J., Gawel, M. J., & Riopelle, R. J. (1990). Depressive symptoms in parkinson's disease: A comparison with disabled control subjects. *Journal of Geriatric Psychiatry and Neurology, 3*, 3-9.

Elkin, I., Pilkonis, P. A., Docherty, J. P., & Sotsky, S. M. (1988). Conceptual and methodological issues in comparative studies in psychotherapy and

pharmacotherapy, I: Active ingredients and mechansisms of change. *The American Journal of Psychiatry, 145,* 909-917.

Ellenberg, J. H., Koller, W. C., & Langston, J. W. (1995). *Etiology of parkinson's disease.* New York: Dekker.

Ellgring, H., Seiler, S., Perleth, B., Frings, W., Gasser, T., & Oertel, W. (1993). Psychosocial aspects of parkinson's disease. *Neurology, 43*(6), 41 – 44.

Emre, M. (2003). Dementia associated with Parkinson's disease. *The Lancet Neurology, 2*(4), 229-237.

Epstein, C. M. et al. (2007). An open study of repetitive transcranial magnetic stimulation in treatment-resistant deperession with Parkinson's disease. *Clinical Neurophysiology, 118*(10), 2189-2194.

Franz, F., Erdfelder, E., Buchner, A., & Lang, A. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behaviour Research Methods, 41*(4), 1149-1160.

Erez, A., Bloom, M. C., & Wells, M. T. (1996). Using random rather than fixed effects models in meta-analysis: Implications for situational specificity and validity generalization. *Personnel Psychology, 49*(2), 275-306.

Espeland, M. A., et al. (2011). Telephone interview for cognitive status (TICS) screening for clinical trials of physical activity and cognitive training: The seniors health and activity research program pilot (SHAR-P) study. *International Journal of Geriatric Psychiatry, 26*(2), 135-143.

Evans, C. (2007). Cognitive-behavioural therapy with older people. *Advances in Psychiatric Treatment, 13,* 111-118.

Evans, S. & Katona, C. (1993). Epidemiology of depressive symptoms in elderly primary care attendees. *Dementia, 4,* 327-333.

Fals-Stewart, W., Marks, A., & Schafer, J. (1993). A comparison of behavioral group therapy and individual behavior therapy in treating obsessive-compulsive disorder. *The Journal of Nervous and Mental Disease, 181*, 189-193.

Farabaugh, A., et al. (2009). Pattern of depressive symptoms in Parkinson's disease. *Psychosomatics, 50*(5), 448-454.

Farabaugh, A., et al. (2010). Cognitive-behavioural therapy for patients with Parkinson's disease and comorbid major depressive disorder. *Psychosomatics, 51,* 124-129.

Farabaugh, A. H., et al. (2011). Assessing depression and factors possibly associated with depression during the course of Parkinson's disease. *Annals of Clinical Psychiatry, 23*(3), 171-177.

Faravelli, C. (1985). Life events preceding the onset of panic disorder. *Journal of Affective Disorders, 9,* 103-105.

Faravelli, C., & Pallanti, S. (1989). Recent life events and panic disorder. *The American Journal of Psychiatry, 146*(5), 622-626.

Feeney, F., Egan, S., & Gasson, N. (2005). Treatment of depression and anxiety in parkinson's disease: A pilot study using group cognitive behavioural therapy. *Clinical Psychologist, 9*, 31 – 38.

Fenelon, G., Mahieux, F., Houn, R., & Ziegler, M. (2000). Hallucinations in parkinson's disease: Prevalence, phenomenology and risk factors. *Brain, 123*(4), 733-745.

Ferguson, S. J., & Koder, D. A. (1998). Geropsychology: Some potential growth areas in psychological research and practice. *Australian Psychologist, 33*(3), 187-192.

Fernandez, H. H., & Durso, R. (1998). Clozapine for dopaminergic-induced paraphilias in parkinson's disease. *Canadian Medical Association Journal, 175,* 1545-1552.

Ferreri, F., Agbokou, C., & Gauthier, S. (2006). Recognition and management of neuropsychiatric complications in parkinson's disease. *Canadian Medical Association Journal, 175*(12), 1545-1552.

Fibiger, H. C. (1984). The neurobiological substrates of depression in Parkinson's disease. A hypothesis. *Canadian Journal of Neurological Science, 11,* 105-107.

Findley, L., Aujla, M., Bain, P. G., Baker, M., Beech, C. B., Bowman, C., Holmes, J., Kingdom, W. K., MacMahon, D. G., Peto, V., & Playfer, J. R. (2003). Direct economic impact of parkinson's disease: A research survey in the United Kingdom. *Movement Disorders, 18*(10), 1139-1145.

Finlay-Jones, R., & Brown, G. W. (1981). Types of stressful life event and the onset of anxiety and depressive disorders. *Psychological Medicine, 11,* 803-815.

First, M. B., Spitzer, R. L, Gibbon, M., & Williams, J. B.W. (1996). *Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version.*

(SCID-I/P). New York:, New York State Psychiatric Institute, Biometrics Research Department.

Fischer, D. J., Himle, J. A., & Hanna, G. L. (1998). Group behavioral therapy for adolescents with obsessive-compulsive disorder: Preliminary outcomes. *Research on Social Work Practice, 8*, 629-636.

Fisher, J. D., Nadler, A., & Whitcher-Alagna, S. (1982). Recipient reactions to aid. *Psychological Bulletin, 91,* 27-54.

Fitzgerald, P. B. (2012). Transcranial magnetic stimulation-based methods in the treatment of depression. *Australian Prescriber, 35,* 59-61.

Fitzpatrick, L., Simpson, J., & Smith, A. (2010). A qualitative analysis of mindfulness-based cognitive therapy (MCBT) in Parkinson's disease. *Psychology and Psychotherapy, 83*(2), 179-192.

Fleminger, S. (1991). Left-sided Parkinson's disease is associated with greater anxiety and depression. *Psychological Medicine, 21*(3), 629-638.

Flint, A. J. (1994). Epidemiology and comorbidity of anxiety disorders in the elderly. *The American Journal of Psychiatry, 151*(5), 640-649.

Francis, P. T., & Kerry, E. K. (2007). Cholinergic and other neurotransmitter mechanisms in parkinson's disease, parkinson's disease dementia and dementia with Lewy bodies. *Movement Disorders, 22*(17), 351-357.

Frank, C., Pari, G., & Rossiter, J. P. (2006). Approach to diagnosis of parkinson's disease. *Canadian Family Physician, 52,* 862-868.

Freeman, M. P. (2000). Omega-3 fatty acids in psychiatry: A review. *Annals of Clinical Psychiatry, 12*(3), 159-165.

Fregni, F., et al. (2004). Repetitive transcranial magnetic stimulation is as effective as fluoxetine in the treatment of depression in patients with Parkinson's disease. *Journal of Neurology, Neurosurgery and Psychiatry, 75,* 1171-1174.

Frisina, P. G., Borod, J. C., Foldi, N. S., & Tenenbaum, H. R. (2008). Depression in parkinson's disease: Health risks, etiology and treatment options. *Neuropsychiatric Disease and Treatment, 4,* 81-91.

Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). Mini mental state: Practical method for grading the cognitive state for the clinician. *Journal of Psychiatric Research, 12,* 189 – 198.

Foltynie, T., Brayne, C., & Barker, R. A. (2002). The heterogeneity of idiopathic parkinson's disease. *Journal of Neurology, 249*(2), 138-145.

Fong, T. G., et al. (2009). Telephone interview for cognitive status: Creating a crosswalk with the Mini Mental State Examination. *Alzheimer's and Dementia, 5,* 492-497.

Gaebel, W., & Baumann, A. E. (2003). Interventions to reduce the stigma associated with severe mental illness: Experiences from the Open the Doors Program in Germany. *Canadian Journal of Psychiatry, 48,* 657-662.

Garcia-Borreguero, D., Larrosa, O., & Bravo, M. (2003). Parkinson's disease and sleep. *Sleep Medicine Reviews, 7*(2), 115-129.

Garratt, G., & Ingram, R. E. (2007). Cognitive processes in cognitive therapy: Evaluation of the mechanisms of change in the treatment of depression. *Clinical Psychological Science and Practice, 14, 224-239.*

Garrido, M. M., Kane, R. L., Kaas, M., & Kane, R. A. (2009). Perceived need for mental health care among community-dwelling older adults. *Journal of Gerontology Series B, 64*(6), 704-712.

Gerber, P. E., & Lynd, L. D. (1998). Selective serotonin-reuptake inhibitor-induced movement disorders. *The Annals of Pharmacotherapy, 32*(6), 692-698.

Gibb, W. R. G., & Lees, A. J. (1988). A comparison of clinical and pathologic features of young- and old-onset parkinson's disease. *Neurology, 38,* 1402-1405.

Gibb, W. R. G., Narabayashi, H., Yokochi, M., Iizuka, R., & Lees, A. J. (1991). New pathologic observations in juvenile onset parkinsonism with dystonia. *Neurology, 41*(6), 820-822.

Giovannini, P., Piccolo, I., Genitrini, S., Soliveri, P., Girotti, F., Geminiani, G., Seigliano, G., & Caraceni, T. (1991). Early-onset parkinson's disease. *Movement Disorder Society, 6,* 36-42.

Glass, T. A., De Leon, M., Bassuk, S. S., & Berkman, L. F. (2006). Social engagement and depressive symptoms in late life: Longitudinal findings. *Journal of Aging and Health, 18,* 604-628.

Gloster, A. T., et al. (2008). Psychometric properties of the Depression Anxiety and Stress Scale-21 in older primary care patients. *Journal of Affective Disorders, 110*(3), 248-259.

Goetz, C. G., Poewe, W., Rascol, O., & Sampaio, C. (2005). Evidence-based medical review update: Pharmacological and surgical treatments of parkinson's disease: 2001 to 2004. *Movement Disorders, 20*(5), 523-539.

Goldberg, D. (2006). The aetiology of depression. *Psychological Medicine, 36*(10), 1341-1347.

Gomez Arevalo, G., Jorge, R., Garcia, S., Scipioni, O., & Gershanik, O. (1997). Clinical and pharmacological differences in eary- versus late-onset parkinson's disease. *Movement Disorder Society, 12*(3), 277-284.

Gonzalez, J. S., et al. (2010). Cognitive-behaviour therapy for adherence and depression (CBT-AD) in Type 2 diabetes. *Journal of Cognitive Psychotherapy, 24*(4), 329-343.

Gould, R. A., Otto, M. W., Pollack, M. H., & Yap, L. (1997). Cognitive behavioural and pharmacological treatment of generalized anxiety disorder: A preliminary meta-analysis. *Behaviour Therapy, 28*(2), 285-305.

Greenberg, D. B. (2004). Barriers to the treatment of depression in cancer patients. *Journal of the National Cancer Institute Monographs, 32,* 127-135.

Greenley, J. R., & Mechanic, D. (1976). Social selection in seeking help for psychological problems. *Journal of Health and Social Behaviour, 17*(3), 249-262.

Griffiths, K. M., Christensen, H., & Jorm, A. F. (2008). Predictors of depression stigma. *Biomed Central, 8*, *25-37.*

Grodstein, F., et al. (2000). Postmenopausal hormone therapy and cognitive function in healthy older women. *Journal of American Geriatric Society, 48,* 746-752.

Gulati, A., Forbes, A., Stegie, F., Kelly, L., Clough, C., & Chaudhuri, K. R. (2004). A clinical observational study of the pattern and occurrence of non-motor symptoms in parkinson's disease ranging from early to advanced disease. *Movement Disorders, 19*(9), 406-416.

Gum, A. M., et al. (2006). Depression treatment preferences in older primary care patients. *The Gerontologist, 46,* 14-22.

Gupta, R. (2000). Treatment of depression in an elderly Asian Indian male: A cognitive behavioural approach. *Clinical Gerontologist, 22,* 87 – 89.

Guze, B. H., & Barrio, J. C. (1991). The etiology of depression in parkinson's disease patients. *Psychomatics, 32*(4), 390-395.

Hackett, M. C., Anderson, C. S., House, A. O. (2004). *Intervention for treating depression after stroke (Cochrane review).* Chichester, United Kingdom: Wiley.

Hagell, P., & Nygren, C. (2006). The 39 item Parkinson's disease questionnaire (PDQ-39) revisited: Implications for evidence based medicine. *Journal of Neurology, Neurosurgery and Psychiatry, 78,* 1191-1198.

Hagell, P., Nordling, S., Reimer, J., Grabowski, M., & Persson, U. (2002). Resource use and costs in a Swedish cohort of patients with parkinson's disease. *Movement Disorders, 17,* 1213-1220.

Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery and Psychiatry, 23,* 56-62.

Hamilton, M. (1959). The assessment of anxiety states by rating. *British Journal of Medical Psychology, 32,* 50-55.

Hartelius, L., & Svensson, P. (1994). Speech and swallowing symptoms associated with parkinson's disease and multiple sclerosis. *Folia Phoniatrica et Logopaedica, 46,* 9-17.

Hatfield, A. B. (1999). Barriers to serving older adults with a psychiatric disability. *Psychiatric Rehabilitation Journal, 22,* 270-276.

Hayslip, B., Maiden, R. J., Thomison, N. L., & Temple, J. R. (2010). Mental health attitudes among rural and urban older adults. *Clinical Gerontologist, 33*(4), 316-331.

Haylsip, B., Ritter, M., Oltman, R., & McConnel, C. (1980). Home health care services and the rural elderly. *The Gerontologist, 20,* 192-199.

Heckman, T. G., & Carlson, B. (2007). A randomized clinical trial of two telephone-delivered, mental health interventions for HIV-infected persons in rural areas of the United States. *AIDS and Behaviour, 11,* 5-14.

Hedges, L. V. (1983). A random effects model for effect sizes. *Psychological Bulletin, 93*(2), 388-395.

Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis.* Academic Press, Inc.

Hedges, L. V., & Vevea, J. L. (1998). Fixed and random effects models in meta-analysis. *Psychological Methods, 3,* 486-504.

Heinrichs, N., Hoffman, E. C., & Hofmann, S. G. (2001). Cognitive-behavioural treatment for social phobia in Parkinson's disease: A single-case study. *Cognitive and Behavioural Practice, 8,* 328-335.

Hely, M., Morris, J. G. L., Reid, W. G. J., & Trafficante, R. (2005). Sydney multicentre study of parkinson's disease: Non-L-dopa-responsive problems dominate at 15 years. *Movement Disorders, 20*(2), 190-199.

Henderson, R., Kurlan, R., Kersun, J. M., & Como, P. (1992). Preliminary examination of the comorbidity of anxiety and depression in parkinson's disease. *The Journal of Neuropsychiatry and Clinical Neurosciences, 4,* 257-264.

Henderson, S., Byrne, D. G., & Duncan-Jones, P. (1981). *Neurosis and the Social Environment.* Sydney: Academic Press.

Hendriks, G. J., Voshaar, R. C., Keijsers, G. P. J., Hoogduin, C. A. L., & van Balkom, A. J. L. M. (2008). Cognitive-behavioural therapy for late-life anxiety disorders: A systematic review and meta-analysis. *Acta Psychiatrica Scandinavica, 117,* 403-411.

Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology, 44,* 227-239.

Hesser, H., Weise, C., Rief, W., & Andersson, G. (2011). The effect of waiting: A meta-analysis of wait-list control groups in trials for tinnitus distress. *Journal of Psychomatic Research, 70,* 378-384.

Higgins, J. P. T., Thompson, S. G., Deeks, J. J., & Altman, D. G. (2003). Measuring inconsistency in meta-analyses. *British Medical Journal, 327,* 557-560.

Higgins, J. P. T., & Thompson, S. G. (2002). Quantifying heterogeneity in a meta-analysis. *Statistics in Medicine, 21*(11), 1539-1558.

Highet, N. J., Hickie, I. B., & Davenport, T. A. (2002). Monitoring awareness of and attitudes to depression in Australia. *Medical Journal of Australia, 176,* 63-68.

Himle, J. A., Fischer, D. J., Van Etten, M. L., Janeck, A. S., & Hanna, G. L. (2003). Group behavioral therapy for adolescents with tic-related and non-tic-related obsessive-compulsive disorder. *Depression and Anxiety, 17*, 73-77.

Himelhoc, S., Wller, W. E., Wu, A. W., Anderson, G. F., & Cooper, L. A. (2004). Chronic medical illness, depression, and use of acute medical services among Medicare beneficiaries. *Medical Care, 42*(6), 512-521.

Hinnell, C., Hurt, C. S., Landau, S., Brown, R. G., & Samuel, M. (2012). Non-motor vs motor symptoms: How much do they matter to health status in Parkinson's disease? *Movement Disorders, 27,* 236-41.

Hinson, J. A., & Swanson, J. L. (1993). Willingness to seek help as a function of self-disclosure and problem severity. *Journal of Counseling and Development, 71*(4), 465-470.

Hoehn, M. M., & Yahr, M. D. (1967). Parkinsonism: Onset, progression, and mortality. *Neurology, 17*(5)*,* 427-442.

Holden, J. E., Kelley, K., & Argarwal, R. (2008). Analyzing change: A primer on multivel models with applications to nephrology. *American Journal of Nephrology, 28*(5), 792-801.

Holroyd, S., Currie, L. J., & Wooten, F. (2005). Depression is associated with impairment of ADL, not motor function in Parkinson's disease. *Neurology, 64,* 2134-2135.

Holvast, F., et al. (2012). Determinants of receiving mental health care for depression in older adults. *Journal of Affective Disorders, 143,* 69-74.

Hornykiewicz, O. (2001). Chemical neuroanatomy of the basal ganglia – normal and in parkinson's disease. *Journal of Chemical Neuroanatomy, 22,* 3-12.

Horvath, A. O., & Bedi, R. P. (2002). The alliance. In J. C. Norcross (Ed.), *Psychotherapy Relationships that Work: therapist contributions and responsiveness to patients*. New York: Oxford University Press.

Hu, L., T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new altneratives. *Structual Equation Modeling: A Multidisciplinary Journal, 6,* 1-55.

Hu, L. T., Bentler, P. M. & Kano, Y. (1992). Can test statistics in covariance structure analysis be trusted? *Psychological Bulletin, 112,* 351-362.

Huber, S. J., Paulson, G. W., & Shuttleworth, E. C. (1988). Relationship of motor symptoms, intellectual impairment, and depression in Parkinson's disease. *Journal of Neurology, Neurosurgery and Psychiatry, 51,* 855-858.

