Assessing the Effectiveness of CBTp Across Time: A Systematic Review and Meta-Analysis

Katarzyna Sitko

Submitted in accordance with the requirements for the degree of
Doctor of Clinical Psychology (D. Clin. Psychol.)

The University of Leeds

School of Medicine

Academic Unit of Psychiatry and Behavioural Sciences

July 2019

The candidate confirms that the work submitted is his/her own and that appropriate credit has been given where reference has been made to the work of others.

Acknowledgements

I would first like to acknowledge the mentorship I received from my thesis supervisors, Dr Ciara Masterson, Dr Bridgette Bewick, and Dr David Owens. I have been very fortunate to have worked with you - thank you for your knowledge and our insightful discussions. I am grateful for your guidance and support in my development as a clinical researcher.

I will forever be grateful to Professor Richard Bentall whose research in psychosis sparked my curiosity. Being part of your 'Psychosis Lab' has had a tremendous impact on my career trajectory.

I would like to thank everyone on the DClin staff team for being kind, understanding, and compassionate. You have made the last three years an enjoyable journey.

I am grateful to the Leeds Teaching Hospitals NHS Trust for funding my place on the course, and for giving me the opportunity to train as a Clinical Psychologist.

I would like to thank my fellow DClin friends for being the support system I needed throughout these three years, especially Bronwyn, Dani, Mandip, Rosie, and Tori.

I would like to thank my parents Barbara and Zbigniew Sitko and my brother Paul for their encouragement and support in my career aspirations. Lastly, I would like to thank Filip – my other half, for his guidance and unconditional support in my journey to becoming a Clinical Psychologist. Thank you for being there every step of the way – we made it!

Abstract

Aim: Research to date has shown small effects of Cognitive Behavioural Therapy for Psychosis (CBTp) on reducing psychotic symptoms. Some have subsequently questioned whether CBTp should continue to be a recommended treatment for psychosis. There have been parallel advances in the understanding of psychosis and in the evolution of CBT that is specific to psychosis. The aim of this study is to examine whether these parallel advances have led to an improved effectiveness of CBTp across time.

Method: The design of this study is a systematic review and meta-analysis. MEDLINE, EMBASE, PsycINFO, and CENTRAL were searched for randomised controlled trials examining CBTp interventions targeting positive and/or negative symptoms versus treatment as usual. Four meta-analyses were carried out to examine the effectiveness of CBTp for positive symptoms, delusions, hallucinations, and negative symptoms, with four meta-regressions to examine whether the effectiveness of CBTp for these symptoms improved across time.

Result: A total of 28 studies (n = 2698) were included in the meta-analysis of positive symptoms which yielded a pooled *g* of -0.24 (95% CI -0.32, -0.16, P < .001) favouring CBTp, with non-significant heterogeneity (Q = 26.87, P = 0.47; I^2 = 0%). A total of 13 studies (n=890) were included in the meta-analysis of delusions which yielded a pooled *g* of -0.36 (-0.59, -0.13, P = 0.002), with substantial heterogeneity (Q = 31.99, P = 0.001; I^2 = 62%). A total of 16 studies (n = 849) were included in the meta-analysis of hallucinations which yielded a pooled *g* of -0.26 (95% CI -0.42, -0.11, P < 0.001), with non-significant heterogeneity (Q = 18.10, P = 0.26; I^2 = 17%). A total of 19 studies (n = 1761) were included in the meta-analysis of negative symptoms which yielded a pooled *g* of -0.22 (95% CI -0.33, -0.12, P < 0.001), with non-significant heterogeneity (Q = 20.32, P = 0.32, I^2 = 11%). Meta-regressions indicated a significant effect of year on the effectiveness of CBTp only for delusions (F(1, 11) = 5.99, p = 0.032; R^2 = 0.594).

Conclusion: The findings indicate small-to-medium effects of CBTp for positive symptoms, delusions, hallucinations, and negative symptoms, and that over time, there has been an improvement in the effectiveness of CBTp for delusional symptoms.

Table of Contents

List of Tables

List of Figures

List of Equations

Introduction

1.1 Overview

Over their lifetime, approximately 1% of the UK population will receive a diagnosis of schizophrenia (Royal College of Psychiatrists, 2017). The complexity of this condition puts pressure on services to provide effective treatments. The National Institute for Care and Health Excellence (NICE) recommends Cognitive Behaviour Therapy for Psychosis (CBTp) as one of the psychological treatments for psychosis (NICE, 2014). A recent meta-analysis reported that CBTp had small effects on reducing psychotic symptoms, and the authors subsequently questioned whether CBTp should continue to be a recommended treatment (Jauhar et al., 2014). From a historical perspective there have been advances in the understanding of psychosis, which have shifted from a biomedical understanding to one that incorporates psychosocial factors. Over the same time, CBT for psychosis has evolved. Consequently, I will examine the hypothesis that these parallel advances – in understanding of the psychosis and in CBT that is specific to psychosis – have led to improved effectiveness for CBTp.

My first step in the introduction to the research will be to make the case that psychosis should be examined at the cluster or symptom level rather than by using conventional diagnostic concepts. My second step will be to examine the advances in the understanding of psychosis by exploring historical and current conceptualisations. Step three will be to examine psychological approaches for psychosis with a focus on CBTp, and how it has evolved.

1.2 Psychosis

The aim of this section is to make the case that psychosis should be examined at the cluster or symptom level rather than by using conventional diagnostic categories. I will first examine the construct of schizophrenia and its development within the Diagnostic and Statistical Manual (DSM). Second, I will explore the challenges of conventional diagnostic categories. Third, I will present research that suggests using clusters or individual psychotic

symptoms as an alternative way to assessing psychotic symptoms. I recognise that other diagnostic systems such as the International Classification of Diseases (ICD) exist. The focus here will be on the DSM because compared with the ICD it has been more widely adopted in research (Clark, Cuthbert, Lewis-Fernández, Narrow, & Reed, 2017).

1.2.1 Schizophrenia and its development within the DSM

According to the DSM-5 (American Psychiatric Association [APA], 2013) schizophrenia is a psychiatric disorder that falls under the umbrella term of psychosis. Psychosis is a term that is used to refer to psychiatric disorders, such as schizophrenia and schizoaffective psychosis, and to psychotic symptoms associated with these disorders, such as hallucinations and delusions. Schizophrenia was first described by Emil Kraepelin (1856-1926) as 'dementia praecox' and later revised by Eugen Bleuler (1857-1939) to 'schizophrenia' (Ebert & Bar, 2010). Kraepelin argued that diagnostic classifications, such as dementia praecox, were distinct disorders that could be successfully differentiated from other disorders (Decker, 2004). He proposed that specific patterns of symptoms, together with the course of the 'illness', could provide clues to an underlying physiological cause and indicate type of diagnosis (Decker, 2004). Although Kraepelin's proposition was highly debated (Palm & Möller, 2011), it became accepted and has since influenced the development and conceptualisation of categorical nosologies such as the DSM (Jablensky, 2010).

From its inception the DSM was criticised as being unreliable and inadequate. This is no surprise as the DSM-I (APA, 1952) and DSM-II (APA, 1968) were based on consensus agreement, rather than empirical evidence (Beck, Ward, Mendelson, Mock, & Erbaugh, 1962). When the DSM-III (APA, 1980) was introduced, it was viewed as a turning point in the way psychiatric disorders were conceptualised because they were now based on empirically-based diagnostic criteria (Surís, Holliday, & North, 2016). In this edition, symptoms were clearly defined and clinicians were required to make a diagnosis on a certain grouping of signs and symptoms. It was believed that this conceptualisation was the golden opportunity to redeem the DSMs reputation, but seven years later the manual was

revised to the DSM-III-R edition (APA, 1987) tightening the criteria for diagnoses such as schizophrenia in the hopes of increased diagnostic homogeneity, which turned out not to be the case (Fenton, McGlashan, & Heinssen, 1988). Since that time the DSM has produced three more editions. The DSM-IV (APA, 1994) and the DSM-IV-TR (APA, 2000) updated the criteria for a schizophrenia diagnosis by including negative symptoms, by removing the required age of onset of up to 45 years (Tandon et al., 2013), and by creating schizophrenia subtypes - paranoid, disorganized, catatonic, undifferentiated, and residual. In the most recent edition however, the DSM-5 (APA, 2013), these schizophrenia subtypes have been removed because they had poor diagnostic stability and reliability, and had limited prognostic value (Tandon et al., 2013).

Since the inception of the DSM, the diagnostic classification of schizophrenia has undergone a number of revisions. These frequent changes without any proof of improved validity can be counterproductive to the progress of research (Fenton et al., 1988). Towards the end of his career, Kraepelin was filled with doubt regarding the validity of the nosology of the psychoses and wrote in 1920 that "It is becoming increasingly clear that we cannot distinguish satisfactorily between these two illnesses [dementia praecox/schizophrenia and manic-depressive insanity/bipolar] and this brings home the suspicion that our formulation of the problem may be incorrect" (Kraepelin, 1920). Kraepelin's early doubts reflect some of the ongoing challenges that the DSM has faced – despite the number of revisions it has undergone. The following section will explore some of these challenges.

1.2.2 Challenges associated with conventional diagnostic categories

Although psychosis can be conceptualised through the use of conventional diagnostic categories such as schizophrenia, there are several challenges associated with this approach such as: a.) the high level of comorbidity between a diagnosis of schizophrenia and other psychotic disorders; b.) the high level of heterogeneity within the diagnosis of schizophrenia; c.) the lack of reliability and validity of the diagnosis of schizophrenia; and d.) the symptoms of schizophrenia existing on a continuum. As a result of these challenges,

alternative ways of conceptualising psychotic symptoms have been proposed. These challenges and alternatives are explored in more detail below.

1.2.2.1 Comorbidity of diagnoses

Symptoms of schizophrenia can occur in other psychiatric diagnoses. Hallucinations and delusions, for example, have been reported by people with a diagnosis of bipolar disorder (Goodwin & Jamison, 2007) or major depression disorder (Serretti, Lattuada, Catalano, & Smeraldi, 1999). In another study, people with a diagnosis of schizophrenia compared with those with no schizophrenia diagnosis had an odds ratio of 14 in meeting the necessary diagnostic criteria for a diagnosis of depression, and an odds ratio of 46 in meeting the necessary diagnostic criteria for mania (Robbins, Locke, & Regier, 1991). It is also common for people with a diagnosis of schizophrenia to receive additional psychiatric diagnoses, with reported prevalence rates of 50% for depression, 47% for substance abuse, 29% for post-traumatic stress disorder, 23% for obsessive-compulsive disorder, and 15% for panic disorder (Buckley, Miller, Lehrer, & Castle, 2009). The International Pilot Study of Schizophrenia carried out by the World Health Organisation (WHO, 1973) examined the degree of relatedness of symptoms between those with a diagnosis of schizophrenia and those with other psychiatric disorders. The research group found that "profiles of certain schizophrenic subgroups were more closely related to the profiles of patients with non-schizophrenic diagnoses than those of other schizophrenics" (p.357), suggesting a high level of comorbidity between a diagnosis of schizophrenia and other psychiatric diagnoses, and also a high level of heterogeneity within the categories. Robbins et al. (1991) suggests that the observed comorbidity could be a result of a ripple effect, where having one psychiatric diagnosis increases the risk for developing other psychiatric diagnoses. Although this is a possibility, a more plausible explanation could be that psychological disorders are not distinct but rather complex multidimensional combinations of psychological problems that are shared across disorders (Clark et al., 2017).

1.2.2.2 Heterogeneity

It has been suggested that there is heterogeneity within the diagnosis of schizophrenia. The DSM-5, for example, proposes that to receive a diagnosis of schizophrenia, a person must have two of the following five symptoms: hallucinations, delusions, negative symptoms, disorganised speech, and/or disorganised behaviours, and that one of these symptoms must be hallucinations, delusions, or disorganised speech (APA, 2013). On the basis of these criteria, there are twelve different ways that two individuals can receive a diagnosis of schizophrenia without sharing any common symptoms (Read, 2013a). Although this is a reduction from the DSM-IV-TR (APA, 2000) where there were fifteen different ways that two individuals could receive a diagnosis of schizophrenia without sharing any common symptoms (Read, 2013a), such heterogeneity decreases the confidence that researchers can have in the diagnosis as it is impossible to know whether the individuals they are studying are even comparable (Read, 2013b). When WHO (1973) carried out the International Pilot Study of Schizophrenia, the research group found that "no 'schizophrenic profile'…was elicited" (p.357). The group also examined clusters of symptoms across various psychiatric diagnoses, and concluded that "the clusters are defining different and more homogenous groups than are the clinical diagnoses" (p.350). This outcome suggests that clusters of symptoms may be a more useful way of conceptualising psychosis that will lead to a more homogenous sample.

1.2.2.3 Reliability and validity

As a psychiatric diagnosis, schizophrenia lacks reliability (or repeatability) and validity. Spitzer and Fleiss (1974) suggested that diagnoses need to meet two criteria – they need to be reliable and valid. It is important to clarify that a diagnosis can be reliable without being valid, but it cannot be valid without being reliable (Spitzer & Fleiss, 1974). In the DSM-5 field trials, a kappa coefficient of 0.46 – or fair agreement, according to Cicchetti and Sparrow's (1981) proposed guidelines, was found for schizophrenia. In the DSM-5 however, Narrow et al. (2013) propose a new guideline to interpreting kappa coefficients where 0.46 now reflects good agreement (Regier et al., 2013). Despite the

inconsistency by which kappa coefficients have been categorised, the agreement research suggests that schizophrenia cannot be reliably diagnosed. Since it cannot be reliably diagnosed the construct of schizophrenia cannot be considered valid. Consequently, different means of examining psychosis that do not reply on conventional diagnostic categories need to be considered.

1.2.2.4 Psychotic experiences exist on a continuum

For many years it was readily believed that schizophrenia symptoms existed outside normal psychological functioning. Recent evidence discredited this belief, suggesting instead that these symptoms exist on a continuum with 'normal' functioning. A systematic review and meta-analysis suggests that the symptoms that are present in people with psychiatric diagnoses are part of a continuum of experiences that can be observed in non-clinical individuals (van Os, Linscott, Myin-Germeys, Delespaul, & Krabbendam, 2009). More recently a systematic review examining auditory verbal hallucinations found support for a continuum model rather than a diagnostic model (Baumeister, Sedgwick, Howes, & Peters, 2017). Similarly, Freeman, Pugh, Vorontsova, Antley, and Slater (2010) found that paranoid beliefs exist on a continuum with 'normal' functioning. Shevlin, McElroy, Bentall, Reininghaus, and Murphy (2016) argue that, if psychotic-like experiences lie on a continuum with psychiatric 'illness', then their symptom structure should be similar to the symptom structure observed in individuals with psychiatric diagnoses. Shevlin et al. (2016) found a similar structure in a non-clinical population that was reported by van Os and Kapur (2009) in a clinical population – positive symptoms, negative symptoms, disorganisation, depression, and mania. These findings suggest that there is continuity between clinical and non-clinical psychotic experiences, thereby challenging the view of a conventional schizophrenia diagnosis.

1.2.3 Examining clusters or individual psychotic symptoms as an alternative

As a result of these longstanding challenges associated with conventional diagnostic categories, other ways of conceptualising the construct of psychosis have been proposed.

Liddle (1987) proposed that the structure of schizophrenia can be reduced to three symptom clusters reflecting positive symptoms, negative symptoms, and cognitive disorganisation. van Os and Kapur (2009) reported that psychosis (schizophrenia, schizoaffective, and bipolar) can be explained by Liddle's three clusters and by depression and mania. Bentall (2004) proposed that examining individual psychotic symptoms could be more useful. He argues that this could lead to identifying symptom-specific psychological mechanisms that can explain these associations. These ideas would have important clinical implications if the mechanisms could be targeted in therapy (Bentall et al., 2014). Similarly to Bentall, Steel et al. (2007) have argued that delusions and hallucinations, which make up positive symptoms, should be examined separately. They make the case that exploring the total cumulative score of positive symptoms could lead to missing out on the multidimensional nature of these symptoms.

The aim of the above section has been to examine the construct of schizophrenia and its development within the DSM, to highlight some of the challenges associated with conventional diagnostic categories such as schizophrenia, and to propose other ways of conceptualising psychosis, such as through clusters or individual symptoms. In this thesis, psychosis will be examined through clusters of symptoms (positive and negative) and individual symptoms (delusions and hallucinations) rather than through the use of conventional diagnostic categories.

1.3 The understanding of psychosis

This section will examine the advances in the understanding of psychosis by exploring both historical and current conceptualisations. I will first examine the history of the understanding of the causes of psychosis, showing a shift from a biomedical understanding to one that incorporates psychosocial factors. I will then examine the current understanding of the trajectory of psychosis. Finally, I will define positive and negative symptoms of psychosis.

1.3.1 The history of the understanding of the causes of schizophrenia

Schizophrenia has been viewed as a disease, with symptoms understood in terms of disordered somatic processes (Engel, 1977). Ludwig (1975) proposed "that sufficient deviation from normal represents disease, that disease is due to known or unknown natural causes, and that elimination of these causes will result in cure or improvement in individual patients" (p.603). Early beliefs reflect this bio-medical understanding. Emil Kraepelin (1856-1926), for example, believed that schizophrenia was a neurodegenerative disease caused by underlying neuropathology that progressively developed into a dementia (Ebert & Bar, 2010). Eugen Bleuler (1857-1939) conceptualised schizophrenia as an inherent illness (Ashok, Baugh, & Yeragani, 2012), and believed that schizophrenia indicated 'splitting' of the 'soul, spirit, mind' (Fusar-Poli & Politi, 2008). Later, clinicians such as Karl Jaspers (1883-1960) argued that the symptoms of schizophrenia cannot be understood in terms of a person's personality and experiences. He subsequently proposed that the only viable explanation for schizophrenia is flawed biology (Stanghellini & Fuchs, 2013). Kurt Schneider (1887-1967), argued that the 'form' and 'content' of schizophrenia symptoms need to be distinguished. He proposed that a diagnosis should not be based on the 'content' of the beliefs - what that auditory hallucinations are saying, but rather the 'form' of the beliefs – how the beliefs are held (Cutler, 2008). Schneider essentially proposed that the content of symptoms is meaningless.

The 1960s brought a different perspective to the field of psychiatry. In his seminal book "The Myth of the Mental Illness", psychiatrist Thomas Szasz (1960), argued that categorising psychological problems as diseases does not make sense. He contrasted and differentiated psychological problems from physical problems and argued that they cannot be diagnosed in the same fashion (Ruse, 1988). Szasz also proposed that psychotherapy can be helpful for people with schizophrenia and that it can be used as a tool for clients to learn about themselves, others, and life (Zilbergeld, 1983), essentially suggesting that psychosis may be meaningfully understood in the context of peoples life experiences. Laing (1967) in his seminal book "The Politics of Experience and the Bird of Paradise", argued that

psychosis was meaningful, and that ‘insanity’ can be viewed a rational response to a rather ‘insane’ world. In his other work, Laing and Esterson (1970) proposed that experiences of victimisation within families can play a causal role in psychotic experiences. Similarly to Laing, Maher (1974) argued that psychosis is understandable. He proposed that odd experiences can lead people to have odd ideas.

In his 1975 paper, Ludwig (a psychiatrist), writes that “psychiatry has become a hodgepodge of unscientific opinions, assorted philosophies and ‘schools of thought’”, (p. 603) and that for the field to gain credibility and to understand psychiatric diagnoses, psychiatrists need to gain expertise in neuropathology, biochemistry, neurophysiology, endocrinology, pharmacology, and physiology. Since that time research has examined brain structures, chemical imbalances, and heredity as causes of schizophrenia. Research has since provided evidence that individuals with a schizophrenia diagnosis have structural brain abnormalities (e.g. Downhill et al., 2000; Job et al., 2002; Nelson, Saykin, Flashman, & Riordan, 1998; Reveley, 1985; Ward, Friedman, Wise, & Schulz, 1996), a chemical imbalance that is associated with hyperactivity of the dopaminergic system (van Os & Kapur, 2009), and a genetically inherited disease (Gottesman, McGuffin, & Farmer, 1987; Tienari et al., 1985). Although Ludwig (1975) proposed that these dysfunctions are the cause of psychotic illness, he recognised that environmental stressors may also play a role in determining certain aspects of the ‘disease’ such as the form and the onset. Ludwig’s explanation, now known as the ‘diathesis stress model’ (Joseph, 2013), began incorporating psychosocial factors in the medical understanding of psychosis.

Researchers have since put forward a psychosocial understanding for the brain abnormalities, chemical imbalances, and heredity that have been observed or hypothesised in individuals with psychosis. First, it has been shown that the structural abnormalities observed in individuals with schizophrenia are also observed in individuals with post-traumatic stress disorder (Copolov & Crook, 2000; Kitayama, Quinn, & Bremner, 2006; Nemeroff et al., 2006; Teicher, Tomoda, & Andersen, 2006). Read, Perry, Moskowitz, and Connolly (2001) propose the ‘Traumagenic Neurodevelopmental Model’ which suggests

that such structural abnormalities may be a result of the brain reacting to environmental stressors. This would suggest that structural changes may not be the cause of schizophrenia, but rather an aftermath of environmental stressors. Second, research has also suggested that the role of the dopaminergic system in schizophrenia may be more complex than a simple causal explanation. Howes and Murray (2014) propose that the dysfunction of the dopaminergic system may, for example, be associated with increased levels of stress and experiences of social adversity in childhood. This evidence would suggest that the hyperactivity of the dopaminergic system may not necessarily indicate a solely biological cause. Finally, although heritability studies sound quite convincing in showing that schizophrenia is genetically inherited, Bentall (2009) has made the argument that heritability estimates rely on genes and the degree of variation in the environment. He argued that when the degree of environment variation is low, heritability estimations can be high, and that such gene x environment interactions can conceal considerable environmental effects. These types of research studies highlight the shift that has taken place in understanding such 'dysfunctions' of psychosis - from a biological understanding to one that takes psychosocial factors into account.

A number of studies have recently examined trauma as a determinant of psychosis. A meta-analysis found that childhood traumatic experiences were a strong risk factor for developing psychosis showing an odds ratio of 2.78 (Varese et al., 2012). Varese and colleagues also found a dose-response relationship between the severity of trauma and risk for developing psychosis. More specifically, a study examining epidemiological data found specific relationships between experiences of neglect and paranoia, and between experiences of sexual abuse and hallucinations (Sitko, Bentall, Shevlin, & Sellwood, 2014).

A number of studies have examined other psychosocial determinants of psychosis. A meta-analysis found that parental communication deviance (abnormal speech style) was associated with an increased risk of psychosis in the parents' children (de Sousa, Varese, Sellwood, & Bentall, 2013). Another meta-analysis found that being an ethnic migrant/minority was associated with an increased risk of developing psychosis, with a

relative risk of 2.7 for first-generation, 4.5 for second-generation, and 4.8 for black migrants/minorities (Cantor-Graae & Selten, 2005). A recent systematic review found that countries with higher levels of income inequality were associated with higher incidence rates of schizophrenia. Finally, a meta-analysis found that the risk for developing psychosis was 2.37 times higher for people living in urban versus rural environments (Vassos, Pedersen, Murray, Collier, & Lewis, 2012), and that there is a dose-response relationship (Pedersen & Mortensen, 2001). These studies show that a variety of psychosocial factors are associated with psychotic experiences, and they point to a shift in the understanding of the causes of psychosis, moving from a largely bio-medical narrative to one that incorporates psychosocial factors.

1.3.2 Current understanding of the trajectory of psychosis

As the understanding of the determinants of psychosis has shifted so has the understanding of the development of psychosis within an individual. There are four distinct phases in the development of psychosis – premorbid, prodromal, psychotic, and stable. The *premorbid phase* is characterised by several antecedents such as social deficits and motor abnormalities in childhood (Tandon, Nasrallah, & Keshavan, 2009). The *prodromal phase,* which begins in adolescence or young adulthood, can be characterised by attenuated psychotic symptoms alongside more pronounced negative symptoms, a decline in functioning, and decreased mood (Cornblatt, Obuchowski, Roberts, Pollack, & Erlenmeyer–Kimling, 1999). The prodromal period has been estimated to last anywhere from a couple of months to several years with the mean time of 5 years (Häfner & an der Heiden, 1999). The *psychotic phase*, also known as ‘first episode of psychosis’, begins with a pre-psychotic phase characterised by increased negative symptoms and low mood followed by an escalation of positive symptoms. This is followed by a psychotic phase which is characterised by florid positive symptoms. This, in turn, is followed by the post-psychotic phase which is characterised by a settling of the positive symptoms and a slower settling of negative symptoms and low mood. The *stable phase* is characterised by remission where symptoms can re-emerge (Tandon et al., 2009). After the first episode of psychosis, the

course of psychosis varies across individuals (Ciompi, 1980). Generally, the course is characterised by escalations and remissions of positive symptoms (Andreasen et al., 2005), and while positive symptoms become less severe over the long term course, negative symptoms become more prominent (Tandon et al., 2009). Positive and negative symptoms will be defined in the following section.

