An Experimental Manipulation of Thought-Action Fusion in Children:

Investigating Obsessive Compulsive Features.

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Abstract

Introduction:

Thought-Action Fusion (TAF) is a cognitive distortion associated with Obsessive Compulsive Disorder (OCD). With limited experimental research, the role of TAF in the development of OCD is unclear. This study aimed to refine an experimental paradigm for manipulating TAF in children (Sillence, 2010), in order to investigate its causal role in OCD-type symptoms.

Method:

One-hundred 9-11 year olds were recruited from primary schools and randomly assigned to a control or experimental condition. Baseline measures of TAF, magical thinking, responsibility and anxiety were completed. Children were asked to wear a helmet and attempt to turn computer-screen images red using their thoughts. Children in the experimental group were shown images that turned redder while those in the control group were shown images that were unchanged. Children were then warned that 'strong thoughts' could damage the computer. They were told a button could be pressed to prevent their thoughts from doing damage. The effects on levels of neutralising behaviour, anxiety, responsibility, probability of harm and thought control, were examined.

Results:

The manipulation was successful. However, no significant group differences on the dependent variables were seen. Baseline TAF was correlated with probability of harm and anxiety, while induced-TAF was correlated with responsibility for harm. Responsibility beliefs appeared relevant with significant correlations noted with anxiety and thought control. For both groups, anxiety decreased following opportunity to neutralise or control thoughts. The results replicate some of the findings seen within the literature. The role of TAF in causing thought control (Sillence, 2010) was not replicated, although thought control was seen in both groups.

Conclusions:

The results add support to the relevance of TAF in childhood OCD but do not corroborate a causal role. Thought control and responsibility beliefs appear highly relevant and worthy of further research. Methodological limitations are acknowledged and modifications suggested.

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Chapter 1

Introduction

1.1 Aims of the Investigation

Childhood Obsessive Compulsive Disorder (OCD) is an anxiety disorder characterised by unwanted intrusive thoughts and compensatory compulsions. The phenomenology varies hugely, from a fear of contamination, to thoughts of violent acts which are alien to the individual. Common compulsions include washing, checking and counting, but can include complex rituals which have to be perfected. The disorder can cause distress to the child and their family, while interfering with a critical phase of social and personal development (Hanna, 1995; Piacentini, Bergman, Keller, & McCracken, 2003). The onset of OCD during childhood is associated with increased symptom severity and poorer treatment outcomes (Rosario-Campos et al., 2005). With 50% of OCD sufferers experiencing the onset of symptoms by the age of 15 (Rapoport, 1986), understanding the development and maintenance of this debilitating disorder in childhood is crucial.

Behavioural models of OCD have led to the development of Exposure and Response Prevention (ERP) as a treatment for OCD. With large drop-out rates, residual symptoms and poorer outcomes for those with co-morbidities or mental rituals (Abramowitz, Whiteside, & Deacon, 2005; Foa et al., 1983; Greist, 1990), the understanding and treatment of childhood OCD has considerable scope for improvement.

Cognitive models of OCD have proposed that a number of cognitive vulnerabilities and distortions are involved in OCD. A number of models have been advanced, including Rachman's misinterpretation of significance model (Rachman, 1997, 1998; Rachman & Shafran, 1999), Salkovskis' model of inflated responsibility (Salkovskis, 1985), and Well's meta-cognitive model (Wells, 1997; Wells & Matthews, 1994). Salkovskis' model in particular has received a large amount of research attention (Bouchard, Rhéaume, & Ladouceur, 1999; Rhéaume, Freeston, Dugas, Letarte, & Ladouceur, 1995; Salkovskis et al., 2000). It has been used to inform cognitive treatments of OCD in which specific faulty beliefs are challenged

(Salkovskis, 1998). Cognitive Behaviour Therapy (CBT) has emerged as a widely used treatment for OCD (March & Mulle, 1998; National Institute of Health and Clinical Excellence, 2005). However, outcome research has yet to prove its effectiveness above and beyond behavioural approaches (Pediatric OCD Treatment Study Team, 2004).