Hunkeler, E. M., Katon, W., Tang, L., Williams Jr, J. W., Kroenke, K., Lin, E. H. B., Harpole, L. H., Arean, P., Levine, S. L., Grypma, L. M., Hargreaves, W. A., & Unutzer, J. (2006). Long term outcomes from the IMPACT trial for depressed elderly patients in primary care. *British Medical Journal, 332*(7536), 259-263.

Hunter, J. E., & Schmidt, F. L. (2002). Fixed effects vs. random effects meta-analysis models: Implications for cumulative research knowledge. *International Journal of Selection and Assessment, 8*(4), 275-292.

Insel, T. R. (1992). Toward a neuroanatomy of obsessive-compulsive disorder. *Archives of General Psychiatry, 49*(9), 739-744.

Jacobson, N. S., & Truax, P. (1991). Clinical significance: A statistical approach to defining meaningful change in psychotherapy research. *Journal of Consulting and Clinical Psychology, 39,* 12 – 19.

Jenkinson, C., Peto, V., Fitzpatrick, R., Greenhall, R. (1995). Self-reported functioning and well-being in patients with Parkinson 's disease: comparison of the Short-form Health Survey (SF-36) and the Parkinson's Disease Questionnaire (PDQ-39). *Age and Ageing, 24*, 505 – 509.

Jorm, A. F., Duncan-Jones, P., & Scott, R. (1989). An analysis of the re-test artefact in longitudinal studies of psychiatric symptoms and personality. *Psychological Medicine, 19*, 487–493.

Jorm, A., Angermeyer, M., & Katschnig, H. (2000). Public knowledge of and attitudes to mental disorders: A limiting factor in the optimal use of treatment services. In G. Andrews, & S. Henderson (Eds.). *Unmet need in psychiatry.* Cambridge University Press.

Kahn, R. L. (1975). The mental health system and the future aged. *Gerontologist, 15*(2), 24-31.

Karabenick, S. A. & Knapp, J. R. (1991). Relationship of academic help seeking to the use of learning strategies and other instrumental achievement behaviour in college students. *Journal of Educational Psychology, 83*(2), 221-230.

Karlin, B. E., & Norris, M, P. (2006). Public mental health care utilization by older adults. *Mental Health and Mental Health Services Research, 33*(6), 730-736.

Katon, W., et al. (1990). Distressed high utilizers of medical care: DSM-II-R diagnoses and treatment needs. *General Hospital Psychiatry, 12*(6), 355-362.

Kendler, K. S., Karkowski, L. M., & Prescott, C. A. (1999). Causal relationship between stressful life events and the onset of major depression. *American Journal of Psychiatry, 156,* 837-848.

Kessler, R. C. (1997). The effects of stressful life events on depression. *Annual Review of Psychology, 48,* 191-214.

Kessler, R. C., Berglund, P. B., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62,* 593-602.

Kisamore, J. L., & Brannick, M. T. (2008). An illustration of the consequences of meta-analysis and model choice. *Organizational Research Methods, 11*, *35-53.*

Kish, L. (1965). *Survey sampling.* New York: Wiley.

Klap, R., Unroe, K. T., & Unutzer, J. (2003). Caring for mental illness in the United States: A focus on older adults. *The American Journal of Geriatric Psychiatry, 11*(5), 517-524.

Klaassen, T., Verhey, F. R. J., Sneijders, G. H. J. M., Rozendaal, N., de Vet, H. C. W., & van Praag, H. M. (1995). Treatment of depression in parkinson's disease: A meta-analysis. *The Journal of Neuropsychiatry and Clinical Neurosciences, 7,* 281-286.

Kline, R. B. (2010). *Principles and practice of structural equation modelling (Ed.).* New York, NY: Guildford.

Klos, K. J., Bower, J. H., Josephs, K. A., Matsumoto, J. Y., & Ahlskog, E. (2005). Pathological hypersexuality predominantly linked to adjuvant dopamine agonist therapy in parkinson's disease and multiple system atrophy. *Parkinsonism and Related Disorders, 11*(6), 381-386.

Kneebone, I. I. (1996). Teaching about ageing: The new challenge for Australian clinical psychologists. *Australian Psychologist, 31,* 124-126.

Kobak, K. A., Greist, J. A., Jefferson, J. W., Katzelnick, D. J., & Henk, H. J. (1998). Behavioral versus pharmacological treatments of obsessive compulsive disorder: A meta-analysis. *Psychopharmacologia, 136*, 205–216.

Komiya, N., Good, G. E., & Sherrod, N. B. (2000). Emotional openness as a predictor of college students' attitudes toward seeking psychological help. *Journal of Counseling Psychology, 47*, 138-143.

Kostic, V., Przedborski, S., Flaster, E., & Sternic, N. (1991). Early development of levodopa-induced dyskinesias and response fluctuations in young-onset parkinson's disease. *Neurology, 41*2), 202-205.

Kostis, J. B., Rosen, R. C., Cosgrove, N. M., Shindler, D. M., & Wilson, A. C. (1994). Nonpharmacologic therapy improves functional and emotional status in congestive heart failure. *Chest, 106*(4), 996-1001.

Kozel, F. A., & George, M. S. (2002). Meta-analysis of left prefrontal repetitive transcranial magnetic stimulation (rTMS) to treat depression. *Journal of Psychiatric Practice, 8*(5), 270-275.

Kremer, J., & Starkstein, S. E. (2000). Affective disorders in Parkinson's disease. *International Review of Psychiatry, 12,* 290–297.

Kunik, M. E., et al. (2001). One session cognitive behavioural therapy for elderly patients with chronic obstructive pulmonary disease. *Psychological Medicine, 31*(4), 717-723.

Kunik, M. E., et al. (2008). COPD education and cognitive behavioural therapy group treatment for clinically significant symptoms of depression and anxiety in COPD patients: A randomized controlled trial. *Psychological Medicine, 38*(3), 385-396.

Kuyken, W., et al. (2008). Mindfulness-based cognitive therapy to prevent relapse in recurrent depression. *Journal of Consulting and Clinical Psychology, 76*(6), 966-978.

Kupio, A., Marttila, R. J., Helenius, H., Toivonen, M., & Rinne, U. K. (2000). The quality of life in Parkinson's disease. *Movement Disorders, 15*(2), 216-223.

Laidlaw, K., (2008) *Cognitive Behaviour Therapy for Depression in Parkinson's disease*, in Laidlaw, K. & Knight, B.G (Eds.,). Handbook of the Assessment and Treatment of Emotional Disorders in Later Life. Oxford: Oxford University Press

Laidlaw, K., Thompson, L.W., Siskin-Dick, L., & Gallagher-Thompson, D. (2003) *Cognitive Behavioural Therapy with Older People.* Chichester: John Wiley & Sons, Ltd.

Laidlaw, K. (2006). *Cognitive Behavior Therapy with Older Adults*. In Quall, S. & Knight, B.G. (Eds.,) Psychotherapy with Older Adults. New York: John Wiley & Sons, Inc.

Laidlaw, K., & McAlpine, S. (2008). Cognitive behaviour therapy: How is it different with older people? *Journal of Rational-Emotional Cognitive Behaviour Therapy, 26,* 250-262.

Laidlaw, K., et al. (2008). A randomised controlled trial of cognitive behaviour therapy vs treatment as usual in the treatment of mild to moderate late life depression. *International Journal of Geriatric Psychiatry, 23,* 843-850.

Lang, A. E., & Obeso, J. A. (2004). Challenges in parkinson's disease: Restoration of the nigrostriatal dopamine system is not enough. *The Lancet Neurology, 3*, 309-316.

Langa, K. M., et al. (2005). The aging, demographics, and memory study: Study design and methods. *Neuroepidemiology, 25,* 181-191.

Lasoski, M. C. (1986). Reasons for low utilization of mental health services by the elderly. *Clinical Gerontologist, 5,* 1-18.

Lasoski, M. C., & Thelen, M. H. (1987). Attitudes of older and middle-aged persons toward mental health intervention. *The Gerontologist, 27*(3), 288-292.

Larcombe, N. A., & Wilson, P. H. (1984). An evaluation of cognitive-behaviour therapy for depression in patients with multiple sclerosis. *British Journal of Psychiatry, 145,* 366-371.

Lauterbach, E. C. (1993). Dopaminergic hallucinosis with fluoxetine in Parkinson's disease. *The American Journal of Psychiatry, 150*(11), 1750-1755.

Lauterbach, E. C., & Duvoisin, R. C. (1991). Anxiety disorders in familial parkinsonism. *The American Journal of Psychiatry, 148*(2), 274-279.

Lauterbach, E. C., Freeman, A., & Vogel, R. L. (2003). Correlates of generalised anxiety and panic attacks in dystonia and parkinson's disease. *Cognitive and Behavioural Neurology, 16*(4), 225-233.

Lebowitz, B. D., et al. (1997). Diagnosis and treatment of depression in late life: Consensus statement update. *The Journal of the American Medical Association, 278*(4), 1186-1190.

Lee, K., Volans, P. J., & Gregory, N. (2003). Trainee clinical psychologists' views on recruitment to work with older people. *Ageing and Society, 23,* 83-97.

Leentjens, A. F. G., Vreeling, F. W., Luijckx, G. J., & Verhey, F. R. J. (2003). SSRIs in the treatment of depression in Parkinson's disease. *International Journal of Geriatric Psychiatry, 18,* 552-554.

Leentjens, A. F. G. (2004). Depression in Parkinson's disease: Conceptual issues and clinical challenges. *Journal of Geriatric Psychiatry and Neurology, 17,* 120-126.

Leentjens, A. F. G., Scholtissen, B., Vreeling, F. W., & Verhey, F. R. J. (2006). The serotonergic hypothesis for depression in Parkinson's disease: An experimental approach. *Neuropsychopharmacology, 31,* 1009-1015.

Leentjens, A. F. G., Dujardin, K., Marsh, L., Martinez-Martin, P., Richard, I. H., Starkstein, S. E., Weintraub, D., Sampaio, C., Poewe, W., Rascol, O., Stebbins, G. T., & Goetz, C. G. (2008). Anxiety rating scales in parkinson's disease: Critique and recommendations. *Movement Disorders, 23*(4), 2015-2025.

Leentjens, A. F. G., Dujardin, K., Marsh, L., Martinez-Martin, P., Richard, I. H., & Starkstein, S. (2012). Anxiety and motor fluctuations in Parkinson's disease: A cross-sectional observational study. *Parkinsonism and Related Disorders, 18,* 1084-1088.

Leentjens, A. F. G., et al. (2012). Anxiety rating scales in Parkinson's disease: A validation study of the Hamilton Anxiety Rating Scale, the Beck Anxiety Inventory, and the Hospital Anxiety and Depression Scale. *Movement Disorders, 26*(3), 407-415.

Leentjens, A. F. G., Koester, J., Fruh, B., Shephard, T. S., Barone, P., & Houben, J. J. G. (2009). The effect of pramipexole on mood and motivational symptoms in Parkinson's disease: A meta-analysis of placebo-controlled studies. *Clinical Therapeutics, 31,* 89-98.

Lemke, M. R., Brecht, M., Koester, J., Kraus, P. H., & Reichmann, H. (2005). Anhedonia, depression, and motor functioning in Parkinson's disease during treatment with pramipexole. *The Journal of Neuropsychiatry and Clinical Neurosciences, 17*(2), 214-220.

Lemke, M. R. (2008). Depressive symptoms in parkinson's disease. *European Journal of Neurology, 15,* 21-25.

Lemke, M. R. (2002). Effect of reboxetine on depression in Parkinson's disease patients. *Journal of Clinical Psychiatry, 63*, 300-304.

Lenze, E. J., Mulsant, B. H., Shear, M. K., Schulberg, H. C., Dew, M. A., Begley, A. E., Pollock, B. G., & Reynolds, C. F. (2000). Comorbid anxiety disorders in depressed elderly patients. *American Journal of Psychiatry, 157,* 722-728.

Leroi, I., & King, P. (2008). Cognitive behaviour therapy for anxiety and depression in Parkinson's disease: A pilot study. *Movement Disorders, 23,* 276-280.

Lewinsohn, P. M., & Clarke, G. N. (1999). Psychosocial treatments for adolescent depression. *Clinical Psychology Review, 19*(3), 329-342.

Lewis, S. J. G., & Barker, R. A. (2009). Understanding the dopaminergic deficits in parkinson's disease: Insights into disease heterogeneity. *Journal of Clinical Neuroscience, 16,* 620-625.

Lii, Y. C., Tsay, S. L., & Wang, T. J. (2007). Group intervention to iprove quality of life in haemodialysis patients. *Journal of Clinical Nursing, 16*(11), 268-275.

Lima, C. A. D., Levav, I., Jacobsson, L., & Rutz, W. (2003). Stigma and discrimination against older people with mental disorders in Europe. *International Journal of Geriatric Psychiatry, 18,* 670-682.

Lin, P., & Su, K. (2007). A meta-analytic review of double-blind, placebo-controlled trials of antidepressant efficacy of Omega-3 fatty acids. *Journal of Clinical Psychiatry, 68*(7), 1056-1061.

Linazasoro, G. (2000). Worsening of Parkinson's disease by citalopram. *Parkinsonism and Related Disorders, 6*(2), 111-113.

Link, B., & Phelan, J. (2001). Conceptualizing stigma. *Annual Review of Sociology, 27*, 363–385

Lipchik, G. L., Smitherman, T. A., Penzien, D. B., & Holroyd, K. A. (2006). Basic principles and techniques of cognitive-behavioural therapies for comorbid psychiatric symptoms among headache patients. *Headache, 46*(3), 119-132.

Lombardi, W. J., Woolston, J., Roberts, J. W., & Gross, R. E. (2001). Cognitive deficits in patients with essential tremor. *Neurology, 57*(5), 785-790.

Looney, S. W. (1995). How to use tests for univariate normalityot assess multivariate normality. *The American Statistician, 49,* 64-70.

Lotharius, J., & Brundin, P. (2002). Pathogenesis of parkinson's disease: Dopamine, vesicles and a-synuclein. *Neuroscience, 3,* 1-11.

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety inventories. *Behaviour Research and Therapy, 33*(3), 335-343.

Lundervold, D. A., & Young, L. G. (1992). Older adults' attitudes and knowledge regarding use of mental health services. *Journal of Clinical and Experimental Gerontology, 14,* 45-55.

Macht, M., et al. (2007). Patient education in Parkinson's disease: Formative evaluation of a standardized programme in seven European countries. *Patient Education and Counseling, 65,* 245-252.

Macht, M., Pasqualini, M. S., & Taba, P. (2007). Cognitive-behavioural strategies for Parkinson's disease: A report of three cases. *Journal of Clinical Psychology in Medical Settings, 14,* 165-176.

Mackenzie, C. S., Knox, V. J., Gekoski, W. L., & Macaulay, H. L. (2004). An adaptation and extension of the Attitudes Toward Seeking Professional Psychological Help Scale. *Journal of Applied Social Psychology, 34*(11), 2410-2435.

Mackenzie, C. S., Gekoski, W. L., & Knox, V. J. (2006). Age, gender, and the underutilization of mental health services: The influence of help-seeking attitudes. *Aging and Mental Health, 10*(6), 574-582.

Mackenzie, C. S., Scott, T., Mather, A., & Sareen, J. (2008). Older adults' help-seeking attitudes and treatment beliefs concerning mental health problems. *The American Journal of Geriatric Psychiatry, 16*(12), 1010-1019.

Maguire, P. (1985). Improving the detection of psychiatric problems in cancer patients. *Social Science and Medicine, 20*(8), 819-823.

Mackenzie, C. S., Pagura, J., & Sareen, J. (2010). Correlates of perceived need for and use of mental health services by older adults in collaborative psychiatric epidemiology surveys. *American Journal of Geriatric Psychiatry, 18*(12), 1103-1115.

Mandir, A. S., & Vaughan, C. (2000). Pathophysiology of parkinson's disease. *International Review of Psychiatry, 12,* 270-280.

Manne, S. L., et al. (2008). Mediators of a coping and communication-enhancing intervention and a supportive counselling intervention among women diagnosed with gynaecological cancers. *Journal of Consulting and Clinical Psychology, 76*(6), 1034-1045.

Marangell, L. B., Martinez, J. M., Zboyan, H. A., Kertz, B., Kim, H. F. S., & Puryear, L. J. (2003). A double-blind, placebo-controlled study of the Omega-3 fatty acid docosahexaenoic acid in the treatment of major depression. *The American Journal of Psychiatry, 160*(5), 996-998.

Marin-Martinez, F., & Sanchez-Meca, J. (2009). Weighting by inverse variance or by sample size in random-effects meta-analysis. *Educational and Psychological Measurement, 70,* 56-73.

Markowitz, F. E. (1998). The effects of stigma on the psychological well-being and life satisfaction of persons with mental illness. *Journal of Health and Social Behaviour, 39*(4), 335-347.

Marsh, L. (2000). Anxiety disorders in Parkinson's disease. *International Review of Psychiatry, 12,* 307-318.

Marsh, L., McDonald, W. M., Cummings, J., & Ravina, B. (2006). Provisional diagnostic criteria for depression in Parkinson's disease: Report of an NINDS/NIMH work group. *Movement Disorders, 21*(2), 148-158.

Martinez-Marin, P., Serrano-Duenas, M., Forjaz, M. J., & Serrano, M. S. (2007). Two questionnaires for Parkinson's disease: Are the PDQ-39 and PDQL equivalent? *Quality of Life Research, 16,* 1221-1230.

Masterton, G. J. R. (2003). The pros and cons of SSRI antidepressants. *Royal College of Physicians of Edinburg, 33,* 162-167.

Mayeux, R., Stern, Y., Rosen, J., & Leventhal, J. (1981). Depression, intellectual impairment, and Parkinson disease. *Neuroloy, 31*(5), 645-650.

Mayeux, R., Stern, Y., Cote, L., & Williams, J. B. W. (1984). Altered serotonin metabolism in depressed patients with Parkinson's disease. *Neurology, 34*(5)-642-647.

Mayeux, R., Stern, Y., Williams, J. B. W., Cote, L., Frantz, A., & Dyrenfurth, I. (1986). Clinical and biochemical features of depression in parkinson's disease. *American Journal of Psychiatry, 143,* 756-759.

McAlpine, D. D., & Mechanic, D. (2000). Utilization of specialty mental health care among persons with severe mental illness: The roles of demographics, need, insurance, and risk. *Health Services Research, 35,* 277-292.