1.3.3 Definition of positive and negative symptoms

1.3.3.1 Positive symptoms

Kraepelin was the first person to differentiate between 'positive' and 'negative' symptoms, which he referred to as 'productive' and 'defect', respectively (Jablensky, 2010). Positive symptoms are present in the *psychotic phase* of the developmental trajectory of psychosis (mentioned in the previous section) (Tandon et al., 2009). These can be conceptualised as behaviours that add to 'normal' behaviour, such as delusions and hallucinations. Delusions are considered bizarre and unusual beliefs that may seem odd or irrational to other people but are held as true by the person who experiences them. The following are among the more common types of delusion, which are defined below: 'paranoid delusions', 'delusions of reference', 'thought broadcasting', 'thought insertion', and 'grandiose delusions' (Kay, Fiszbein, & Opler, 1987; Kiran & Chaudhury, 2009).

paranoid delusions – the belief that a person is being persecuted or harmed by a person or group of individuals. It involves, for example, beliefs about being spied on (followed and watched), plotted against, and poisoned or drugged;

delusions of reference – the belief that a person is receiving special messages - perhaps from the radio or TV. Also the belief that something in the environment has a special meaning to the person, for example, when a person sees a blue car, they believe that God is sending them a message;

thought broadcasting – the belief that other people can read or hear a person's thoughts;

thought insertion – the belief that thoughts feel foreign and that they must have been inserted into a person's mind by an outside force;

grandiose delusions – the belief that a person has a special identity, is wealthy, is on a special mission in life, or has special powers.

Hallucinations are considered to be distortions of perception in any sensory modality: auditory, visual, olfactory, gustatory, or somatic. A person experiences these as real, although the people around them do not hear, see, or smell what they experience. A person, for example, might hear someone call them a name, see a religious figure, feel 'bugs' crawl under their skin, smell something burnt or rotten, or taste something unpleasant without the stimulus being perceptible to another person.

In this thesis positive symptoms will be examined through two individual symptoms - delusions and hallucinations, and as a single syndrome cluster which reflects an overall average of several of the delusions and hallucinations listed above (depending on the scale).

1.3.3.2 Negative symptoms

Negative symptoms are present in the *prodromal phase* of the developmental trajectory of psychosis (mentioned in the previous section) (Tandon et al., 2009), and can be conceptualised as behaviours that are normally present but are diminished or absent in the person who experiences psychosis (Millan, Fone, Steckler, & Horan, 2014). Negative symptoms have been characterised as primary or secondary (Carpenter Jr., Heinrichs, & Wagman, 1988). They are considered secondary if they occur in response to positive psychotic symptoms, are a consequence of comorbid depressive symptomatology, or are a consequence of medication side effects. They are considered primary when they are associated with the 'disorder' itself, and are not caused by the reasons above. The following are among the more common types of negative symptoms: 'apathy/avolition', 'anergia', 'anhedonia', 'blunted affect', 'poverty of speech', and 'asociality', which are described below (Morrison et al., 2004).

apathy/avolition - diminished interest in activities that used to be enjoyable, and difficulty in attending to personal hygiene;

anergia – lack of energy;

anhedonia – inability to feel pleasure from activities that used to be enjoyable;

blunted affect - diminished emotion in facial expressions and gestures;

poverty of speech – diminished quantity of speech content, diminished spontaneous speech, diminished conversational productivity and fluency;

asociality - diminished interest in social interactions including interactions with family and friends, often due to a lack of emotional connection.

Negative symptoms are often examined as a single construct although research suggests three clusters: social amotivation (i.e. apathy/avolition, anhedonia/asociality, and anergia), diminished expression (i.e. blunted affect) and inattention-alogia (i.e. poverty of speech) (Sayers, Curran, & Mueser, 1996). In this thesis negative symptoms will be examined as a single syndrome cluster because none of the studies included in the current meta-analysis reported individual symptoms.

The aim of the above section has been to examine the advances in the understanding of psychosis by exploring historical and current conceptualisations. First, the history of the understanding of the causes of psychosis was examined, pointing to the shift from a solely biomedical understanding to one that incorporates psychosocial factors. Second, the current understanding of the developmental trajectory of psychosis was examined. Lastly, positive and negative symptoms were defined, and it was stated that both psychotic syndrome clusters (positive and negative) and individual symptoms (delusions and hallucinations) will be examined in this thesis.

1.4 Psychological approaches for psychosis

This section will examine the psychological approaches for psychosis. First it will examine the NICE recommended treatments for psychosis with a focus on CBTp. Second it will examine CBTp and how it has evolved. Third, it will examine the goals of CBTp, and the current evidence for the effectiveness of CBTp.

1.4.1 NICE recommended treatment for psychosis

In the "Psychosis and Schizophrenia in Adults: Prevention and Management" clinical guideline, NICE recommend two psychological interventions: CBTp and family interventions. The focus of this section will be on CBTp as this intervention is examined in the current thesis. The NICE recommend CBTp to be delivered on a one-to-one basis over 16 weeks by a healthcare professional with an appropriate level of competence in delivering CBT for people with psychosis (NICE, 2014). CBTp is recommended for people a.) who are in an acute phase of psychosis; b.) who are at risk of developing psychosis; c.) who are experiencing a first episode of psychosis; d.) who are experiencing an acute exacerbation or recurrent psychosis; and e.) for people who are in remission. The guideline also suggests that CBTp might be used to promote recovery in people who experience persisting positive and negative symptoms. It is important to point out that in this guideline NICE uses the term 'psychosis' to refer to and include schizophrenia, schizoaffective disorder, schizophreniform disorder, and delusional disorder. This assumption suggests that NICE recognise the overlap between such diagnoses and the resultant limitations of the conventional diagnostic approach in delivering national guidelines.

In its guideline, NICE proposes that a treatment manual should be followed when delivering CBTp, ideally one with evidence of efficacy from clinical trials (NICE, 2014). NICE suggests that CBTp is delivered so that "people can establish links between their thoughts, feelings or actions and their current or past symptoms, and/or functioning" (p.22), and so that "the re-evaluation of people's perceptions, beliefs or reasoning relates to the target symptoms" (p.23). In addition, at least one of the following components should be incorporated into the therapy: "people monitoring their own thoughts, feelings or behaviours with respect to their symptoms or recurrence of symptoms", "promoting alternative ways of coping with the target symptom", "reducing distress", and "improving functioning" (NICE, 2014).

1.4.2 CBTp

CBTp has evolved from ‘first wave’ behavioural interventions, to ‘second wave’ cognitive interventions, to ‘third wave’ interventions. There have also been advances in the understanding of the psychological mechanisms involved in psychosis that could be targeted within a CBTp framework. The CBTp evolution and the advances in the understanding of these psychological mechanisms are examined in more detail below.

1.4.2.1 Behavioural interventions: ‘first wave’ CBT

The field of clinical psychology was created in the asylum era in the United States during the Boulder Conference in Colorado in 1949 (Scull, 2011). The creation of this profession was in response to the growing needs of asylum institutions. The hope was that this new profession would address the increasing number of mental health inpatients which nearly tripled over the century, and in 1940 was approximately 445,000 (Scull, 2011). This sharp increase in number of inpatients led to overcrowding and to the deterioration of hospital conditions. Early psychological treatments in asylums relied on behavioural interventions also known as ‘first wave’ CBT that were influenced by learning theories. It was viewed that such treatments could rehabilitate institutionalised individuals towards a life in the community (Scull, 2011).

An early publication described using ‘operant-conditioning therapy’ in a ‘mental hospital’ to lead to the extinction of persistent behavioural problems such as ‘psychotic talk’, ‘avoidance of self-feeding’, ‘hoarding’, and ‘entering the nurses office’, through rewards and punishments of such behaviours (Ayllon & Michael, 1959). Token economies, which employed systematic reinforcements for desired behaviours were also used in inpatient hospitals. Patients were given plastic tokens as reinforcement for desired behaviours which were later exchangeable for cigarettes or sweets. In the mid-1970s Paul and Lentz carried out a randomised controlled trial (RCT) using the token economy approach on severely institutionalised individuals (Liberman, 1980). They found that the discharge rate to long-term community placements following this approach was 97% compared with treatment as usual (TAU) where the discharge rate was less than 45%,

suggesting that the token economy treatment was quite effective. A separate study showed that it is not the tokens but the social reinforcement received from staff through the token economy exchange that was the critical ingredient (Baker, Hall, Hutchinson, & Bridge, 1977). It seems likely that what this intervention does well is reward 'normal' behaviour – so 'abnormal' behaviour (symptoms) decrease as a consequence.

1.4.2.2 Cognitive interventions: 'second wave' CBT

1.4.2.2.1 The beginnings of CBTp

In the 1950s Aaron Beck (1952) had written a single case study describing the treatment of a 'chronic schizophrenic with paranoid delusions'. The patient was a World War II veteran who had the belief that 50 men employed by the FBI were tasked with secretly observing him. He had beliefs that these agents who pretended to be customers in the store where he worked, concealed microphones and were building a case a case against him - the content of which was unknown to the patient. Beck saw the patient for 30 sessions, over an eighth month period, and began his early sessions discussing the current problems, proposing recreational activities, and counselling the patient on his relationships. Beck described his role as the therapist as supportive, educative, and his style as non-directive, thus allowing the patient to bring what he wanted to the sessions. In the early sessions, the patient wished to focus on his war experiences – describing being belittled and humiliated. Beck noted that this discussion led the patient to experience relief from his anxiety, nightmares, and feelings of depersonalisation. In the following sessions, the patient began to consider that he felt that the FBI would soon get all of their evidence and leave finding him not guilty. Beck measured the success of his therapy through the patient's decrease in delusional thinking. At the end of therapy the patient had narrowed down his belief that 50 FBI agents were observing him to 2 or 3 possibilities. After 10 months following the end of therapy, the patient no longer held this delusional belief.

In Beck's reflections on why the therapy was successful he listed three components: a.) the 'emotional experience' between him and the patient; b.) working in a flexible way by attending to the patient's needs and not using any fixed therapeutic techniques; and c.)

reducing the clients anxiety which decreased his defences and allowed him to discriminate between ‘reality and fantasy’. Beck believed that it was the patient’s insight that led to the disappearance of his delusions. Contrary to early beliefs that targeting delusional beliefs directly will exacerbate them (Mehl, Werner, & Lincoln, 2015), Beck was able to show that talking about delusions led to a successful outcome.

1.4.2.2.2 Evidence for the effectiveness of CBTp from individual studies

As already mentioned, it was believed that targeting delusional beliefs directly would exacerbate them (Mehl et al., 2015). Since, at that time, delusions were viewed as being qualitatively different from ‘normal’ experience, and therefore not amenable to ‘normal’ reasoning, cognitive techniques were not readily used. In the early 1960s Meehl (1962) suggested the idea of a psychosis continuum model by proposing that some of his clients presented with psychosis-like experiences. Although they did not reach the clinical threshold, he regarded them as still needing treatment. This began to challenge those early ideas that delusions were qualitatively different from ‘normal’ experience. Years later studies began to show empirical support for the psychosis continuum idea, indeed showing that delusions exist on a continuum with ‘normal’ experiences (van Os et al., 1999). This shift indicated that the formation and maintenance of delusions could be linked with ‘normal’ reasoning, which perhaps led to an increased interest in incorporating more cognitive techniques into therapy.

Early studies showed that CBTp can be effective at reducing psychotic symptoms. In a small controlled trial, Garety, Kuipers, Fowler, Chamberlain, and Dunn (1994) compared CBTp (n=13) with a waitlist control (n=7) in people with persistent psychotic symptoms. Therapy targeted positive symptoms and was delivered weekly or biweekly, over a six month period, with an average of 16 sessions using a manualised approach (Fowler, Garety, & Kuipers, 1995). The CBTp group showed a significant decrease in psychiatric symptoms on the Brief Psychotic Rating Scale (BPRS; Overall & Gorham, 1962) compared to the control group. The BPRS measures psychiatric symptoms such as anxiety, guilt, somatic concerns, hostility, grandiosity, suspiciousness, hallucinations, unusual thought

content, bizarre behaviours, and other symptoms. More specifically the findings showed a reduction in conviction and preoccupation of the delusional beliefs.

A separate controlled study by Kuipers et al. (1997) compared CBTp plus standard care (n=28) with standard care alone (n=32). CBTp was delivered weekly at first, then fortnightly for up to 9 months with an average of 18.6 sessions using a manualised approach targeting positive symptoms (Fowler, Garety, & Kuipers, 1995). Clinically significant change was shown on the BPRS - there was a 25% reduction in scores for the CBTp group mainly by changes due to targeting hallucinations and delusions.

A study by Tarrier et al. (1998) compared CBTp plus routine care (n=33), supportive counselling plus routine care (n=26), and routine care alone (n=28). CBTp and supportive counselling were delivered over 10 weeks, twice a week equalling to 20 sessions. The intervention targeted positive and/or negative symptoms. A significant reduction in positive symptom severity (hallucinations and delusions from the BPRS) were found for the CBTp plus routine care group, and no improvements were found for the supportive counselling plus routine care, and routine care alone groups. Those who received CBTp had nearly eight times greater odds at symptom improvement compared to the comparison groups. No analyses were carried out on negative symptoms, and although a reduction in the CBTp group was observed in Tarrier et al. (1999), it is uncertain whether this reduction was significant. These early studies, discussed above, indicated three important points, first, that CBTp was more effective than the control group in reducing overall psychiatric symptoms and more specifically positive symptoms of psychosis. Second, that psychotic symptoms were in fact amendable to 'normal reasoning'. Third, that 'second wave' focused more on positive symptoms rather than on negative symptoms.

1.4.2.2.3 Description of CBTp

'Second wave' CBT is a cognitive intervention that suggests that people's early experiences can contribute to the development of emotional difficulties in adulthood. Beck (1979) proposed that early experiences lead people to develop beliefs about the self, others, and the world. When these beliefs are triggered they give rise to negative automatic

thoughts, memories, and images, which affect how the person is feeling, their behaviour, and their physiological state. Beck (1979) proposed that by identifying negative automatic thoughts and by evaluating their accuracy, people can consider alternative ways of thinking leading to a reduction in distorted thinking.

A therapist who delivers CBT helps a client link their thoughts, feelings, and behaviours to demonstrate the relationship between them. The client can further monitor these in their daily life through a thought record by recording their thoughts - and how much the thoughts are believed, their emotions - and how intense the feeling is, their behaviours, and the situations in which these occur. The client is encouraged to view their beliefs as hypotheses and to re-evaluate them by challenging the content of their delusions and/or hallucinations. This can be done in a variety of ways, for example, by examining the advantages and disadvantages of holding such beliefs, by examining the evidence for such beliefs, and by generating alternative explanations for their beliefs. Behavioural experiments can also be utilised to test out the validity of beliefs to influence cognitive change. Clients can make a prediction, review the evidence for and against their prediction, and devise an experiment to test out their prediction (Morrison, 1998).

1.4.2.2.4 An example of a cognitive formulation and intervention for hallucinations

The following is a case study of a cognitive formulation of hallucinations of a client who hears abusive and persecutory voices, which is shown in Figure 1. The client's trigger leads him to hear a voice "Let's glass him". The client's appraisal of the voice is "They are going to maim me", "I'm going mad". Subsequent to this appraisal the client is hypervigilant and preoccupied, he searches for the attacker in the attic and under the floorboards, he drinks alcohol to remain calm, and he sits near the door to see if the attacker will come to attack him. The client feels scared and paranoid, his body is tense and he is getting a lack of sleep. The client's cognition, behaviour, mood, and physical responses maintain the cycle (Morrison, 1998).

Several cognitive and behavioural strategies were used in this CBTp case study intervention to bring about cognitive change. The client used a thought record to write what

the voice was saying, how it made him feel, and the impact on his behaviour. The client was then encouraged to think of evidence for and against what the voice was saying - challenging the content of the voices. The client was also asked to think of alternative explanations for his experience of hearing a voice. So in addition to the voice being a real abusive persecutor, other possibilities for why the client is hearing a voice were examined. For example, whether the voice can be related to a traumatic road traffic accident that the client was recently in, the pain-relieving medication that the client is taking, or an increase in the client's stress levels. Evidence for and against these explanations were considered with belief ratings of how much the client believed in each explanation rated from 0-100%. Finally, behavioural experiments were used. One of the client's safety behaviour was sitting next to the door to prevent an attack against him. This behaviour was maintaining the client's delusional beliefs and preventing cognitive change – as the client believed that he had not been attacked because he sat next to the door. Behavioural experiments were set up to test these beliefs - by not sitting next to the door and seeing if an attack against him occurred (Morrison, 1998).

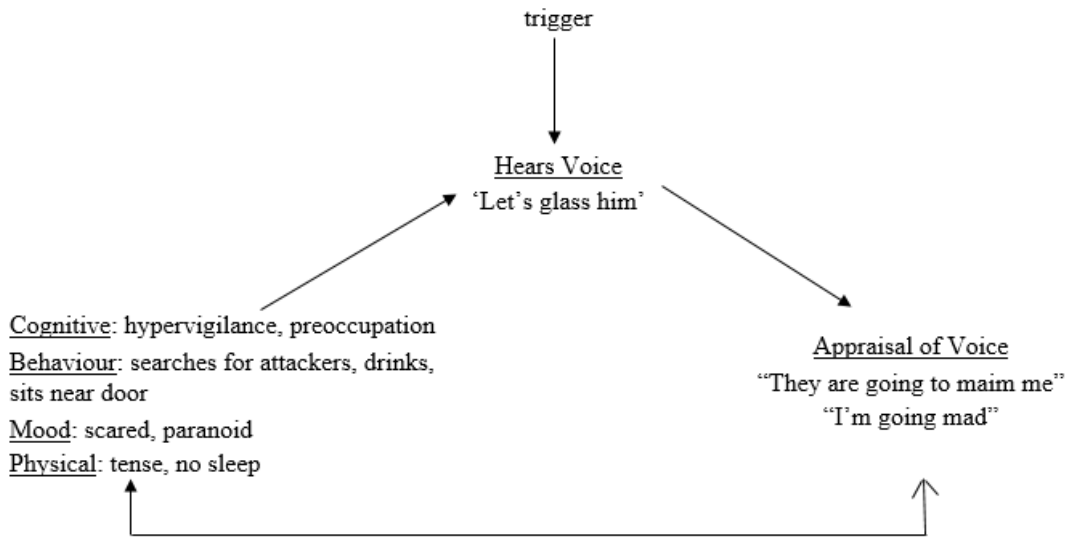


Figure 1. A cognitive formulation of hallucinations. Adapted from Morrison (1998).

1.4.2.3 'Third wave' CBT

With the introduction of 'third wave' CBT, there has been a shift away from challenging thoughts and disputing their content to focusing on the process of altering one's relationship with their thoughts and feelings. The idea behind 'third wave' interventions is that perhaps it is not the thought that is the problem but rather the interpretation of the thought – how the person thinks about their thought (meta-cognition) (Tai & Turkington, 2009).

There have been ongoing discussions as to what really constitutes 'third wave', and how it differs from 'second wave'. Forman and Herbert (2009) note that the difference between the two waves is that while 'second wave' uses behavioural strategies to test out the validity of 'dysfunctional' beliefs in the aim of cognitive change, 'third wave' uses behavioural strategies to target meta-cognitive processes (mindfulness, cognitive defusion, acceptance). They also note that while 'second wave' CBT focuses on symptom reduction, 'third wave' CBT focuses on working towards life goals. Hayes, Luoma, Bond, Masuda, and Lillis (2006) consider Dialectical Behaviour Therapy (DBT; Linehan, 1993), Meta-Cognitive Therapy (MCT; Wells, 1999), Mindfulness-Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002) and Acceptance and Commitment Therapy (ACT; Hayes et al., 2006) as 'third wave' therapies. Although Hayes et al. (2006) take the stance that the two waves are distinct, other researchers have proposed that the two waves are actually not that different from one another. Hofmann, Sawyer, and Fang (2010) propose that some interventions that are considered 'third wave' are simply extensions of 'second wave' CBT. They note that the approach adds a technique, for example acceptance, and offers subtle changes in terms of theory. Adrian Wells' MCT, and Marsha Linehan's DBT have often, for example, been described as 'third wave' (Hayes et al., 2006). In his personal communications with Wells and Linehan, Hofmann et al. (2010) found that they do not consider their interventions as 'third wave' but rather as an extension of CBT with an acceptance component.

In his CBTp treatment manual, which is often considered ‘second wave’ but could be considered as ‘third wave’ by others, Morrison (2017) proposes that cognitive, behavioural, and/or meta-cognitive change strategies can be utilised. Morrison (2017) notes that in addition to examining what people think (thought content), examining how people think (thought process) can be helpful. Part of the intervention can be evaluating positive or negative beliefs about thought processes such as paranoia, worry, and rumination. Meta-cognitive strategies can then be utilised to target these processes. One of these strategies is ‘detached mindfulness’ where a person is encouraged to disengage from their thinking by allowing their thoughts to come and go without engaging them. Another strategy is ‘postponing perseverative processing’, where a person is encouraged to postpone their rumination or worry until a later time – at which they can also choose not to engage this process.

1.4.2.3.1 Evidence for the effectiveness of ‘third wave’ CBT from individual studies and a description of ‘third wave’ interventions with clients with psychosis

A nonrandomised study examined Mindfulness Based Therapy (MBT) in clients (n=16) from an Early Intervention in Psychosis service (van der Valk, van de Waerdt, Meijer, van den Hout, & de Haan, 2013). The intervention consisted of 8 hourly sessions over 4 weeks. The findings showed no significant changes in terms of positive or negative symptoms of psychosis. The goal of the intervention was for clients to develop a mindful attitude by, a.) becoming aware of their sensory sensations through breathing meditations, body scan meditations, walking meditations, and meditative yoga; b.) becoming aware of their automatic reactions to their sensory experiences – such as avoidance or any other obstacles to being mindful; c.) learning to let go of their automatic reactions, by accepting unpleasant thoughts, physical sensations, and emotions instead of fighting against them, and by developing a compassionate attitude towards themselves instead of being harsh.

A study by White and colleagues (2011) utilised a prospective randomised open blind evaluation to examine the effectiveness of ACT (n=14) vs TAU (n=13) for clients with psychosis from a variety of mental health services (Community Mental Health Teams,

Early Interventions Services, Inpatient Services, Forensic Services). The intervention was delivered over a maximum of 10 hourly long sessions. The findings indicated no reduction in positive symptoms, but a reduction in negative symptoms. The sessions focused on some of the following themes; a.) differentiating between internal experiences versus sensory experiences; b.) recognising how the client gets caught up in trying to move away from suffering; c.) moving towards the client's values; d.) paying attention to how trying to control unpleasant mental experiences can often be part of the problem instead of a solution; e.) paying attention to the context in which the unpleasant mental experiences occur instead of the content of the experiences; f.) paying attention to thoughts of worry which are associated with psychosis; and g.) incorporating mindfulness breathing exercises.

1.4.2.3.2 Meta-analytic evidence for 'third wave'

One meta-analysis showed a small-to-moderate effect for mindfulness interventions for psychosis when compared with a control group (TAU or active control) in reducing negative symptoms, and no significant effect in reducing positive symptoms (Khoury, Lecomte, Gaudiano, & Paquin, 2013). This meta-analysis combined findings from 13 studies which used a variety of approaches such as ACT, MBCT, Compassionate Mind Training (Gilbert, 2001), Loving Kindness Meditation (Salzberg, 1995), and others. Not all of these studies however assessed positive and/or negative symptoms, and the between-group end of treatment analysis only included 3 studies in the analysis of negative symptoms and four studies in the analysis of positive symptoms.

A recent meta-analysis examining the effectiveness of ACT vs TAU in psychosis found that ACT was a significantly more effective at treating negative symptoms and not positive symptoms (Tonarelli, Pasillas, Alvarado, Dwivedi, & Cancellare, 2016). One of the main limitations of this meta-analysis is the small number of studies included (n=4). Overall, the findings in the individual studies discussed above, and the meta-analyses discussed here, suggest that 'third wave' approaches may me more beneficial in terms of treating negative symptoms rather than positive symptoms, however more studies need to be carried out to increase confidence in these findings.

1.4.2.4 Other advances

In addition to the evolution of CBTp, there have been advances in the understanding of the psychological mechanisms that could contribute to the formation, maintenance, and experience of psychotic symptoms: such as the role of emotion (Freeman & Garety, 2003), arousal (Morrison & Wells, 2003), self-esteem (Barrowclough et al., 2003), attachment (MacBeth, Schwannauer, & Gumley 2008), interpersonal issues (Birchwood, Meaden, Trower, Gilbert, & Plaistow, 2000), and loss and trauma (Read et al., 2001). These psychological mechanisms may permit more targeted treatment within the CBTp framework for people who experience psychosis but have different personal histories, views of the world, and psychotic difficulties (Velligan, 2009).

1.4.3 Goals of CBTp

Psychosis is a complex experience, and the literature suggests that CBTp treatment can have multiple goals. Garety, Kuipers, Fowler, Freeman, and Bebbington (2001). propose that the goal is to reduce positive symptoms and the risk of relapse. Birchwood and Trower (2006) propose that the primary goal is to reduce the emotional distress and behavioural disturbance associated with individual psychotic symptoms. Wykes, Steel, Everitt and Tarrier (2008) argue that CBTp was designed to treat positive symptoms. Beck, Rector, Stolar, and Grant (2009) propose that the primary goal of CBTp is to reduce distress and to improve quality of life. Brockman and Murrell (2015) examined various CBTp models using a theoretical and empirical review methods and concluded that the goals fall within four categories: reduction of individual psychotic symptoms, reduction in the global psychotic syndrome, reduction of emotional distress, and a reduction of behavioural disturbance.