Present in some form within each of the cognitive models is the distortion of Thought-Action Fusion (TAF) (Shafran, Teachman, Kerry, & Rachman, 1999). This has received limited research attention, particularly in relation to young people. Magical thinking, a developmental feature of childhood, has been highlighted for its parallels to OCD-type thinking and TAF in particular (Bolton, Dearsley, Madronal-Luque, & Baron-Cohen, 2002). Given the high rate of OCD onset in early adolescence, the time at which magical thinking is thought to decline, this distortion could be important and is worthy of further research. The proposed study will use an experimental method of investigation.

Experimental methods are necessary to investigate causal relationships and can be used for understanding clinical phenomena. Sillence (2010) devised a successful experimental paradigm for investigating the role of TAF in the development of OCD-like behaviours.

The primary aim of this investigation is to modify and extend Sillence's TAF paradigm in order to further our understanding of the role of TAF in the development of OCD among young people.

1.2 Chapter Overview

This chapter presents background information and literature on OCD relevant to the current study. It begins with an outline of the phenomenology and epidemiology of OCD in childhood. Treatments, including drug, behaviour and cognitive treatments are outlined. The evidence for each is considered. Biological and psychological models are explained with a particular focus on cognitive theories. TAF, and its possible role within three models of OCD are detailed. Literature concerning the presence and role of TAF in OCD among adults is outlined, along with methodological evaluations. A systematic literature review of research on TAF amongst children and its relationship to OCD is then included. Finally, an experimental

paradigm for the manipulation of TAF among children is outlined and evaluated, culminating in the rationale for the current study. The chapter ends with the research questions to be investigated and the researcher's hypotheses.

1.3 Obsessive Compulsive Disorder in Children

1.3.1 Diagnostic criteria.

According to the Diagnostic and Statistical Manual of Mental Disorders Forth Edition: DSM-IV (American Psychiatric Association, 1994), OCD is an Axis I clinical anxiety disorder. It is characterised by the presence of obsessions and/or compulsions, which cause distress and/or interfere with daily, occupational or social functioning. Obsessions are recurrent intrusive thoughts, impulses or images that are unwanted and distressing to the individual. Efforts to suppress or neutralise these intrusions are often evident. Compulsions are physical or mental behaviours that are performed in response to the obsession in order to reduce feelings of distress or to prevent a feared event. These may be overt repetitive behaviours such as hand washing or checking, or covert acts such as counting or repeating words silently.

1.3.2 Phenomenology.

Individual presentations of OCD vary considerably but common themes have been identified. Common obsessions include: a fear of dirt and contamination, fear of harm to self or others, scrupulous religious concern, symmetry and/or exactness, aggressive or sexual urges. Common compulsions include washing, repeating, checking, ordering, touching, hoarding, counting, praying and countering thoughts. Particularly for children with OCD, the content of obsessions and compulsions can change over time (Flament et al., 1988; Hanna, 1995). They are likely to experience multiple obsessive-compulsive features simultaneously (Walitza et al., 2011). Comparisons of phenomenology between children and adults suggest similar presentations (Delorme et al., 2006; Flament & Cohen, 2002; Mancebo et al., 2008), although others have identified particular differences associated with juvenile-onset of OCD (see section 1.3.3.2).

1.3.3 Epidemiology.

1.3.3.1 Prevalence.

An early study of 5,596 American adolescents found a point prevalence of between 0.5 and 1.5% and a lifetime prevalence of between 1.2 and 2.6% (Flament, et al., 1988). Further studies report prevalence rates of between 2.2% and 4% (Douglass, Moffitt, Dar, McGee, & de Silva, 1995; Rady, Salama, Hamza, & Ketat, 2011; Rapoport et al., 2000; Valleni-Basile et al., 1994; Zohar et al., 1992) and lifetime prevalence rates of between 1.9 and 2.3% (Apter et al., 1996; Reinherz, Giaconia, Lefkowitz, Pakiz, & Frost, 1993; Whitaker et al., 1990). A nationwide epidemiological study based on a sample of over 10,000 children and adolescents reported a much lower prevalence rate of just 0.25% (Heyman et al., 2001). The authors suggest this lower rate was due to the more restricted age band of up to 15.