McDonald, W. M., Richard, I. H., & DeLong, M. R. (2003). Prevalence, etiology and treatment of depression in parkinson's disease. *Biological Psychiatry, 54,* 363-375.

McDougle, C. J., et al. (1994). Haloperidol addition in fluvoxamine-refractory obsessive-compulsive disorder: A double-blind, placebo-controlled study in patients with and without tics. *Archives of General Psychiatry, 51*(4), 302-308.

McNamara, P., Stavitsky, K., Durso, R., & Harris, E. (2010). The impact of clinical and cognitive variables on social functioning in Parkinosn's disease: Patient versus examiner estimates. *Parkinson's Disease, 2010,* 1-6.

Melfi, C. A., Anita, C., Thomas, C., Mark, H., Kennedy, S., & Sredl, K. (1998). The effects of adherence to antidepressant treatment guidelines on relapse and recurrence of depression. *Archives of General Psychiatry, 55*(12), 1128-1132.

Menza, M. A., & Mark, M. H. (1994). Parkinson's disease and depression: The relationship to disability and personality. *The Journal of Neuropsychiatry and Clinical Neurosciences, 6*(2), 165-169.

Menza, M. A., Robertson-Hoffman, D. E., & Bonapace, A. S. (1993). Parkinson's disease and anxiety: Comorbidity with depression. *Biological Psychiatry, 34,* 465-470.

Menza, M., et al. (2009). A controlled trial of antidepressants in patients with Parkinson disease and depression. *Neurology, 72,* 886-892.

Micieli, G., Tosi, P., Marcheselli, S., & Cavallini, A. (2003). Autonomic dysfunction in parkinson's disease. *Neurological Sciences, 24,* 32-34.

Mickus, M., Colenda, C. C., & Hogan, A. J. (2000). Knowledge of mental health benefits and preferences for type of mental health providers among the general public. *Psychiatric Services, 51,* 199-202.

Miller, K. M., Okun, M. S., Fernandez, H. F., Jacobson, C. E., Rodriguez, R. L., & Bowers, D. (2007). Depression symptoms in movement disorders: Comparing parkinson's disease, dystonia, and essential tremor. *Movement Disorders, 22*(5), 666-672.

Miner, C. M., et al. (1995). Brain fluoxetine measurements using fluorine magnetic resonance spectroscopy in patients with social phobia. *Biological Psychiatry, 38*(10), 696-698.

Mizutima, Y., Yokochi, M., & Ozanagi, S. (1991). Juvenile parkinsonism: A case with first clinical manifestation at the age of six years and with neuropathological findings suggesting a new pathogenesis. *Clinical Neuropathology, 10,* 91-97.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *British Medical Journal, 339,* 2535-2540.

Mohlman, J. (2004). Psychosocial treatment of late-life generalized anxiety disorder: Current status and future directions. *Clinical Psychology Review, 24*(2), 140-169.

Mohlman, J., Reel, D. H., Chazin, D., Ong, D., Georgescu, B., Tiu, J., & Dobkin, R. D. (2010). A novel approach to treating anxiety and enhancing executive skills in an older adult with Parkinson's disease. *Clinical Case Studies, 9,* 74-90.

Mohr, D. C., Boudewynn, C., Goodkin, D. E., Bostrom, A., & Epstein, L. (2001). Comparative outcomes for individual CBT, supportive-expressive group psychotherapy and sertraline for the treatment of depression in multiple sclerosis. *Journal of Consulting Clinical Psychology, 69*, 942 – 949.

Mohr, D. C., et al. (2009). The selection and design of control conditions for randomized controlled trials of psychological interventions. *Psychotherapy and Psychosomatics, 78*, 275-284.

Mondolo, F., Jahanshahi, M., Grana, A., Biasutti, E., Cacciatori, E., Di Benedetto, P. (2007). Evaluation of anxiety in parknison's disease with some commonly used rating scales. *Neurological Science, 28,* 270-275.

Montgomery, S. A., & Asberg, M. (1979). A new depression scale, designed to be sensitive to change. *British Journal of Psychiatry, 134,* 382-389.

Morley, S., Eccleston, C., Williams, A. (1999). Systematic review and meta analysis of randomized controlled trials of cognitive behaviour therapy and behaviour therapy for chronic pain in adults, excluding headache. *Pain, 80*, 1 – 13.

Morgan, J. C., diDonato, C. J., Iyer, S. S., Jenkins, P. D., Smith, J. R., & Sethi, K. D. (2006). Self-stimulatory behaviour associated with deep brain stimulation in parkinson's disease. *Movement Disorders, 21*(2), 283-285.

Morris, M. C., Evans, D. A., Tangney, C. C., Bienias, J. L., & Wilson, R. S. (2005). Fish consumption and cognitive decline with age in a large community study. *Archives of Neurology, 65*(12), 1849-1853.

Morrison, N. (2001). Group cognitive therapy: treatment of choice or sub-optimal option? *Behavioural and Cognitive Psychotherapy, 29,* 311–332

Morrison, C. E., et al. (2004). Neuropsychological functioning following bilateral subthalamic nucleus stimulation in Parkinson's disease. *Archives of Clinical Neuropsychology, 19*(2), 165-181.

Mojtabai, R., Olfson, M., & Mechanic, D. (2002). Perceived need and help-seeking in adults with mood, anxiety, or substance use disorders. *Archives of General Psychiatry, 59,* 77-84.

Muller, T. (2002). Drug treatment of non-motor symptoms in parkinson's disease. *Expert Opinion on Pharmacotherapy, 3*(4), 381-388.

Muthane, U. B., Swamy, H. S., Satishchandra, P., Subhash, N., Rao, S., & Subbakrishna, D. (1994). Early onset parkinson's disease: Are juvenile and young-onset different? *Movement Disorder Society, 9*(5), 539-544.

Mynor-Wallis, L. M., Gath, D. H., Day, A., & Baker, F. (2000). Randomised controlled trial of problem solving treatment, antidepressant medication, and combined treatment for major depression in primary care. *British Medical Journal, 320,* 26-30.

Nada-Raja, S., Morrison, D., & Skegg, K. (2003). A population-based study of help-seeking for self-harm in young adults. *Australian and New Zealand Journal of Psychiatry, 37*(5), 600-605.

Narabayashi, H., Yokochi, M., Iizuka, R., & Nagatsu, T. (1986). Juvenile parkinsonism. In P. J. Vinken, G. W. Bruyn, H. L. Klawans (Eds.), *Handbook of Clinical Neurology* (pp. 153-165). Amsterdam: Elsevier.

Nathan, P., Reeces, C., & Smith, L. (2001). *Mood Management Course.* The West Australian Institute for Psychotherapy Research.

Nathan, P., McEvoy, P. & Rees, C. (2004). *Transporting efficacy research into community treatment: A benchmarking study*. Paper presented at The 27th National AACBT Conference, May, Perth, Australia

National Institute of Health and Clinical Excellence. (2006). *Parkinson's disease. National clinical guideline for diagnosis and management in primary and secondary care.* Great Britain: Royal College of Physicians.

National Institute of Health and Clinical Excellence. (2010a). *Depression. The NICE guideline on the treatment management of depression in adults. Updated Version.* Great Britain: British Psychological Society and the Royal College of Psychiatrists.

National Institute of Health and Clinical Excellence. (2010b). *Generalised anxiety disorder and panic disorder (with or without agoraphobia) in adults: Management in primary, secondary and community care (partial update).*

Great Britain: National Collaborating Centre for Mental Health and the Royal College of General Practitioners.

Negre-Pages, L., et al. (2010). Anxious and depressive symptoms in Parkinson's disease: The French cross-sectional DoPAMiP study. *Movement Disorders, 25*(2), 157-166.

Nemets, B., Stahl, Z., & Belmaker, R. H. (2002). Addition of Omega-3 fatty acid to maintenance medication treatment for recurrent unipolar depressive disorder. *The American Journal of Psychiatry, 159*(3), 477-479.

Noble, C. (2007). Understanding Parkinson's disease. *Nursing Standard, 21(*34), 48-56.

Nussbaum, R. L., & Ellis, C. E. (2003). Alzheimer's disease and parkinson's disease. *New England Journal of Mediciine, 348,* 1356-1364.

Nuti, A., Ceravolo, R., Piccinni, A., Dell'Agnello, G., Bellini, G., Gambaccini, G., Rossi, C., Logi, C., Dell'Osso, L., & Bonuccelli, U. (2004). Psychiatric comorbidity in a population of parkinson's disease patients. *European Journal of Neurology, 11,* 315-320.

Nutt, J. G., Woodward, W. R., Hammerstad, J. P., Carter, J. H., & Anderson, J. L. (1984). The "on-off" phenomenon in parkinson's disease. *Parkinson's Disease, 310*(8), 483-488.

Nygren, B., et al. (2005). Resilience, sense of coherence, purpose in life and self-transcendence in relation to perceived physical and mental health among the oldest old. *Aging and Mental Health, 9*(4), 354-362.

Oehlberg, K., et al. (2008). Attitudes regarding the etiology and treatment of depression in Parkinson's disease: A qualitative study. *Journal of Geriatric Psychiatry and Neurology, 21*(2), 123-132.

Okun, M. S., & Watts, R. L. (2002). Depression associated with parkinson's disease: Clinical features and treatment. *Neurology, 58,* S63-S70.

Olanow, C. W., Watts, R. L., & Koller, W. C. (2001). An algorithm (decision tree) for the management of parkinson's disease (2001): Treatment guidelines. *Neurology, 56*(11), 1-88.

Olfson, M., & Pincus, H. A. (1996). Outpatient mental health care in nonhospital settings: Distribution of patients across provider groups. *The American Journal of Psychiatry, 153*(10), 1353-1356.

Olfson, M., Marcus, S. C., Tedeschi, M., & Wan, G. J. (2006). Continuity of antidepressant treatment for adults with depression in the United States. *The American Journal of Psychiatry, 163,* 101-108.

Ormel, J., Koeter, M. W. J., van den Brink, W., & van de Willige, G. (1991). Recognition, management and course of anxiety and depression in general practice. *Archives of General Psychiatry, 48*(8), 700-706.

Otto, M. W., Tuby, K. S., Gould, R. A., McLean, R. Y. S., & Pollack, M. H. (2001). An effect-size analysis of the relative efficacy and tolerability of serotonin selective reuptake inhibitors for panic disorder. *The American Journal of Psychiatry, 158*(12), 1989-1992.

Oxman, T. E., & Hull, J. G. (1997). Social support, depression, and activities of daily living in older heart surgery patients. *The Journals of Gerontology Series B, 51,* 1-14.

Pachana, N. A., et al. (2007). Development and validation of the Geriatric Anxiety Inventory. *International Psychogeriatrics, 19,* 103-114.

Pal, E., Nagy, F., Aschermann, Z., Balazs, E., & Kovacs, N. (2010). The impact of left prefrontal repetitive transcranial magnetic stimulation on depression in Parkinson's disease: A randomized, double-blind, placebo-controlled study. *Movement Disorders, 25*(4), 2311-2317.

Palanci, J., Marsh, L., & Pontone, G. (2011). Gaps in treatment for anxiety in Parkinson's disease. *American Journal of Geriatric Psychiatry, 19*(10), 907-908.

Pallone, J. A. (2007). Introduction to parkinson's disease. *Disease-A-Month, 53*(4), 195-199.

Papapetropoulous, S., & Mash, D. C. (2005). Psychotic symptoms in parkinson's disease. *Journal of Neurology, 252*(7), 753-764.

Parkinson's Association of Western Australia. (2003). *Guidelines for Nursing Practice in Caring for People with Parkinson's Disease.* Authors.

Parslow, R. A., & Jorm, A. F. (2000). Who uses mental health services in Australia? An analysis of data from the National Survey of Mental Health and Wellbeing. *Australian and New Zealand Journal of Psychiatry, 34,* 997-1008.

Paulus, W., & Jellinger, K. (1991). The neuropathologic basis of different clinical subgroups of parkinson's disease. *Journal of Neuropathology and Experimental Neurology, 50*(6), 743-755.

Paykel, E. S. (2007). Life events, social support and depression. *Acta Psychiatrica Scandinavica, 89,* 50-58.

Pepin, R., Segal, D. L., & Coolidge, F. L. (2009). Intrinsic and extrinsic barriers to mental health care among community-dwelling younger and older adults. *Aging and Mental Health, 13*(5), 769-777.

Peterson, A. L., & Halstead, T. S. (1998). Group cognitive behaviour therapy for depression in a community setting: A clinical replication series. *Behaviour Thearpy, 29,* 3-18.

Peto, V., Jenkinson, C., & Fitzpatrick, R. PDQ-39: A review of the development, validation and application of a parkinson's disease quality of life questionnaire and its associated measures. *Journal of Neurology, 245*, 10 – 14.

Petry, N. M., Weinstock, J., Ledgerwood, D. M., & Morasco, B. (2008). A randomized trial of brief interventions for problem and pathological gamblers. *Journal of Consulting and Clinical Psychology, 76*(2), 318-328.

Pinheiro, J. C., & Bates, D. M. (2000). *Mixed-effect models in S and S-plus.* Springer.

Pinquart, M., & Duberstein, P. R. (2007). Treatment of anxiety disorders in older adults: A meta-analytic comparison of behavioural and pharmacological interventions. *The American Journal of Geriatric Psychiatry, 15*(8), 639-651.

Pinquart, M., Duberstein, P. R., & Lyness, J. M. (2007a). Treatments for later-life depressive conditions: A meta-analytic comparison of pharmacotherapy and psychotherapy. *The American Journal of Psychiatry, 163,* 1493-1501.

Pinquart, M., Duberstein, P. R., & Lyness, J. M. (2007b). Effects of psychotherapy and other behavioral interventions on clinically depressed older adults: a meta-analysis. *Aging and Mental Health, 11*, 645 – 657.

Pitchot, W., Ansseau, M., Moreno, A. G., Hansenne, M., & von Frenckell, R. (1992). Dopaminergic function in panic disorder: Comparison with major and minor depression. *Biological Psychiatry, 32*(11), 1004-1011.

Plassman, B. L., Newman, T. T., Welsh, K. A., Helms, M. J., & Breitner, J. C. (1994). Properties of the Telephone Interview for Cognitive Status:

Application in epidemiological and longitudinal studies. *Neuropsychiatry, Neuropsychology and Behavioural Neurology, 7,* 235-241.

Poewe, W., & Seppi, K. (2001). Treatment options for depression and psychosis in Parkinson's disease. *Journal of Neurology, 248*(3), 12-21.

Politis, M., Wu, K., Loane, C., Kiferle, L., Molloy, S., Brooks, D., & Piccini, P. (2010). Staging of seroterngic dysfunction in parkinson's disease: An in vivo C-DASB PET study. *Neurobiology of Disease, 40,* 216-221.

Potts, N. L. S., & Davidson, J. R. T. (1992). Social phobia: Biological aspects and pharmacotherapy. *Progress in Neuro-Psychopharmacology and Biological Psychiatry, 16*(5), 635-646.

Prado, R. C. P., & Barbosa, E. R. (2005). Depression in Parkinson's disease. *Arquivos De Neuro-Psiquiatria, 63,* 766-771.

Prediger, R. D. S., et al. (2012). Anxiety in Parkinson's disease: A critical review of experimental and clinical studies. *Neuropharmacology, 62,* 115-124.

Preskorn, S. H., & Lacey, R. L. (2007). Polypharmcy: When is it rational? *Journal of Psychiatric Practice, 13,* 97-105.

Prins, M. A., Verhaak, P., Bensing, J., Veer, K. V. (2008). Health believes and perceived need of mental health care for anxiety and depression – the patient's perspective explored. *Clinical Psychology Review, 28*(6), 1038-1058.

Qualls, S. H., Segal, D. L., Norman, S., Niederehe, G., & Gallagher-Thompson, D. (2002). Psychologists in practice with older adults: Current patterns, sources of training, and need for continuing education. *Professional Psychology: Research and Practice, 33*(5), 435-442.

Quinn, N. P., Rossor, M. N., & Marsden, C. D. (1986). Dementia and parkinson's disease – pathological and neurochemical considerations. *British Medical Bulletin, 42,* 86-90.

Qureshi, S. U., Amspoker, A. B., Calleo, J. S., Kunik, M. E., & Marsh, L. (2012). Anxiey disorders, physical illnesses, and health care utilization in older male veterans with Parkinson disease and comorbid depression. *Journal of Geriatric Psychiatry and Neurology, 25,* 233-239.

Rabey, J. M., Orlov, E., & Korczyn, A. D. (1996). Comparison of fluvoxamine versus amitriptyline for treatment of depression in Parkinson's disease. *Neurology, 46,* 374-379.

Rachman, S. (1999). Rapid and not-so-rapid responses to cognitive behavioural therapy. *Clinical Psychological Science and Practice, 6,*

Rahman, S., Griffin, H. J. Quinn, N. P., & Jahanshahi, M. (2009). Quality of life in parkinson's disease: The relative importance of the symptoms. *Movement Disorders, 23*(10), 1428-1434.

Rampello, L., Santina, C., Rocco, R., Ignazio, V., & Francesco, N. (2002). The SSRI, Citalopram, improves bradykinesia in patients with Parkinson's disease treated with L-Dopa. *Clinical Neuropharmacology, 25,* 21-24.

Ramig, L. O., Fox, C., & Sapir, S. (2004). Parkinson's disease: Speech and voice disorders and their treatment with the Lee Silverman Voice Treatment. *Seminars in Speech and Language, 25*(2), 169-180.

Rao, S. S., Hofmann, L. A., & Shakil, A. (2006). Parkinson's disease: Diagnosis and treatment. *American Family Physician, 74,* 2046-2054.

Ray, D. C., Raciti, M. A., & MacLean, W. E. (1992). Effects of perceived responsibility on help-seeking decisions among elderly persons. *Journal of Gerontology, 47*(3), 199-205.

Ray, J. W., & Shadish, W. R. (1996). How interchangeable are different estimators of effect size? *Journal of Consulting and Clinical Psychology, 64*(6), 1318-1325.

Rea, L., & Parker, R. (1997). *Designing and Conducting Survey Research.* San Francisco, CA: Jossey Bass.

Reijnders, J. S. A. M., Ehrt, U., Weber, W. E. J., Aarsland, D., & Leentjens, A. F. G. (2008). A systematic review of prevalence studies of depression in parkinson's disease. *Movement Disorders, 23*(2), 183-189.

Rektorova, I., et al. (2003). Pramipexole and pergolide in the treatment of depression in Parkinson's disease: A national multicentre prospective randomized study. *European Journal of Neurology, 10,* 399-406.