In their Delphi study examining the components of CBTp, Morrison and Barratt (2009) write that the expert team did not reach a consensus about the goal of CBTp. They did, however, reach a consensus that "CBT for psychosis should be idiosyncratic and that the targets for treatment should be collaboratively negotiated, based on a shared list of problems and goals, and that particular change strategies should be formulation driven"

(p.138). They noted that people with psychosis can experience a broad range of difficulties, such as low mood and anxiety, and that as a result there is a wide possibility of treatment targets making it difficult to determine whether "CBT should focus on negative symptoms" (p.138) or whether "CBT should reduce symptoms of psychosis" (p.138). Although CBTp treatment can have multiple goals, there seems to be a consensus that it should be delivered in an idiosyncratic manner, and that a reduction in both positive and negative symptoms can be a goal.

1.4.4 Effectiveness of CBTp

The effectiveness of CBTp for positive symptoms and negative symptoms will be examined next, and the basis for the current study will be described.

1.4.4.1 Positive symptoms

There have been several notable meta-analyses carried out exploring the effectiveness of CBTp in reducing psychotic symptoms. Wykes et al. (2008) found a 'modest' effect size of 0.37 for positive symptoms, but when the authors divided the studies by methodological quality, the effect size for the high quality studies was 0.22 against 0.49 for the low quality studies. This study clearly showed that methodological rigour can influence the effect sizes. Jauhar et al. (2014) found a 'small' effect of 0.25 on positive symptoms when CBTp was compared with a control intervention, although the effect size was 0.31 when CBTp was compared with TAU only. When different aspects of bias were taken into consideration – such as masking, allocation concealment, sequence generation, and incomplete outcome data – the effect sizes decreased.

Jauhar et al. (2014) suggested that the difference in effect sizes between their findings and those of Wykes et al. (2008) could be that, while Wykes et al. used Glass's approach, Jauhar et al. used *Hedges' g*. *Hedges' g* divides the difference in means by the combined sum of the standard deviations from both groups, while Glass's method uses the standard deviation of the control group, which can inflate effect sizes. In light of their findings Jauhar et al. (2014) questioned whether the NICE guidelines should recommend

CBTp as a treatment for psychosis. These findings led others to argue that CBTp has been 'oversold' as a treatment for psychosis (McKenna & Kingdon, 2014).

van der Gaag, Valmaggia, and Smit (2014) carried out a meta-analysis examining delusions and hallucinations separately and found an effect size of 0.44 favouring CBTp for hallucinations, and an effect size of 0.36 favouring CBTp for delusions when compared with the control group (TAU or an active control, or a combination of both in studies with more than one control group). They did not find that higher study quality was associated with lower effect size. When Jauhar et al. (2014) ran a separate analysis for hallucinations, they found an effect size of 0.34. These effect sizes are nearing what would be rated as a medium effect.

In addition, there are other meta-analyses that have been carried out. Mehl, Werner and Lincoln (2015) examined the effect of CBTp on delusions. Kennedy and Xyrichis (2017) examined the effect of CBT on auditory hallucinations. Turner, van der Gaag, Karyotaki and Cuijpers (2014) and Naeem et al., (2016) examined the effect of CBTp in reducing both positive and negative symptoms.

1.4.4.2 Negative symptoms

In terms of negative symptoms Wykes et al. (2008) found an effect size of 0.44 favouring CBTp although, when the studies were divided by methodological quality, the effect size for the high quality studies was 0.21, against 0.61 for the low quality studies – once again pointing to the impact that methodological quality can have on findings. Jauhar et al. (2014) found an effect size of 0.08 when compared with a control intervention but 0.13 when compared with TAU. As with positive symptoms, when a variety of aspects of bias were taken into consideration, the effect sizes decreased. One meta-analysis focused on assessing only negative symptoms - Velthorst et al. (2015) found that most of the studies reported negative symptoms as secondary treatment targets which yielded an effect of 0.09 favouring CBTp, and that there were only two studies where negative symptoms were primary targets which delivered an effect of 0.16. Since most studies included in Velthorst et al.'s (2015) meta-analysis targeted positive symptoms as the primary outcome, and

measured negative symptoms as a secondary outcome, the authors argued that this limits our understanding of the actual effect of CBTp targeting negative symptoms. Morrison, Renton, Dunn, Williams, and Bentall (2004) have stated that cognitive therapists have devoted more time to positive symptoms rather than negative symptoms. This less amount of time devoted to negative symptoms could in part reflect the poor understanding of these symptoms, and explain why they are often not the primary outcomes in RCTs.

Velthorst et al. (2015) also carried out a meta-regression examining the effectiveness of CBTp on negative symptoms across time and found a decreasing effect, suggesting stronger treatment outcomes for studies with an earlier publication date. The authors also found that studies that had more of a behavioural component had larger effect sizes (Hedges' $g = 0.25$), compared with studies that had fewer behavioural components (Hedges' $g = 0.02$). Since larger effect sizes were found with earlier year of publication, where treatment used more behavioural approaches, the finding in this meta-analysis seems to suggest that behavioural techniques rather than cognitive techniques are more beneficial in terms of targeting negative symptoms. The study however also found that higher quality trials were associated with lower effect sizes, this suggests that the effect may be a result of trial quality rather than an actual difference in the effect of behavioural and cognitive techniques.

1.4.6 Basis for the current study

One limitation of the meta-analyses examining positive symptoms is that the effectiveness of CBTp across time has not been examined. Since Jauhar et al.'s (2014) publication, several other RCTs have been published. An RCT by Morrison et al. (2014), for example, compared CBTp versus TAU and found a significant reduction in positive symptoms with an effect size of 2.22 favouring CBTp. This effect was approximately 9 times larger than the findings reported by Jauhar et al. (2014). Since there have been developments in the understanding of psychosis and CBTp has evolved, an analysis that examines the temporal effect is warranted.

Also, since Velthorst et al.'s (2015) meta-analysis, other RCTs examining the effectiveness of CBT on negative symptoms have been published – as a result, a new meta-analysis is warranted. The study by Morrison et al. (2014), for example, found no significant effects for negative symptoms when comparing CBTp to TAU. Whilst, Velthorst et al. (2015) examined the effectiveness of CBT on negative symptoms across time by dividing the year of publication into four chronological clusters. A study that examines year of publication without the use of clusters is also warranted to explore whether this, in addition to newly published RCTs not included in Velthorst et al.'s (2015) meta-analysis, would yield a different finding.

Some of the meta-analyses described above indicate that methodological quality affects the results – good methodological quality has been associated with lower effect sizes, and poor methodological quality has been associated with better outcomes (e.g. Velthorst et al., 2015). As a result, methodological quality will be assessed to examine whether the results in this study are independent of quality. This will be important to evidence as the aim of the present study is to show that the improvement in effectiveness of CBTp is the result of the parallel advances in CBTp and in the understanding of psychosis rather than due to methodological quality.

The aim of this section was to examine the psychological approaches for the treatment of psychosis. First, I examined the NICE recommended treatments for psychosis with a focus of CBTp and recommendations for its delivery. Second, I examined CBTp and described how it has evolved from 'first wave', to 'second wave' and finally to 'third wave' – and how this evolution could have affected the treatments offered to people with psychosis. I also examined the advances in the understanding of psychological mechanisms in psychosis which may have, across time, permitted more targeted treatments within a CBTp framework. Third, I examined the goals of CBTp and pointed out that, although there are a number of possible goals, one of those goals is symptom reduction either for individual positive or negative symptoms or syndromes. Next, I examined evidence from meta-analyses examining the effectiveness of CBTp on positive and negative symptoms,

which is small, and has made some researchers propose that CBTp has been 'oversold' as treatment (McKenna & Kingdon, 2014). Finally, I argued that as a result of the developments in the understanding of psychosis, and as a result of the hypothesised evolution of CBTp, an analysis that examines the temporal effects of CBTp on positive symptoms is warranted. I also argued that a new meta-analysis is warranted for negative symptoms to examine whether year of publication (without the use of clusters as has been used in Velthorst et al.'s (2015) meta-regression), in addition to the newly published RCTs not included in Velthorst et al.'s (2015) meta-analysis would yield a different result. I also discussed that the analyses in this study will take methodological quality into account to examine its impact on the findings.

1.5 Conclusion

The aim of this introduction was to make the argument that a meta-analysis examining the effectiveness of CBTp for positive symptoms, delusions, hallucinations, and negative symptoms across time is warranted – this is as a result of the parallel advances in the understanding of the causes of psychosis, and in the evolution of CBTp. This introduction began by examining the construct of schizophrenia and its development within the DSM. I argued that frequent changes to the construct may be counterproductive to research, proposing that since psychosis may be better understood through clusters of symptoms or individual symptoms, rather than through conventional diagnostic categories, clusters and individual symptoms will be examined in this thesis. Second, I examined the development in the understanding of the causes of psychosis to point towards a widely-accepted shift from a biomedical narrative to one that incorporates psychosocial factors – proposing that this altered understanding may have influenced the treatments that are offered within the CBTp framework. Third, I examined the evolution of CBTp across time – which could also have influenced the delivery of CBT specific to psychosis. Finally, I examined the advances in the understanding of psychological mechanisms involved in

psychosis that could have, across time, impacted on providing more targeted treatment within a CBTp framework.

1.6 Hypotheses

The first hypothesis is that, in light of the evidence concerning the parallel developments in the understanding of psychosis and the evolution of how CBT is delivered for psychosis, there will be an increase in the effectiveness of CBTp across time for positive symptoms. The second hypothesis is that there will be an increase in the effectiveness of CBTp for hallucinations and delusions, when each symptom is assessed separately. The third hypothesis is that there will not be an increase in the effectiveness of CBTp across time for negative symptoms.

Method

As discussed in the previous section, meta-analyses have found 'small' to 'moderate' effect sizes with regards to the effectiveness of CBTp on positive and negative symptoms. Since the understanding of psychosis has developed, and CBT delivered in the context of psychosis has evolved, it has been argued that the effectiveness of CBTp should be assessed across time. The design of this study is a systematic review and meta-analysis. A meta-analysis is an approach that statistically combines results from separate studies. This combination of studies increases statistical power, and as a result increases the likelihood of detecting whether a significant effect exists – and, by combining multiple studies, it spreads the research's coverage of the study population. The meta-analytic approach is also well-suited to examine change in effect over time - it combines findings from relevant RCTs which are subsequently analysed in a meta-regression to examine whether any changes are detectable across time. The aim of this meta-analysis will be to examine the effectiveness of CBTp for positive symptoms, delusions, hallucinations, and negative symptoms, and to examine whether the effectiveness of CBTp for these symptoms improved across time. The Cochrane Handbook for Systematic Reviews of Interventions (Higgins & Green, 2011) was used for guidance in carrying out the systematic review and meta-analyses.

2.1 Search strategy

Electronic searches of MEDLINE, EMBASE, PsycINFO, and CENTRAL were conducted on 26/04/2018 without a date restriction. Bibliographic references from previous meta-analytic reviews (e.g. Jauhar et al., 2014; van der Gaag et al., 2015) were manually searched for studies that were not identified by the current search strategy. The search strategy used in this meta-analysis is shown in Table 1. The strategy was devised by the author of this study with the input of an Information Specialist who works for the University of Leeds.

Table 1.

Search Strategy

1	Schizophrenia/
2	psychotic.tw.
3	psychosis.tw.
4	schizo*.tw.
5	((positive or negative) adj3 symptom*).tw,kw.
6	1 or 2 or 3 or 4 or 5
7	Cognitive Therapy/
8	CBT.tw.
9	cognitive behavio*.tw.
10	7 or 8 or 9
11	randomi#ed controlled trial.pt.
12	controlled clinical trial.pt.
13	randomi#ed.ab
14	placebo.ab
15	clinical trials as topic.sh.
16	randomly.ab
17	trial.ti
18	11 or 12 or 13 or 14 or 15 or 16 or 17
19	exp animals/ not humans.sh.
20	18 not 19
21	6 and 10 and 20

Note: / or sh. denotes a Medical Subject Heading (MeSH) term; tw. denotes a word in the title and abstract; kw. denotes a keyword that was assigned by the author; pt. denotes publication type; * and # denotes truncation; ab. denotes a word in the abstract; ti. denotes a word in the title; 'adj3' operator indicates within 3 words

2.2 Criteria for study inclusion

2.2.1 Types of studies

Studies included were parallel-group RCTs - where participants were randomised to at least one treatment group (CBTp) versus TAU (Turner, 2013). Single-blind trials - where participants did not know whether they had been assigned to the treatment of interest or TAU, and open trials – where participants and researchers both knew the allocation of the participant's treatment (Day & Altman, 2000), were included. Only RCTs were included because they are considered the gold standard for effectiveness research (Hariton & Locascio, 2018).

2.2.2 Types of participants

Participants were those who experienced positive and/or negative symptoms, including At-Risk-Mental-State (ARMS) participants. All types of delusional beliefs, hallucinations, and negative symptoms were included - these were described in the introduction section. Participants came from all mental health settings (e.g. inpatient, rehabilitation, community).

2.2.3 Types of interventions

The inclusion criterion for the intervention group was individual or group CBTp or cognitive therapy (CT) that targeted positive and/or negative symptoms. These interventions were included because they are one of the NICE (2014) recommended psychological treatments for individuals who experience psychosis. Morrison and Barratt's (2009) recommendations of what constitutes CBTp, and the NICE (2014) description of the components of CBTp were used as a guideline in evaluating whether studies were delivering CBTp. If a study used other therapeutic elements, for example, family interventions, it was only included if the CBTp was plainly the predominant intervention. The inclusion criterion for the control group was TAU as the control condition. TAU was conceptualised as the accepted usual treatment that was part of routine practice within the service where the RCT was delivered. If a study, described TAU, for example, as consisting of prescribing all participants a particular antipsychotic, it was included.

2.2.4 Types of outcome measures

Studies that were included reported end-of-treatment positive and/or negative symptoms. Only outcomes that were researcher-rated were included. The accuracy in how researchers rate, often as a result of their reliability training, increases the confidence that the differences observed at post treatment reflect true change rather than change that is associated with different perspectives of self-reporters. Unless stated, it was assumed that the outcome measures were researcher-rated rather than self-reported.

2.3 Criteria for study exclusion

2.3.1 Types of studies

Unpublished studies and studies not in the English language were excluded. Cross-over trials – where participants first received treatment A, then treatment B and vice versa (Sibbald & Roberts, 1998), were also excluded due to carryover effects.

2.3.2 Types of participants

There was a restriction placed on age, where studies including only children were excluded. Studies where participants had co-morbid difficulties, such as recent history of violent behaviour, cognitive impairment or substance use, were also excluded.

2.3.3 Types of interventions

Studies were excluded if the intervention was integrative, rather than predominantly CBTp. Studies were excluded if CBTp was compared with another intervention that was not considered TAU.

2.3.4 Types of outcome measures

Studies that reported self-reported outcomes were excluded. A summary of the inclusion and exclusion criteria is shown in a table in Appendix A.

2.4 Stages of the review and meta-analysis

The following process for selecting, extracting, and evaluating studies was carried out:

1.) All search results were merged into Excel, and duplicate records were removed by the author KS.

2.) Screening stage: titles and abstracts were examined using the screening tool by KS. Irrelevant studies were excluded and a reason provided. Inter-rater reliability from a random selection of studies (N=406) was calculated using the ratings of another reviewer, Sarah Rudkin (SR), a research assistant.

3.) Eligibility stage: full-text articles that were identified as meeting the screening tool criteria were retrieved and screened by KS to check that they met the inclusion criteria. Full-text articles that were identified as meeting the screening tool criteria,

from the 406 studies reviewed by SR, were checked by SR to make sure they met the inclusion criteria.

4.) Extraction stage: data from the eligible studies were extracted and inputted into Excel and into a reference manager software.
5.) The Cochrane Risk of Bias tool was used by KS to assess risk of bias. Inter-rater reliability from a random selection of studies (N=5) was calculated using the ratings of another reviewer (SR) using Cohen's Kappa coefficient.
6.) Quality of each RCT was assessed using RCT-PQRS by KS. Inter-rater reliability from a random selection of studies (N=5) was calculated using the ratings of another reviewer (SR) using Cohen's Kappa coefficient.
7.) To double check that no studies were missed during the screening stage, KS reviewed all the titles and abstracts again, and reviewed Jauhar et al.'s (2014) and van der Gaag et al.'s (2015) list of included studies.

Disagreements between KS and SR were first discussed between themselves. If consensus was not reached, thesis supervisors Bridgette Bewick (BB) and Ciara Masterson (CM) were included in discussions and a consensus decision reached.

2.5 Data extraction and management

Four types of data were extracted from the included studies and managed within Excel: client, treatment, therapist, and outcome. The outcome data were also managed in Review Manager 5.3 (Review Manager [RevMan], 2014).

2.5.1 Client data

Demographic factors (including age, sex, ethnicity, education level, and marital status), and 'illness factors' (including mean length of psychosis, current use of medication, diagnosis, co-morbid diagnoses, and whether clients were inpatients or outpatients) were extracted.

2.5.2 Treatment data

Therapy factors (including number of therapy sessions, length of therapy sessions, symptoms targeted [positive or negative], treatment format [group or individual], control group type, whether CBTp was delivered using any other therapeutic elements, type of CBTp manual used, and a statement of adherence to a manual), and study factors (including number of individuals allocated to the intervention versus control group, country where the study was carried out, year of study publication, RCT-PQRS, and Risk of Bias) were extracted.

2.5.3 Therapist data

Type of therapist (CBTp therapist, psychologist, psychiatrist, nurse), therapist experience with CBTp, training arrangements, and supervision arrangements were extracted.

2.5.4 Outcome data

Means, standard deviations (or standard errors or confidence intervals), and sample sizes at end of treatment for positive and/or negative symptoms of psychosis were extracted. Several of the studies that were retrieved were based on the same dataset. In cases where data could not be extracted from the original article – because for example, it was missing, incomplete, or presented in change scores – articles based on the same dataset were searched.

2.6 Measures

The following scales were extracted for positive symptoms, delusions, hallucinations, and negative symptoms.

2.6.1 Positive symptoms

For the meta-analysis of positive symptoms, studies were included if they reported an overall positive score, or separate scores for delusions or hallucinations. The scales included in the meta-analysis were the positive subscale from the Positive and Negative Syndrome Scale (PANSS; Kay et al., 1987), the positive subscale from the BPRS (Overall & Gorham, 1962), the Schedule for the Assessment of Positive Symptoms (SAPS;

Andreasen, 1984), the Psychotic Symptoms Rating Scale (PSYRATS; Haddock, McCarron, Tarrier, & Faragher, 1999), the positive subscale from the Comprehensive Assessment of At-Risk Mental States (CAARMS; Yung et al., 2005), the Green et al. Paranoid Thoughts Scale (GPTS; Green et al., 2008), and the Comprehensive Psychopathological Rating Scale (CPRS; Åsberg, Montgomery, Perris, Schalling, & Sedvall, 1978), where 4 hallucination items (#37, 38, 39, 40) were averaged and 3 delusion items (#31, 33, 36) were averaged and reported separately. For the CAARMS measure, one study reported the severity and frequency scores summed, and another reported these separately, which were averaged for the purpose of this meta-analysis. Two studies reported only a hallucination score, and one study reported only a paranoia score, these studies were still included.

Studies that reported an overall Schizophrenia Change Scale (SCS; Montgomery, Taylor, & Montgomery, 1978) score were excluded as this score reflects other types of non-psychotic symptoms. When a study reported separate subscale scores for hallucinations and delusions they were averaged as they have been in a previous meta-analysis (e.g. Jauhar et al., 2014), which is based on the assumption that these scores are correlated ($r = 0.34$) (Smith, Mar, & Turoff, 1998). When the GTPS reported separate scores for the two subscales - ideas of social reference and ideas of persecution - these scores were also averaged on the assumption that they correlated ($r = 0.69$) (Green et al., 2008). For studies that used more than one measure of positive symptoms for example the PANSS and the PSYRATS, the PANSS was prioritised as it did not require any additional calculations, such as the averaging of subscales.

2.6.1.1 Delusions

For the meta-analysis of delusions, nine of the studies used the delusions subscale from the PSYRATS. When individual PSYRATS delusion sub-scores were reported, they were averaged based on the correlations found between them in a study by Steel et al. (2007). One study averaged the 3 delusion items from the CPRS (#31, 33, 36), another study used the GPTS, where two of the subscales - ideas of social reference and ideas of persecution - were averaged. Another study used the Peter's Delusional Inventory (PDI;

Peters, Joseph, Day, & Garety, 2004); the subscales were also averaged on the assumption that the items within the three subcategories - conviction, preoccupation, and distress correlated between r = 0.35 and 0.60 (Peters et al., 2004).

2.6.1.2 Hallucinations

For the meta-analysis of hallucinations, 13 of the studies used the hallucinations subscale from the PSYRATS. When individual PSYRATS hallucination sub-scores were reported, they were averaged, as in a previous meta-analysis (Jauhar et al., 2014) that was based on the correlations between them (Steel et al. 2007). One study used the single auditory hallucinations item from the BPRS, one study used the single hallucinations score from the PANSS, while another study averaged the 4 hallucination items from the CPRS (#37, 38, 39, 40).

2.6.2 Negative symptoms

For the meta-analysis of negative symptoms, studies included used the following scales: the negative subscale from the PANSS, the negative subscale from the BPRS, the Negative Symptom Assessment (NSA; Axelrod, Goldman, & Alphs, 1993), and the Scale for the Assessment of Negative Symptoms (SANS; Andreasen, 1982). All of these scales provided a global negative symptoms score. One study used the Brief Assessment of Negative Symptoms Scale (BRIANS; Hansen, Turkington, Kingdon, & Smith, 2003), which I was unable to access and was thereby unable to affirm that it was measuring negative symptoms. Although this study was excluded it was included in a separate meta-analysis to examine its impact on the pooled estimate.

2.7 Assessment of methodological quality and bias

Methodological quality of RCTs has been proposed as a possible source of funnel plot asymmetry (Egger, Smith, Schneider, & Minder, 1997), where lower quality trials may show larger intervention effects compared with higher quality trials (Schulz, Chalmers, Hayes, & Altman, 1995). One of the reasons for this effect may be that smaller studies often have less methodological rigour compared with larger studies. It could also be that poorer

methodological quality could lead to bias and impact on the results by either underestimating, or more often, overestimating the true intervention effects (Higgins & Green, 2011). As a result, the RCT-Psychotherapy Quality Rating Scale (RCT-PQRS; Kocsis et al., 2010) and the Cochrane Risk of Bias Tool (Higgins et al., 2011) were used to assess for methodological quality and bias, once data extraction was complete. While the RCT-PQRS appraises internal validity – how well a study was designed and carried out to prevent bias (Hartling et al., 2009) – the Cochrane risk of bias tool assesses whether bias exists from flaws in the design, analysis, reporting, or interpretation of the study.

2.7.1 Assessment of methodological quality

The RCT-PQRS (Kocsis et al., 2010) is a 25-item scale that assesses the quality of psychotherapies in RCTs. Items 1-24 are rated on a 0-2 Likert scale. A score of '0' reflects a poorly described and executed study design element; a score of '1' reflects a moderately described and executed study design element, or a well described but poorly executed study design element, or a poorly described but well executed study design element; and a score of '2' reflects a well justified, described, and executed study design element. Item 25, which is the omnibus quality rating of the whole study, is rated on a Likert scale from 1 to 7, where '1' reflects exceptionally poor quality and '7' reflects exceptionally good quality. All 25 items are grouped into six domains: description of subjects, definition and delivery of treatment, outcome measures, data analysis, treatment assignment, and overall quality of the study. To determine an omnibus quality rating (a score of 1-7) all subscales were averaged, then an overall average of the subscales was scaled on a 7 point rating scale; Cronbach's α = 0.87 (Kocsis et al., 2010).

2.7.2 Assessment of bias

The Cochrane Risk of Bias Tool (Higgins et al., 2011), was used to examine the magnitude of risk of bias within six domains: selection bias, performance bias, selection bias, attrition bias, reporting bias, and other bias. There are two parts to assessment within each domain item. First, the magnitude of risk of bias is judged as low, high, or unclear using the guidance provided in the assessment tool. Second, text descriptions of the trial

characteristics on which the judgements of risk of bias are based can be included to ensure transparency and to show support for the decision.

2.8 Data analytic plan

Effect sizes were computed using RevMan using the random-effects model. In comparison with the fixed-effects model, which makes the assumption that the observed difference in study effects is the result of within-study sampling error, the random-effects model makes the assumption that the observed difference in study effects is also a result of between-study heterogeneity. This model therefore suggests that the observed effect sizes might be higher or lower in some studies because, for example, the treatment intervention might have been delivered differently, or the studies might have had different inclusion criteria, or that the studies used different outcome measures to estimate the size of the effect (Borenstein, Hedges, & Rothstein, 2007). Since individual studies included in a meta-analysis can measure outcomes on a variety of different scales, *Hedges' g* (Hedges, 1981) was used to standardise the results of all individual studies to a uniform scale. *Hedges' g* reflects the magnitude of intervention effect in each study, and it has been proposed that *Hedges' g* should be interpreted similarly to *Cohen's d* where an effect size of 0.20 reflects a small effect, an effect size of 0.50 reflects a medium effect, and an effect size of 0.80 reflects a large effect.

The following formula was used to calculate *Hedges' g* (Hedges, 1981), where M1 denotes the mean of sample 1, M2 denotes the mean of sample 2, and SD^{*}_{pooled} denotes the weighted and pooled standard deviation.

Equation 1 $$\boldsymbol{Hedges'\ g = \frac{M1-M2}{SD^{*}_{pooled}}}$$

The following formula was used to calculate the weighted and pooled standard deviation (Hedges, 1981), where n_1 denotes the sample size for sample 1, n_2 denotes the sample size

for sample 2, SD_1 denotes the standard deviation for sample 1, and SD_2 denotes the standard deviation for sample 2.