A surprisingly high rate of 'subclinical OCD' was identified by Valleni-Basile and colleagues (1994) with a prevalence of 19% and a one-year incidence rate of 8.4% (Valleni-Basile et al., 1996). This highlights the common occurrence of obsessive compulsive behaviours in the 'non-clinical' population.

In considering the impact of gender on prevalence rates, there is some discrepancy across studies with no clear difference emerging. Hanna (1995), Delorme and colleagues (2005) and Masi and colleagues (2010) reported a higher male to female ratio while others reported an equal prevalence (Valleni-Basile, et al., 1994; Zohar, et al., 1992). Interestingly, in one study, females were found to report more compulsions, while males reported more obsessions (Valleni-Basile, et al., 1994).

1.3.3.2 Age of onset.

Rapoport suggested that 50% of those with OCD have experienced onset by the age of 15 (Rapoport, 1986). The mean age of onset of OCD in children and adolescents ranges from 9 to 13 years (Flament, et al., 1988; Honjo et al., 1989; Rapoport, et al., 2000; Riddle et al., 1990; Toro, Cervera, Osejo, & Salamero, 1992). There is evidence of a bimodal incidence pattern with

the first peak of onset occurring around the age of 11 and a further peak occurring in the early twenties (Delorme, et al., 2005). This has given rise to debate concerning a juvenile-onset sub-type of OCD, with a specific clinical pattern reported. Numerous studies have cited differences to that seen within the adult-onset population including a higher rate of compulsion-only presentations, aggressive obsessions, hoarding and atypical tic-like compulsions (Eichstedt & Arnold, 2001; Geller et al., 1998; Swedo, Rapoport, Leonard, Lenane, & Cheslow, 1989). There is evidence that juvenile-onset OCD is associated with familial cases of OCD (Chabane et al., 2005; Nestadt et al., 2000; Pauls, Alsobrook, Goodman, Rasmussen, & Leckman, 1995), a higher male prevalence rate (Hanna, 1995; Mancebo, et al., 2008; Swedo, Rapoport, Leonard, et al., 1989) and psychiatric co-morbidity (Chabane, et al., 2005; Geller, et al., 1998; Mancebo, et al., 2008; Masi, et al., 2010; Toro, et al., 1992). Early onset of OCD has been found to have a poorer prognosis with higher symptom severity, a broader range of obsessions and compulsions and reduced treatment outcomes (Rosario-Campos et al., 2001; Sobin, Blundell, & Karayiorgou, 2000).

1.3.3.3 Course and prognosis.

OCD is a chronic and debilitating disorder that can interfere with personal, social and educational development as well as with functioning at home and school (American Psychiatric Association, 1994; Flament, et al., 1988; Hanna, 1995; Hollingsworth, Tanguay, Grossman, & Pabst, 1980; March & Mulle, 1998; Piacentini, et al., 2003). Without treatment the course is usually deteriorating (Turner & Beidel, 1988). In a large scale meta-analysis of studies investigating long term outcomes of child-onset OCD, Stewart and colleagues (2004) found persistence rates of 41% for full OCD, and 60% when including sub-threshold OCD, suggesting a persistent course for a majority of young people with OCD.

Although often considered unremitting, the course of OCD symptoms has been found to fluctuate with periods of improvement and relapse (Gojer, Khannu, & Channabasavanna, 1987). Mancebo and colleagues (2008) found that 28% of juvenile participants described a 'waxing and waning' pattern to their symptoms with periods of partial remission.

The prognosis for those experiencing OCD during childhood is uncertain. Stewart and colleagues' meta-analysis (2004) noted a full remission rate of 40%. However, an investigation by Wewetzer and colleagues (2001), found that although just 36% still had a diagnosis of OCD, 71% had a diagnosis of some psychiatric disorder. Furthermore, of those with OCD, 70% had an additional diagnosis including anxiety and affective disorders. This suggests a vulnerability to ongoing psychopathology. Thomsen (1994) categorised adults, followed up 15 years after seeking help for childhood OCD, into four categories of approximately equal size: no later OCD, subclinical OCD, episodic course of OCD and chronic course of OCD.