Reynolds, C. F., & Kupfer, D. J. (1999). Depression and aging: A look to the future. *Psychiatric Services, 50*(9), 1167-1172.

Richard, I. H., Schiffer, R. B., & Kurlan, R. (1996). Anxiety and parkinson's disease. *The Journal of Neuropsychiatry and Clinical Neurosciences, 8,* 383-392.

Richard, I. H., & Kurlan, R. (1997). A survey of antidepressant drug use in Parkinson's disease. *Neurology, 49*(4), 1168-1170.

Rickwood, D. J., & Braithwaite, V. A. (1994). Social-psychological factors affecting help-seeking for emotional problems. *Social Science and Medicine, 39*(4), 563-572.

Riley, D. E. (2002). Reversible transvestic fetishism in a man with parkinson's disease treated with selegiline. *Clinical Neuropharmacology, 25*(4), 234-237.

Ritsher, J. B., Otilingam, P. G., & Grajales, M. (2003). Internalized stigma of mental illness: Psychometric properties of a new measure. *Psychiatry Research, 121,* 31-49.

Robb, C., Chen, H., & Haley, W. E. (2002). Ageism in mental health and health care: A critical review. *Journal of Clinical Geropsychology, 8,* 1-12.

Robertson, S., & Mosher-Ashley, P. (2003). Patterns of confiding and factors influencing mental health service use in older adults. *Clinical Gerontologist, 26*(2), 101-116.

Rocha, F. L., Murad, M. G. R., Stumpf, B. P., Hara, C., & Fuzikawa, C. (2013). Antidepressants for depression in Parkinson's disease: Systematic review and meta-analysis. *Journal of Psychopharmacology, 27*(5), 417-423.

Roeloffs, C., Sherbourne, C., Unutzer, J., Fink, A., & Wells, K. B. (2003). Stigma and depression among primary care patients. *General Hospital Psychiatry, 25*(5), 311-315.

Rojo, A., Aguilar, M., Garolera, M. T., Cubo, E., Navas, I., & Quintana, S. (2003). Depression in Parkinson's disease: Clinical correlates and outcome. *Parkinsonism and Related Disorders, 10,* 23-28.

Rosoenthal, R. (1979). The "file drawer problem" and tolerance for null results. *Psychological Bulletin, 86*(3), 638-641.

Rounsaville, B. J., & Carroll, K. M. (2001). A stage model of behavioural therapies research: Getting started and moving on from Stage I. *Clinical Psychology Science and Practice, 8,* 133-142.

Roy-Byrne, P. P., Marilla, G., & Uhde, T. W. (1986). Life events and the onset of panic disorder. *The American Journal of Psychiatry, 143*(11), 1424-1427.

Rupke, S. J., Blecke, D., & Renfrow, M. (2006). Cognitive therapy for depression. *American Family Physician, 73,* 83-93.

Rye, D. B., & Jankovic, J. (2002). Emerging views of dopamine in modulating sleep/wake state from an unlikely source: Parkinson's disease. *Neurology, 58*(3), 341-346.

Safren, S. A., et al. (2009). A randomised controlled trial of cognitive behavioural therapy for adherence and depression (CBT-AD) in HIV-infected individuals. *Health Psychology, 28,* 1-10.

Salkovskis, P. M. (1985). Obsessional-compulsive problems: A cognitive-behavioural analysis. *Behaviour Research and Therapy, 23,* 571-583.

Salkovskis, P. M. (1991). The importance of behaviour in the maintenance of anxiety and panic: A cognitive account. *Behavioural Psychotherapy, 19,* 6-19.

Samadi, P., Gregoire, L., Rouillard, C., Bedard, P. J., Di Paolo, T., & Levesque, D. (2006). Docosahexaenoic acid reduces levodopa-induced dyskinesias in 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine monkeys. *Annals of Neurology, 59*(2), 282-288.

Sanchez-Meca, J., & Marin-Martinez, F. (2008). Confidence intervals for the overall effect size in random-effects meta-analysis. *Psychological Methods, 13,* 31-48.

Sareen, J., et al. (2007). Perceived barriers to mental health service utilization in the United States, Ontario, and thte Netherlands. *Psychiatric Services, 58,* 357-364.

Sarin, F., Wallin, L., & Widerlov, B. (2011). Cognitive behaviour therapy for schizophrenia: A meta-analytical reviw of randomized controlled trials. *Nordic Journal of Psychiatry, 65*(3), 162-174.

Savard, J., et al. (2006). Randomized clinical trial on cognitive therapy for depression in women with metastatic breast cancer: Psychological and immunological effects. *Palliative and Support Care, 4*(3), 219-237.

Scheife, R. T., Schumock, G. T., Burstein, A., Gottwlad, M. D., & Leur, M. S. (2000). Impact of Parkinson's disease and its pharmacologic treatment on quality of life and economic outcomes. *American Journal of Health-System Pharmacy, 579,* 952-962.

Schiess, M. C., Zheng, H., Soukup, V. M., Bonnen, J. G., & Nauta, H. J. W. (2000). Pakrinson's disease subtypes: Clinical classification and ventricular cerebrospinal fluid analysis. *Parkinsonism and Related Disorders, 6*(2), 69-76.

Schiffer, R. B., Kurlan, R., Rubin, A., & Boer, S. (1988). Evidence for atypical depression in parkinson's disease. *The American Journal of Psychiatry, 145*(8), 1020-1022.

Schonert-Reichl, K. A., & Muller, J. R. (1995). Correlates of help-seeking in adolescence. *Journal of Youth and Adolescence, 25*(6), 705-731.

Schomerus, G., & Angermeyer, M. C. (2008). Stigma and its impact on help-seeking for mental disorders: What do we know? *Epidemioliga e Psichiatria Sociale, 17,* 31-37.

Schomerus, G., Matschinger, H., & Angermeyer, M. C. (2009). The stigma of psychiatric treatment and help-seeking intentions for depression. *European Archives of Psychiatry, 259,* 298-306.

Schrag, A. (2004). Psychiatric aspects of parkinson's disease: An update. *Journal of Neurology, 251,* 795-804.

Schrag, A., Ben-Shlomo, Y., Brown, R., Marsden, C. D., & Quinn, N. (1998). Young-onset parkinson's disease revisited – clinical features, natural history, and mortality. *Movement Disorder Society, 13*(6), 885-894.

Schrag, A., Jahanshahi, M., & Quinn, N. (2000). How does parkinson's disease affect quality of life? A comparison with quality of life in the general population. *Movement Disorders, 15*(6), 1112-1118.

Schrag, A., et al. (2007). Depression rating scales in Parkinson's disease: Critique and recommendations. *Movement Disorders, 22*(8), 1077-1092.

Schumacker, R. E., & Lomax, R. G. (2004). *A beginner's guide to structural equation modelling.* Routledge Academic.

Sensky, T., Turkington, D., Kindon, D., Scott, J. L., Scott, J., Siddle, R., O'Carroll, M., & Barnes, T. R. E. (2000). A randomized controlled trial of cognitive-behavioural therapy for persistent symptoms in schizophrenia resistant to medication. *Archives of General Psychiatry, 57*(2), 165-172.

Sharpe, L., Sensky, T., Timberlake, N., Ryan, B., & Allard, S. (2003). Long-term efficacy of a cognitive behavioural treatment from a randomized controlled trial for patients recently diagnosed with rheumatoid arthritis. *Rheumatology, 42*(3), 435-441.

Shemesh, E., et al. (2006). Symptoms of posttraumatic stress disorder in patients who have had a myocardial infarction. *Psychosomatics, 47*(3), 231-239.

Sherbourne, C. D., & Wells, K. B. (1997). Course of depression in patients with comorbid anxiety disorders. *Journal of Affective Disorders, 43*(3), 245-250.

Siddiqui, M. F., Rast, S., Lynn, M. J., Auchus, A. P., & Pfeiffer, R. F. (2002). Autonomic dysfunction in parkinson's disease: A comprehensive symptom survey. *Parkinsonism and Related Disorders, 8*(4), 277-284.

Silvers, K. M., Woolley, C. C., Hamilton, F. C., Watts, P. M., & Watson, R. A. (2005). Randomised double-blind placebo-controlled trial of fish oil in the treatment of depression. *Prostaglandins, Leukotrienes and Essential Fatty Acids, 72*(3), 211-218.

Sirey, J. A., Bruce, M. L., Alexopoulos, G. S., Perlick, D. A., Friedman, S. J., & Meyers, B. S. (2001). Perceived stigma and patient-rated severity of illness as predictors of antidepressant drug adherence. *Psychiatric Services, 52,* 1615-1620.

Sirey, J. A., et al. (2001). Perceived stigma as a predictor of treatment discontinuation in young and older outpatients with depression. *American Journal of Psychiatry, 158,* 479-481.

Segal, D. L., Coolidge, F. L., Mincic, M. S., & O'Riley, A. (2005). Beliefs about mental illness and willingness to seek help: A cross-sectional study. *Aging and Mental Health, 9*(4), 363-367.

Selikhova, M., Williams, D. R., Kempster, P. A., Holton, J. L., Revesz, T., & Lees, A. J. (2009). A clinic-pathological study of subtypes in parkinson's disease. *Brain, 132,* 2947-2957.

Serra-Mestres, J., & Ring, H. A. (2002). Evidence supporting a cognitive model of depression in Parkinson's disease. *Journal of Nervous and Mental Disease, 190,* 407-410.

Sharpe, J. P., & Gilbert, D. G. (1998). Effects of repeated administration of the Beck Depression Inventory and other measures of negative mood states. *Personality and Individual Differences, 24*, 457–463.

Sheehan, D. V., & Lecrubier, Y. (2006). *M.I.N.I. SCREEN 5.0.0.* Tampa: University of South Florida.

Sheehan, D. V., & Lecrubier, Y. (2009). *Mini International Neuropsychiatric Interview 6.0.0.* Tampa: University of South Florida.

Shulman, L. M., Taback, R. L., Rabinstein, A. A., & Weiner, W. J. (2002). Non-recognition of depression and other non-motor symptoms in Parkinson's disease. *Parkinsonism and Related Disorders, 8,* 193-197.

Simons, G., Thompson, S. B. N., & Pasqualini, M. C. S. (2006). An innovative education programme for people with Parkinson's disease and their carers. *Parkinsonism and Related Disorders, 12,* 478-485.

Simon, G. E., VonKorff, M., & Barlow, W. (1995). Health care costs of primary care patients with recognized depression. *Archives of General Psychiatry, 52*(10), 850-856.

Simuni, T., & Sethi, K. (2008). Nonmotor manifestations of parkinson's disease. *Annals of Neurology, 64*(2), 65-80.

Skapinakis, P., et al. (2010). Efficacy and acceptability of selective serotonin reuptake inhibitors for the treatment of depression in Parkinson's disease: A systematic review and meta-analysis of randomized controlled trials. *BioMedCentral Neurology, 10,* 49-60.

Slaughter, J. R., Slaughter, K. A., Nichols, D., Holmes, S. E., & Martens, M. P. (2001). Prevalence, clinical manifestations, etiology, and treatment of depression in parkinson's disease. *The Journal of Neuropsychiatry and Clinical Neurosciences, 13,* 187-196.

Snaith, R. P., & Zigmond, A. S. (2000). *Handbook of Psychiatric Measures.* Washington DC: American Psychiatric Association.

Snijders, T., & Bosker, R. (1999). *Multilevel Models: An Introduction to Basic and Advanced Multilevel Modeling.* Thousand Oaks, CA: Sage Publications.

Snowdon, J., Ames, D., Chiu, E., & Wattis, J. (1995). A survey of psychiatric services for elderly people in Australia. *Australian and New Zealand Journal of Psychiatry, 29*(2), 207-214.

Speer, D. C., & Schneider, M. G. (2003). Mental health needs of older adults and primary care: Opportunity for interdisciplinary geriatric team practice. *Clinical Psychological Science and Practice, 10,* 85-101.

Speer, D. C., Williams, J., West, H., & Dupress, L. (1991). Older adult users of outpatient mental health services. *Community Mental Health Journal, 27,* 69-76.

Spiegel, J., Hellwig, D., Farmakis, G., Jost, W. H., Samick, S., Fassbender, K., Kirsch, C., & Dillmann, U. (2007). Myocardial sympathetic degeneration

correlates with clinical phenotype of parkinson's disease. *Movement Disorders, 22*(7), 1004-1008.

Spielberger, C. D., Gorusch, R. L., & Lushene, R. E. (1970). *Manual for the State-Trait Inventory.* Palo Alto: Consulting Psychologists Press.

Starkstein, S. E., Mayberg, H. S., Leiguarda, R., Preziosi, T. J., & Robinson, R. G. (1992). A prospective longitudinal study of depression, cognitive decline, and physical impairments in patients with Parkinson's disease. *Journal of Neurology, Neurosurgery, and Psychiatry, 55,* 3770382.

Starkstein, S., et al. (2011). Diagnostic criteria for depression in Parkinson's disease: A study of symptom patterns using latent class analysis. *Movement Disorders, 26*(12), 2239-2245.

Starkstein, S. E., Sabe, L., Pertracca, G., Chemerinski, E., Kuzis, G., Merello, M., & Leiguards, R. (1996). Neuropsychological and psychiatric differences between alzheimer's disease and parkinson's disease with dementia. *Journal of Neurology, Neurosurgery, and Psychiatry, 61,* 381-387.

Starkstein, S. E., & Merello, M. (2002). *Psychiatric and cognitive disorders in parkinson's disease.* United Kingdom: Cambridge University Press.

Steer, R. A., Cavalieri, D. O., Leonard, D. M., & Beck, A. T. (1999). Use of the Beck Depression Inventory for primary care to screen for major depression disorders. *General Hospital Psychiatry, 21,* 106-111.

Stefanova, E., et al. (2006). Depression predicts the pattern of cognitive impairment in early Parkinson's disease. *Journal of the Neurological Sciences, 248,* 131-137.

Stefl, M. E., & Prosperi, D. C. (1985). Barriers to mental health service utilization. *Community Mental Health Journal, 21*(3), 167-178.

Stein, M. B., Heuser, I. J., Juncos, J. L., & Uhde, T. W. (1990). Anxiety disorders in patients with parkinson's disease. *The American Journal of Psychiatry, 147*(2), 217-220.

Stella, F., Banzato, C. E. M., Barasnevicius Quagliato, E. M. A., & Viana, M. A. (2008). Depression in patients with parkinson's disease: Impact on functioning. *Journal of the Neurological Sciences, 272,* 158-163.

Stern, M. B., Lang, A. L., & Poewe, W. (2012). Toward a redifintion of Parkinson's disease. *Movement Disorders, 27*, 54-60.

Sterne, J. A. C., Egger, M., & Smith, G. D. (2001). Investigating and dealing with publication and other biases in meta-analysis. *British Medical Journal, 323,* 101-105.

Steuer, J. L., & Hammen, C. L. (1983). Cognitive-behavioural group therapy for the depressed elderly: Issues and adaptations. *Cognitive Therapy and Research, 7*(4), 285-296.

Steuer, J. L., Mintz, J., Hammen, C. L., Hill, M. A., Jarvik, L. F., McCarley, T., Motoike, P., & Rosen, R. (1984). Cognitive-behavioral and psychodynamic group psychotherapy in treatment of geriatric depression. *Journal of Consulting and Clinical Psychology, 52*, 180–189.

Stocchi, F. (2005). Pathological gambling in parkinson's disease. *The Lancet Neurology, 4*(10), 590-592.

Stuart, H., & Arboleda-Florez, J. (2001). Community attitudes toward people with schizophrenia. *Canadian Journal of Psychiatry, 46,* 245-252.

Su, K., Huang, S., Chiu, C., & Shen, W. W. (2003). Omega-3 fatty acids in major depressive disorder: A preliminary double-blind, placebo-controlled trial. *European Neuropsychopharmacology, 13*(4), 267-271.

Sullivan, M., Simon, G., Spertus, J., & Russo, J. (2002). Depression-realted costs in heart failure care. *Archives of Inernal Medicine, 162*(16), 1860-1866.

Swanson, P. D. (1994). Drug treatment of parkinson's disease: Is "polypharmacy" best? *Journal of Neurology, Neurosurgery, and Psychiatry, 57,* 401-403.

Tabachnick, B.G., & Fidell, L.S. (2007). *Using Multivariate Statistics* (5th ed.). New York: Allyn and Bacon

Taylor, A. E., & Saint-Cyr, J. A. (1990). Depression in Parkinson's disease: Reconciling physiological and psychological perspectives. *Neuropsychiatric Practice and Opinion, 2,* 92-98.

Ten Have, M., de Graaf, R., Ormel, J., Vilagut, G., Kovess, V., & Alonso, J. (2010). Are attitudes towards mental health help-seeking associated with service use? Results form the European Study of Epidemiology of Mental Disorders. *Social Psychiatry and Epidemiology, 45,* 153-163.

Tessler, R., Mechanic, D., & Dimond, M. (1976). The effect of psychological distress on physician utilization: A prospective study. *Journal of Health and Social Behavior, 17*(4), 353-364.

Thalheimer, W., & Cook, S. (2002). How to calculate effect sizes from published research articles: A simplified methodology. Retrieved October 21, 2012 from http://work-learning.com/effect_sizes.htm.

Thompson, L. W. (1996) Cognitive–behavioural therapy and treatment for late-life depression. *Journal of Clinical Psychiatry, 57*(5), 29–37.

Thompson, L. W., Powers, D. V., Coon, D. W., Takagi, K., McKibbin, C., & Gallagher-Thompson, D. (2000). Older adults. In J.R. White & A.S. Freeman (Eds.), *Cognitive behavioral group therapy: For specific problems and populations* (pp. 235 – 261). Washington D.C.: American Psychological Association.

Thornton, A., & Lee, P. (2000). Publication bias in meta-analysis: Its causes and consequences. *Journal of Clinical Epidemiology, 53*(2), 207-216.

Tijhuis, M. A. R., Peters, L., & Foets, M. (1990). An orientation toward help-seeking for emotional problems. *Social Science and Medicine, 31*(9), 989-995.

Trend, P., Kaye, J., Gage, H., Owen, C., & Wade, D. (2002). Short-term effectiveness of intensive multidisclipinary rehabilitation for people with Parkinson's disease and their carers. *Clinical Rehabilitation, 16,* 717-725.