Equation 2 $$\boldsymbol{SD^{*}_{pooled}} = \sqrt{\frac{(\boldsymbol{n_1}-1)\boldsymbol{SD_1^2}+(\boldsymbol{n_2}-1)\boldsymbol{SD_2^2}}{(\boldsymbol{n_1}-1)+(\boldsymbol{n_2}-1)}}$$

While the fixed-effects model assigns weights using within-studies variance, by taking the inverse of its variance, the random-effects model assigns study weights by taking the inverse of the sum of both within-study and between-study variance. Assigning weights allows studies that yield a more precise estimate to carry more importance (Borenstein, Hedges, Higgins, & Rothstein, 2010). The following formula (Cochran, 1954) was used to calculate the weight for a study (w_i), where v_i denotes within-study variance for study (i) and τ^2 (tau-squared) denotes between-studies variance (Borestein et al., 2010).

Equation 3 $$\boldsymbol{w_i} = \frac{\boldsymbol{1}}{\boldsymbol{v_i}+\boldsymbol{\tau^2}}$$

To examine whether the effectiveness of CBTp has improved over time for positive symptoms, delusions, hallucinations, and negative symptoms, four meta-regression analyses were carried out using the Statistical Package for the Social Sciences (SPSS) version 24 software (IBM Corp., 2016). The linear regression analysis was selected using the year of publication as the independent variable, and *Hedges' g* effect sizes from RevMan as the dependent variable. Higgins and Thompson (2002) propose that a meta-regression should be weighted to take into account both within-study and between-studies variance. All meta-regressions used weights produced in RevMan which were inserted into the 'WLS weight' option in the linear regression. In the case of significant findings, test assumptions were examined for autocorrelation, multicollinearity, and heteroscedasticity.

Since it has been proposed that co-occurring symptoms may confound predictors (Pickering, Simpson, & Bentall, 2008), hallucinations were controlled for when examining delusions and vice versa in additional analyses. Finally, it can be argued that the methodological quality of RCTs assessing CBTp may have changed across time. Additional analyses assessing for methodological quality were therefore also carried out where significant effect of year of publication on effect size was found. This was done by adding the methodological quality scores from the RCT-PQRS into the linear regression to assess whether it confounded the relationship between year of publication and the observed effect sizes.

2.8.1 Additional analyses undertaken

Additional analyses were computed when examining the effects of CBTp for positive symptoms. The inclusion criteria included RCTs where participants experienced positive and/or negative symptoms. Trials that examined ARMS were therefore included (e.g. Morrison et al., 2012; van der Gaag et al., 2012). Since this population is considered different from those who have experienced first episode psychosis or more recurrent psychosis, a separate meta-analysis was carried out excluding the two ARMS studies to examine whether this would have an impact on the observed pooled effect size. Also, since two studies were self-guided and one study was virtual reality (VR) based, these could also be deemed different because they were not delivered face to face. As a result, another separate analysis was carried out excluding these studies (e.g. Gottlieb et al., 2017; Naeem et al., 2016; Pot-Kolder et al., 2018). Finally, in terms of negative symptoms, one study used the BRIANS scale which was not accessible, and I could therefore not be sure that it was measuring negative symptoms (e.g. Rathod et al., 2013). Although this study was excluded, a separate meta-analysis was carried out with it included – to examine its impact on the pooled estimate.

2.8.2 Assessment of heterogeneity

Heterogeneity is the variation observed in study outcomes, and was examined statistically using the I^2 statistic. The I^2 statistic provides a percentage of the total between-

study variation that is due to heterogeneity and not sampling variation (Higgins & Thompson, 2002). The following guide was used to interpret the I^2 statistic: 0%-40% heterogeneity might not be important, 30%-60% may represent moderate heterogeneity, 50%-90% may represent substantial heterogeneity, and 75%-100% considerable heterogeneity (Higgins & Green, 2011). Extreme heterogeneity can often suggest that data might have been incorrectly extracted from the studies. The extracted data here were double checked for errors. It has been suggested that for a meta-analysis to provide a meaningful summary it should only be considered when outcome data in studies are homogeneous. As stated above, I used the random-effects model, which is a conservative approach and is less likely to lead to a statistically significant finding (Higgins & Green, 2011). In cases where heterogeneity continued to exist, possible causes were explored.

2.8.3 Assessment of publication bias

It is possible that studies with significant intervention effects are published while studies without significant intervention effects remain unpublished, and that this bias may overestimate the intervention effect (Higgins & Green, 2011). While it has been suggested that publication bias can be quantified through visual assessment of funnel plots, where no bias leads to a symmetrical inverted funnel plot (Higgins & Green, 2011), it has recently been argued that funnel plots may look misleading and that statistical tests are preferred (Simmonds, 2015). As a result, I examined publication bias using the Begg and Mazumdar's Rank Order Correlation test (Begg & Mazumdar, 1994), Egger's regression intercept test (Egger et al., 1997), and Duval and Tweedie's (2000) trim-and-fill procedure using the Comprehensive Meta-Analysis software (version 3) (Borenstein, Hedges, Higgins, & Rothstein, 2013). The Begg and Mazumdar's, and Egger's tests have been criticised for possible lack of power (Macaskill, Walter, & Irwig, 2001). Both tests were therefore carried out to increase the probability of identifying possible publication bias.

Begg and Mazumdar suggest that publication bias will induce a correlation between variances and effect sizes. The test therefore correlates the ranks of variances and the ranks of effects sizes, based on Kendall's tau (Begg & Mazumdar, 1994). The stronger the

relationship between these variables, the higher the probability of publication bias. Egger's test is based on a linear regression where the effect size is regressed against its standard error, weighted by the inverse of the variance of the effect size. The intercept of the regression line indicates level of asymmetry; where no publication bias exists the intercept is zero (Egger et al., 1997). Finally, Duval and Tweedie's procedure first 'trims' the smaller studies that cause funnel asymmetry, then estimates the 'true' centre of the funnel using the trimmed funnel plot, providing an estimate of how many excluded studies there are and 'filling' these excluded studies with an adjusted pooled effect size.

2.8.4 Inter-rater reliability

Inter-rater reliability was calculated using Cohen's Kappa in SPSS v24 (IBM Corp., 2016). Landis and Koch's (1977) guide was used to interpret the coefficients, where a score of < 0 reflects disagreement, a score of 0 to 0.20 reflects slight agreement, a score of 0.21 to 0.40 reflects fair agreement, a score of 0.41 to 0.60 reflects moderate agreement, a score of 0.61 to 0.80 reflects substantial agreement, and a score of 0.81 to 1.00 reflects almost perfect agreement.

Results

The literature search produced 3451 titles. After the initial duplicate copies were removed, 2407 remained and were screened by title and abstract reading; 218 of these articles were included in the final screening phase yielding 29 studies that were eligible for analysis. These studies were published between the years 1998 and 2018. The phases of the systematic search are shown in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher, Liberati, Tetzlaff, & Altman, 2009) diagram in Figure 2.

3.1 Additional study exclusions and considerations

One study was excluded because the outcomes were self-reported at baseline and researcher-rated at end of treatment (Hazell, Hayward, Cavanagh, Jones, & Strauss, 2018). I considered that this lack of rater consistency could have affected outcomes. Another study reported only state paranoia scores - how the individual felt within the past 15 minutes (Waller et al., 2015). I excluded it because this method of measurement significantly deviated from the other included studies. In one study two participants in the CT group and one in the TAU group self-reported at the end of treatment (Jolley et al., 2003); it seemed unreasonable to exclude it considering that the rest of the outcome data were researcher-rated. One study was excluded because it did not report the end-of-treatment data required to input into a meta-analysis. This author was contacted via email but was unable to respond. Several studies that initially appeared to be targeting positive and/or negative symptoms, but later stated that they focused on prioritising other client difficulties such as anxiety or depression (e.g. Peters et al., 2010), were excluded as not all clients received the same intervention. RCTs that delivered CBTp but only to clients who exhibited warning signs of potential relapse (e.g. Gumley et al., 2003) were also excluded, as not all clients received the same intervention and it would therefore be difficult to assess its effectiveness.

Several of the studies that were retrieved were based on the same dataset. In cases where data could not be extracted from the original article because for example, it was

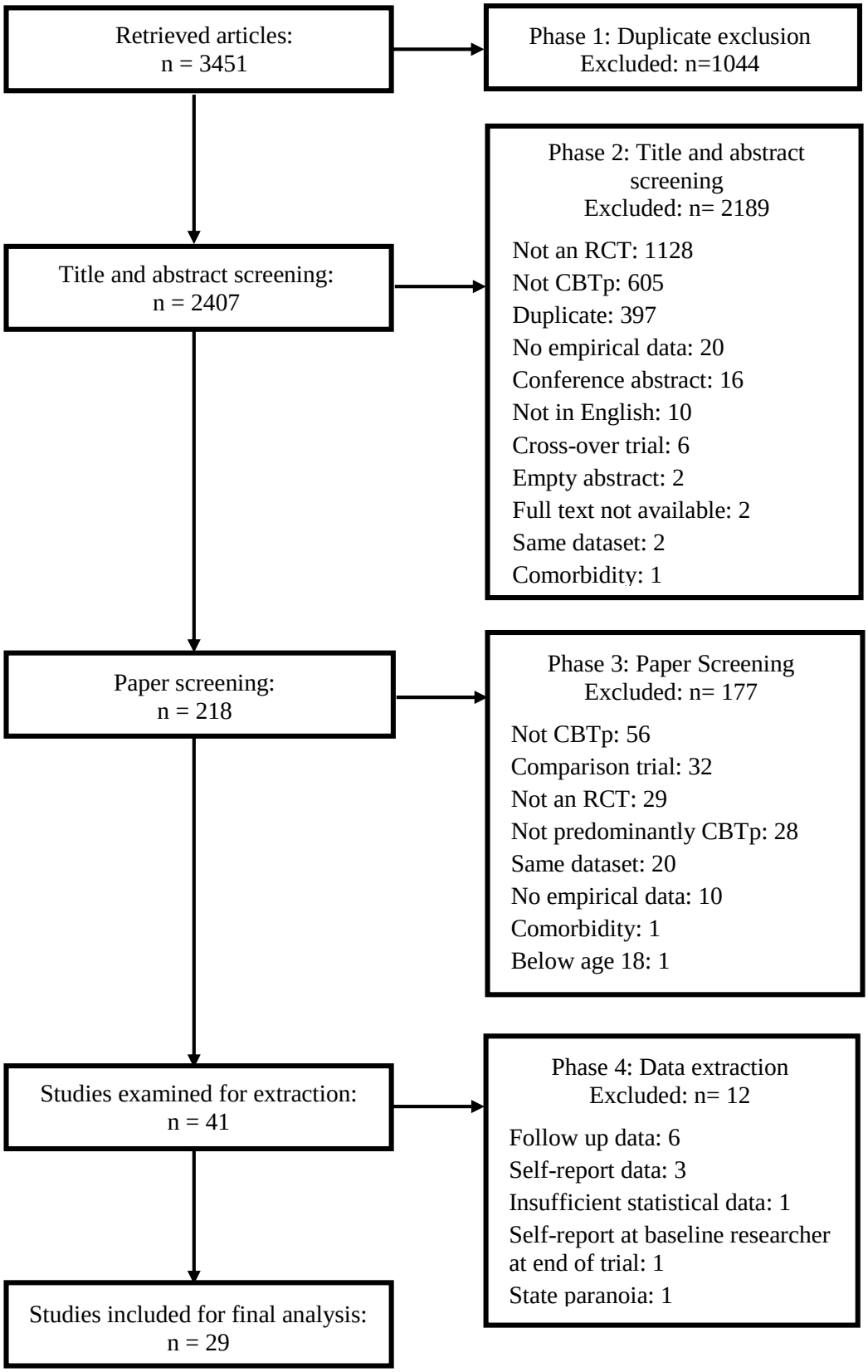


Figure 2. PRISMA diagram of the studies included in the meta-analysis.

missing, incomplete, or presented in change scores, the article with the most complete statistical information was sought, although the original article was cited (e.g. Lecomte et al., 2008; Tarrier et al., 1998).

3.2 Characteristics of the included studies

Table 2 summarises the characteristics of the included studies. Three of the studies delivered treatment in group format, while the rest delivered treatment individually. Fifteen of the studies were published in the UK, and 14 were published in another country (e.g. Canada, USA, Netherlands, Germany, Norway, Pakistan, Italy, and China). All studies were RCTs that compared the study intervention with TAU. Eighteen studies delivered CBTp, two delivered CT, one delivered Culturally Adapted CBT (CaCBT), one delivered CaCBT with family interventions, one delivered Motivation and Enhancement Training (MOVE) which consisted of mainly CBT with some social skills building, two were self-help, one was VR, two were CBT for ultra-high risk (CBTuhr), and one delivered CBTp with family interventions. Duration of treatment ranged from 5 weeks to 52 weeks. The number of treatment session ranged from 6 to 36 sessions. One study targeted paranoia, four targeted hallucinations, six targeted only positive symptoms, one targeted only negative symptoms, while the remaining 17 studies targeted both positive and negative symptoms. Although some studies did not specifically report which symptoms they were targeting, this was deduced from reading the article.

3.3 Inter-rater reliability

From the initial 2407 titles, 406 (17%) were randomly selected for reliability testing. KS and SR rated these studies for inclusion or exclusion using the screening tool. We reached an agreement rate of 98%. We agreed to ‘exclude’ 390 studies, ‘include’ 5 studies, and ‘could not tell’ for 2 of the studies. The disagreement rate was 2% with 2 ratings being ‘include’ versus ‘exclude’, and 7 of the ratings being ‘cannot tell’ versus

Table 2.

Study Characteristics

Author, year	Intervention group	Control Group	Country	Method of Delivery	Intervention Length	Sessions Offered	Sessions Received	Targetted Symptoms
Tarrier 1998	CBTp + TAU	TAU	UK	individual	10 weeks	20 sessions	not recorded	positive; negative
Lewis 2002	CBTp + TAU	TAU	UK	individual	5 weeks	15-20 hours + booster	mean 16.1; 95% CI (15.2–17.1)	positive
Rector 2003	CBTp + ETAU	ETAU	Canada	individual	26 weeks	20 sessions	not reported	positive; negative
Durham 2003	CBTp + TAU	TAU	UK	individual	39 weeks	20 sessions	not reported	positive; negative
Jolley 2003	CT + TAU	TAU	UK	individual	26 weeks	18 sessions	mean 7.5; SD 6.4	positive (distress)
Trower 2004	CT + TAU	TAU	UK	individual	26 weeks	not reported	median 16	hallucinations (distress)
Startup 2004	CBTp + TAU	TAU	UK	individual	26 weeks	25 sessions	mean 12.9; SD 9.4	positive; negative
Barrowclough 2006	CBTp + TAU	TAU	UK	group	26 weeks	18 sessions	mean 10.4; SD 6.5	positive
McLeod 2007	CBTp + TAU	TAU	UK	group	12 weeks	8 sessions	not reported	hallucinations
Lecomte 2008	CBTp + TAU	TAU	Canada	group	13 weeks	24 sessions	not reported	positive; negative
Garety 2008 no carer	CBTp + TAU	TAU	UK	individual	52 weeks	12-20 sessions	mean 14.4; SD 7.8	positive; negative
Garety 2008 carer	CBTp + TAU	TAU	UK	individual	52 weeks	12-20 sessions	mean 13.9; SD 8.0	positive; negative
Pinninti 2010	CBTp + TAU(SGA)	TAU(SGA)	USA	individual	12 weeks	12 sessions	mean 11.93; SD 0.83	positive
van der Gaag 2011	CBTp + TAU	TAU	Netherlands	individual	26 weeks	26 sessions	not reported	positive; negative
Lincoln 2012	CBTp + TAU	TAU	Germany	individual	38 weeks*	not reported	mean 28.9; SD 7.4	positive; negative
Morrison 2012	CBTuhr + TAU + monitoring	TAU + monitoring	UK	individual	26 weeks	26 sessions + booster	mean 9.11; SD 6.69	positive; negative
van der Gaag 2012	CBTuhr + TAU	TAU	Netherlands	individual	26 weeks	26 sessions	mean 10	positive; negative
Rathod 2013	CaCBT + TAU	TAU	UK	individual	16-20 weeks	16 sessions	mean 13.6; SD 4.9	positive (distress)
Krakvik 2013	CBTp + TAU	TAU	Norway	individual	17-26 weeks	20 sessions	not reported	positive (distress)
Morrison 2014	CBTp + TAU	TAU	UK	individual	39 weeks	26 sessions + booster	mean 13.3; SD 7.57	positive; negative
Birchwood 2014	CBTp + TAU	TAU	UK	individual	39 weeks	25 sessions	mean 19; SD 9	hallucinations (distress)
Naeem 2015	CaCBT + FI + TAU	TAU	Pakistan	Individual	17 weeks	6 sessions	not reported	positive; negative
Ruggeri 2015	CBTp + FI + TAU	TAU	Italy	individual	39 weeks	CBTp: 20-30; FI 10-15 sessions	not reported	positive; negative
Velligan 2015	CBT + SS + TAU (MOVE)	TAU	USA	individual	39 weeks	36 sessions	not reported	negative
Naeem 2016	CBTp GSH + TAU	TAU	Canada	individual	16 weeks	12-16 sessions	not reported	positive; negative
Guo 2017	CBTp + TAU	TAU	China	Individual	13 weeks	8 sessions	mean 6.5; SD 1.7	positive; negative
Gottileb 2017	Web-based CBTp + TAU	TAU	USA	individual	self-paced	10 sessions	not reported	hallucinations
Morrison 2018	CBTp + TAU(antipsychotics)	TAU(antipsychotics)	UK	Individual	26 weeks	26 sessions + booster	mean 14.39; SD 9.12	positive; negative
Pot-Kolder 2018	VR-CBT + TAU	TAU	Netherlands	individual	8-12 weeks	16 sessions	not reported	paranoia

Note: CBTp - cognitive behaviour therapy for psychosis; CT - cognitive therapy; FI - family involvement; CaCBT - culturally adapted CBT; SS - social skills; uhr - ultra-high risk; GSH - guided self-help; VR - virtual reality; SGA - second generation antipsychotic; TAU - treatment as usual; ETAU - enhanced TAU; MOVE - motivation and enhancement training; Intervention length reflects maximum number of offered sessions; * indicates the average number of sessions attended; If studies reported length in months it was multiplied by 4.34 to determine week equivalency.

'exclude'. We discussed these disagreements between each other to come to a consensus rating. When an agreement could not be reached two thesis supervisors (CM and BB) were involved in the decision process.

From the 29 studies included in the meta-analysis, 5 were randomly selected for inter-rater reliability ratings of the RCT-PQRS and the Cochrane Risk of Bias Tool. For the RCT-PQRS, Cohen's Kappa (κ) = 0.62, and for the Cochrane Risk of Bias, Cohen's Kappa (κ) = 0.73. According to Landis and Koch (1977) this represents a substantial level of agreement.

3.4 Meta-analyses and meta-regressions

3.4.1 Positive symptoms

The analysis for positive symptoms included 2698 participants. The pooled effect size for the 28 studies examining positive symptoms was -0.24 (95% CI -0.32, -0.16, $P <$ .001) (negative sign favours CBTp); these results indicated non-significant heterogeneity (Q = 26.87, P = 0.47) with an I^2 = 0%. When the two ARMS studies were excluded (as discussed above in the additional analyses undertaken subsection of the Methods section), the pooled effect size for the 26 studies was -0.26 (95% CI -0.34, -0.18, $P <$ .001), these results indicated non-significant heterogeneity (Q = 24.78, P = 0.47), with an I^2 = 0%. Finally, when in addition to the ARMS studies, the one VR and two self-help studies were removed, the pooled effect size for the 23 studies was -0.26 (95% CI -0.34, -0.17, $P <$ .001), also indicating non-significant heterogeneity (Q = 20.57, P = 0.55) with an I^2 = 0%. Since excluding the ARMS, VR, and self-help studies made little difference to the overall pooled effect size, all 28 studies were included in the final meta-analysis; the forest plot is shown in Figure 3. A weighted meta-regression indicated no effect of year on the effectiveness of CBTp, $F(1, 26) = 0.00$, $p = 0.996$, with an $R^2 = 0.001$.

3.4.1.1 Delusions

When the 15 out of the 28 studies that report a specific measure of delusions were taken into account, the pooled effect for these studies was -0.33 (95% CI -0.53, -0.14, $P <$

.001). These studies were heterogeneous (Q = 32.80, P = 0.003) with an I^2 = 57%. Within this meta-analysis, there were two studies that reported that they were targeting only hallucinations, and not delusions. When these studies were removed the pooled effect size for the 890 participants was -0.36 (-0.59, -0.13, P = 0.002). These studies similarly indicated substantial heterogeneity (Q = 31.99, P = 0.001) with an I^2 = 62%. The forest plot for these studies is shown in Figure 4.

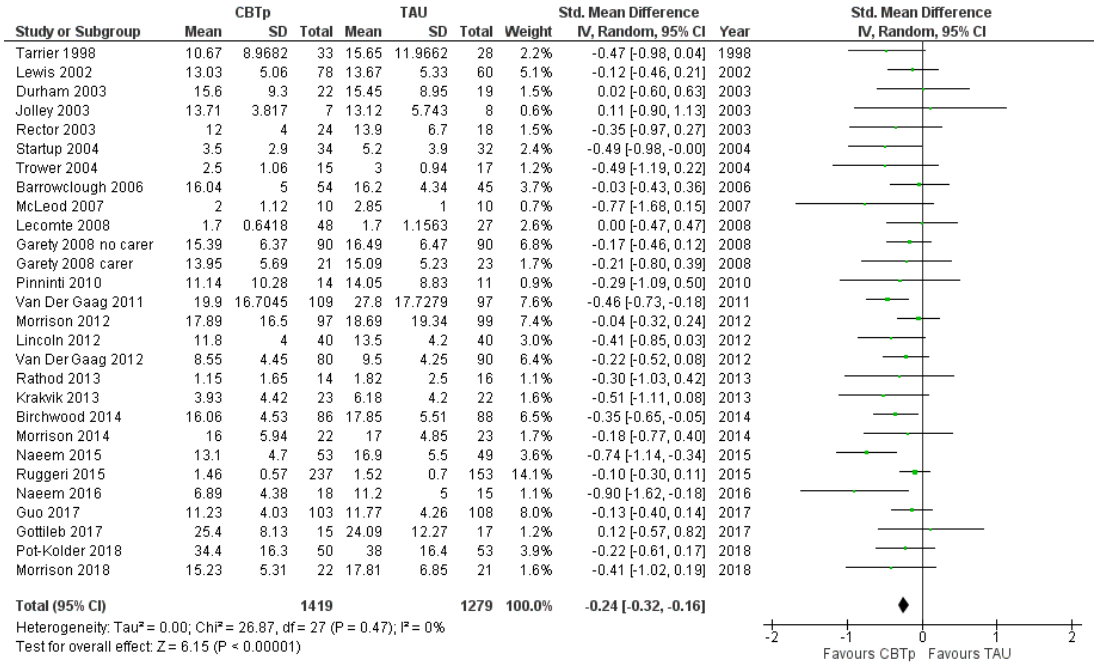


Figure 3. Forest plot of studies in the meta-analysis of positive symptoms.

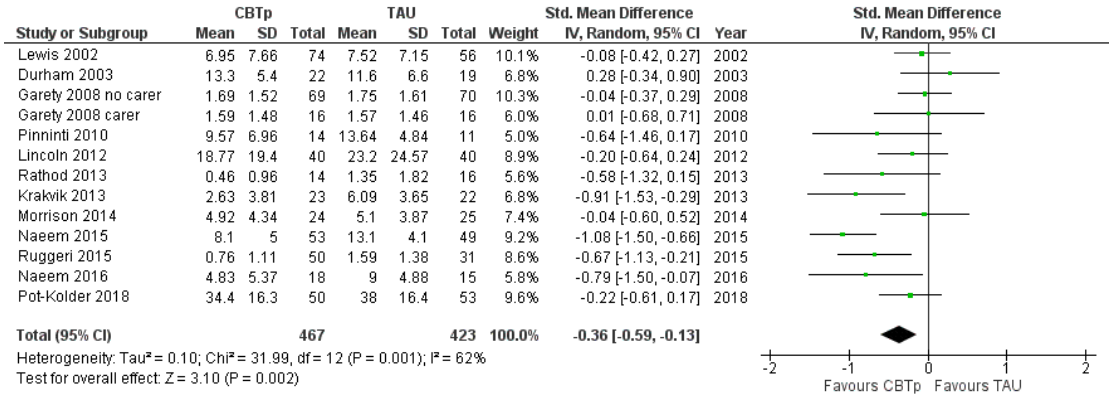


Figure 4. Forest plot of studies in the meta-analyses of delusions.

A weighted meta-regression indicated a significant effect of year on the effectiveness of CBTp, $F(1, 11) = 5.99$, $p = 0.032$, with an $R^2 = 0.594$. In this model, the year of publication $t(11) = -2.44$, $p = 0.032$ was a significant predictor of the effectiveness of CBTp on delusions. A graph of this effect in Figure 5 shows that as year of publication advanced, the effect sizes increased. This finding persisted even when co-occurring hallucinations were controlled for, $F(2, 8) = 5.441$, $p = 0.032$, with an $R^2 = 0.759$, where the year of publication $t(8) = -2.72$, $p = 0.026$ still significantly predicted CBTp effectiveness on delusions. This finding also persisted when methodological quality (RCT-PQRS; ratings in Appendix C) was controlled for as a confounding variable, $F(3, 7) = 13.34$, $p = 0.003$, with an $R^2 = 0.923$, where the year of publication $t(7) = -4.29$, $p = 0.004$ continued to significantly predict the effectiveness of CBTp on delusions. This finding suggests that methodological quality did not confound the relationship year of publication had on the effectiveness of CBTp on delusions. All test assumptions were met.