A number of factors predict poorer outcomes from treatment including earlier age of onset (Rosario-Campos, et al., 2001; Stewart, et al., 2004), in-patient treatment (Stewart, et al., 2004), ending treatment against advice (Wewetzer, et al., 2001), childhood tics (Leonard et al., 1993; Wewetzer, et al., 2001), parental axis-I diagnosis, more severe OCD (Leonard, et al., 1993) and co-morbid ADHD (Walitza et al., 2008).

1.3.3.4 Co-morbidity.

There is a large amount of evidence to suggest that OCD increases the risk of other psychopathology. In Flament and colleagues' (1988) study, 50% had at least one other current diagnosis with major depression and anxiety being among the most frequent (Honjo, et al., 1989; Rady, et al., 2011; Rapoport, 1986; Riddle, et al., 1990; Valleni-Basile, et al., 1994). Hanna (1995) reported that over 80% of clinically referred children with OCD had other lifetime diagnoses, a factor found to be related to more intense obsessive compulsive symptoms (Jans et al., 2007). There is also evidence of an increased risk of attention deficit hyperactivity disorders and eating disorders (Geller, et al., 1998; Jans, et al., 2007; Rapoport, 1986). Those with early onset OCD are at increased risk for tics or tic disorders (Delorme, et al., 2005; Masi, et al., 2010; Riddle, et al., 1990; Rosario-Campos, et al., 2001; Thomsen, 1994), as well as other pervasive developmental disorders such as Asperger Syndrome (Thomsen, 1994). This co-morbidity makes this population both heterogeneous and more vulnerable.

1.4 Treatments for OCD

1.4.1 Drug treatments.

In the UK, the National Institute for Health and Clinical Excellence (2005) recommend selective serotonin reuptake inhibitors (SSRIs) as the drug treatment of choice for adults with moderate OCD. For children, they recommend using SSRIs as a last choice and with caution given the unknown effect of such medication on the developing brain.

A number of trials have reported evidence for the effective and safe use of medications for childhood OCD. Sertraline, Fluoxetine, Fluvoxamine and Paroxetine, all SSRIs, have been shown to effectively reduce symptoms compared to a placebo (Geller et al., 2004; March et al., 1998; Riddle et al., 2001; Riddle et al., 1992). There is also evidence for the effectiveness of Clomipramine, a tricyclic, for use with children and adolescents with severe OCD (Leonard et al., 1989). According to a meta-analysis of paediatric pharmacotherapy trials comparing each of the above SSRIs and Clomipramine, all had statistically significant but modest effect sizes. Clomipramine was found to have a significantly larger effect size than the SSRIs (Geller et al., 2003). The Paediatric OCD Treatment Study (POTS) found that a combination treatment of CBT and Sertraline was most effective for children and adolescents with OCD, achieving a remission rate of 54% (2004). Relapse rates when medication is withdrawn have been shown to be high amongst this age group (Leonard et al., 1991).

1.4.2 Behavioural therapy – exposure and response prevention.

On the basis of behavioural theory (see section 1.6.1), various behavioural techniques have been used to treat OCD. The most successful and widely used is exposure and response prevention (ERP) first demonstrated by Meyer (1966). This approach involves exposing the patient to an anxiety-provoking stimulus, and asking them to refrain from performing their compulsions (response prevention). The aim of this technique is to help patients learn that the obsessional situation is not truly dangerous or catastrophic, and that given time, their anxiety naturally declines. The conditioned fear is extinguished through habituation and the challenging of mistaken associations. Treatment is conducted with the help of the therapist, in a systematic

way with repeated and prolonged exposure to either the physical or imagined stimulus. This treatment is recommended by NICE (2005) as a first line approach for children with moderate to severe OCD.

Studies investigating the effectiveness of ERP among adults with OCD demonstrate good overall success rates (Foa et al., 2005; Foa, Steketee, & Ozarow, 1985; Franklin, Abramowitz, Kozak, Levitt, & Foa, 2000; Lindsay, Crino, & Andrews, 1997; Van Balkom et al., 1998). Foa and Kozac's (1996) review of 13 studies reported an overall treatment response rate of 83%. However, this did not account for large variations in treatment lengths, therapist involvement, drop-out rates or settings.