Tucker, M., & Oei, T. P. S. (2007). Is group more cost effective than individual cognitive behaviour therapy? The evidence is not solid yet. *Behavioural and Cognitive Psychotherapy, 35,* 77-91.

Uekermann, J., Daum, I., Peters, S., Wiebel, B., Przuntek, H., & Muller, T. (2003). Depressed mood and executive dysfunction in early Parkinson's disease. *Acta Neurologica Scandinavica, 107*(5), 341-348.

Uher, R. (2008). The implications of gene-environment interactions in depression: Will cause inform cure? *Molecular Psychiatry, 13,* 1070-1078.

Unutzer, J. (2002). Diagnosis and treatment of older adults with depression in primary care. *Biological Psychiatry, 52,* 285-292.

Vajda, F. J. E., & Solinas, C. (2005). Current approaches to management of depression in Parkinson's disease. *Journal of Clinical Neuroscience, 12*(7), 739-743.

Van Der Leeden, R. (1998). Multilevel analysis of repeated measures data. *Quality and Quantity, 32,* 15-29.

van Schaik, D. J. F., Klein, A. F. J., van Hout, H. P. J., van Marwijk, H. W. J., Beekman, A. T. F., de Haan, M., et al. (2004). Patients' preferences in the

treatment of depressive disorder in primary care. *Psychiatry and Primary Care, 26,* 184–189

Van Vorhees, B. W., Fogel, J., Houston, T. K., Cooper, L. A., & Wang, N. (2006). Attitudes and illness factors associated with low perceived need for depression treatment among young adults. *Social Psychiatry and Psychiatric Epidemiology, 41*(9), 746-754.

Vazquez, A., Jimenez-Jimenez, P., Garcia-Ruiz, D., & Garica-Urra, D. "Panic attacks" in Parkinson's disease. *Acta Neurologica Scandinavica, 87,* 14-18.

Veazey, C., Aki, S. O. E., Cook, K. F., Lai, E. C., & Kunik. M. E. (2005). Prevalence and treatment of depression in parkinson's disease. *The Journal of Neuropsychiatry and Clinical Neurosciences, 17,* 310-323.

Veazey, C., Cook, K. F., Stanley, M., Lai, E. C., & Kunik, M. E. (2009). Telephone-administered cognitive behavioural therapy: A case study of anxiety and depression in Parkinson's disease. *Journal of Clinical Psychology in Medical Settings, 16,* 243-253.

Verbeke, G., & Molenbergs, G. (2000). *Linear Mixed Models for Longitudinal Data.* New York: Springer-Verlag.

Vinogradov, S. and Yalom I. (1994). Group therapy. In R. Hales, S. Yudofsky and J. Talbott (Eds.), *The American Psychiatric Press Textbook of Psychiatry* (2nd ed.) (pp. 143–1175). Washington: American Psychiatric Press.

Vogel, D. L., Wade, N. G., & Haake, S. (2006). Measuring the self-stigma associated with seeking psychological help. *Journal of Counseling Psychology, 53*(3), 325-337.

Vogel, D. L., Wester, S. R., Wei, M., & Boysen, G. A. (2005). The role of outcome expectations and attitudes on decisions to seek professional help. *Journal of Counseling Psychology, 52*(4), 459-470.

Wakabayashi, K., & Takahashi, H. (1997). Neuropathology of autonomic nervous system in parkinson's disease. *European Neurology, 38*(2), 2-7.

Walsh, K., & Bennett, G. (2001). Parkinson's disease and anxiety. *Postgraduate Medical Journal, 77,* 89-93.

Ware, J. E., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical Care, 30*(6), 473-483.

Watson, H. J., & Rees, C. S. (2008). Meta-analysis of randomized, controlled treatment tirals for pediatric obsessive-compulsive disorder. *The Journal of Child Psychology and Psychiatry, 49*(5), 489-498.

Waxman, H. M., Carner, E. A., & Klein, M. (1984). Underutilization of mental health professionals by community elderly. *Gerontologist, 24,* 23-30.

Weinberger, M. I., Nelson, C. J., & Roth, A. J. (2011). Self-reported barriers to mental health treatment among men with prostate cancer. *Psycho-Oncology, 20,* 444-446.

Weintraub, D., Moberg, P. J., Duda, J. E., Katz, I. R., & Stern, M. B. (2004). Effect of psychiatric and other nonmotor symptoms on disability in Parkinson's disease. *Journal of the Americian Geriatrics Society, 51,* 784-788.

Weintraub, D., et al. (2005). Antidepressant studies in Parkinson's disease: A review and meta-analysis. *Movement Disorders, 20*(9), 1161-1169.

Weintraub, D., Cornella, C. L., & Horn, S. (2008). Parkinson's disease – part 1: Pathophysiology, symptoms, burden, diagnosis, and assessment. *American Journal of Managed Care, 14,* 40-48.

Weintraub, D., et al. (2010). Atomoxetine for depression and other neuropsychiatric symptoms in Parkinson disease. *Neurology, 75,* 446-455.

Weintraub, D., & Burn, D. J. (2011). Parkinson's Disease: The quintessential neuropsychiatric disorder. *Movement Disorders, 26*(6), 1022-1031.

Wells, A., & Carter, K. (1999). Preliminary tests of a cognitive model of generalized anxiety disorder. *Behaviour Research and Therapy, 37*(6), 585-594.

Wermuth, L., et al. (1997). Depression in idiopathic Parkinson's disease treated with citalopram. *Nordic Journal of Psychiatry, 52,* 163-169.

Westbrook, D., Kennerley, H., & Kirk, J. (2011). *An Introduction to Cognitive Behaviour Therapy: Skills and Applications.* SAGE Publications.

Wilhelm, K., et al. (2006). Life events, first depression onset and the serotonin transporter gene. *The British Journal of Psychiatry, 188,* 210-215.

Wilkinson, P., et al. (2009). A pilot randomised controlled trial of a brief cognitive behavioural group intervention to reduce recurrence rates in late life depression. *International Journal of Geriatric Psychiatry, 24,* 68-75.

Wood, B. M., Nicholas, M. K., Blyth, F., Asghari, A., & Gibson, S. (2010). The utility of the short version of the Depression Anxiety Stress Scales (DASS-21) in elderly patients with persistent pain: Does age make a difference? *Pain Medicine, 11*(12), 1780-1790.

Woodruff, J. C., Donnan, H., & Halfin, G. (1988). Changing elderly persons' attitudes toward mental helath professionals. *Gerontologist, 28,* 800-802.

Woodward, R., & Pachana, N. A. (2009). Attitudes towards psychological treatment among older Australians. *Australian Psychologist, 44*(2), 86-93.

Wolitzky-Taylor, K. B., Castriotta, M. A., Lenze, E. J., Stanley, M. A., & Craske, M. G. (2010). Anxiety disorders in older adults: A comprehensive review. *Depression and Anxiety, 27*(2), 190-211.

Wright, J. H. (2006). Cognitive behaviour therapy: Basic principles and recent advances. *Clinical Synthesis, 4*(2), 173-178.

Yesavage, J. L., et al. (1982). Development and validation of a geriatric depression screening scale: A preliminary report. *Journal of Psychiatric Research, 17,* 37-49.

Yokochi, M. (1993). Nosological concept of juvenile parkinsonism with reference to dopa-responsive syndrome. *Advanced Neurology., 60,* 548-552.

Yuan, K., & Bentler, P. M. (1999). F Tests for mean and covariance structure analysis. *Journal of Educational and Behavioral Statistics, 24*(3), 225-243.

Zgaljardic, D. J., Borod, J. C., Foldi, N. S., & Mattis, P. (2003). A review of the cognitive and behavioural sequelae of Parkinson's disease: Relationship to frontostriatal circuitry. *Cognitive and Behavioural Neurology, 16*(4), 193-210.

Zung, W. W., Magruder-Habib, K., Velez, R., & Alling, W. (1990). The comorbidity of anxiety and depression in general medical patients: A longitudinal study. *Journal of Clinical Psychiatry, 51*(6), 77-80.

Zung, W. W. K. (1971). A rating instrument for anxiety disorders. *Psychosomatics, 12,* 371-379.

Every reasonable effort has been made to acknowledge the owners of copyright material. I would be pleased to hear from any copyright owner who has been omitted or incorrectly acknowledged.

Appendix A

SPSS output of DASS-D unconditional means model for calculation of intracluster correlation to estimate design effect

Mixed Model Analysis

[DataSet5] C:\Users\13139913\Dropbox\PhD\DATA\ITT_CBTvWaitlistT1T2restructuredMLM.sav

Warnings

Iteration was terminated but convergence has not been achieved. The MIXED procedure continues despite this warning. Subsequent results produced are based on the last iteration. Validity of the model fit is uncertain.

Model Dimension[b]

		Number of Levels	Covariance Structure	Number of Parameters	Subject Variables
Fixed Effects	Intercept	1		1	
Random Effects	Intercept + Time[a]	2	Unstructured	3	No
Residual				1	
Total		3		5	

a. As of version 11.5, the syntax rules for the RANDOM subcommand have changed. Your command syntax may yield results that differ from those produced by prior versions. If you are using version 11 syntax, please consult the current syntax reference guide for more information.

b. Dependent Variable: DASSD.

Information Criteria[a]

-2 Restricted Log Likelihood	202.210
Akaike's Information Criterion (AIC)	210.210
Hurvich and Tsai's Criterion (AICC)	211.543
Bozdogan's Criterion (CAIC)	220.431
Schwarz's Bayesian Criterion (BIC)	216.431

The information criteria are displayed in smaller-is-better forms.

a. Dependent Variable: DASSD.

Fixed Effects

Type III Tests of Fixed Effects[a]

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	17.311	95.920	.000

a. Dependent Variable: DASSD.

Estimates of Fixed Effects[a]

Parameter	Estimate	Std. Error	df	t	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Intercept	9.229841	.942410	17.311	9.794	.000	7.244249	11.215433

a. Dependent Variable: DASSD.

Covariance Parameters

Estimates of Covariance Parameters[b]

Parameter		Estimate	Std. Error	Wald Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Residual		8.702996	2.762304	3.151	.002	4.671971	16.212033
Intercept + Time [subject = No]	UN (1,1)	10.389743	7.202816	1.442	.149	2.669924	40.430645
	UN (2,1)	.164351	.641141	.256	.798	-1.092262	1.420964
	UN (2,2)	.002602[a]	.000000	.	.	.	.

a. This covariance parameter is redundant. The test statistic and confidence interval cannot be computed.

b. Dependent Variable: DASSD.

Appendix B

MLM Model 1: Assumption Testing

Normality of Residuals

Tests of Normality

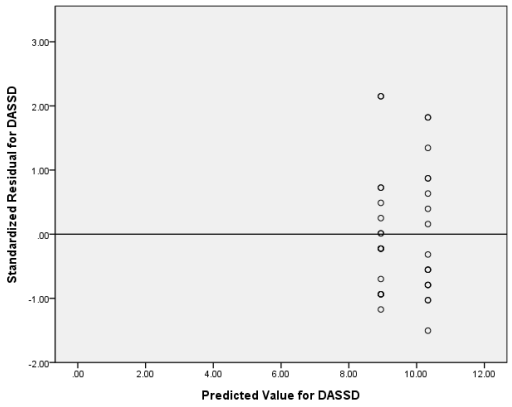
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
DepL1 Residuals	.075	35	.200*	.989	35	.972
ANXL1Residuals	.139	35	.087	.962	35	.266
StressL1Residuals	.162	35	.021	.943	35	.067
PDQL1Residuals	.091	35	.200*	.990	35	.980
CCLDL1Residuals	.066	35	.200*	.983	35	.838
CCLAL1Residuals	.108	35	.200*	.981	35	.783
DEPL2Residuals	.160	35	.224	.885	35	.202
ANXL2Residuals	.106	35	.200*	.976	35	.627
STRESSL2Residuals	.161	35	.023	.942	35	.065
PDQL2Residuals	.107	35	.200*	.977	35	.673
CCLDL2Residuals	.118	35	.200*	.968	35	.396
CCLAL2Residuals	.094	35	.200*	.972	35	.509

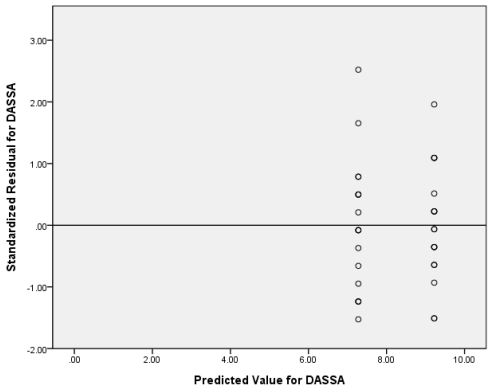
a. Lilliefors Significance Correction

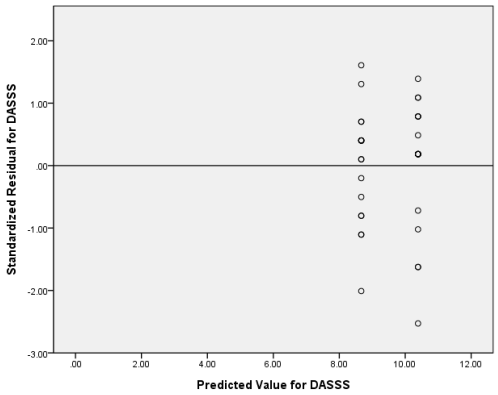
*. This is a lower bound of the true significance.

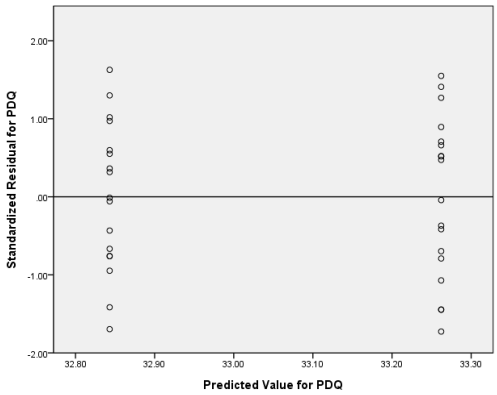
Constant variances of Residuals

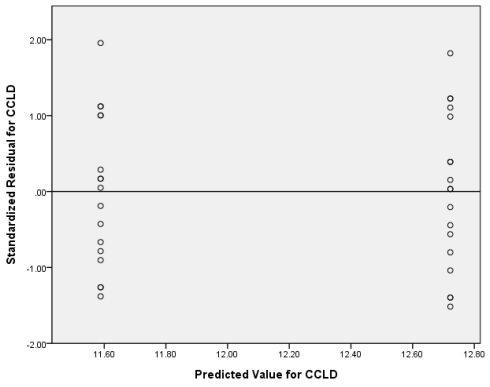
Level 1

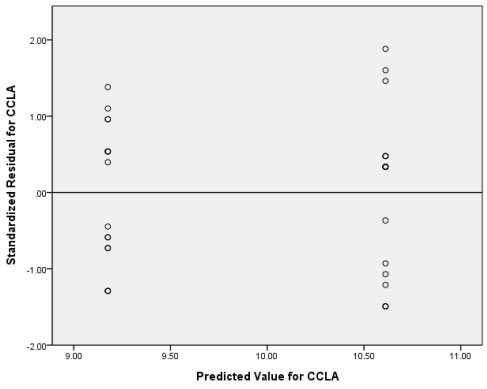






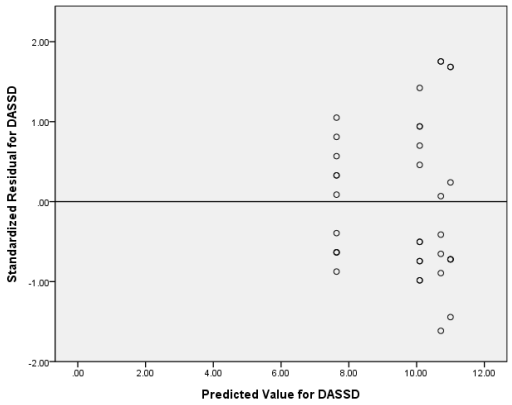


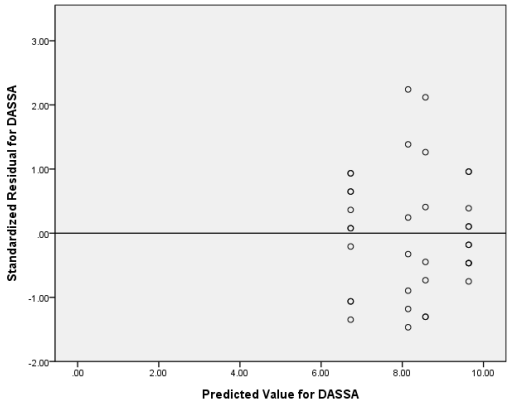


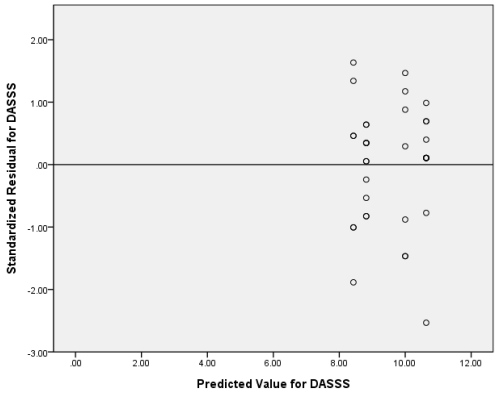


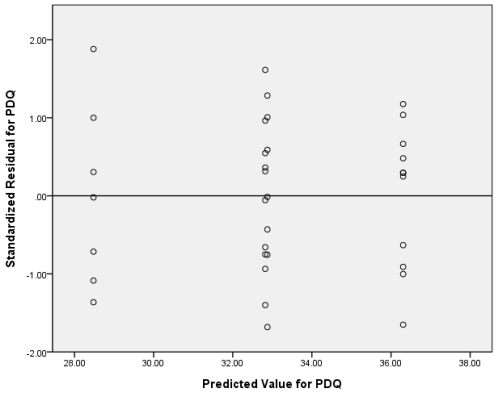
Constant variances of Residuals

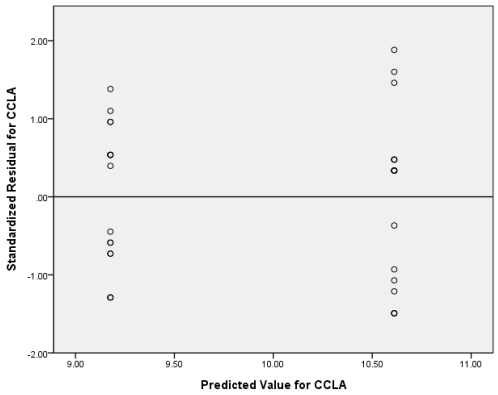
Level 2

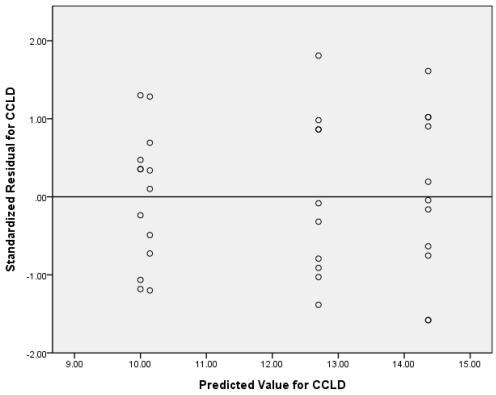












Independence of Residuals

Level 1 Residuals and Units

		Time
L1_DASSD	Correlation Coefficient	.011
	Sig. (2-tailed)	.951
L1_DASSS	Correlation Coefficient	.091
	Sig. (2-tailed)	.598
L1_DASSA	Correlation Coefficient	-.043
	Sig. (2-tailed)	.804
L1_PDQ	Correlation Coefficient	-.075
	Sig. (2-tailed)	.664
L1_CCLD	Correlation Coefficient	-.011
	Sig. (2-tailed)	.951
L1_CCLA	Correlation Coefficient	.011
	Sig. (2-tailed)	.951