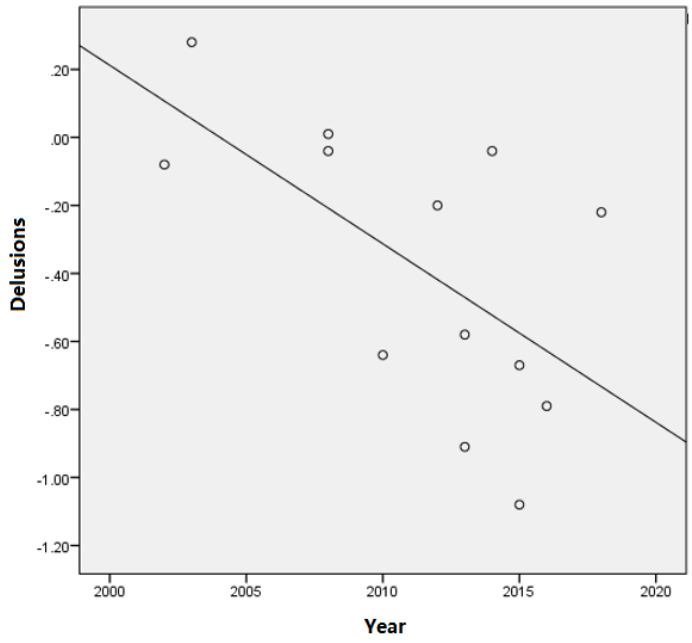


Figure 5. Effect of CBTp on outcome relating to delusions across time (negative sign favours CBTp).

3.4.1.2 Hallucinations

When all studies that report a score for hallucinations were taken into account, the pooled effect for the 849 participants in the 16 studies was -0.26 (95% CI -0.42, -0.11), $P < 0.001$. These studies indicate non-significant heterogeneity ($Q = 18.10$, $P = 0.26$) with an $I^2 = 17\%$. The forest plot for these studies is shown in Figure 6. A weighted meta-regression indicated a non-significant effect of year on the effectiveness of CBTp on hallucinations $F(1, 14) = 0.43$, $p = 0.522$, with an $R^2 = 0.173$. This finding was unchanged when co-occurring delusions were controlled for $F(2, 8) = 1.67$, $p = 0.248$, with an $R^2 = 0.543$.

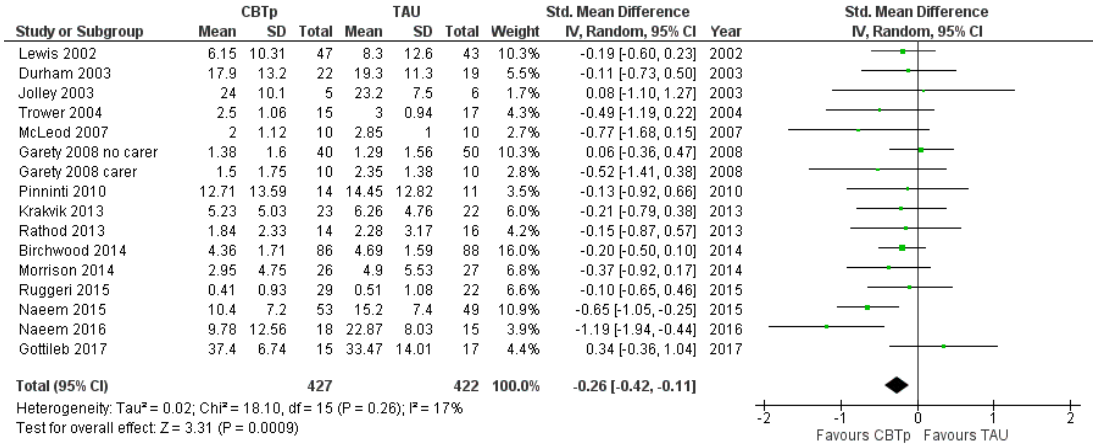


Figure 6. Forest plot of studies in the meta-analyses of hallucinations.

3.4.2 Negative symptoms

When all studies that report negative symptoms were taken into account, the pooled effect for the 1761 participants in the 19 studies was -0.22 (95% CI -0.33, -0.12), $P < 0.001$. These studies were not heterogeneous ($Q = 20.32$, $P = 0.32$) with an $I^2 = 11\%$. The forest plot for these studies is shown in Figure 7. A weighted meta-regression indicated a non-significant effect of year on the impact of CBTp on negative symptoms, $F(1, 16) = 0.747$, $p = 0.400$, with an $R^2 = 0.211$.

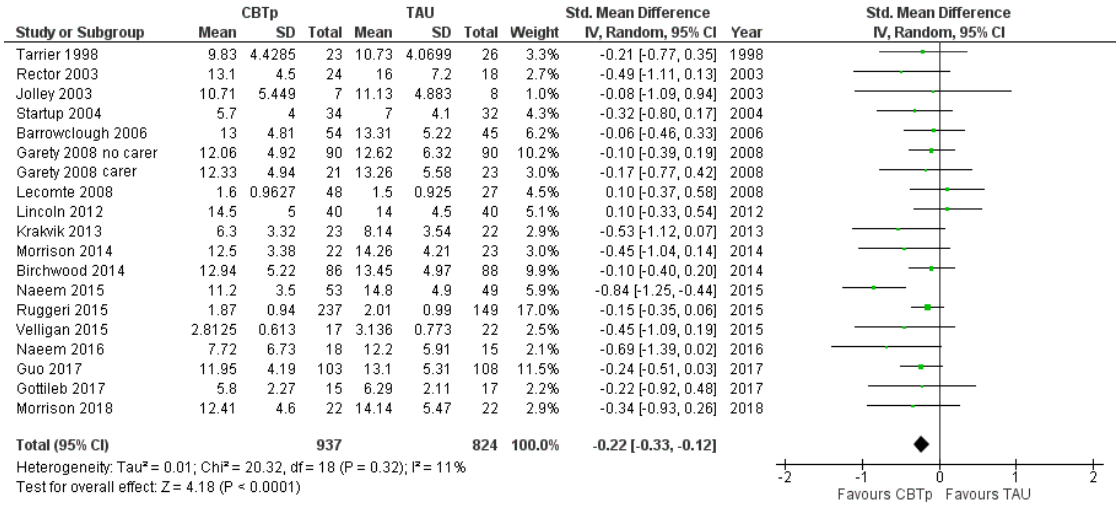


Figure 7. Forest plot of studies in the meta-analysis of negative symptoms

3.5 Cochrane risk of bias

Ratings on the six domains of the Cochrane Risk of Bias were mainly low or unclear risk (Appendix B). A few studies were rated as high risk on certain domains, thereby restricting the ability to carry out additional analyses examining the impact of bias. In terms of the blinding of participant and personnel domain, all the studies were rated as high risk because it is impossible to blind the therapist to the intervention they are delivering. Four studies were rated as high risk for blinding of outcome assessment (e.g. Jolley et al., 2003; Kråkvik, Gråwe, Hagen, & Stiles, 2013; Ruggeri et al., 2015; Startup, Jackson & Bendix, 2004). The raters in these studies were not blind to the randomised allocation of the client, which might have influenced their ratings. Four studies were rated as high risk on the selective reporting domain – Trower et al. (2004) did not report outcomes for negative symptoms and these could not be inputted into the meta-analysis. Lecomte (2008) did not include numbers of participants per group CBTp vs. TAU. This information was later taken from Lecomte, Leclerc and Wykes (2012) and subsequently entered into the meta-analysis. Velligan et al., (2015) did not report outcomes for negative symptoms. The data were received from the authors via email communication and inputted in the meta-analysis. Guo et al., (2017) did not report all of the study's pre-specified primary outcomes (PSYRATS) as outlined in their protocol.

3.6 Publication bias

The results of tests for publication bias for positive symptoms, delusions, hallucinations, and negative symptoms are presented in Table 3.

Table 3.

Results of tests for publication bias for positive symptoms, delusions, hallucinations, and negative symptoms

		Effect size (95% CI)		Egger's test[b]		Begg & Mazumdar's test[b]	
Symptoms	Studies, n	Unadjusted	Trim & Fill	*t*	*P*	*Z*	*P*
Positive	28	-0.24 (-0.32; -0.16)	-0.20 (-0.29; -0.11)[a]	1.65	0.06	1.32	0.09
Delusions	13	-0.36 (-0.59; -0.13)	none	0.83	0.21	0.79	0.21
Hallucinations	16	-0.26 (-0.42; -0.11)	none	0.47	0.32	0.67	0.25
Negative	19	-0.22 (-0.33; -0.12)	-0.14 (-0.27; -0.02)[a]	1.45	0.08	1.75	0.04

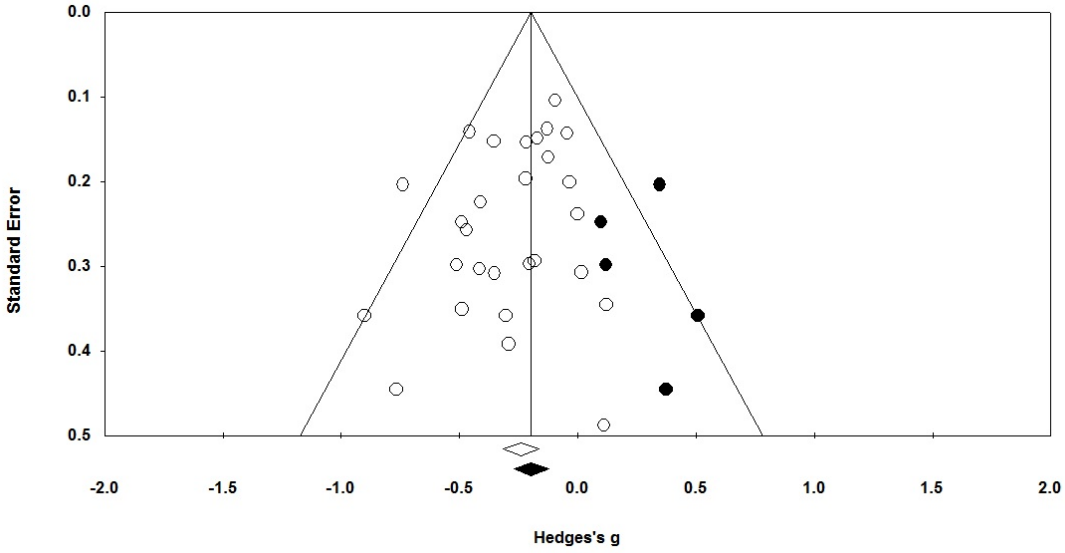
Note: a = 5 studies were imputed; b = tests were one-tailed

3.6.1 Positive symptoms

For positive symptoms, Begg and Mazumdar's test revealed non-significant Kendall's τ of -0.18 (z = 1.32; P = 0.09, one-tailed). Egger's test revealed an intercept of -0.80 (95% CI [-1.79; 0.19]; t[26] = 1.65; P = 0.06 (one-tailed) which reflects trend level significance, suggesting that publication bias might well exist. Duval and Tweedie's trim and fill procedure identified 5 potential missing studies, and recomputed the new point estimate at -0.20 (95% CI [-0.29; -0.11]), which slightly affected the overall magnitude of the effect size. This is shown in Figure 8.

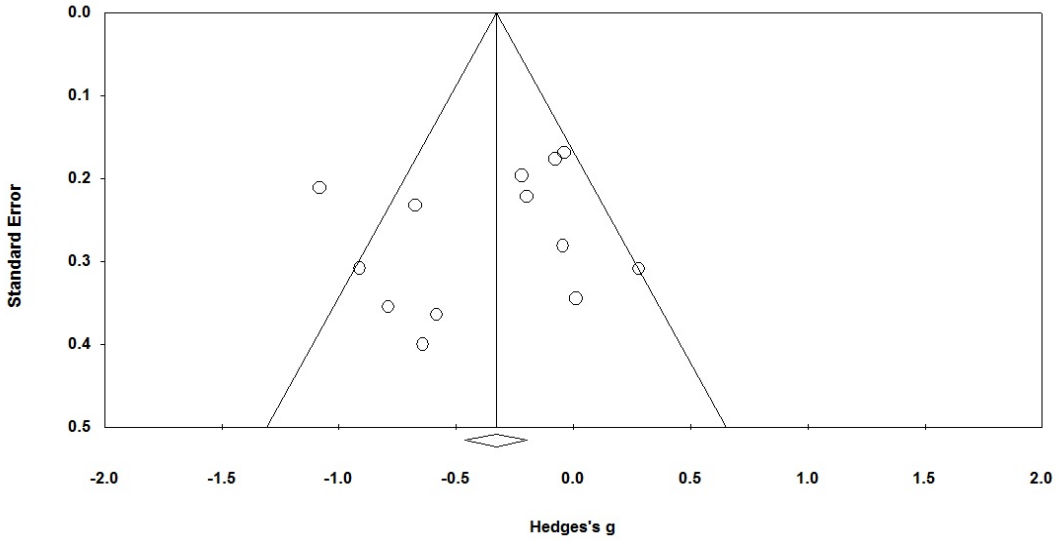
3.6.1.1 Delusions

For delusions, Begg and Mazumdar's test revealed a non-significant Kendall's τ of -0.17 (z = 0.79; P = 0.21, one-tailed). Egger's test revealed an intercept of -1.42 (95% CI [-5.16; 2.32]; t[11] = 0.83; P = 0.21 (one-tailed). Both tests suggest that publication bias does not exist, and consequently the Duval and Tweedie's trim and fill procedure identified no potential missing studies, leaving the point estimate at -0.36 (95% CI [-0.59; -0.13]). The funnel plot is shown in Figure 9.



Note: open circles reflect the studies included in the meta-analysis; darkened circles reflect imputed studies; open diamond reflects the unadjusted magnitude of the effect size; darkened diamond reflects the adjusted magnitude of the effect size.

Figure 8. Funnel plot for studies in the meta-analysis examining positive symptoms.

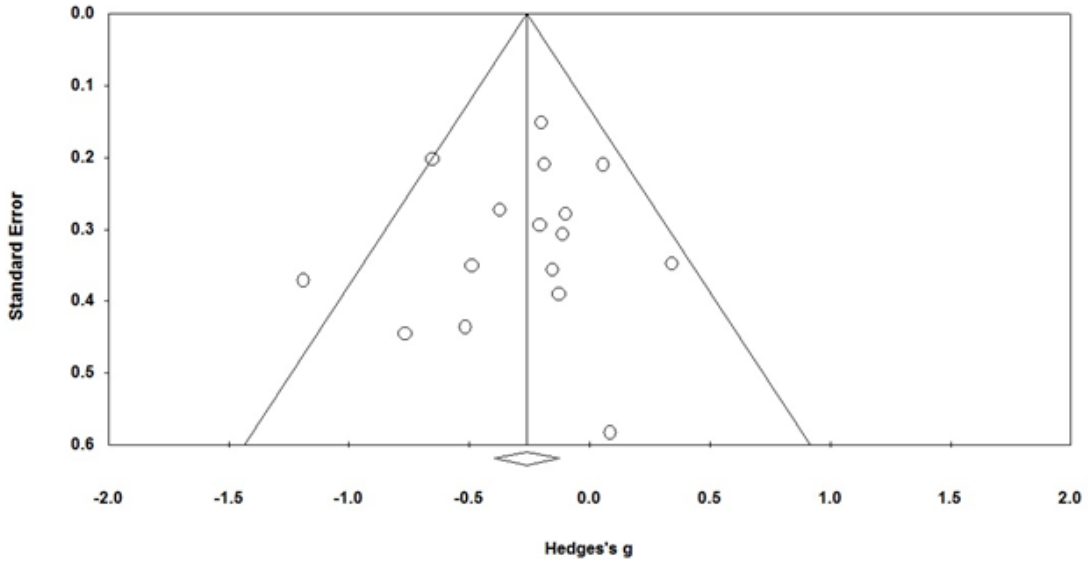


Note: open circles reflect the studies included in the meta-analysis; open diamond reflects the unadjusted magnitude of the effect size.

Figure 9. Funnel plot for studies in the meta-analysis examining delusions.

3.6.1.2 Hallucinations

For hallucinations, Begg and Mazumdar's test revealed a Kendall's τ of -0.13 (z = 0.67; P = 0.25, one-tailed). Egger's test revealed an intercept of -0.40 (95% CI [-2.25; 1.44]; t[14] = 0.47; P = 0.32 (one-tailed). As with delusions, both tests suggest that publication bias is not present, and the Duval and Tweedie's trim and fill procedure identified no potential missing studies, leaving the point estimate at -0.26 (95% CI [-0.42; -0.11]). The funnel plot is shown in Figure 10.

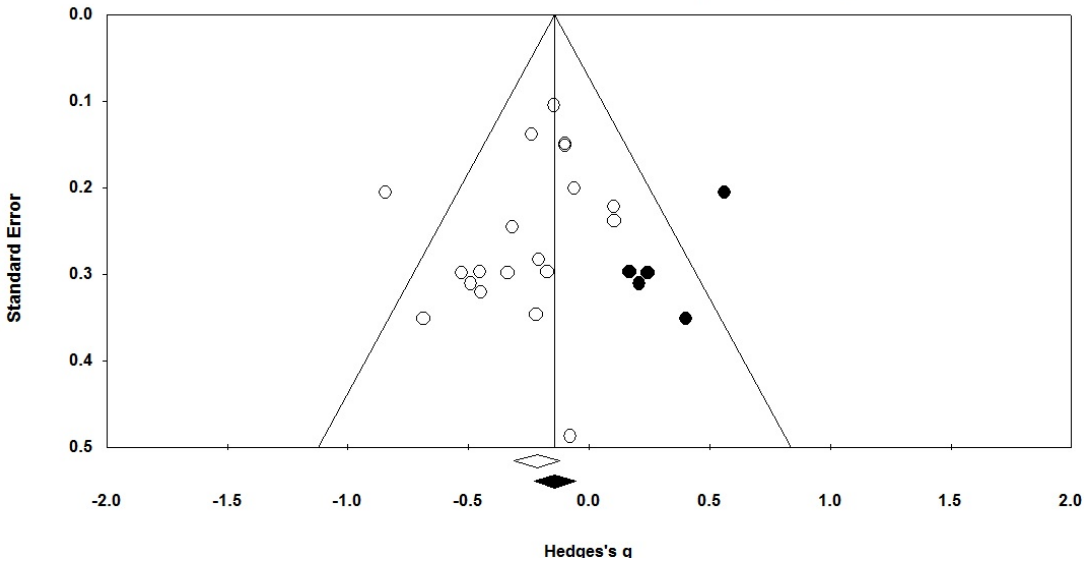


Note: open circles reflect the studies included in the meta-analysis; open diamond reflects the unadjusted magnitude of the effect size.

Figure 10. Funnel plot for studies in the meta-analysis examining hallucinations.

3.6.2 Negative symptoms

For negative symptoms, Begg and Mazumdar's test revealed a significant Kendall's τ of -0.29 (z = 1.75; P = 0.04, one-tailed). Egger's test revealed an intercept of -0.91 (95% CI [-2.22; 0.41]; t[17] = 1.45; P = 0.08, one-tailed) which reflects non-significance, suggesting that publication bias is not present. Duval and Tweedie's trim and fill procedure, however, identified 5 potential missing studies and recomputed the new point estimate at -0.14 (95% CI [-0.27; -0.02]), which affected the overall magnitude of the effect size. The funnel plot is shown in Figure 11.



Note: open circles reflect the studies included in the meta-analysis; darkened circles reflect imputed studies; open diamond reflects the unadjusted magnitude of the effect size; darkened diamond reflects the adjusted magnitude of the effect size.

Figure 11. Funnel plot for studies in the meta-analysis examining negative symptoms.

Discussion

The aim of this meta-analysis was to examine the effectiveness of CBTp for positive symptoms, delusions, hallucinations, and negative symptoms, and to examine whether the effectiveness of CBTp improved across time. It was hypothesised that there will be an improvement across time in the effectiveness of CBTp for positive symptoms, and for hallucinations and delusions when assessed separately. No increase in the effectiveness of CBTp was hypothesised for negative symptoms. The results showed small-to-medium significant effects favouring CBTp for positive symptoms, hallucinations, delusions, and negative symptoms. Improvements across time were only observed for delusions.

4.1 Positive symptoms

In terms of positive symptoms, the pooled effect size indicated a small significant effect of 0.24, favouring CBTp over TAU. When publication bias was assessed, the results in the current meta-analysis suggested that a disproportionate number of studies with significant intervention effects were published in comparison to studies without significant intervention effects. Since this discrepancy might have led to an overestimated intervention effect, the Duval and Tweedie trim and fill procedure was used, which identified 5 unpublished studies and a new point estimate was re-calculated; this step only slightly affected the overall magnitude of the effect size, 0.20. My finding is similar to that of Jauhar and colleagues (2014) who found an effect size of 0.24, although these researchers, when comparing CBTp to TAU, as in the current meta-analysis, found an effect of 0.31 that was slightly larger than the one found here. In comparison, Wykes et al. (2008) found a small-to-medium effect size of 0.37 but, as discussed in Jauhar et al. (2014), the authors used Glass's approach in calculating effect size, which has been purported to inflate the effect size.

Both Jauhar et al. (2014) and Wykes et al. (2008) found moderate-to-substantial heterogeneity in their assessment of positive symptoms, which might point to unknown moderator effects. The findings in the current meta-analysis indicated no important heterogeneity. In comparison with the current meta-analyses, Jauhar et al. (2014) and

Wykes et al. (2008) employed broader inclusion criteria than I did – including studies that had both a TAU and/or an active intervention comparison group. The heterogeneity observed in Jauhar et al. (2014) and Wykes et al. (2008) meta-analyses might be due to the variety of comparison groups included, unlike the TAU-only comparison group included in the current meta-analysis.

A meta-regression showed only a non-significant effect of CBTp on positive symptoms across time, indicating that the effectiveness of CBTp has not measurably increased or decreased. Although no change was observed, it is worth noting that the effectiveness did not decrease; a study exploring the effectiveness of CBT for depression, for example, found a decrease in effectiveness over time (Johnsen & Friborg, 2015). Despite a lack of developments in CBT for depression the authors did not expect a decline, and wondered whether the declining treatment outcomes could be a reflection of the methodological quality of the intervention, specifically the degree of clinician experience and the fidelity to the manual. They argued that initial studies were carried out by the founders of CBT for depression who had a large amount of experience and strong adherence to the manual, which they hypothesised might explain why the earlier studies were more effective.

In the current meta-analysis, as in published meta-analyses (e.g. Jauhar et al., 2014; Wykes et al., 2008), the hallucination and delusion scores were averaged to generate a positive score in studies that did not report an overall score. Since hallucinations and delusions correlate well with one another (e.g. r = 0.44; Steel et al., 2007), there is good justification for such a composite score. However, Steel et al. (2007) reported that many people experience only delusions or only hallucinations; averaging these subscales in individuals who experience only one of these symptoms may lead to a deflated score as a result of the loss of important information in terms of severity when the scores are averaged. Furthermore, exploring positive symptoms as a syndrome might disregard the multidimensional nature of delusions and hallucinations (Steel et al., 2007). Examining psychotic symptoms individually can be more informative and meaningful than exploring

positive symptoms as a syndrome (e.g. Bentall et al., 2014; Sitko et al., 2014; Varese et al., 2012). Consequently, I carried out two meta-analyses, exploring hallucinations and delusions separately.

4.1.2 Delusions and hallucinations

4.1.2.1 Delusions

In terms of delusions, the pooled effect size in the current study indicated a small-to-medium significant effect of 0.36 favouring CBTp. A recent meta-analysis assessing the effectiveness of CBTp on delusions reported the same effect size of 0.36 favouring CBTp (van der Gaag et al., 2015). When publication bias was considered in the current study, there was no indication that there were more significant than non-significant intervention effects published, which suggests that the pooled effect size is a good estimate of the overall intervention effect. There was, however, substantial heterogeneity, which indicated that 62% of the variation among the studies resulted from actual heterogeneity rather than chance alone. The possible cause of this heterogeneity was further explored in a meta-regression examining year of publication as the predictor variable. The findings showed that year of publication was a significant predictor of the effectiveness of CBTp on delusions indicating that, as year of publication advanced, the effect sizes increased. The meta-regression model explained 59% of the variance observed among the studies. When co-occurring hallucinations were controlled for, the model explained 76% of the variance. Since it could be argued that the methodological quality might affect the observed increase in the effectiveness of CBTp on delusions, an interaction term between the methodological quality and year of publication was examined. This interaction was non-significant, suggesting that the finding is not a reflection of increasing or decreasing methodological quality.

4.1.2.2 Hallucinations

In terms of hallucinations, the pooled effect size in the current study indicated a small significant effect of 0.26. There was no significant heterogeneity and publication bias was not observed. Neither was there an effect of year of publication on the effectiveness of CBTp on hallucinations. In other meta-analyses, Jauhar et al. (2014) found an effect size of

0.34, while van der Gaag et al. (2015) found an effect size of 0.44 favouring CBTp. The effect sizes in both of these meta-analyses are higher than in the current meta-analysis but an important difference is that both these published meta-analyses included any comparison condition while I only included TAU as a comparison. Also, when more than one comparison condition existed, the authors pooled the data – for example combining scores from the TAU and supportive therapy groups. The meaning of this difference is unclear and I cannot tell whether or how it could have affected the difference observed in effect sizes. Unfortunately, the authors of these meta-analyses did not report the means and standard deviations, and van der Gaag et al. (2015) also failed to set out the number of people in each intervention group. This restricts the making of comparisons between the studies and highlights the importance of future meta-analyses to provide these statistics as they may provide additional information that may be helpful in determining why such differences may exist.