In a small study of 18 adults, the superiority of ERP was demonstrated compared to a psychosocial placebo of anxiety management training (Lindsay, et al., 1997). Exclusion criteria were not detailed but the impact of the therapist-client relationship was considered. Participants were randomly assigned and both treatments involved 15 hours of treatment. Although small, this study demonstrated a significantly better outcome, including symptom severity and interference, for those receiving ERP. In a larger study of 117 adults with OCD, Van Balkom (1998) found cognitive therapy, ERP and Fluvoxamine combined with each therapy to be equally effective. All four of these conditions resulted in a significant decrease in symptoms compared to a waiting list control. However, exposure work was assigned as homework only, most likely limiting its effectiveness. A more recent randomised controlled trail (RCT) (Foa, et al., 2005), tested the relative and combined effect of ERP and Clomipramine against a pill placebo. Foa and colleagues made use of a manualised empirically validated version of ERP as well as an adequate dose of Clomipramine. They found ERP to be superior to Clomipramine alone, and equal with the combined intervention. A response rate of 86% was found for those completing ERP, and 62% for those entering treatment. However, no data was gathered from the 18% that dropped out following randomisation but before treatment. Inter-rater reliability was not assessed and detailed information on treatment history was not gathered. Outcome measures were also limited to symptoms and not functional impairment.

Many criticise randomised controlled trials (RCTs), and their stringent experimental control, for their lack of generalisability to clinical settings. Franklin and colleagues (2000) point to the homogenous samples resulting from strict exclusion criteria, as well as manualised treatments which distinguish research trials from clinical practice. To assess ecological validity, outcome data from a clinical sample taken from an outpatient setting, with no exclusion criteria in place, were compared to findings from four RCTs (Franklin, et al., 2000). Reductions in OCD and depressive symptoms were both significant and comparable to the RCTs. The results were assessed for clinically significant change; 86% of treatment completers scored below the clinical cut-off. However, there was no control group, no long term follow up data, and no information on treatment integrity.

Meta analyses have detected treatment effect sizes for ERP of more than 1.0 (Abramowitz, 1996; Rosa-Alcázar, Sánchez-Meca, Gómez-Conesa, & Marín-Martínez, 2008). Abramowitz (1996) reviewed 38 trials and found therapist-controlled exposure, longer sessions and combined imaginal and in-vivo exposure were associated with better outcomes. Studies including patients with co-morbidities were excluded.

Among the first to investigate the effectiveness of ERP for children was Bolton, Collins and Steinberg (1983) who reported improvement in 87% of 15 hospitalised adolescents aged 12-18. However, as this was an uncontrolled study with no standard treatment protocol and clients received a range of therapies, the specific effect of ERP cannot be assessed. In a larger Australian study ($N = 57$) Wever and Rey (1997) reported a 68% remission rate and a 60% decrease in symptoms using behavioural treatment. However, pharmacological treatments were used simultaneously and no comparison group was included.

In a small scale randomised controlled pilot study (Haan, Hoogduin, Buitelaar, & Keijsers, 1998), comparing ERP ($n = 12$) and Clomipramine ($n = 10$), clinical improvement was seen in both treatment conditions. Using well validated measures, including the Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS) and Leyton Obsessional Inventory – Child Version (LOI-CV), ERP had better response rates (66.7% vs. 50%) and greater reduction

in symptom severity (59.9% vs. 33.4%). These changes were statistically significant on the CY-BOCS only. No follow up was completed.

There are limitations to ERP as a treatment for OCD. Many patients with OCD refuse ERP (Greist, 1990) and dropout rates of between 20 and 25% are reported (Foa, et al., 1983; Rachman & Hodgson, 1980). Children and adolescents in particular may not be able to tolerate the high levels of anxiety experienced during ERP (Francis & Gragg, 1996). Those with co-morbid depression have poorer success rates, as do those who use mental rituals (Greist, 1990). Furthermore, Abramowitz, Whiteside and Deacon (2005) evidenced that, on average, young people's post-treatment CY-BOCS score fell within the mild range of symptom severity indicating that many continue to experience residual symptoms. Given these limitations, an emphasis has been placed on alternative theories and treatment models for OCD.