Level 2 Residuals and Units

		Number
L2_DASSD	Correlation Coefficient	-.276
	Sig. (2-tailed)	.104
L2_DASSA	Correlation Coefficient	-.054
	Sig. (2-tailed)	.756
L2_DASSS	Correlation Coefficient	.231
	Sig. (2-tailed)	.176
L2_PDQ	Correlation Coefficient	.231
	Sig. (2-tailed)	.176
L2_CCLD	Correlation Coefficient	.184
	Sig. (2-tailed)	.283
L2_CCLA	Correlation Coefficient	-.231
	Sig. (2-tailed)	.176

Across Levels (Level 1 Residuals and Level 2 Residuals)

		L2_DASSD	L2_DASSA	L2_DASSS	L2_PDQ	L2_CCLD	L2_CCLA
L1_DASSD	Pearson Correlation	-.009					
	Sig. (2-tailed)	.960					
L1_DASSA	Pearson Correlation		-.214				
	Sig. (2-tailed)		.211				
L1_DASSS	Pearson Correlation			-.001			
	Sig. (2-tailed)			.996			
L1_PDQ	Pearson Correlation				-.009		
	Sig. (2-tailed)				.958		
L1_CCLD	Pearson Correlation					.003	
	Sig. (2-tailed)					.985	
L1_CCLA	Pearson Correlation						.000
	Sig. (2-tailed)						1.000

Appendix C

MLM Model 2: Assumption Testing

Normality of Residuals: Intervention Group

Tests of Normality[b]

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
DepL1 Residuals	.085	44	.200*	.963	44	.168
AnxL1Residuals	.065	44	.200*	.990	44	.963
SL1Residuals	.070	44	.200*	.989	44	.954
PDQL1Residuals	.060	44	.200*	.988	44	.924
CCLDL1Residuals	.098	44	.200*	.980	44	.650
CCLAL1Residuals	.075	44	.200*	.979	44	.596
DepL2Residuals	.082	44	.200*	.960	44	.130
AnxL2Residuals	.053	44	.200*	.990	44	.956
StresL2Residuals	.076	44	.200*	.988	44	.929
PDQL2Residuals	.057	44	.200*	.990	44	.966
CCLDL2Residuals	.103	44	.200*	.975	44	.435
CCLAL2Residuals	.084	44	.200*	.978	44	.555

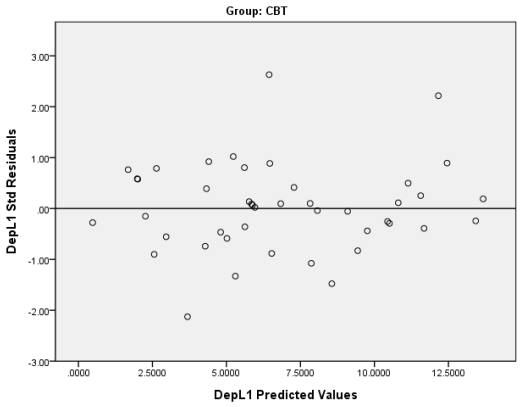
a. Lilliefors Significance Correction

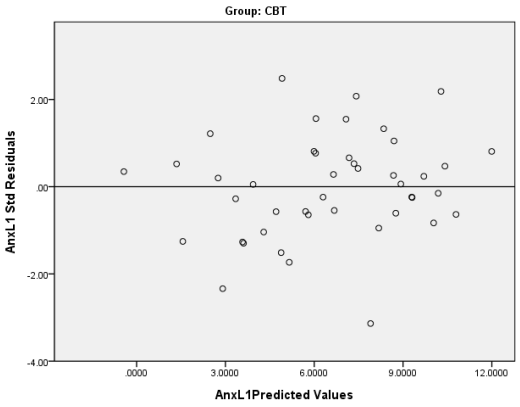
*. This is a lower bound of the true significance.

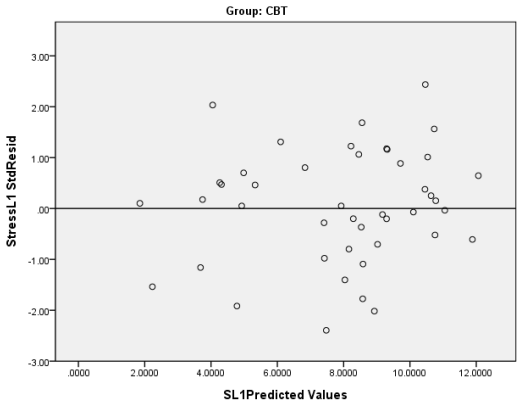
b. Group = Intervention

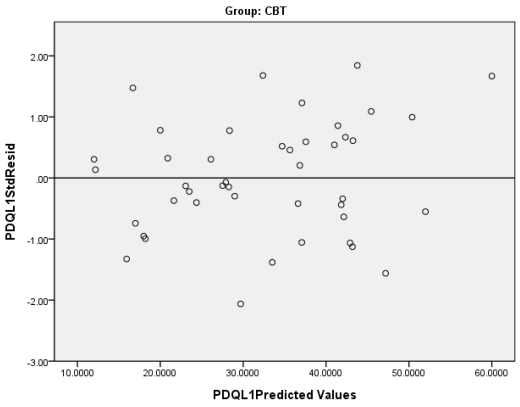
Constant variances of Residuals

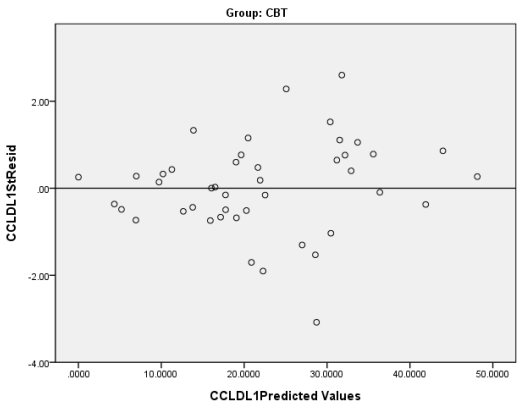
Level 1: Intervention Group

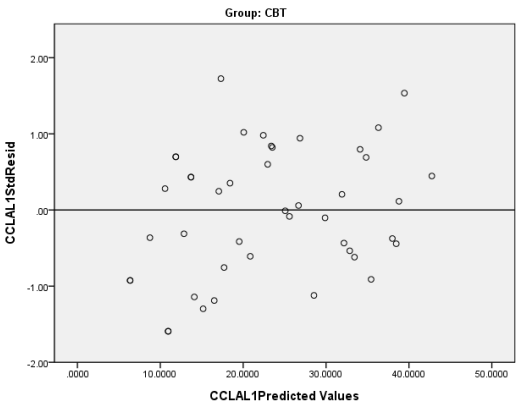






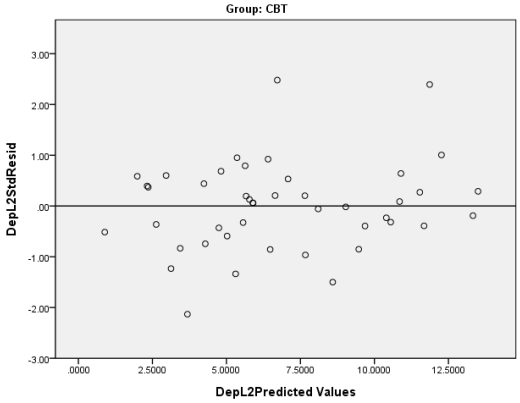


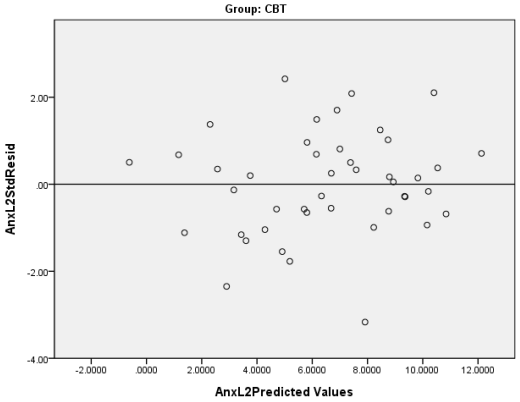


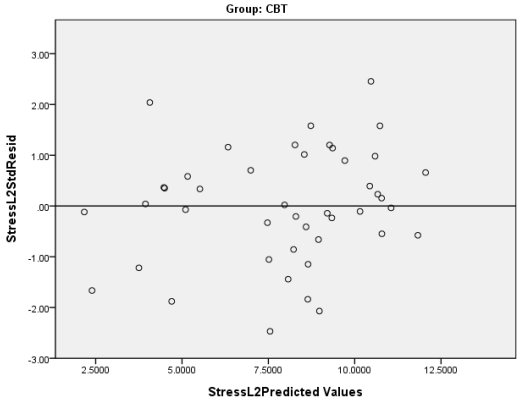


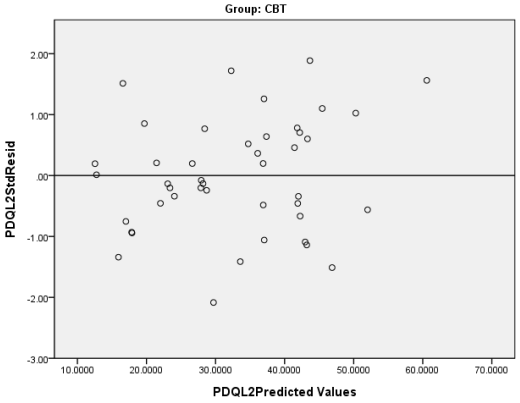
Constant variances of Residuals

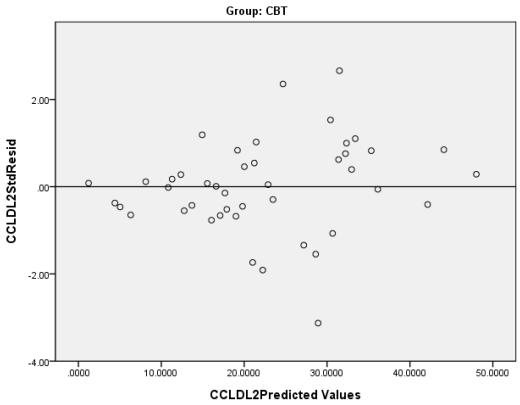
Level 2: Intervention Group

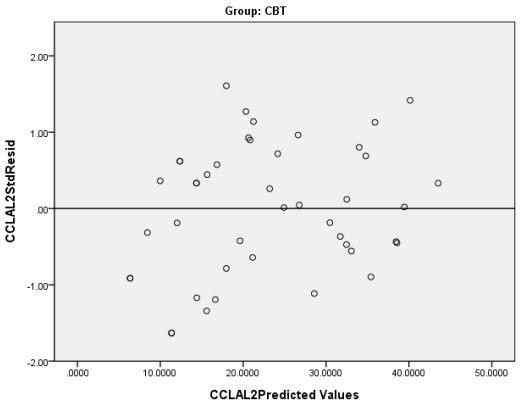












Independence of Residuals: Intervention Group

Level 1 Residuals and Units

		Time
L1_DASSD	Correlation Coefficient	.063
	Sig. (2-tailed)	.749
L1_DASSS	Correlation Coefficient	.170
	Sig. (2-tailed)	.387
L1_DASSA	Correlation Coefficient	-.115
	Sig. (2-tailed)	.561
L1_PDQ	Correlation Coefficient	-.051
	Sig. (2-tailed)	.795
L1_CCLD	Correlation Coefficient	-.308
	Sig. (2-tailed)	.110
L1_CCLA	Correlation Coefficient	-.095
	Sig. (2-tailed)	.631

Level 2 Residuals and Units

		Number
L2_DASSD	Correlation Coefficient	-.115
	Sig. (2-tailed)	.561
L2_DASSA	Correlation Coefficient	.008
	Sig. (2-tailed)	.968
L2_DASSS	Correlation Coefficient	-.210
	Sig. (2-tailed)	.284
L2_PDQ	Correlation Coefficient	-.008
	Sig. (2-tailed)	.968
L2_CCLD	Correlation Coefficient	.024
	Sig. (2-tailed)	.905
L2_CCLA	Correlation Coefficient	-.047
	Sig. (2-tailed)	.810

Across Levels (Level 1 Residuals and Level 2 Residuals)

		L2_DASSD	L2_DASSA	L2_DASSS	L2_PDQ	L2_CCLD	L2_CCLA
L1_DASSD	Pearson Correlation	-.009					
	Sig. (2-tailed)	.960					
L1_DASSA	Pearson Correlation		-.214				
	Sig. (2-tailed)		.211				
L1_DASSS	Pearson Correlation			-.001			
	Sig. (2-tailed)			.996			
L1_PDQ	Pearson Correlation				-.009		
	Sig. (2-tailed)				.958		
L1_CCLD	Pearson Correlation					.003	
	Sig. (2-tailed)					.985	
L1_CCLA	Pearson Correlation						.000
	Sig. (2-tailed)						1.000

Appendix D

Post-hoc comparisons for MLM Model 2

DASS-D

(I) Time2	(J) Time2	Mean Difference (I-J)	Std. Error	df	Sig.[a]	95% Confidence Interval for Difference[a]	
						Lower Bound	Upper Bound
Pretreatment	Posttreatment	-2.091*	.798	18.512	.017	-3.763	-.419
	1m F-up	-3.818*	.887	14.513	.001	-5.715	-1.922
	6m F-up	-6.273*	1.082	10.407	.000	-8.671	-3.874
Posttreatment	Pretreatment	2.091*	.798	18.512	.017	.419	3.763
	1m F-up	-1.727*	.554	22.385	.005	-2.875	-.579
	6m F-up	-4.182*	.646	29.613	.000	-5.501	-2.863
1m F-up	Pretreatment	3.818*	.887	14.513	.001	1.922	5.715
	Posttreatment	1.727*	.554	22.385	.005	.579	2.875
	6m F-up	-2.455*	.590	27.959	.000	-3.663	-1.246
6m F-up	Pretreatment	6.273*	1.082	10.407	.000	3.874	8.671
	Posttreatment	4.182*	.646	29.613	.000	2.863	5.501
	1m F-up	2.455*	.590	27.959	.000	1.246	3.663

DASS-A

(I) Time2	(J) Time2	Mean Difference (I-J)	Std. Error	df	Sig.[a]	95% Confidence Interval for Difference[a]	
						Lower Bound	Upper Bound
Pretreatment	Posttreatment	-2.000*	.757	26.301	.014	-3.556	-.444
	1m F-up	-2.909*	.795	20.036	.002	-4.568	-1.250
	6m F-up	-5.818*	.885	10.937	.000	-7.768	-3.868
Posttreatment	Pretreatment	2.000*	.757	26.301	.014	.444	3.556
	1m F-up	-.909	.666	21.066	.187	-2.295	.477
	6m F-up	-3.818*	.698	28.254	.000	-5.248	-2.389
1m F-up	Pretreatment	2.909*	.795	20.036	.002	1.250	4.568
	Posttreatment	.909	.666	21.066	.187	-.477	2.295
	6m F-up	-2.909*	.678	24.165	.000	-4.309	-1.509
6m F-up	Pretreatment	5.818*	.885	10.937	.000	3.868	7.768
	Posttreatment	3.818*	.698	28.254	.000	2.389	5.248
	1m F-up	2.909*	.678	24.165	.000	1.509	4.309

DASS-S

(I) Time2	(J) Time2	Mean Difference (I-J)	Std. Error	df	Sig.[a]	95% Confidence Interval for Difference[a]	
						Lower Bound	Upper Bound
Pretreatment	Posttreatment	-1.455	.910	25.117	.123	-3.329	.420
	1m F-up	-3.364*	.965	18.966	.002	-5.385	-1.343
	6m F-up	-5.182*	1.093	10.826	.001	-7.593	-2.771
Posttreatment	Pretreatment	1.455	.910	25.117	.123	-.420	3.329
	1m F-up	-1.909*	.777	21.205	.023	-3.523	-.295
	6m F-up	-3.727*	.824	28.821	.000	-5.412	-2.042
1m F-up	Pretreatment	3.364*	.965	18.966	.002	1.343	5.385
	Posttreatment	1.909*	.777	21.205	.023	.295	3.523
	6m F-up	-1.818*	.795	24.647	.031	-3.456	-.180
6m F-up	Pretreatment	5.182*	1.093	10.826	.001	2.771	7.593
	Posttreatment	3.727*	.824	28.821	.000	2.042	5.412
	1m F-up	1.818*	.795	24.647	.031	.180	3.456