4.1.3 Why has the effectiveness of CBTp increased for delusions but not for hallucinations?

I initially hypothesised that, as a result of the developments in the understanding of psychosis and the evolution of CBT in the context of psychosis, improvement across time would be observed for the treatment of both delusions and hallucinations. The main finding in this meta-analysis is that the effectiveness of CBTp increased for delusions but not for hallucinations. Some have argued that CBTp more effectively reduces delusional beliefs than hallucinations. Birchwood and Spencer (2002), for example, propose that the focus of working with hallucinations is to change the relationship an individual has with their voices by challenging the power and omnipotence of the voices – leading to a reduction in distress rather than to a reduction in frequency. Although they acknowledge that a reduction in distress might lead to a reduction in frequency of hallucinations, they assert that this is not the focus of therapy. Since the current meta-analysis examined symptom reduction rather than distress reduction, I was unable to examine the effectiveness of CBTp on distress, and whether there was improvement across time.

I propose that the parallel advances – in understanding of the psychosis and in CBT that is specific to psychosis – have led to the improved effectiveness of CBTp for delusions across time. This study did not test for the exact elements that contributed to this increase in effectiveness. It could be that the therapeutic advances collectively contributed to the improvement, or perhaps it was the developments in the understanding of the psychological mechanisms that allowed for more targeted treatment which lead, in turn, to the benefits. On the other hand, perhaps this finding is spurious and there is no temporal effect.

A closer examination of the studies in the current meta-analysis concerned with delusions showed that most of the more recent studies were not carried out in the UK. There was substantial variability in terms of manual use: some studies reported a manualised approach with adherence and fidelity ratings, others reported not using a manualised approach, while yet others reported amalgamating several different manuals. Morrison (2017) proposed that, in order to replicate outcomes, RCTs should show adherence and fidelity to the trial's models and manualised protocol. This process could help identify which models or manuals are associated with more effective outcomes. It might also ascertain whether the RCTs are providing the treatment they set out to deliver. A visual scan of the data in the current meta-analysis suggests that the increase in effectiveness of CBTp for delusions was not necessarily associated with a manualised approach or adherence or fidelity to a manual.

4.1.4 What symptoms are the interventions included in the studies targeting?

One of the main limitations of assessing the effectiveness of CBTp for delusions and hallucinations is that it is often unknown what symptoms were targeted in the delivery of the CBTp intervention. For example, only four studies in the hallucinations meta-analysis claimed to be targeting hallucinations only, while one study in the delusions meta-analysis claimed that it was specifically targeting paranoia. The rest of the studies either do not objectively indicate what specific symptoms they are aimed at, or they broadly state that they are targeting positive symptoms. Although the two meta-analyses carried out here

explored the effectiveness of CBTp on specific symptoms, it is unknown what proportion of these symptoms were targeted in each study. As a result, the interpretation of findings is difficult and, although delusions and hallucinations do co-occur, there are many people who experience one or the other. Steel et al. (2007), for example, reported that, out of a sample of 276 individuals, delusions and hallucinations co-occurred in 123 individuals (45%) with a correlation of, $r = 0.44$; the remaining 153 people (55%) experienced either hallucinations or delusions. The authors showed that the mean score for individuals reporting hallucinations only on the PSYRATS (Haddock et al., 1999) was 27.6 (SD = 6.7) but when combined with the whole group, including those who did not report hallucinations, the mean was 14.4 (SD = 14.6). This difference in averages indicates the loss of important information in terms of severity when the whole group, including those who do not experience hallucinations, is averaged. For people reporting delusions only, the difference in means is smaller 16.3, (SD = 4.0), while the whole sample mean was 13.5 (SD = 7.1). Averaging means for the whole sample, in cases where some of the sample do not experience hallucinations and where hallucinations were not the targeted intervention (even in those experiencing hallucinations), may be another reason why no increase in the effectiveness of CBTp for hallucinations was observed across time. Since it is not certain what proportion of the sample within the studies actually targeted hallucinations, the observed effect of CBTp for hallucinations may not be a true reflection of the actual effect of interventions targeting hallucinations specifically.

4.1.5 Why is the effect size deflated when examining the positive syndrome?

It is worth noting that when hallucinations and delusions were combined as positive symptoms, the effect size was 0.24, but when they were examined separately the effect sizes were larger, especially for delusions. There was also publication bias evident when studies of positive symptoms were pooled, but no bias when target symptoms were investigated separately: it seems that combining individual positive symptoms into a single syndrome score can lead to a deflated effect. This observation fits with Steel et al.'s argument (2007)

that examining a total cumulative positive symptoms score could lead to missing out on the multidimensional nature of delusions and hallucinations. This also supports Steel et al.'s (2007) argument and provides further evidence that delusions and hallucinations should be assessed individually.

4.2 Negative symptoms

In terms of negative symptoms the pooled effect size in the current meta-analysis indicated a small significant effect (0.22). When publication bias was assessed, 5 potential missing studies were identified, and the new effect size was recomputed to 0.14, suggesting little effect. These findings reflect recent findings by Velthorst et al. (2015) who found quite similar effects (0.09) in favour of CBTp when negative symptoms were examined as secondary outcomes and an effect of (0.16) when negative symptoms were examined as primary outcomes. Although the current meta-analysis did not find any effects of year of publication on the effectiveness of CBTp on negative symptoms, Velthorst et al. (2015) found that earlier trials were more effective. The main difference between Velthorst et al.'s (2015) study and the current study is that Velthorst et al. clustered the year of publication into four groups. In the context of the evolution of CBT, their finding suggests that earlier, more behavioural strategies (rather than the current more cognitive strategies) may have been more beneficial for negative symptoms. The present finding, which indicates a very small effect, points to the observation that CBTp interventions for negative symptoms may not be very effective, and raises the question whether other approaches might be better suited. The only study in this meta-analysis that targeted only negative symptoms (e.g. Velligan et al., 2015) found a medium effect size of 0.45 for an intervention, which mainly used behavioural techniques with few cognitive and social skills components. It may be that a greater behavioural and a smaller cognitive component is more effective with negative symptoms, but this would need to be further assessed.

One of the main limitations of assessing negative symptoms is that there was often no information as to what proportion of therapy goals were targeting negative symptoms. In

the current meta-analysis there was only one study that focused on targeting negative symptoms (i.e. Velligan et al., 2015). Since it is not certain whether the interventions in the studies included in the present meta-analysis actually targeted negative symptoms, the effect size observed may not be a true reflection of the actual effect of targeted treatment. A distinction between primary or secondary negative symptoms (defined in the introduction) would also have been helpful. A decrease in negative symptoms could have been a result of a reduction in positive symptoms rather than through direct targeted treatment. This would have been an important distinction as it has been argued that treatment for primary negative symptoms pose a major challenge for mental health services, and more effective treatments are needed (Staring, ter Huurne, & van der Gaag, 2013) – especially since there is clear evidence to show that negative symptoms can begin years before the emergence of positive symptoms and are strong predictors of poorer prognosis (Lang, Kösters, Lang, Becker, & Jäger, 2013), quality of life, and social outcomes (Kirkpatrick, Fenton, Carpenter, & Marder, 2006). Since the primary and secondary distinction was usually not made in the studies it was not possible to assess these separately.

4.3 Methodological considerations

In light of the findings there are several strengths and limitations of this study that need consideration.

4.3.1 Strengths

This study has several strengths that need to be considered. First, I followed the guidance of the Cochrane Handbook for Systematic Reviews of Interventions (Higgins & Green, 2011) when carrying out the systematic review and meta-analyses. The Cochrane Handbook sets high review standards and describes a rigorous approach, in planning a review, searching and selecting studies, risk of bias assessment, data collection, statistical analysis and more. Second, an Information Specialist who works for the University of Leeds was involved in devising and reviewing the search strategy for the electronic database search. Third, to ensure good reliability of the screening tool, the Cochrane Risk of Bias

tool, and the RCT-PQRS, a research assistant (SR) and I practised these ratings on a number of studies until we achieved good levels of reliability. The research assistant was then involved at the screening, eligibility, and extraction stages of the review process where we achieved a substantial level of agreement on the Cochrane Risk of Bias Tool and the RCT-PQRS, and 98% agreement on the use of the screening tool. Fourth, two thesis supervisors (BB and CM) were involved in discussions to reach a decision when I was uncertain whether to include or exclude a study. Specifically, the classification of CBTp was very seriously considered. Fifth, to ensure that studies that met the inclusion criteria were not accidentally missed or excluded, I reviewed titles and abstracts of the 2407 studies twice. In addition, the studies included in two previous meta-analyses (e.g. Jauhar et al., 2014; van der Gaag et al., 2015) were searched manually to make sure that no studies were missed out. Sixth, when the outcome data in studies that were included in the current meta-analysis were not reported, or reported incompletely in a way that could not be extracted, I contacted study authors via email. Seventh, when I was uncertain whether the intervention delivered in the studies was CBTp, I emailed authors asking for the intervention manual, and discussion between myself and my thesis supervisors followed. Eighth, when I was not able to get a hold of a manuscript, authors were emailed asking for the manuscript. Ninth, although grey literature was not searched I used the appropriate statistical methods to assess for publication bias. Finally, the present study included assistance from experts in the topics of systematic reviews, meta-analyses, and CBT who were able to guide and advise the author.

4.3.2 Limitations

There are several limitations that need to be considered in terms of outcomes, inclusion criteria, active ingredients, publication year, and other limitations. These are in addition to the two limitations already discussed in sections above pertaining to the difficulty in interpreting findings regarding the effectiveness of CBTp on delusions, hallucinations, and negative symptoms when it is often unknown what symptoms were targeted in the delivery of the CBTp interventions.

4.3.2.1 Outcomes

First, the current meta-analyses only examined researcher-rated symptom outcomes. Previous research has shown poor correlations between clients' subjective ratings and clinicians' ratings of psychotic symptoms (Morrison et al., 2013). It would therefore have been valuable to examine both ratings to see whether Morrison et al.'s (2013) findings would be replicated. However, since most of the studies reported researcher-rated outcomes, this would have been a much smaller analysis. Second, the meta-analyses focused on clinical outcomes (symptoms) rather than any other outcome that might have been important to the service users, such as quality of life or subjective recovery. Since recovery in psychosis is a personally defined journey (Anthony, 1993) that is not always associated with symptom reduction, it would have been valuable to examine subjective recovery outcomes. Fortunately there is a growing trend to include service-user outcome measures. The *questionnaire about the process of recovery* (QPR; Neil et al., 2009) that has been developed collaboratively with service users has been used as an outcome in a recent study (e.g. Morrison et al., 2014), and future meta-analyses will be able to incorporate this aspect of impact. Third, since Birchwood and Spencer (2002) have suggested that the goal with hallucinations is to reduce the distress associated with the experience rather than the frequency of the experience, it would have been helpful to examine whether CBTp actually decreases distress. Fourth, the current meta-analyses examined data at the end of treatment. Assessing follow-up data could indicate whether the effects persist, increase, or decrease with time, which would be important in terms of treatment planning of delivery such as whether to offer booster therapy sessions. Fifth, many studies based their inclusion criteria on positive symptom thresholds, and clients were therefore not selected on the severity of their negative symptoms.

4.3.2.2 Inclusion criteria

First, the search strategy excluded studies that were not in English, which might have led to a language bias, especially since several studies needed to be excluded on the basis of this criterion. Second, grey literature was not searched to uncover any non-

published studies, although methods to assess for publication bias were carried out and the results were adjusted accordingly. In addition, I searched previous meta-analyses by hand (e.g. Jauhar et al., 2014; van der Gaag et al., 2014) to check whether any studies failed to be picked up by my search strategy. Third, the search criteria in the current meta-analysis focused on positive and negative symptoms, however two of the meta-analyses carried out examined hallucinations and delusions. Since the search strategy did not include delusions or hallucinations certain studies might have been missed out. Previous meta-analyses that examined delusions and/or hallucinations separately (e.g. Jauhar et al., 2014; van der Gaag et al., 2014) were searched manually. This search indicated that no studies were missed out in the current study.

4.3.2.3 Active ingredients

First, as already mentioned, the current study hypothesised that it is the combination of the increased understanding of psychosis and the evolution of CBTp that has led to the observed increase in the effectiveness of CBTp in delusions across time. However, the present study is unable to test which particular elements contributed to this improvement and a more specific examination would therefore be warranted. Second, I hypothesised that technique-specific factors contributed to the increase in the effectiveness of CBTp for delusions, but other factors, such as client characteristics, have not been examined. Other methods, such as individual participant meta-analysis, might be better suited to such an additional analysis.

4.3.2.4 Publication year

The meta-regression used the year of publication as the dependent variable rather than the year in which the RCTs were carried out. Although there may be a delay between the year when the studies were carried out and the publication year, it is also true that most studies will be published as soon as possible and that the publication process will be of similar length for all the studies.

4.3.2.5 Other limitations

First, the current meta-analysis combined sub-scale scores of hallucinations and delusions to calculate a cumulative positive symptoms score. As mentioned previously, although this has been done in previous meta-analyses one of the drawbacks is averaging these subscales in cases where delusions and hallucinations, for example, do not co-occur – which can lead to a loss of information about the multidimensional aspect of these individual symptoms. However, as a result of this limitation, separate delusions and hallucinations meta-analyses were computed. Second, some studies did not provide adherence ratings and it cannot be known for certain that they delivered CBTp. However, if there was any indication that CBTp was not delivered, studies were excluded. For example, some studies initially described setting out to deliver CBTp, but later stated that the treatment focused on other aspects of mental health; these studies were excluded. Third, RCTs that recruited clients with comorbid difficulties were excluded. It could therefore be argued that the population examined within this study may not wholly reflect a true clinical population. However the goal of this study was to assess CBTp on psychotic symptoms, and inclusion of studies where clients experienced additional comorbidities might have made the interpretation of results difficult to disentangle. Fourth, the effects of antipsychotic medication were not controlled for. It could be argued that the changes in care provision over the last 30 years could have contributed to an increase in the observed effectiveness of CBTp, especially with the movement from de-institutionalisation to community care and, with the introduction of second generation antipsychotics. Although it could be the case that the evolution in antipsychotic medication led to this observed increase, the TAU group usually included medication as one of the treatments so this does not seem to be a plausible argument. It could also be argued that the effect of antipsychotic medication was to help clients engage better in therapy; although this notion could be plausible, it would need to be further examined.

4.4 Implications

4.4.1 Implications for clinical practice

In terms of implications for clinical practice, this study indicates a small effect of CBTp for negative symptoms (0.22), which reduced to 0.14 when publication bias was considered. This suggests that CBTp may not be the most effective method of intervention so other approaches may be more beneficial. In one psychosis service in Leeds, for example, negative symptoms, such as social withdrawal, are targeted through 'social recovery' activities. Clients are encouraged to participate in structured activities such as the walking group, film group, and the gym group. This approach has shown to lead to increases in structured activity and therefore to a decrease in social withdrawal (Fowler et al., 2018). The findings in the current study also indicate that small-to-medium effects exist for CBTp on delusions (0.36) and hallucinations (0.26), which suggests that CBTp can be effective at symptom reduction of these individual positive symptoms – perhaps more so for delusions. A visual scan of the extracted data does not suggest that this is a result of a manualised approach. This indicates that these effects can be obtained without strict adherence or fidelity to a particular manual or model.

The findings in the current study also show that there has been an improvement in the effectiveness of CBTp for delusions. It is important to note that this increase in effectiveness is hypothesised to be associated with the developments in the understanding of psychosis and with the evolution of CBTp. Since the first research study was published showing a link between childhood trauma and psychosis (e.g. Read et al., 1997), for example, the National Institute for Clinical Excellence guidelines (NICE, 2014) have proposed a trauma-informed approach when working with people with psychosis. It is important for clinicians working within psychosis to be aware of NICE guideline recommendations and to be aware of the developments in research, as these could contribute to delivering evidence-based care that could lead to a continued increase in the effectiveness of CBTp for delusions – building on the improvements observed up to this point.

The findings also suggest that guided self-help and VR approaches that use CBTp principles may also be helpful in reducing symptoms. In the climate of the increasing pressures placed on services to provide effective treatments, there is a suggestion here that approaches that do not rely on the traditional face-to-face therapeutic approaches may be beneficial. These approaches would probably need to be tailored to the right client, and more research to show effectiveness is needed. Studies included in the current meta-analyses also include two RCTs that have adapted CBTp to the cultural needs of the client and have also involved family members. This flexible approach of using culturally informed practice and family involvement highlights the benefits that such adaptations can have on the effectiveness of CBTp. This is especially important in the context of the Triangle of Care (Worthington, Rooney, & Hannan, 2013) framework, which promotes collaboration between service users, carers and staff. Involving carers or family members in the delivery of CBTp, for example, may allow them to play a more active role in their family member's recovery, and also provides an opportunity to build strong relationships.

Finally, the present meta-analysis suggests that, although CBTp can be effective at reducing psychotic symptoms, it is not be equally effective for all clients – and the difficulty with basing treatment decisions on meta-analytic findings is that the data relies on 'average' outcomes and there are no 'average clients'. Wampold and Budge (2012) propose a common factors model they call the *contextual model.* The model suggests that there are three common pathways through which psychotherapy produces benefit across all therapies: a.) by developing a real relationship; b.) by creating expectations through the explanation of the 'condition' and the treatment involved; and c.) by enhancing health-promoting actions. The authors developed this model from the perspective that all psychotherapies are equivalent, and that it is important for therapists to provide a treatment that elicits healthy client actions. This model suggests that healthy client actions could be elicited, for example, through the use of CBT, mindfulness approaches, ACT, or other approaches. Presently there is more evidence for CBT than for other therapeutic approaches, because there are more RCTs for CBT than for other therapies. Some evidence however for mindfulness approaches

and ACT for psychosis were briefly mentioned in the CBTp section of the Introduction. Growing a bigger evidence base for other therapeutic approaches for psychosis might allow the therapist to select a therapy that is best suited to the client.

4.4.2 Implications for further research

First, if it is to continue advancing the knowledge of the impact of CBTp on psychosis, future research should provide separate scores for individual psychotic symptoms so that they can be individually evaluated. Researchers should also provide a list of the primary symptoms that were targeted, and a separate list of scores for these symptoms. For example, if hallucinations were targeted with 12 study participants, delusions with 23, both symptoms with 5 people, and negative symptoms with 3, providing separate scores for these four categories would be help other researchers to evaluate the effectiveness of CBTp for the symptoms that were targeted.

Second, future research should provide a full description of the TAU group. It has been argued that TAU can be an active intervention (Witt et al., 2018), and it could therefore be that the heterogeneous findings often found in meta-analytic studies could exist as a result of the variability between the TAU interventions rather than the active interventions. A systematic review examining the effectiveness of CBT versus TAU for self-harm, for example, found that TAU varied considerably between trials. The study further found that when TAU was not clearly described, the effects for CBT were stronger. Clear descriptions would provide an opportunity to examine the content and quality of the TAU (Witt et al., 2018), and provide further context to the interpretations of results and be helpful to mental health services providing treatments.

Third, future research should provide therapeutic alliance scores. In their research, Goldsmith, Lewis, Dunn, and Bentall (2015) found that good therapeutic alliance was associated with better outcomes and that poor therapeutic alliance was detrimental in the delivery of CBTp. Including therapeutic alliance as a moderating variable in a meta-analysis would provide richer information as to the effectiveness of CBTp in the context of a good therapeutic relationship versus a poor therapeutic relationship.

Fourth, some RCTs that assess the effectiveness of CBTp are not manualised, or if they are do not provide adherence or fidelity ratings. In these cases it becomes difficult to evaluate a treatment when there is no information on whether the intended treatment was actually delivered. Morrison (2017) suggests that the likelihood of replicating outcomes from trials could be maximised if manualised protocols were used and if adherence and fidelity ratings were provided. Components that contribute to better outcomes could be evaluated if this information were provided. Future studies should provide adherence and fidelity ratings to ascertain that CBTp was in fact delivered, to examine whether any manuals or models are more effective than others, and to assess the effective components of CBTp for both positive and negative symptoms.

Fifth, research should continue reporting follow-up data to allow for a comprehensive assessment of the long term effectiveness of CBTp. At the moment there is variability in how and when these follow-up data are collected and reported. This reporting would be helpful in comparing whether there are long-term differences in effectiveness with positive symptoms and negative symptoms.

Sixth, research should persist in attempting to identify the psychological mechanisms involved in the formation and maintenance of psychotic symptoms, and how these mechanisms interact in their effect on symptoms. For example, how does attachment style (often associated with paranoia) and dissociation (often associated with hallucinations) interact with individuals with co-occurring symptoms? This approach could perhaps allow for even more targeted treatment.

Seventh, studies often report negative symptoms as a single syndrome, without distinguishing between the specific negative symptoms (i.e. social amotivation, diminished expression, and inattention-alogia). Focusing on individual negative symptoms could be helpful in determining which CBTp is most effective for.

Finally, to establish a better understanding of CBTp on psychotic symptoms, further research should examine how individual characteristics and therapy characteristics (length of therapy, and the like) affect outcomes. Currently, a research group in Manchester is

carrying out an *individual participant meta-analysis*, which differs from a conventional meta-analysis. While a meta-analysis takes aggregate means and standard deviation data from each study, an individual participant meta-analysis takes data points from all the participants in the RCTs. This type of method allows for a closer examination of how individual characteristics or therapy characteristics predict outcomes. This approach may be well suited to the answering of questions such as: for whom is CBTp most effective; and what length of therapy leads to the most effective outcomes?

4.5 Conclusions

In conclusion, the aim of this study was to assess whether the parallel advances in the understanding of psychosis, and in the evolution of CBT that is specific to psychosis, have led to improved effectiveness of CBTp across time. I carried out four meta-analyses to examine the effectiveness of CBTp on positive symptoms, delusions, hallucinations, and negative symptoms, and four meta-regressions to examine whether the effectiveness of CBTp increased across time. The findings indicate small-to-medium effects of CBTp on positive symptoms, delusions, hallucinations, and negative symptoms. The findings also show that the effectiveness of CBTp increased across time for delusions. This finding was not a result of an increase or decrease in methodological quality or in the increased use of a manualised approach. The most recent National Clinical Audit of Psychosis (The Royal College of Psychiatrist, 2018) reported that only 26% of service users were offered CBTp. The finding in the current thesis suggests that CBTp can be effective at reducing psychotic symptoms, and that the effectiveness of CBTp for delusions has increased. In line with NICE recommendations, CBTp should continue to be offered as a psychological intervention to all clients with psychosis (NICE, 2014).

References

American Psychiatric Association. (1952). *Diagnostic and statistical manual of mental disorders* (1st ed.). Washington, DC: American Psychiatric Association.

American Psychiatric Association. (1968). *Diagnostic and statistical manual of mental disorders* (2nd ed.). Washington, DC: American Psychiatric Association.

American Psychiatric Association. (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, DC: American Psychiatric Association.

American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., rev.). Washington, DC: American Psychiatric Association.

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., rev.). Washington, DC: American Psychiatric Association.

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

Andreasen, N. C. (1982). Negative symptoms in schizophrenia: Definition and reliability. *Archives of General Psychiatry, 39,* 784-788.

Andreasen, N. C. (1984). Scale for the assessment of positive symptoms. *Iowa City: University of Iowa*.

Andreasen, N. C., Carpenter Jr, W. T., Kane, J. M., Lasser, R. A., Marder, S. R., & Weinberger, D. R. (2005). Remission in schizophrenia: Proposed criteria and rationale for consensus. *American Journal of Psychiatry, 162*, 441-449.

Anthony, W. A. (1993). Recovery from mental illness: The guiding vision of the mental health service system in the 1990s. *Psychosocial Rehabilitation Journal, 16*, 11-23.

Åsberg, M., Montgomery, S. A., Perris, C., Schalling, D., & Sedvall, G. (1978). A comprehensive psychopathological rating scale. *Acta Psychiatrica Scandinavica, 57*, 5-27.

Ashok, A. H., Baugh, J., & Yeragani, V. K. (2012). Paul Eugen Bleuler and the origin of the term schizophrenia (SCHIZOPRENIEGRUPPE). *Indian Journal of Psychiatry, 54*, 95-96.

Axelrod, B. N., Goldman, R. S., & Alphs, L. D. (1993). Validation of the 16-item negative symptom assessment. *Journal of Psychiatric Research, 27*, 253-258.

Ayllon, T., & Michael, J. (1959). The psychiatric nurse as a behavioral engineer 1. *Journal of the Experimental Analysis of Behavior, 2*, 323-334.

Baker, R., Hall, J., Hutchinson, K., & Bridge, G. (1977). Symptom changes in chronic schizophrenic patients on a token economy: A controlled experiment. *The British Journal of Psychiatry, 131*, 381-393.

Barrowclough, C., Tarrier, N., Humphreys, L., Ward, J., Gregg, L., & Andrews, B. (2003). Self-esteem in schizophrenia: Relationships between self-evaluation, family attitudes, and symptomatology. *Journal of Abnormal Psychology*, *112*, 92-99.

Barrowclough, C., Haddock, G., Lobban, F., Jones, S., Siddle, R. O. N., Roberts, C., & Gregg, L. (2006). Group cognitive-behavioural therapy for schizophrenia: Randomised controlled trial. *The British Journal of Psychiatry*, *189*, 527-532.

Baumeister, D., Sedgwick, O., Howes, O., & Peters, E. (2017). Auditory verbal hallucinations and continuum models of psychosis: A systematic review of the healthy voice-hearer literature. *Clinical Psychology Review, 51*, 125-141.

Beck, A. T. (1952). Successful outpatient psychotherapy of a chronic schizophrenic with a delusion based on borrowed guilt. *Psychiatry, 15*, 305-312.

Beck, A. T., Ward, C. H., Mendelson, M., Mock, J. E., & Erbaugh, J. K. (1962). Reliability of psychiatric diagnoses: 2. A study of consistency of clinical judgments and ratings. *American Journal of Psychiatry, 119*, 351-357.

Beck, A. T. (1979). *Cognitive therapy and the emotional disorders*. Penguin.

Beck, A., Rector, N., Stolar, N., & Grant, P. (2009). Schizophrenia: Cognitive theory, research and therapy. *Psychiatric Rehabilitation Journal, 32*, 327-328.

Begg, C. B., & Mazumdar, M. (1994). Operating characteristics of a rank correlation test for publication bias. *Biometrics, 50,* 1088-1101.

Bentall, R. P. (2004). *Madness explained: Psychosis and human nature*: London: Penguin Books.

Bentall, R. P. (2009). *Doctoring the mind: Is our current treatment of mental illness really any good?* New York, NY, US: New York University Press.

Bentall, R. P., de Sousa, P., Varese, F., Wickham, S., Sitko, K., Haarmans, M., & Read, J. (2014). From adversity to psychosis: Pathways and mechanisms from specific adversities to specific symptoms. *Social Psychiatry and Psychiatric Epidemiology*, *49*, 1011-1022.

Birchwood, M., Meaden, A., Trower, P., Gilbert, P., & Plaistow, J. (2000). The power and omnipotence of voices: Subordination and entrapment by voices and significant others. *Psychological Medicine, 30,* 337-344.

Birchwood, M., & Spencer, E. (2002). Psychotherapies for schizophrenia. In M. Maj, & N. Sartorius (Eds.), *Schizophrenia: WPA Series in Evidence and Experience in Psychiatry* (pp. 147-241). Chichester: Wiley.

Birchwood, M., & Trower, P. (2006). The future of cognitive-behavioural therapy for psychosis: Not a quasi-neuroleptic. *The British Journal of Psychiatry, 188,* 107-108.

Birchwood, M., Michail, M., Meaden, A., Tarrier, N., Lewis, S., Wykes, T., ... & Peters, E. (2014). Cognitive behaviour therapy to prevent harmful compliance with command hallucinations (COMMAND): A randomised controlled trial. *The Lancet Psychiatry, 1*, 23-33.

Borenstein, M., Hedges, L., & Rothstein, H. (2007). Meta-analysis: Fixed effect vs. random effects. *Meta-analysis.com*.

Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2010). A basic introduction to fixed-effect and random-effects models for meta-analysis. *Research Synthesis Methods, 1*, 97-111.

Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2013). Comprehensive Meta-Analysis, Version 3 [Computer program]. Biostat, Englewood, NJ.

Brockman, R., & Murrell, E. (2015). What are the primary goals of cognitive behavior therapy for psychosis? A theoretical and empirical review. *Journal of Cognitive Psychotherapy, 29*, 45-67.

Buckley, P. F., Miller, B. J., Lehrer, D. S., & Castle, D. J. (2009). Psychiatric comorbidities and schizophrenia. *Schizophrenia Bulletin, 35*, 383-402.

Cantor-Graae, E., & Selten, J.-P. (2005). Schizophrenia and migration: A meta-analysis and review. *American Journal of Psychiatry, 162*, 12-24.

Carpenter Jr, W. T., Heinrichs, D. W., & Wagman, A. M. (1988). Deficit and nondeficit forms of schizophrenia: The concept. *The American Journal of Psychiatry, 145*, 578-583.

Cicchetti, D. V., & Sparrow, S. A. (1981). Developing criteria for establishing interrater reliability of specific items: Applications to assessment of adaptive behavior. *American Journal of Mental Deficiency, 86*, 127-137.

Ciompi, L. (1980). The natural history of schizophrenia in the long term. *The British Journal of Psychiatry, 136*, 413-420.

Clark, L. A., Cuthbert, B., Lewis-Fernández, R., Narrow, W. E., & Reed, G. M. (2017). Three approaches to understanding and classifying mental disorder: ICD-11, DSM-5, and the National Institute of Mental Health's Research Domain Criteria (RDoC). *Psychological Science in the Public Interest, 18,* 72-145.

Cochran, W. G. (1954). The combination of estimates from different experiments. *Biometrics, 10,* 101-129.

Copolov, D., & Crook, J. (2000). Biological markers and schizophrenia. *Australian and New Zealand Journal of Psychiatry, 34,* 108-112.

Cornblatt, B., Obuchowski, M., Roberts, S., Pollack, S., & Erlenmeyer–Kimling, L. (1999). Cognitive and behavioral precursors of schizophrenia. *Development and Psychopathology, 11,* 487-508.

Cutler, B. L. (2008). *Encyclopedia of psychology of law:* Sage Publications.

de Sousa, P., Varese, F., Sellwood, W., & Bentall, R. P. (2013). Parental communication and psychosis: A meta-analysis. *Schizophrenia Bulletin, 40,* 756-768.

Day, S. J., & Altman, D. G. (2000). Blinding in clinical trials and other studies. *The BMJ, 321,* 504.

Decker, H. S. (2004). The psychiatric works of Emil Kraepelin: A many-faceted story of modern medicine. *Journal of the History of the Neurosciences, 13,* 248-276.

Downhill, J. E., Buchsbaum, M. S., Wei, T., Spiegel-Cohen, J., Hazlett, E. A., Haznedar, M. M., . . . Siever, L. J. (2000). Shape and size of the corpus callosum in schizophrenia and schizotypal personality disorder. *Schizophrenia Research, 42,* 193-208.

Durham, R. C., Guthrie, M., Morton, R. V., Reid, D. A., Treliving, L. R., Fowler, D., & MacDonald, R. R. (2003). Tayside–Fife clinical trial of cognitive–behavioural therapy for medication-resistant psychotic symptoms: Results to 3-month follow-up. *The British Journal of Psychiatry, 182,* 303-311.

Duval, S., & Tweedie, R. (2000). A nonparametric “trim and fill” method of accounting for publication bias in meta-analysis. *Journal of the American Statistical Association, 95*, 89-98.

Ebert, A., & Bar, K. J. (2010). Emil Kraepelin: A pioneer of scientific understanding of psychiatry and psychopharmacology. *Indian Journal of Psychiatry, 52*, 191-192.

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *The BMJ, 315*, 629-634.

Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science, 196*, 129-136.

Fenton, W. S., McGlashan, T. H., & Heinssen, R. K. (1988). A comparison of DSM-III and DSM-III-R schizophrenia. *American Journal of Psychiatry, 145*, 1446-1449.

Forman, E. M., & Herbert, J. D. (2009). New directions in cognitive behavior therapy: Acceptance-based therapies. In W. O’Donohue, & J.E. Fisher (Eds.), *General principles and empirically supported techniques of cognitive behavior therapy* (pp. 77-101). Hoboken, NJ: Wiley & Sons, Inc.

Fowler, D., Garety, P., & Kuipers, E. (1995). Cognitive Behaviour Therapy for People with Psychosis: A clinical handbook.

Fowler, D., Hodgekins, J., French, P., Marshall, M., Freemantle, N., McCrone, P., ... & Singh, S. (2018). Social recovery therapy in combination with early intervention services for enhancement of social recovery in patients with first-episode psychosis (SUPEREDEN3): A single-blind, randomised controlled trial. *The Lancet Psychiatry, 5*, 41-50.

Freeman, D., & Garety, P. A. (2003). Connecting neurosis and psychosis: The direct influence of emotion on delusions and hallucinations. *Behaviour Research and Therapy, 41*, 923-947.

Freeman, D., Pugh, K., Vorontsova, N., Antley, A., & Slater, M. (2010). Testing the continuum of delusional beliefs: An experimental study using virtual reality. *Journal of Abnormal Psychology, 119*, 83.

Fusar-Poli, P., & Politi, P. (2008). Paul Eugen Bleuler and the birth of schizophrenia (1908). *American Journal of Psychiatry, 165*, 1407-1407.

Garety, P. A., Kuipers, L., Fowler, D., Chamberlain, F., & Dunn, G. (1994). Cognitive behavioural therapy for drug-resistant psychosis. *British Journal of Medical Psychology*, *67*, 259-271.

Garety, P. A., Kuipers, E., Fowler, D., Freeman, D., & Bebbington, P. (2001). A cognitive model of the positive symptoms of psychosis. *Psychological Medicine, 31*, 189-195.

Garety, P. A., Fowler, D. G., Freeman, D., Bebbington, P., Dunn, G., & Kuipers, E. (2008). Cognitive-behavioural therapy and family intervention for relapse prevention and symptom reduction in psychosis: Randomised controlled trial. *The British Journal of Psychiatry*, *192*, 412-423.

Gilbert, P. (2001). Evolutionary approaches to psychopathology: The role of natural defences. *Australian and New Zealand Journal of Psychiatry, 35*, 17-27.

Goldsmith, L. P., Lewis, S. W., Dunn, G., & Bentall, R. P. (2015). Psychological treatments for early psychosis can be beneficial or harmful, depending on the therapeutic alliance: An instrumental variable analysis. *Psychological Medicine*, *45*, 2365-2373.

Goodwin, F. K. J., & Jamison, K. R. (1990). *Manic depressive: A definitive overview of bipolar disorder.* New York: Oxford University Press.

Gottesman, I. I., McGuffin, P., & Farmer, A. E. (1987). Clinical genetics as clues to the "real" genetics of Schizophrenia (a decade of modest gains while playing for time). *Schizophrenia Bulletin, 13*, 23-48.

Gottlieb, J. D., Gidugu, V., Maru, M., Tepper, M. C., Davis, M. J., Greenwold, J., ... & Mueser, K. T. (2017). Randomized controlled trial of an internet cognitive

behavioral skills-based program for auditory hallucinations in persons with psychosis. *Psychiatric Rehabilitation Journal, 40*, 283-292.

Green, C. E. L., Freeman, D., Kuipers, E., Bebbington, P., Fowler, D., Dunn, G., & Garety, P. A. (2008). Measuring ideas of persecution and social reference: The Green et al. Paranoid Thought Scales (GPTS). *Psychological Medicine, 38*, 101-111.

Gumley, A., O'Grady, M., McNay, L., Reilly, J., Power, K., & Norrie, J. (2003). Early intervention for relapse in schizophrenia: Results of a 12-month randomized controlled trial of cognitive behavioural therapy. *Psychological Medicine, 33*, 419-431.

Guo, Z. H., Li, Z. J., Ma, Y., Sun, J., Guo, J. H., Li, W. X., ... & Kingdon, D. (2017). Brief cognitive–behavioural therapy for patients in the community with schizophrenia: Randomised controlled trial in Beijing, China. *The British Journal of Psychiatry, 210*, 223-229.

Haddock, G., McCarron, J., Tarrier, N., & Faragher, E. B. (1999). Scales to measure dimensions of hallucinations and delusions: The psychotic symptom rating scales (PSYRATS). *Psychological Medicine, 29*, 879-889.

Häfner, H., & an der Heiden, W. (1999). The course of schizophrenia in the light of modern follow-up studies: The ABC and WHO studies. *European Archives of Psychiatry and Clinical Neuroscience, 249*, 14-26.

Hansen, L., Turkington, D., Kingdon, D., & Smith, P. (2003). Brief rating instrument for assessment of negative symptoms: derived from the Comprehensive Psychopathological Rating Scale (CPRS). *International Journal of Psychiatry in Clinical Practice, 7*, 113-116.

Hariton, E., & Locascio, J. J. (2018). Randomised controlled trials—the gold standard for effectiveness research. *BJOG: An International Journal of Obstetrics and Gynaecology*, *125*, 1716.

Hartling, L., Ospina, M., Liang, Y., Dryden, D. M., Hooton, N., Seida, J. K., & Klassen, T. P. (2009). Risk of bias versus quality assessment of randomised controlled trials: Cross sectional study. *The BMJ, 339*, b4012.

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

Hazell, C. M., Hayward, M., Cavanagh, K., Jones, A. M., & Strauss, C. (2018). Guided self-help cognitive-behaviour Intervention for VoicEs (GiVE): Results from a pilot randomised controlled trial in a transdiagnostic sample. *Schizophrenia Research, 195*, 441-447.

Hedges, L. V. (1981). Distribution theory for Glass's estimator of effect size and related estimators. J*ournal of Educational Statistics, 6*, 107-128.

Higgins, J., & Thompson, S. G. (2002). Quantifying heterogeneity in a meta-analysis. *Statistics in Medicine, 21*, 1539-1558.

Higgins, J. P., Altman, D. G., Gøtzsche, P. C., Jüni, P., Moher, D., Oxman, A. D., ... & Sterne, J. A. (2011). The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *The BMJ, 343*, d5928.

Higgins, J. P., & Green, S. (2011). *Cochrane handbook for systematic reviews of interventions* (Vol. 4). John Wiley & Sons.

Hofmann, S. G., Sawyer, A. T., & Fang, A. (2010). The empirical status of the "new wave" of cognitive behavioral therapy. *Psychiatric Clinics, 33*, 701-710.

Howes, O. D., & Murray, R. M. (2014). Schizophrenia: An integrated sociodevelopmental-cognitive model. *The Lancet, 383*, 1677-1687.

IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version 24.0. Armonk, NY: IBM Corp.

Jablensky, A. (2010). The diagnostic concept of schizophrenia: Its history, evolution, and future prospects. *Dialogues in Clinical Neuroscience, 12*, 271-287.

Jauhar, S., McKenna, P. J., Radua, J., Fung, E., Salvador, R., & Laws, K. R. (2014). Cognitive–behavioural therapy for the symptoms of schizophrenia: Systematic review and meta-analysis with examination of potential bias. *The British Journal of Psychiatry*, *204*, 20-29.

Job, D. E., Whalley, H. C., McConnell, S., Glabus, M., Johnstone, E. C., & Lawrie, S. M. (2002). Structural gray matter differences between first-episode schizophrenics and normal controls using voxel-based morphometry. *Neuroimage, 17*, 880-889.

Johnsen, T. J., & Friborg, O. (2015). The effects of cognitive behavioral therapy as an anti-depressive treatment is falling: A meta-analysis. *Psychological Bulletin, 141*, 747-768.

Jolley, S., Garety, P., Craig, T., Dunn, G., White, J., & Aitken, M. (2003). Cognitive therapy in early psychosis: A pilot randomized controlled trial. *Behavioural and Cognitive Psychotherapy*, *31*, 473-478.

Joseph, J. (2013). 'Schizophrenia' and heredity: Why the emperor (Still) has no genes. In J. Read, & J. Dillon (Eds.), *Models of madness: Psychological, social and biological approaches to psychosis* (pp. 72–90). Hove, UK: Routledge.

Kay, S. R., Fiszbein, A., & Opler, L. A. (1987). The positive and negative syndrome scale (PANSS) for schizophrenia. *Schizophrenia Bulletin, 13*, 261-276.

Kennedy, L., & Xyrichis, A. (2017). Cognitive behavioral therapy compared with non-specialized therapy for alleviating the effect of auditory hallucinations in people with reoccurring schizophrenia: A systematic review and meta-analysis. *Community Mental Health Journal, 53*, 127-133.

Khoury, B., Lecomte, T., Gaudiano, B. A., & Paquin, K. (2013). Mindfulness interventions for psychosis: A meta-analysis. *Schizophrenia Research, 150*, 176-184.

Kiran, C., & Chaudhury, S. (2009). Understanding delusions. *Industrial Psychiatry Journal, 18,* 3-18.

Kirkpatrick, B., Fenton, W. S., Carpenter, W. T., & Marder, S. R. (2006). The NIMH-MATRICS consensus statement on negative symptoms. *Schizophrenia Bulletin, 32,* 214-219.

Kitayama, N., Quinn, S., & Bremner, J. D. (2006). Smaller volume of anterior cingulate cortex in abuse-related posttraumatic stress disorder. *Journal of Affective Disorders, 90,* 171-174.

Kocsis, J. H., Gerber, A. J., Milrod, B., Roose, S. P., Barber, J., Thase, M. E., . . . Leon, A. C. (2010). A new scale for assessing the quality of randomized clinical trials of psychotherapy. *Comprehensive Psychiatry, 51,* 319-324.

Kraepelin, E. (1920). Patterns of mental disorder (trans. Marshall H). In: Hirsch SR, Shepard M, (Eds.), *Themes and variations in European psychiatry: An anthology* (pp. 7-30). Bristol: John Wright & Sons Ltd.

Kråkvik, B., Gråwe, R. W., Hagen, R., & Stiles, T. C. (2013). Cognitive behaviour therapy for psychotic symptoms: A randomized controlled effectiveness trial. *Behavioural and Cognitive Psychotherapy, 41,* 511-524.

Kuipers, E., Garety, P., Fowler, D., Dunn, G., Bebbington, P., Freeman, D., & Hadley, C. (1997). London–East Anglia randomised controlled trial of cognitive–behavioural therapy for psychosis: I: Effects of the treatment phase. *The British Journal of Psychiatry, 171,* 319-327.

Laing, R. D. (1967). *Politics of Experience and the Bird of Paradise.* New York, US: Ballantine.

Laing, R. D., & Esterson, A. (1970). *Sanity, madness, and the family: Families of schizophrenics.* London: Penguin Books Ltd.

Landis, J. R., & Koch, G. G. (1977). The measurement of observer agreement for categorical data. B*iometrics*, 159-174.

Lang, F. U., Kösters, M., Lang, S., Becker, T., & Jäger, M. (2013). Psychopathological long-term outcome of schizophrenia–A review. *Acta Psychiatrica Scandinavica*, *127*, 173-182.

Lecomte, T., Leclerc, C., Corbiere, M., Wykes, T., Wallace, C. J., & Spidel, A. (2008). Group Cognitive Behavior Therapy or Social Skills Training for individuals with a recent onset of psychosis? Results of a randomized controlled trial. *The Journal of Nervous and Mental Disease*, *196*, 866-875.

Lecomte, T., Leclerc, C., & Wykes, T. (2012). Group CBT for early psychosis—are there still benefits one year later? *International Journal of Group Psychotherapy*, *62*, 309-321.

Lewis, S., Tarrier, N., Haddock, G., Bentall, R., Kinderman, P., Kingdon, D., ... & Benn, A. (2002). Randomised controlled trial of cognitive-behavioural therapy in early schizophrenia: Acute-phase outcomes. *The British Journal of Psychiatry*, *181*, 91-97.

Liberman, R. P. (1980). A review of Paul and Lentz's psychological treatment for chronic mental patients: Milieu versus social-learning programs. *Journal of Applied Behavior Analysis*, *13*, 367-371.

Liddle, P. F. (1987). The symptoms of chronic schizophrenia. A re-examination of the positive-negative dichotomy. *The British Journal of Psychiatry*, *151*, 145-151.

Lincoln, T. M., Ziegler, M., Mehl, S., Kesting, M. L., Lüllmann, E., Westermann, S., & Rief, W. (2012). Moving from efficacy to effectiveness in cognitive behavioral therapy for psychosis: A randomized clinical practice trial. *Journal of Consulting and Clinical Psychology*, *80*, 674-686.

Linehan, M. M. (1993). *Skills training manual for treating borderline personality disorder*. Guilford Press.

Ludwig, A. M. (1975). The psychiatrist as physician. *The Journal of American Medical Association*, *234*, 603-604.

MacBeth, A., Schwannauer, M., & Gumley, A. (2008). The association between attachment style, social mentalities, and paranoid ideation: An analogue study. *Psychology and Psychotherapy: Theory, Research and Practice*, *81*, 79-93.

McKenna, P., & Kingdon, D. (2014). Has cognitive behavioural therapy for psychosis been oversold? *The BMJ, 348*, g2295.

McLeod, T., Morris, M., Birchwood, M., & Dovey, A. (2007). Cognitive behavioural therapy group work with voice hearers. *British Journal of Nursing*, *16*, 248-252.

Macaskill, P., Walter, S. D., & Irwig, L. (2001). A comparison of methods to detect publication bias in meta-analysis. *Statistics in Medicine*, *20*, 641-654.

Maher, B. A. (1974). Delusional thinking and perceptual disorder. *Journal of Individual Psychology, 30*, 98-113.

Meehl, P. E. (1962). Schizotaxia, schizotypy, schizophrenia. In A.H. Buss, & E.H Buss (Eds.), *Schizophrenia: Seven approaches* (pp. 21-46). New York, US: Routledge.

Mehl, S., Werner, D., & Lincoln, T. M. (2015). Does Cognitive Behavior Therapy for psychosis (CBTp) show a sustainable effect on delusions? A meta-analysis. *Frontiers in Psychology*, *6*, 1450.

Millan, M. J., Fone, K., Steckler, T., & Horan, W. P. (2014). Negative symptoms of schizophrenia: Clinical characteristics, pathophysiological substrates, experimental models and prospects for improved treatment. *European Neuropsychopharmacology, 24*, 645-692.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *Annals of Internal Medicine*, *151*, 264-269.

Montgomery, S. A., Taylor, P., & Montgomery, D. (1978). Development of a schizophrenia scale sensitive to change. *Neuropharmacology*, 1062-1063.

Morrison A. P. (1998). Cognitive Behaviour Therapy for psychotic symptoms in schizophrenia. In N. Tarrier, A. E. Wells, & G. E. Haddock (Eds.), *Treating complex cases: The cognitive behavioural therapy approach* (pp 195-216). Chichester, UK: John Wiley & Sons Ltd.

Morrison, A. P., & Wells, A. (2003). Metacognition across disorders: A comparison of patients with hallucinations, delusions, and panic disorder with non-patients. *Behaviour Research and Therapy, 41*, 251-256.

Morrison, A., Renton, J., Dunn, H., Williams, S., & Bentall, R. (2004). *Cognitive therapy for psychosis: A formulation-based approach*. East Sussex, UK: Routledge.

Morrison, A. P., & Barratt, S. (2009). What are the components of CBT for psychosis? A Delphi study. *Schizophrenia Bulletin, 36*, 136-142.

Morrison, A. P., French, P., Stewart, S. L., Birchwood, M., Fowler, D., Gumley, A. I., ... & Patterson, P. (2012). Early detection and intervention evaluation for people at risk of psychosis: Multisite randomised controlled trial. *The BMJ*, *344*, 1-14.

Morrison, A. P., Shryane, N., Beck, R., Heffernan, S., Law, H., McCusker, M., & Bentall, R. P. (2013). Psychosocial and neuropsychiatric predictors of subjective recovery from psychosis. *Psychiatry Research, 208,* 203-209.

Morrison, A. P., Turkington, D., Pyle, M., Spencer, H., Brabban, A., Dunn, G., . . . Callcott, P. (2014). Cognitive therapy for people with schizophrenia spectrum disorders not

taking antipsychotic drugs: A single-blind randomised controlled trial. *The Lancet, 383*, 1395-1403.

Morrison, A. P. (2017). A manualised treatment protocol to guide delivery of evidence-based cognitive therapy for people with distressing psychosis: learning from clinical trials. *Psychosis*, *9*, 271-281.

Morrison, A. P., Law, H., Carter, L., Sellers, R., Emsley, R., Pyle, M., ... & Holden, N. (2018). Antipsychotic drugs versus cognitive behavioural therapy versus a combination of both in people with psychosis: a randomised controlled pilot and feasibility study. *The Lancet Psychiatry*, *5*, 411-423.

Naeem, F., Saeed, S., Irfan, M., Kiran, T., Mehmood, N., Gul, M., ... & Farooq, S. (2015). Brief culturally adapted CBT for psychosis (CaCBTp): A randomized controlled trial from a low-income country. *Schizophrenia Research*, *164*, 143-148.

Naeem, F., Johal, R., McKenna, C., Rathod, S., Ayub, M., Lecomte, T., ... & Farooq, S. (2016). Cognitive Behavior Therapy for psychosis based Guided Self-help (CBTp-GSH) delivered by frontline mental health professionals: Results of a feasibility study. *Schizophrenia Research*, *173*, 69-74.

Naeem, F., Khoury, B., Munshi, T., Ayub, M., Lecomte, T., Kingdon, D., & Farooq, S. (2016). Brief cognitive behavioral therapy for psychosis (CBTp) for schizophrenia: Literature review and meta-analysis. *International Journal of Cognitive Therapy*, *9*, 73-86.

Narrow, W. E., Clarke, D. E., Kuramoto, S. J., Kraemer, H. C., Kupfer, D. J., Greiner, L., & Regier, D. A. (2013). DSM-5 field trials in the United States and Canada, Part III: Development and reliability testing of a cross-cutting symptom assessment for DSM-5. *American Journal of Psychiatry*, *170*, 71-82.

National Institute for Health and Clinical Excellence. (2014). Psychosis and schizophrenia in adults: Treatment and management. NICE clinical guideline 178.

Neil, S. T., Kilbride, M., Pitt, L., Nothard, S., Welford, M., Sellwood, W., & Morrison, A. P. (2009). The questionnaire about the process of recovery (QPR): A measurement tool developed in collaboration with service users. *Psychosis*, *1*, 145-155.

Nelson, M. D., Saykin, A. J., Flashman, L. A., & Riordan, H. J. (1998). Hippocampal volume reduction in schizophrenia as assessed by magnetic resonance imaging: A meta-analytic study. *Archives of General Psychiatry, 55*, 433-440.