PDQ-39

(I) Time2	(J) Time2	Mean Difference (I-J)	Std. Error	df	Sig.[a]	95% Confidence Interval for Difference[a]	
						Lower Bound	Upper Bound
Pretreatment	Posttreatment	1.515	2.807	22.223	.595	-4.303	7.334
	1m F-up	-.291	3.041	16.798	.925	-6.713	6.131
	6m F-up	-4.253	3.568	10.616	.259	-12.140	3.635
Posttreatment	Pretreatment	-1.515	2.807	22.223	.595	-7.334	4.303
	1m F-up	-1.806	2.213	21.602	.423	-6.401	2.788
	6m F-up	-5.768*	2.427	29.801	.024	-10.727	-.809
1m F-up	Pretreatment	.291	3.041	16.798	.925	-6.131	6.713
	Posttreatment	1.806	2.213	21.602	.423	-2.788	6.401
	6m F-up	-3.962	2.296	25.926	.096	-8.681	.758
6m F-up	Pretreatment	4.253	3.568	10.616	.259	-3.635	12.140
	Posttreatment	5.768*	2.427	29.801	.024	.809	10.727
	1m F-up	3.962	2.296	25.926	.096	-.758	8.681

CCL-D

(I) Time2	(J) Time2	Mean Difference (I-J)	Std. Error	df	Sig.[a]	95% Confidence Interval for Difference[a]	
						Lower Bound	Upper Bound
Pretreatment	Posttreatment	2.055	3.416	23.266	.553	-5.008	9.119
	1m F-up	-3.626	3.455	24.328	.304	-10.752	3.499
	6m F-up	-12.392*	3.551	27.137	.002	-19.675	-5.108
Posttreatment	Pretreatment	-2.055	3.416	23.266	.553	-9.119	5.008
	1m F-up	-5.682	3.331	21.031	.103	-12.609	1.245
	6m F-up	-14.447*	3.360	21.764	.000	-21.420	-7.475
1m F-up	Pretreatment	3.626	3.455	24.328	.304	-3.499	10.752
	Posttreatment	5.682	3.331	21.031	.103	-1.245	12.609
	6m F-up	-8.765*	3.342	21.305	.016	-15.710	-1.821
6m F-up	Pretreatment	12.392*	3.551	27.137	.002	5.108	19.675
	Posttreatment	14.447*	3.360	21.764	.000	7.475	21.420
	1m F-up	8.765*	3.342	21.305	.016	1.821	15.710

CCL-A

(I) Time2	(J) Time2	Mean Difference (I-J)	Std. Error	df	Sig.[a]	95% Confidence Interval for Difference[a]	
						Lower Bound	Upper Bound
Pretreatment	Posttreatment	-3.762	2.638	28.345	.165	-9.163	1.639
	1m F-up	-7.360*	2.699	31.050	.010	-12.864	-1.856
	6m F-up	-15.694*	2.848	38.490	.000	-21.456	-9.931
Posttreatment	Pretreatment	3.762	2.638	28.345	.165	-1.639	9.163
	1m F-up	-3.598	2.500	22.872	.164	-8.772	1.576
	6m F-up	-11.932*	2.547	24.631	.000	-17.182	-6.682
1m F-up	Pretreatment	7.360*	2.699	31.050	.010	1.856	12.864
	Posttreatment	3.598	2.500	22.872	.164	-1.576	8.772
	6m F-up	-8.334*	2.518	23.524	.003	-13.536	-3.131
6m F-up	Pretreatment	15.694*	2.848	38.490	.000	9.931	21.456
	Posttreatment	11.932*	2.547	24.631	.000	6.682	17.182
	1m F-up	8.334*	2.518	23.524	.003	3.131	13.536

Appendix E

MLM Model 3: Assumption Testing

Normality of Residuals

Tests of Normality

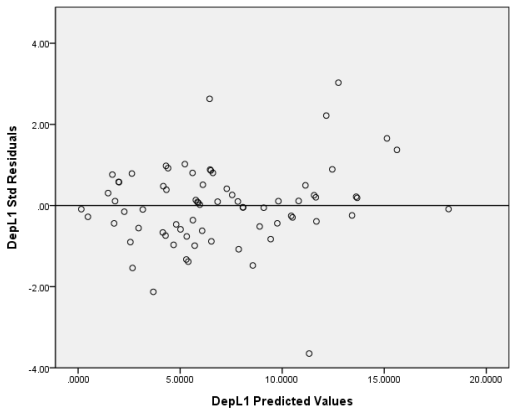
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
DepL1 Residuals	.084	72	.200*	.951	72	.070
AnxL1Residuals	.070	72	.200*	.985	72	.525
SL1Residuals	.109	72	.033	.984	72	.506
PDQL1Residuals	.057	72	.200*	.992	72	.917
CCLDL1Residuals	.076	72	.200*	.985	72	.572
CCLAL1Residuals	.068	72	.200*	.984	72	.479
DepL2Residuals	.089	72	.200*	.952	72	.080
AnxL2Residuals	.072	72	.200*	.982	72	.396
StresL2Residuals	.105	72	.049	.984	72	.513
PDQL2Residuals	.049	72	.200*	.993	72	.951
CCLDL2Residuals	.082	72	.200*	.982	72	.394
CCLAL2Residuals	.064	72	.200*	.985	72	.551

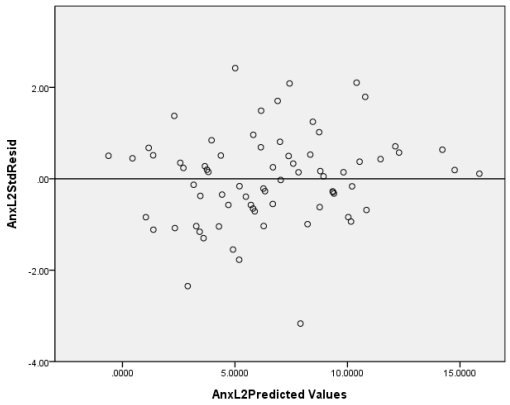
a. Lilliefors Significance Correction

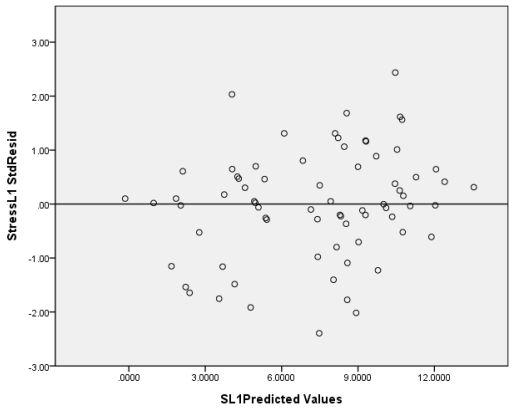
*. This is a lower bound of the true significance.

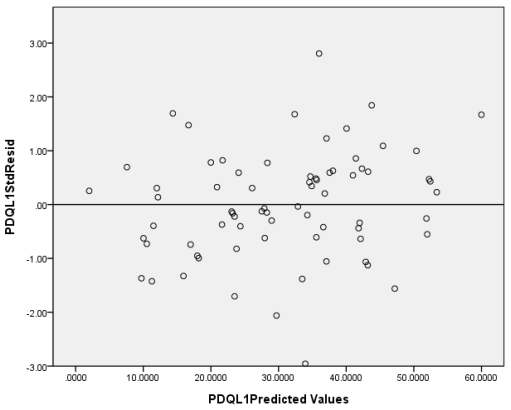
Constant variances of Residuals

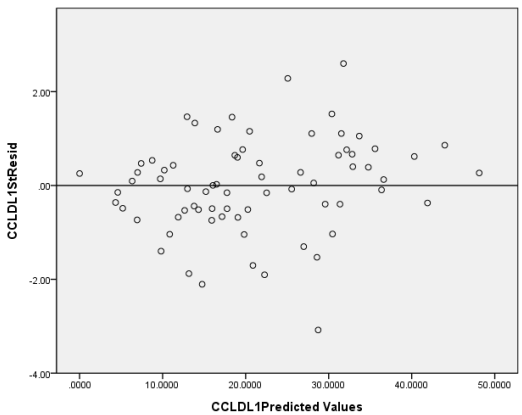
Level 1

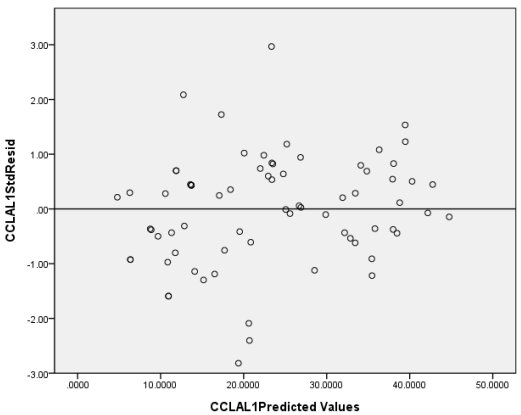






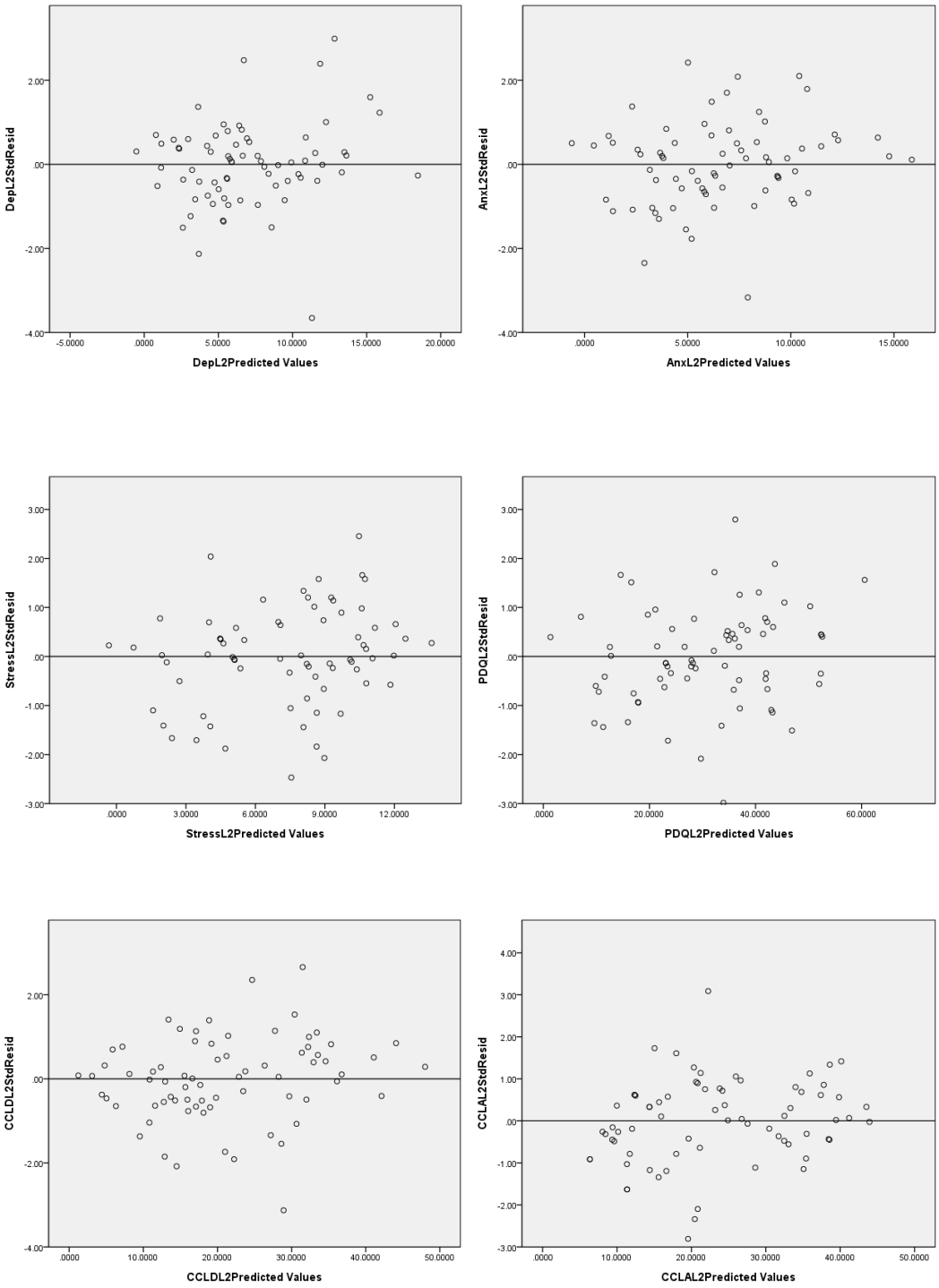






Constant variances of Residuals

Level 2



Independence of Residuals

Level 1 Residuals and Units

Level 2 Residuals and Units

		Number
L2_DASSD	Correlation Coefficient	-.170
	Sig. (2-tailed)	.530
L2_DASSA	Correlation Coefficient	-.424
	Sig. (2-tailed)	.101
L2_DASSS	Correlation Coefficient	-.097
	Sig. (2-tailed)	.721
L2_PDQ	Correlation Coefficient	.243
	Sig. (2-tailed)	.365
L2_CCLD	Correlation Coefficient	-.182
	Sig. (2-tailed)	.500
L2_CCLA	Correlation Coefficient	-.582
	Sig. (2-tailed)	.118

		Time
L1_DASSD	Correlation Coefficient	-.041
	Sig. (2-tailed)	.735
L1_DASSS	Correlation Coefficient	-.005
	Sig. (2-tailed)	.968
L1_DASSA	Correlation Coefficient	-.128
	Sig. (2-tailed)	.284
L1_PDQ	Correlation Coefficient	-.003
	Sig. (2-tailed)	.980
L1_CCLD	Correlation Coefficient	-.108
	Sig. (2-tailed)	.366
L1_CCLA	Correlation Coefficient	-.161
	Sig. (2-tailed)	.177

Across Levels (Level 1 Residuals and Level 2 Residuals)

		L2_DASSD	L2_DASSA	L2_DASSS	L2_PDQ	L2_CCLD	L2_CCLA
L1_DASSD	Pearson Correlation	.039					
	Sig. (2-tailed)	.743					
L1_DASSA	Pearson Correlation		-.006				
	Sig. (2-tailed)		.959				
L1_DASSS	Pearson Correlation			-.018			
	Sig. (2-tailed)			.880			
L1_PDQ	Pearson Correlation				-.029		
	Sig. (2-tailed)				.807		
L1_CCLD	Pearson Correlation					.000	
	Sig. (2-tailed)					.999	
L1_CCLA	Pearson Correlation						.021
	Sig. (2-tailed)						.859

Demographic and Medical History Questionnaire

A. Demographic Information

Age: ___ years Gender: M | F (please circle)

Nationality: _____

Relationship status: (please circle)

Single In a relationship De facto Engaged

Married Separated Divorced Widowed Other: _____

Do you have any children? Y | N If yes, how many? _____

Are you currently employed? Y | N If yes, on what time basis? _____

(e.g., full-time, part-time, casual, contrac

B. Parkinson's Disease History

How old were you when you:

First noticed signs of PD? ____ years

Were *formally diagnosed* with PD? ____ years By who? _____

(e.g., GP, neurologist etc.)

Do or have any of your relatives have or had PD? Y | N

If yes, what relation are/were they to you? 1. _____ 2. _____

3. _____ 4. _____

Please place **a tick** next to the symptoms that you have experienced.

Slowness of movement	☐	Vomiting	☐	Headache/migraine	
Stiffness	☐	Dizziness or fainting	☐	Urinary incontinence	
Tremor	☐	Excessive sweating	☐	Pain	
Falls	☐	Stooped posture	☐	Memory problems	
Loss of balance	☐	Bladder frequency	☐	Confusion	
Difficulty in dressing	☐	Bladder urgency	☐	Fatigue	
Difficulty in walking	☐	Constipation	☐	Nausea	

Please provide a list of the **medication** you are currently taking for your **Parkinson's.**

1.	2.	3.
4.	5.	6.

C. General Medical History

Do you have any medical condition(s) other than Parkinson's? Y | N

If yes, what condition(s)? _____

_____

Are you currently taking any medication for these conditions? Y | N

If yes, please specify the **type of medication** and **which condition it is used for**.

_____

D. Psychiatric History

Has your GP/neurologist ever spoken to you about anxiety, depression or other psychological conditio that can occur in PD? Y | N

Would you see a mental health professional (eg psychiatrist, psychologist, counsellor) for help with psychological problems ? Y | N

Have you ever been diagnosed with a psychological disorder? Y | N

If yes, please specify **which disorder(s)** and **what year(s) you were diagnosed**.

_____

Are you currently taking any medication for a psychological condition? Y | N

If yes, please list these medications. _____

Have you seen a mental health professional ….

In the past month? Y | N Type of professional: (eg, psychiatrist, psychologist, counsellor) _____

In the past 6 months? Y | N Type of professional: _____

In the past year? Y | N Type of professional: _____

In the past 5 years? Y | N Type of professional: _____

Ever? Y | N Type of professional: _____

Have you seen the advertisement for the **"Anxiety and Depression in Parkinson's Disease Treatm Trial"** at Curtin University in the PWA newsletter from 2010-2011? Y | N

Please read the following statements and indicate whether you Agree, Disagree or Neither Agree or Disagree with each (Neutral).

		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	**It is a sign of weakness to talk with a mental health professional about emotional distress**	☐	☐	☐	☐	☐
2	**I do not like taking any medication for emotional difficulties**	☐	☐	☐	☐	☐
3	**It is a sign of weakness to take medication for emotional difficulties**	☐	☐	☐	☐	☐
4	**I feel like I should be able to take care of my problems by myself**	☐	☐	☐	☐	☐
5	**If a person always takes medication whenever upset or feeling down then the medication might not work as well when it is really needed**	☐	☐	☐	☐	☐
6	**If I sought help for my emotional problems then I might lose my health benefits**	☐	☐	☐	☐	☐
7	**I can afford to pay for treatment for mental health problems**	☐	☐	☐	☐	☐
8	**I would rather not seek help for mental health problems because I might lose my health benefits**	☐	☐	☐	☐	☐

		Strongly Disagree	Disagree	Neutral	Agree	Stro Agr
9	The cost of mental health treatment is well covered by my health insurance	☐	☐	☐	☐	☐
10	Getting help for my mental health problems may jeopardise getting life insurance	☐	☐	☐	☐	☐
11	I believe that treatment for emotional problems will help me	☐	☐	☐	☐	☐
12	I would be less depressed if I talked about my problems	☐	☐	☐	☐	☐
13	I would cope better with my Parkinson's if I got help for my emotional problems	☐	☐	☐	☐	☐
14	I prefer to use prayer to treat emotional problems rather than going for therapy or taking pills	☐	☐	☐	☐	☐
15	Talking about my emotional problems may help my Parkinson's to get better	☐	☐	☐	☐	☐
16	I don't want to become dependent on a therapist	☐	☐	☐	☐	☐

17	**I don't want to become dependent on psychiatric medication**	☐	☐	☐	☐	☐
18	**Good patients do not talk about their emotional problems with their doctors**	☐	☐	☐	☐	☐
19	**Most doctors want to hear about any problems a patient is having in addition to those related to Parkinson's**	☐	☐	☐	☐	☐
20	**My doctor may not want me to be his/her patient anymore if I talk too much about my emotional problems**	☐	☐	☐	☐	☐
21	**I don't want to reveal that I have emotional problems because I am afraid of what my doctor would think of me**	☐	☐	☐	☐	☐
22	**I don't want to see a mental health professional because my doctor will think I am weak**	☐	☐	☐	☐	☐
23	**Most doctors are more than willing to listen to patients talk about their emotional distress**	☐	☐	☐	☐	☐
24	**I don't want to get treatment for mental health problems because my family and friends will think I am crazy**	☐	☐	☐	☐	☐

		Strongly Disagree	Disagree	Neutral	Agree	Stro Agr
25	It is normal for anyone with Parkinson's to be distressed therefore help for emotional problems is not needed	☐	☐	☐	☐	☐
26	I would rather not seek emotional help because I am afraid my employer would find out (if employed)	☐	☐	☐	☐	☐
27	I know where to go to find a therapist if I need one	☐	☐	☐	☐	☐
28	I would rather not seek help for emotional problems because it is too difficult getting around to see yet another doctor	☐	☐	☐	☐	☐
29	I worry that taking psychiatric medication may cause distressing side effects (e.g., nausea, constipation and sexual problems)	☐	☐	☐	☐	☐
30	I think that it is easier to put up with emotional distress than with the side effects that may come from psychiatric medications	☐	☐	☐	☐	☐
31	I don't want to take psychiatric medications in a bad way	☐	☐	☐	☐	☐
32	I fear that using relaxation techniques might make me do things without being able to control them	☐	☐	☐	☐	☐

33	**I worry about becoming too sedated from psychiatric medications**	☐	☐	☐	☐	☐
34	**Getting help for my emotional problems will take away time and energy that I need to spend coping with Parkinson's**	☐	☐	☐	☐	☐
35	**It is as important for my doctor to listen to me about my emotional problems as it is for him/her to help me with my PD**	☐	☐	☐	☐	☐
36	**I feel like I should be able to take care of my problems by myself**	☐	☐	☐	☐	☐
37	**Taking psychiatric medication would dull my emotions**	☐	☐	☐	☐	☐
38	**Medication is more effective than psychotherapy for emotional problems**	☐	☐	☐	☐	☐
39	**Psychotherapy is more effective than medication for emotional problems**	☐	☐	☐	☐	☐
40	**Medication and psychotherapy are equally effective for emotional problems**	☐	☐	☐	☐	☐
41	**I worry about interactions between psychiatric medication and my Parkinson's medication**	☐	☐	☐	☐	☐
42	**I prefer medication for emotional problems rather than psychotherapy**	☐	☐	☐	☐	☐

Appendix G

Item-Component Loadings and Cronbach's Alpha Values of Internal Consistency for the Needs Survey

		Loading	α
Weakness			
1	It is a sign of weakness to talk with a mental health professional about emotional distress	.10	
2	I do not like taking any medication for emotional difficulties	.50	
3	It is a sign of weakness to take medication for emotional difficulties	.35	
4	I feel like I should be able to take care of my problems by myself	.59	.69
5	If a person always takes medication whenever upset or feeling down then the medication might not work as well when it is really needed	.50	
Cost/Health Benefits			
6	If I sought help for my emotional problems then I might lose my health benefits	.67	
7	I can afford to pay for treatment for mental health problems	.10	
8	I would rather not seek help for mental health problems because I might lose my health benefits	.66	
9	The cost of mental health treatment is well covered by my health insurance	.19	.61
10	Getting help for my mental health problems may jeopardise getting life insurance	.57	
Efficacy			
11	I believe that treatment for emotional problems will help me	.78	
12	I would be less depressed if I talked about my problems	.82	
13	I would cope better with my Parkinson's if I got help for my emotional problems	.81	
14	I prefer to use prayer to treat emotional problems rather than going for therapy or taking pills	.14	.57
15	Talking about my emotional problems may help my Parkinson's to get better	.52	
Dependency			
16	I don't want to become dependent on a therapist	.70	
17	I don't want to become dependent on psychiatric medication	.66	.55
Doctor's Reaction			
18	Good patients do not talk about their emotional problems with their doctors	.66	
19	Most doctors want to hear about any problems a patient is having in addition to those related to Parkinson's	.10	
20	My doctor may not want me to be his/her patient anymore if I talk too much about my emotional problems	.73	
21	I don't want to reveal that I have emotional problems because I am afraid of what my doctor would think of me	.79	.73
22	I don't want to see a mental health professional because my doctor will think I am weak	.73	
23	Most doctors are more than willing to listen to patients talk about their emotional distress	.14	
Stigma			
24	I don't want to get treatment for mental health problems because my family and friends will think I am crazy	.33	
25	It is normal for anyone with Parkinson's to be distressed therefore help for emotional problems is not needed	.14	.54
26	I would rather not seek emotional help because I am afraid my employer would find out	.61	
Access/Logistics			
27	I know where to go to find a therapist if I need one	.38	
28	I would rather not seek help for emotional problems because it is too difficult getting around to see yet another doctor	.65	.37
Side Effects			
29	I worry that taking psychiatric medication may cause distressing side effects	.73	
30	I think that it is easier to put up with emotional distress than with the side effects that may come from psychiatric medications	.47	
31	I don't want to take psychiatric medications in a bad way	.09	
32	I fear that using relaxation techniques might make me do things without being able to control them	.33	.60
33	I worry about becoming too sedated from psychiatric medications	.74	
34	Taking psychiatric medication would dull my emotions	.64	
Concern for PD			
35	Getting help for my emotional problems will take away time and energy that I need to spend coping with Parkinson's	.57	
36	It is as important for my doctor to listen to me about my emotional problems as it is for him/her to help me with my PD	.42	.37

Appendix H – Study IV Outlier Tests

Univariate outliers

Extreme Values

			Case Number	Value
Zscore(DASSDEP)	Highest	1	206	3.29196
		2	269	3.09526
		3	49	2.89856
		4	312	2.89856
		5	104	2.70186[a]
	Lowest	1	327	-1.03544
		2	325	-1.03544
		3	321	-1.03544
		4	315	-1.03544
		5	313	-1.03544[b]
Zscore(DASSANX)	Highest	1	104	3.19013
		2	206	3.19013
		3	267	3.19013
		4	297	3.19013
		5	35	2.68867[c]
	Lowest	1	327	-1.32303
		2	315	-1.32303
		3	313	-1.32303
		4	299	-1.32303
		5	294	-1.32303[d]
Zscore(DASSSTRESS)	Highest	1	128	3.27098
		2	76	3.05788
		3	267	3.05788
		4	297	3.05788
		5	45	2.84479
	Lowest	1	327	-1.20405
		2	322	-1.20405
		3	320	-1.20405
		4	315	-1.20405
		5	314	-1.20405[e]
Zscore(PDQtotal)	Highest	1	128	3.57251
		2	267	2.84732
		3	1	2.50200
		4	49	2.43293
		5	70	2.39840
	Lowest	1	20	-1.60739
		2	313	-1.53832
		3	299	-1.53832
		4	265	-1.53832
		5	125	-1.53832
Zscore(PsychOpenness)	Highest	1	12	2.76671
		2	24	2.76671
		3	42	2.76671
		4	44	2.76671
		5	1	2.65329[f]
	Lowest	1	299	-1.77030
		2	269	-1.77030
		3	111	-1.77030
		4	72	-1.77030
		5	25	-1.77030

Zscore(HelpSeekPropensity)	Highest	1	3	1.31650
		2	4	1.16890
		3	11	1.16890
		4	111	1.16890
		5	119	1.16890[g]
	Lowest	1	127	-3.55437
		2	92	-3.55437
		3	70	-3.55437
		4	25	-3.55437
		5	5	-3.25917
Zscore(PerceivedPubStigma)	Highest	1	322	7.39858
		2	267	2.77373
		3	110	1.69460
		4	131	1.69460
		5	132	1.69460[h]
	Lowest	1	313	-2.62193
		2	264	-2.62193
		3	187	-2.62193
		4	291	-2.46776
		5	257	-2.31360[i]
Zscore(Shame_SSDS)	Highest	1	58	2.35958
		2	128	2.35958
		3	120	2.08176
		4	4	1.80395
		5	7	1.80395[j]
	Lowest	1	32	-1.58264
		2	326	-1.52985
		3	320	-1.52985
		4	316	-1.52985
		5	313	-1.52985[k]
Zscore(SelfBlame_SSDS)	Highest	1	120	2.59475
		2	131	2.01932
		3	132	2.01932
		4	18	1.73161
		5	3	1.44390[l]
	Lowest	1	313	-2.00866
		2	306	-2.00866
		3	304	-2.00866
		4	299	-2.00866
		5	291	-2.00866[m]
Zscore(SocInadequacy_SSDS)	Highest	1	267	2.61391
		2	38	2.27098
		3	18	1.92804
		4	49	1.92804
		5	131	1.92804[n]
	Lowest	1	205	-2.53010
		2	313	-2.18716
		3	291	-2.18716
		4	270	-2.18716
		5	253	-2.18716
Zscore(NSWeakness)	Highest	1	4	2.91649
		2	58	2.62319
		3	181	2.62319
		4	91	2.03658
		5	150	2.03658[o]
	Lowest	1	318	-2.36300
		2	206	-2.36300
		3	123	-2.36300
		4	13	-2.36300

		5	253	-2.13422
Zscore(NSCost)	Highest	1	155	5.06305
		2	18	2.70577
		3	166	2.70577
		4	167	2.70577
		5	32	2.36902
	Lowest	1	326	-2.34554
		2	189	-2.34554
		3	280	-2.00878
		4	275	-2.00878
		5	268	-2.00878[p]
Zscore(NSEfficacy)	Highest	1	17	3.53536
		2	104	2.90928
		3	238	2.59624
		4	327	2.28321
		5	15	1.97017[q]
	Lowest	1	120	-3.03844
		2	296	-2.72540
		3	325	-2.41237
		4	278	-2.41237
		5	277	-2.41237[r]
Zscore(NSDepenendecy)	Highest	1	38	2.67348
		2	17	2.07883
		3	44	2.07883
		4	2	1.48418
		5	3	1.48418[s]
	Lowest	1	326	-3.27300
		2	325	-3.27300
		3	276	-3.27300
		4	252	-3.27300
		5	125	-3.27300[t]
Zscore(NSStigma)	Highest	1	4	4.16346
		2	283	3.14519
		3	67	2.63605
		4	3	2.12691
		5	15	2.12691[u]
	Lowest	1	327	-1.94618
		2	325	-1.94618
		3	322	-1.94618
		4	318	-1.94618
		5	310	-1.94618[v]
Zscore(NSAccess)	Highest	1	128	2.85421
		2	4	2.56353
		3	15	2.27285
		4	16	2.27285
		5	129	2.27285[w]
	Lowest	1	327	-1.79670
		2	326	-1.79670
		3	322	-1.79670
		4	321	-1.79670
		5	320	-1.79670[x]
Zscore(NSMisc)	Highest	1	1	3.80972
		2	2	2.98351
		3	3	2.98351
		4	4	2.15730
		5	5	2.15730[y]
	Lowest	1	327	-3.62618
		2	326	-3.62618
		3	325	-3.62618

	4	324	-2.79997
	5	323	-2.79997

Extreme Values

			Case Number	Value
Zscore(NSWeakness)	Highest	1	4	2.91649
		2	58	2.62319
		3	181	2.62319
		4	91	2.03658
		5	150	2.03658[a]
	Lowest	1	318	-2.36300
		2	206	-2.36300
		3	123	-2.36300
		4	13	-2.36300
		5	253	-2.13422
Zscore(NSCost)	Highest	1	155	5.06305
		2	18	2.70577
		3	166	2.70577
		4	167	2.70577
		5	32	2.36902
	Lowest	1	326	-2.34554
		2	189	-2.34554
		3	280	-2.00878
		4	275	-2.00878
		5	268	-2.00878[b]
Zscore(NSEfficacy)	Highest	1	17	3.53536
		2	104	2.90928
		3	238	2.59624
		4	327	2.28321
		5	15	1.97017[c]
	Lowest	1	120	-3.03844
		2	296	-2.72540
		3	325	-2.41237
		4	278	-2.41237
		5	277	-2.41237[d]
Zscore(NSDepenendecy)	Highest	1	38	2.67348
		2	17	2.07883
		3	44	2.07883
		4	2	1.48418
		5	3	1.48418[e]
	Lowest	1	326	-3.27300
		2	325	-3.27300
		3	276	-3.27300
		4	252	-3.27300
		5	125	-3.27300[f]
Zscore(NSStigma)	Highest	1	4	4.16346
		2	283	3.14519
		3	67	2.63605
		4	3	2.12691
		5	15	2.12691[g]
	Lowest	1	327	-1.94618
		2	325	-1.94618
		3	322	-1.94618
		4	318	-1.94618
		5	310	-1.94618[h]
Zscore(NSAccess)	Highest	1	128	2.85421
		2	4	2.56353
		3	15	2.27285

		4	16	2.27285
		5	129	2.27285[I]
	Lowest	1	327	-1.79670
		2	326	-1.79670
		3	322	-1.79670
		4	321	-1.79670
		5	320	-1.79670[J]
Zscore(NSMisc)	Highest	1	1	3.80972
		2	2	2.98351
		3	3	2.98351
		4	4	2.15730
		5	5	2.15730[K]
	Lowest	1	327	-3.62618
		2	326	-3.62618
		3	325	-3.62618
		4	324	-2.79997
		5	323	-2.79997

Multivariate Outliers

Extreme Values

			Case Number	Value
Analog of Cook's influence statistics	Highest	1	300	.31007
		2	295	.24803
		3	311	.23582
		4	212	.22936
		5	78	.21936
	Lowest	1	254	.00003
		2	257	.00006
		3	37	.00006
		4	158	.00006
		5	267	.00006
MahalonobisD	Highest	1	53	-.86
		2	55	-.89
		3	253	-.89
		4	201	-.90
		5	239	-.92
	Lowest	1	254	-.99
		2	158	-.99
		3	267	-.99
		4	257	-.99

Extreme Values

			Case Number	Value
Analog of Cook's influence statistics	Highest	1	300	.31007
		2	295	.24803
		3	311	.23582
		4	212	.22936
		5	78	.21936
	Lowest	1	254	.00003
		2	257	.00006
		3	37	.00006
		4	158	.00006
		5	267	.00006
MahalonobisD	Highest	1	53	-.86
		2	55	-.89
		3	253	-.89
		4	201	-.90
		5	239	-.92
	Lowest	1	254	-.99
		2	158	-.99
		3	267	-.99
		4	257	-.99
		5	37	-.99

Appendix I

Study II: Tests for multicollinearity

Zero-order correlation matrix

Correlations

	Age	Would you see a mental health professional for help with psychological problems?	Psych Talk	Treatment lifetime	HelpSeek Propensity	SocInadequacy SSDS	NS Efficacy	NS Weakness
Age	1	-.311**	.179**	-.318**	-.123*	-.023	-.136*	.235**
		.000	.001	.000	.026	.683	.014	.000
Would you seee a mental health professional for help with psychological problems?	-.311**	1	-.143**	.271**	.186**	.095	.229**	-.232**
	.000		.009	.000	.001	.085	.000	.000
Has your GP/neurologist ever spoken to you about psychological conditions that can occur in PD?	.179**	-.143**	1	-.353**	-.047	-.051	-.065	.178**
	.001	.009		.000	.393	.362	.244	.001
Treatment_lifetime	-.318**	.271**	-.353**	1	.027	.150**	.205**	-.267**
	.000	.000	.000		.627	.007	.000	.000
HelpSeekPropensity	-.123*	.186**	-.047	.027	1	-.162**	.034	-.229**
	.026	.001	.393	.627		.003	.535	.000
SocInadequacy_SSDS	-.023	.095	-.051	.150**	-.162**	1	.075	.142**
	.683	.085	.362	.007	.003		.178	.010
NSEfficacy	-.136*	.229**	-.065	.205**	.034	.075	1	-.103
	.014	.000	.244	.000	.535	.178		.062
NSWeakness	.235**	-.232**	.178**	-.267**	-.229**	.142**	-.103	1
	.000	.000	.001	.000	.000	.010	.062	
	327	327	327	327	327	327	327	327

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Parameter Estimates

Effect	Parameter	Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Treatment_lifetime*PsychMedication*PsychTalk	1	-.180	.356	-.504	.614	-.878	.519
Treatment_lifetime*PsychMedication	1	.180	.356	.504	.614	-.519	.878
Treatment_lifetime*PsychTalk	1	.034	.356	.096	.924	-.664	.732
PsychMedication*PsychTalk	1	-.129	.356	-.361	.718	-.827	.569
Treatment_lifetime	1	-.034	.356	-.096	.924	-.732	.664
PsychMedication	1	.129	.356	.361	.718	-.569	.827
PsychTalk	1	-.148	.356	-.030	.000	-.846	1.450

Appendix J

Study III. Tests for Linearity in the Logit

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Age	-.071	.019	14.458	1	.000	.932
	PsychMedication(1)	1.241	.393	9.977	1	.002	3.457
	Treatment_lifetime	1.087	.423	6.593	1	.010	2.965
	PsychTalk(1)	.243	.312	.607	1	.436	1.275
	HelpSeekPropensity	.195	.097	4.019	1	.045	1.215
	SocInadequacy_SSDS	.148	.359	.169	1	.681	1.159
	NSWeakness	-.203	.131	2.394	1	.122	.816
	NSEfficacy	.389	.211	3.391	1	.066	1.476
	HelpSeek_LN	-6.119	4.152	2.172	1	.141	.002
	SocInad_LN	-.370	9.474	.002	1	.969	.691
	Eff_LN	-5.867	4.631	1.606	1	.205	.003
	Weakness_LN	1.317	1.923	.469	1	.493	3.734
	Constant	9.087	6.568	1.914	1	.167	8836.515

a. Variable(s) entered on step 1: PsychMedication, Treatment_lifetime, PsychTalk, HelpSeekPropensity, SocInadequacy_SSDS, NSWeakness, NSEfficacy, HelpSeek_LN, SocInad_LN, Eff_LN, Weakness_LN.