Nemeroff, C. B., Bremner, J. D., Foa, E. B., Mayberg, H. S., North, C. S., & Stein, M. B. (2006). Posttraumatic stress disorder: A state-of-the-science review. *Journal of Psychiatric Research, 40,* 1-21.

Overall, J. E., & Gorham, D. R. (1962). The Brief Psychotic Rating Scale (BPRS). *Psychological Reports, 10,* 799-812.

Palm, U., & Möller, H. J. (2011). Reception of Kraepelin's ideas 1900-1960. *Psychiatry and Clinical Neurosciences, 65*, 318-325.

Pedersen, C. B., & Mortensen, P. B. (2001). Evidence of a dose-response relationship between urbanicity during upbringing and schizophrenia risk. *Archives of General Psychiatry, 58,* 1039-1046.

Peters, E., Joseph, S., Day, S., & Garety, P. (2004). Measuring delusional ideation: The 21-item Peters et al. Delusions Inventory (PDI). *Schizophrenia Bulletin, 30,* 1005-1022.

Peters, E., Landau, S., McCrone, P., Cooke, M., Fisher, P., Steel, C., ... & Howard, A. (2010). A randomised controlled trial of cognitive behaviour therapy for psychosis in a routine clinical service. *Acta Psychiatrica Scandinavica, 122*, 302-318.

Pickering, L., Simpson, J., & Bentall, R. P. (2008). Insecure attachment predicts proneness to paranoia but not hallucinations. *Personality and Individual Differences, 44*, 1212-1224.

Pinninti, N. R., Rissmiller, D. J., & Steer, R. A. (2010). Cognitive-behavioral therapy as an adjunct to second-generation antipsychotics in the treatment of schizophrenia. *Psychiatric Services*, *61*, 940-943.

Pot-Kolder, R. M., Geraets, C. N., Veling, W., van Beilen, M., Staring, A. B., Gijsman, H. J., ... & van der Gaag, M. (2018). Virtual-reality-based cognitive behavioural therapy versus waiting list control for paranoid ideation and social avoidance in patients with psychotic disorders: A single-blind randomised controlled trial. *The Lancet Psychiatry*, *5*, 217-226.

Rathod, S., Phiri, P., Harris, S., Underwood, C., Thagadur, M., Padmanabi, U., & Kingdon, D. (2013). Cognitive behaviour therapy for psychosis can be adapted for minority ethnic groups: A randomised controlled trial. *Schizophrenia Research*, *143*, 319-326.

Read, J. (1997). Child abuse and psychosis: A literature review and implications for professional practice. *Professional Psychology: Research and Practice*, *28*, 448-456.

Read, J., Perry, B. D., Moskowitz, A., & Connolly, J. (2001). The contribution of early traumatic events to schizophrenia in some patients: A traumagenic neurodevelopmental model. *Psychiatry: Interpersonal and Biological Processes*, *64*, 319-345.

Read, J. (2013a). Does 'schizophrenia' exist? Reliability and validity. In J. Read, & J. Dillon (Eds.), *Models of madness: Psychological, social and biological approaches to psychosis* (pp. 47–61). Hove, UK: Routledge.

Read, J. (2013b). Biological psychiatry's lost cause: The 'schizophrenia' brain. In J. Read, & J. Dillon (Eds.), *Models of madness: Psychological, social and biological approaches to psychosis* (pp. 62–71). Hove, UK: Routledge.

Rector, N. A., Seeman, M. V., & Segal, Z. V. (2003). Cognitive therapy for schizophrenia: A preliminary randomized controlled trial. *Schizophrenia Research, 63*, 1-11.

Regier, D. A., Narrow, W. E., Clarke, D. E., Kraemer, H. C., Kuramoto, S. J., Kuhl, E. A., & Kupfer, D. J. (2013). DSM-5 field trials in the United States and Canada, Part II: Test-retest reliability of selected categorical diagnoses. *The American Journal of Psychiatry, 170,* 59-70.

Reveley, M. A. (1985). Ventricular enlargement in schizophrenia. The validity of computerised tomographic findings. *The British Journal of Psychiatry, 147,* 233-240.

Review Manager (RevMan) [Computer program]. (2014) Version 5.3. Copenhagen: The Nordic Cochrane Centre, The Cochrane Collaboration.

Robbins, L. N., Locke, B. Z., & Regier, D. A. (1991). An overview of psychiatric disorders in America. In L. N. Robbins & D. A. Reiger (Eds.), *Psychiatric disorders in America: The Epidemiologic Catchment Area Study* (328-366). New York, NY: The Free Press.

Royal College of Psychiatrists. (2017). Factsheet, schizophrenia: Information for parents, carers and anyone who works with young people. Retrieved from: http://www.rcpsych.ac.uk/healthadvice/parentsandyouthinfo/parentscarers/schizophrenia.aspx

Ruggeri, M., Bonetto, C., Lasalvia, A., Fioritti, A., De Girolamo, G., Santonastaso, P., ... & Miceli, M. (2015). Feasibility and effectiveness of a multi-element psychosocial intervention for first-episode psychosis: Results from the cluster-randomized controlled GET UP PIANO trial in a catchment area of 10 million inhabitants. *Schizophrenia Bulletin*, *41*, 1192-1203.

Ruse, M. (1988). *Homosexuality: A philosophical inquiry:* Oxford: Basil Blackwell.

Salzberg, S. (1995). Loving-Kindness: The revolutionary art of happiness. Boston, MA: Shamhala.

Sayers, S. L., Curran, P. J., & Mueser, K. T. (1996). Factor structure and construct validity of the Scale for the Assessment of Negative Symptoms. *Psychological Assessment, 8,* 269-280.

Schulz, K. F., Chalmers, I., Hayes, R. J., & Altman, D. G. (1995). Empirical evidence of bias: Dimensions of methodological quality associated with estimates of treatment effects in controlled trials. *The Journal of the American Medical Association, 273,* 408-412.

Scull, A. (2011). Contested jurisdictions: Psychiatry, psychoanalysis, and clinical psychology in the United States, 1940–2010. *Medical History, 55,* 401-406.

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

Serretti, A., Lattuada, E., Catalano, M., & Smeraldi, E. (1999). Serotonin transporter gene not associated with psychotic symptomatology of mood disorders. *Psychiatry Research, 86,* 59-65.

Shevlin, M., McElroy, E., Bentall, R. P., Reininghaus, U., & Murphy, J. (2016). The psychosis continuum: Testing a bifactor model of psychosis in a general population sample. *Schizophrenia Bulletin, 43,* 133-141.

Sibbald, B., & Roberts, C. (1998). Understanding controlled trials crossover trials. *The BMJ, 316,* 1719-1720.

Simmonds, M. (2015). Quantifying the risk of error when interpreting funnel plots. *Systematic Reviews, 4,* 24.

Sitko, K., Bentall, R. P., Shevlin, M., & Sellwood, W. (2014). Associations between specific psychotic symptoms and specific childhood adversities are mediated by

attachment styles: An analysis of the National Comorbidity Survey. *Psychiatry Research*, *217*, 202-209.

Smith, D. A., Mar, C. M., & Turoff, B. K. (1998). The structure of schizophrenic symptoms: A meta-analytic confirmatory factor analysis. *Schizophrenia Research, 31*, 57-70.

Spitzer, R. L., & Fleiss, J. L. (1974). A re-analysis of the reliability of psychiatric diagnosis. *The British Journal of Psychiatry, 125*, 341-347.

Stanghellini, G., & Fuchs, T. (2013). *One century of Karl Jaspers' general psychopathology*. Oxford: University Press.

Staring, A. B., ter Huurne, M. A. B., & van der Gaag, M. (2013). Cognitive behavioral therapy for negative symptoms (CBT-n) in psychotic disorders: A pilot study. *Journal of Behavior Therapy and Experimental Psychiatry, 44*, 300-306.

Startup, M., Jackson, M. C., & Bendix, S. (2004). North Wales randomized controlled trial of cognitive behaviour therapy for acute schizophrenia spectrum disorders: Outcomes at 6 and 12 months. *Psychological Medicine, 34*, 413-422.

Steel, C., Garety, P. A., Freeman, D., Craig, E., Kuipers, E., Bebbington, P., ... & Dunn, G. (2007). The multidimensional measurement of the positive symptoms of psychosis. *International Journal of Methods in Psychiatric Research*, *16*, 88-96.

Surís, A., Holliday, R., & North, C. (2016). The evolution of the classification of psychiatric disorders. *Behavioral Sciences*, *6*, 5.

Szasz, T. S. (1960). The myth of mental illness. *American Psychologist, 15*, 113-118.

Tai, S., & Turkington, D. (2009). The evolution of cognitive behavior therapy for schizophrenia: Current practice and recent developments. *Schizophrenia Bulletin, 35*, 865-873.

Tandon, R., Nasrallah, H. A., & Keshavan, M. S. (2009). Schizophrenia, “just the facts” 4. Clinical features and conceptualization. *Schizophrenia Research, 110*, 1-23.

Tandon, R., Gaebel, W., Barch, D. M., Bustillo, J., Gur, R. E., Heckers, S., . . . Carpenter, W. (2013). Definition and description of schizophrenia in the DSM-5. *Schizophrenia Research, 150*, 3-10.

Tarrier, N., Yusupoff, L., Kinney, C., McCarthy, E., Gledhill, A., Haddock, G., & Morris, J. (1998). Randomised controlled trial of intensive cognitive behaviour therapy for patients with chronic schizophrenia. *The BMJ, 317*, 303-307.

Tarrier, N., Witttkowskj, A., Kinney, C., McCarthy, E., Morris, J., & Humphreys, L. (1999). Durability of the effects of cognitive–behavioural therapy in the treatment of chronic schizophrenia: 12-month follow-up. *The British Journal of Psychiatry*, *174*, 500-504.

Teicher, M. H., Tomoda, A., & Andersen, S. L. (2006). Neurobiological consequences of early stress and childhood maltreatment: Are results from human and animal studies comparable? *Annals of the New York Academy of Sciences, 1071*, 313-323.

The Royal College of Psychiatrists. (2018). National Clinical Audit of Psychosis – National Report for the Core Audit 2018. London: Healthcare Quality Improvement Partnership.

Tienari, P., Sorri, A., Lahti, I., Naarala, M., Wahlberg, K., Rönkkö, T., . . . Moring, J. (1985). The Finnish adoptive family study of schizophrenia. *The Yale Journal of Biology and Medicine, 58*, 227-237.

Tonarelli, S. B., Pasillas, R., Alvarado, L., Dwivedi, A., & Cancellare, A. (2016). Acceptance and commitment therapy compared to treatment as usual in psychosis: A systematic review and meta-analysis. *Journal of Psychiatry, 19*, 366-370.

Trower, P., Birchwood, M., Meaden, A., Byrne, S., Nelson, A., & Ross, K. (2004). Cognitive therapy for command hallucinations: Randomised controlled trial. *The British Journal of Psychiatry*, *184*, 312-320.

Turner, J. R. (2013). Parallel group design. *Encyclopedia of Behavioral Medicine*, 1436-1436.

Turner, D. T., van der Gaag, M., Karyotaki, E., & Cuijpers, P. (2014). Psychological interventions for psychosis: A meta-analysis of comparative outcome studies. *American Journal of Psychiatry*, *171*, 523-538.

van der Gaag, M., Stant, A. D., Wolters, K. J., Buskens, E., & Wiersma, D. (2011). Cognitive–behavioural therapy for persistent and recurrent psychosis in people with schizophrenia-spectrum disorder: Cost-effectiveness analysis. *The British Journal of Psychiatry*, *198*, 59-65.

van der Gaag, M., Nieman, D. H., Rietdijk, J., Dragt, S., Ising, H. K., Klaassen, R. M., ... & Linszen, D. H. (2012). Cognitive behavioral therapy for subjects at ultrahigh risk for developing psychosis: A randomized controlled clinical trial. *Schizophrenia Bulletin*, *38*, 1180-1188.

van der Gaag, M., Valmaggia, L. R., & Smit, F. (2014). The effects of individually tailored formulation-based cognitive behavioural therapy in auditory hallucinations and delusions: A meta-analysis. *Schizophrenia Research*, *156*, 30-37.

van der Valk, R., van de Waerdt, S., Meijer, C. J., van den Hout, I., & de Haan, L. (2013). Feasibility of mindfulness-based therapy in patients recovering from a first psychotic episode: A pilot study. *Early Intervention in Psychiatry*, *7*, 64-70.

van Os, J., Verdoux, H., Maurice-Tison, S., Gay, B., Liraud, F., Salamon, R., & Bourgeois, M. (1999). Self-reported psychosis-like symptoms and the continuum of psychosis. *Social Psychiatry and Psychiatric Epidemiology*, *34*, 459-463.

van Os, J., & Kapur, S. (2009). Schizophrenia. *The Lancet*, *374*, 635-645.

van Os, J., Linscott, R. J., Myin-Germeys, I., Delespaul, P., & Krabbendam, L. (2009). A systematic review and meta-analysis of the psychosis continuum: Evidence for a

psychosis proneness–persistence–impairment model of psychotic disorder. *Psychological Medicine*, *39*, 179-195.

Varese, F., Smeets, F., Drukker, M., Lieverse, R., Lataster, T., Viechtbauer, W., . . . Bentall, R. P. (2012). Childhood adversities increase the risk of psychosis: A meta-analysis of patient-control, prospective-and cross-sectional cohort studies. *Schizophrenia Bulletin*, *38*, 661-671.

Vassos, E., Pedersen, C. B., Murray, R. M., Collier, D. A., & Lewis, C. M. (2012). Meta-analysis of the association of urbanicity with schizophrenia. *Schizophrenia Bulletin*, *38*, 1118-1123.

Velligan, D. I. (2009). Cognitive behavior therapy for psychosis: Where have we been and where are we going? *Schizophrenia Bulletin*, *35*, 857-858.

Velligan, D. I., Roberts, D., Mintz, J., Maples, N., Li, X., Medellin, E., & Brown, M. (2015). A randomized pilot study of MOtiVation and Enhancement (MOVE) Training for negative symptoms in schizophrenia. *Schizophrenia Research*, *165*, 175-180.

Velthorst, E., Koeter, M., Van Der Gaag, M., Nieman, D. H., Fett, A. K., Smit, F., ... & De Haan, L. (2015). Adapted cognitive–behavioural therapy required for targeting negative symptoms in schizophrenia: Meta-analysis and meta-regression. *Psychological Medicine*, *45*, 453-465.

Waller, H., Emsley, R., Freeman, D., Bebbington, P., Dunn, G., Fowler, D., ... & Garety, P. (2015). Thinking Well: A randomised controlled feasibility study of a new CBT therapy targeting reasoning biases in people with distressing persecutory delusional beliefs. *Journal of Behavior Therapy and Experimental Psychiatry*, *48*, 82-89.

Wampold, B. E., & Budge, S. L. (2012). The 2011 Leona Tyler Award Address: The relationship—And its relationship to the common and specific factors of psychotherapy. *The Counseling Psychologist*, *40*, 601-623.

Ward, K. E., Friedman, L., Wise, A., & Schulz, S. C. (1996). Meta-analysis of brain and cranial size in schizophrenia. *Schizophrenia Research, 22*, 197-213.

Wells, A. (1999). A metacognitive model and therapy for generalized anxiety disorder. *Clinical Psychology and Psychotherapy: An International Journal of Theory and Practice*, *6*, 86-95.

White, R., Gumley, A., McTaggart, J., Rattrie, L., McConville, D., Cleare, S., & Mitchell, G. (2011). A feasibility study of Acceptance and Commitment Therapy for emotional dysfunction following psychosis. *Behaviour Research and Therapy, 49*, 901-907.

Witt, K., de Moraes, D. P., Salisbury, T. T., Arensman, E., Gunnell, D., Hazell, P., ... & Hawton, K. (2018). Treatment as usual (TAU) as a control condition in trials of cognitive behavioural-based psychotherapy for self-harm: Impact of content and quality on outcomes in a systematic review. *Journal of Affective Disorders*, *235*, 434-447.

World Health Organization, (1973). Report of the international pilot study of schizophrenia.

Worthington, A., Rooney, P., & Hannan, R. (2013). The Triangle of Care (2nd ed.). London: UK. Carers Trust.

Wykes, T., Steel, C., Everitt, B., & Tarrier, N. (2008). Cognitive behavior therapy for schizophrenia: Effect sizes, clinical models, and methodological rigor. *Schizophrenia Bulletin, 34*, 523-537.

Yung, A. R., Yuen, H. P., McGorry, P. D., Phillips, L. J., Kelly, D., Dell'Olio, M., ... & Godfrey, K. (2005). Mapping the onset of psychosis: the comprehensive assessment of at-risk mental states. *Australian and New Zealand Journal of Psychiatry*, *39*, 964-971.

Zilbergeld, B. (1983). *The shrinking of America: Myths of psychological change*: Little, Brown.

List of Abbreviations

ACT – Acceptance and commitment therapy

APA- American Psychiatric Association

ARMS – At-Risk-Mental-State

CBTp – Cognitive Behavioural Therapy for Psychosis

CT – Cognitive therapy

DBT - Dialectical Behaviour Therapy

DSM – Diagnostic and Statistical Manual

ICD - International Classification of Diseases

MBCT – Mindfulness based cognitive therapy

MBT – Mindfulness based therapy

MCT – Meta-cognitive therapy

NICE - National Institute for Care and Health Excellence

PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses

RCT – Randomised controlled trial

TAU – Treatment as usual

VR – Virtual reality

WHO – World Health Organisation

Appendix A

A.1 The inclusion and exclusion criteria used during the screening process.

Inclusion Criteria	
Types of studies	Parallel group RCTs.
	Single-blind trials.
	Open trials.
Types of participants	Experiencing positive and/or negative symptoms including ARMS participants.
	Participants experiencing all types of delusional beliefs, hallucinations, and negative symptoms.
	Participants from all types of mental health settings.
Types of interventions	The intervention group receiving group or individual CBTp or CT.
	CBTp targeting positive and/or negative symptoms.
	CBTp being the predominant intervention in cases where additional therapeutic elements are used.
	The control group receiving a TAU intervention.
Types of outcome measures	End of treatment positive and/or negative symptoms.
	Researcher-rated outcomes.
Exclusion Criteria	
Types of studies	Non English language.
	Cross-over trials.
	Unpublished studies.
Types of participants	Studies including only children (age < 18).
	Comorbid difficulties e.g. violent behaviour, cognitive impairment, substance use.
Types of interventions	CBTp used as part of an integrative approach.
	Comparison trials where CBTp is compared with another intervention not considered TAU.
Types of outcome measures	Self-reported outcomes.

Note: ARMS: At-Risk-Mental-State; CBTp – Cognitive Behaviour Therapy for Psychosis; CT – cognitive therapy; TAU – treatment as usual; RCT – randomised controlled trial

Appendix B

B.1 Cochrane Risk of Bias ratings

Author, Year	RSG	AC	BoPaP	BoOA	IOD	SR	OB
Tarrier 1998	unclear	unclear	high	low	low	unclear	low
Lewis 2002	low	unclear	high	low	unclear	unclear	low
Rector 2003	unclear	unclear	high	low	low	unclear	low
Durham 2003	unclear	unclear	high	low	low	unclear	unclear
Jolley 2003	unclear	unclear	high	high	unclear	unclear	unclear
Trower 2004	low	low	low	low	unclear	high	low
Startup 2004	low	unclear	high	high	unclear	unclear	unclear
Barrowclough 2006	low	unclear	high	low	unclear	unclear	low
McLeod 2007	unclear	unclear	high	unclear	unclear	unclear	unclear
Lecomte 2008	unclear	unclear	high	low	unclear	high	unclear
Garety 2008 no carer	unclear	low	high	low	low	low	unclear
Garety 2008 carer	unclear	low	high	low	low	low	unclear
Pinninti 2010	low	unclear	high	low	unclear	unclear	unclear
van Der Gaag 2011	unclear	unclear	high	unclear	low	low	unclear
Lincoln 2012	low	low	high	low	low	unclear	low
Morrison 2012	low	low	high	low	low	unclear	unclear
van der Gaag 2012	low	low	high	low	low	low	unclear
Rathod 2013	unclear	unclear	high	low	low	low	unclear
Krakvik 2013	unclear	unclear	high	high	low	low	unclear
Morrison 2014	low	low	high	low	unclear	low	unclear
Birchwood 2014	low	low	high	low	low	low	low
Naeem 2015	low	low	high	low	unclear	unclear	unclear
Ruggeri 2015	unclear	unclear	high	high	low	low	unclear
Velligan 2015	unclear	unclear	high	low	unclear	high	low
Naeem 2016	low	low	high	low	low	unclear	unclear
Guo 2017	low	low	high	low	unclear	high	low
Gottileb 2017	unclear	unclear	high	low	unclear	unclear	unclear
Morrison 2018	low	low	high	low	unclear	low	unclear
Pot-Kolder 2018	low	low	high	low	low	low	low

Note: RSG: random sequence generation; AC: allocation concealment; BoPaP: blinding of participant and personnel; BoOA: blinding of outcome assessment IOD: incomplete outcome data; SR: selective reporting; OB: other bias.

Appendix C

C.1 RCT-Psychotherapy Quality Rating Scale ratings

Author, Year	Question																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Tarrier 1998	1	0	0	2	1	1	1	0	2	2	2	1	0	0	2	1	1	2	0	2	2	1	0	2	3.86
Lewis 2002	2	0	0	2	2	2	1	0	0	2	2	2	0	0	2	1	2	2	0	1	2	1	0	2	4.04
Rector 2003	2	1	0	1	2	0	2	0	2	2	2	2	0	1	0	1	2	0	1	2	2	1	0	2	4.12
Durham 2003	2	0	0	2	2	1	1	0	2	2	2	1	0	1	0	1	2	0	1	2	2	1	0	2	4.01
Jolley 2003	2	0	0	2	2	0	2	1	1	2	2	0	0	0	0	2	1	0	0	2	2	1	0	1	3.36
Trower 2004	2	0	0	2	2	2	1	0	1	2	2	1	1	1	2	2	2	1	0	2	2	2	0	2	4.67
Startup 2004	2	0	0	2	1	2	2	1	2	2	2	0	0	1	2	2	2	2	0	2	2	2	0	2	4.78
Barrowclough 2006	1	0	0	2	2	1	1	1	0	2	2	2	0	1	2	0	2	2	0	2	2	1	0	2	4.09
McLeod 2007	0	0	0	0	1	0	0	0	0	2	2	0	0	0	0	2	2	0	0	2	2	1	0	1	2.31
Lecomte 2008	2	2	0	0	1	2	0	0	1	2	2	2	0	1	2	1	2	2	2	2	2	1	0	2	4.47
Garety 2008 no carer	2	0	0	2	2	2	2	0	0	2	2	2	2	1	2	1	1	2	0	2	2	1	0	2	4.59
Garety 2008 carer	2	0	0	2	2	2	2	0	0	2	2	2	2	1	2	1	1	2	0	2	2	1	0	2	4.59
Pinninti 2010	2	1	2	2	1	0	1	0	1	2	2	1	1	1	2	1	1	0	0	1	2	1	0	1	3.72
van Der Gaag 2011	2	0	0	2	2	2	1	1	0	2	2	0	0	0	2	2	2	2	1	2	2	1	0	2	4.36
Lincoln 2012	2	1	1	2	2	0	1	1	1	2	2	2	2	1	2	2	2	2	0	2	2	2	0	2	5.19
Morrison 2012	2	2	1	2	2	2	2	1	2	2	2	2	0	2	2	1	2	2	1	2	2	2	0	2	5.69
van der Gaag 2012	2	2	1	2	2	0	2	1	2	2	2	2	0	1	2	1	2	1	0	2	2	2	0	2	5.10
Rathod 2013	2	0	0	0	1	0	1	1	1	2	2	2	1	1	2	2	0	2	0	2	2	1	0	2	3.95
Krakvik 2013	2	0	0	2	2	0	1	2	0	2	2	0	0	1	2	2	2	0	0	2	2	1	0	2	4.01
Morrison 2014	2	1	0	2	2	1	2	1	1	2	2	1	2	1	2	1	2	2	0	2	2	1	0	2	4.85
Birchwood 2014	2	0	0	2	2	1	2	2	2	2	2	1	2	1	2	2	2	2	1	2	2	2	0	2	5.37
Naeem 2015	2	0	0	2	2	0	2	2	0	2	2	2	0	0	2	1	1	2	0	2	2	1	0	1	3.95
Ruggeri 2015	2	0	0	1	1	0	1	1	2	2	2	0	1	0	2	2	2	1	0	2	2	1	0	2	3.98
Velligan 2015	2	1	0	2	2	0	0	1	1	2	2	1	0	0	0	2	2	0	0	2	2	1	0	2	3.80
Naeem 2016	2	0	0	2	2	0	0	1	0	2	2	1	0	0	2	2	2	0	0	2	2	2	0	2	3.97
Guo 2017	2	0	0	2	2	0	1	2	2	2	2	2	0	1	2	2	2	2	0	2	2	2	0	2	4.90
Gottileb 2017	2	1	0	0	1	2	*	*	0	2	2	1	0	1	0	1	2	0	*	2	2	1	*	2	4.30
Morrison 2018	2	0	0	2	2	0	1	1	0	2	2	2	2	1	2	1	2	2	0	2	2	1	0	2	4.47
Pot-Kolder 2018	2	0	0	2	2	1	1	1	1	2	2	1	0	1	2	2	2	1	0	2	2	2	0	2	4.55

Note: *: unable to rate due to the nature of the study