1.4.3 Cognitive behaviour therapy.

Cognitive models of OCD (see section 1.6.2) have provided guiding principles for the assessment, formulation and treatment of OCD. During assessment, clients are asked about the nature of their thoughts and beliefs about the power of thoughts, responsibility for harm and probability of harm. By introducing a client to these concepts, they can be helped to understand the perpetuating cycle of thoughts, feelings and compulsive responses. Cognitive therapy aims to modify distorted appraisals and beliefs. Using behavioural experiments, efforts to suppress or neutralise thoughts are challenged. CBT protocols which focus on responsibility cognitions demonstrate the extent to which cognitive models have informed cognitive therapy practice (Salkovskis, 1998). CBT has become a widespread treatment for OCD.

1.4.3.1 The effectiveness of cognitive behaviour therapy for adults.

The research into CBT for adults with OCD is varied with differing comparisons, treatment protocols and outcome measures. Meta-analyses which standardise and aggregate results can help demonstrate treatment efficacy. Van Balkom and colleagues (1994) identified 46 behaviour therapy trials, 3 cognitive therapy (CT) trials, and 5 CBT trials. Inclusion criteria specified a primary diagnosis of OCD in treatment studies from 1970 to 1993. Well validated

measures of OCD severity were identified but there was a poor overlap of measures across the studies. Drop-out rates varied from 5 to 25%. Study quality was rated. For self rated symptoms, effect sizes were 1.46 for behaviour therapy, 1.09 for cognitive therapy and 1.30 for cognitive-behaviour therapy respectively. No long term efficacy outcomes were reported.

Abramowitz (1997) conducted a meta-analysis of four RCTs directly comparing ERP and cognitive therapy. Studies had to use standardised diagnostic criteria and exclude participants with co-morbid diagnoses. Three studies involved CT that emphasised cognitive distortions of perceived responsibility and overestimation of catastrophe (Emmelkamp & Beens, 1991; Emmelkamp, Visser, & Hoekstra, 1988; Van Oppen et al., 1995). One was based on thought stopping and would not be considered a standard cognitive approach (Hackman & McLean, 1975). Effect sizes were based on behavioural symptoms and measures of OCD symptom severity with known psychometric properties. A small effect size in favour of cognitive treatment was found (0.19) although this was non-significant. Since this meta-analysis made use of quite stringent selection criteria, this can be seen as a reasonably reliable account of efficacy.

Abramowitz, Franklin and Foa (2002) reviewed 16 controlled trials of ERP, CT and CBT. Respective effect sizes of 1.50, 1.19 and 0.99 were found. Five studies compared ERP and CT: there was a mean effect size of 0.07 which was not significant. A more recent meta-analysis, containing 24 comparisons between a treatment and control group, found similar effect sizes of 1.13, 1.09 and 1.00 for ERP, cognitive restructuring and combined treatments respectively (Rosa-Alcázar, et al., 2008). The authors concluded that combined treatment did not offer an improvement above and beyond the separate modalities. However, a difficulty in separating elements of cognitive and behavioural interventions is apparent in the classification process. The effect estimate for CT alone, which was based on only three studies, includes one which clearly identifies the treatment protocol as CBT including behavioural experiments (McLean et al., 2001). As Rosa- Alcázar and colleagues (2008) outline, cognitive techniques often involve behavioural experiments and ERP often involves discussing the patient's cognitive experiences. As such, the equal effect sizes may not be surprising. Only half of the

included studies provided follow up data, which was available for treatment groups only. Efforts were made to consider a range of outcome variables and the impact of different treatment characteristics and methodological quality. However, analyses did not include treated versus completer response rates.

Eddy, Dutra, Bradley and Westen (2004) reported a multi-dimensional meta analysis (presenting a range of statistics on clinical utility and external validity) which attempted to overcome some of the limitations noted, among others: high exclusion rates, lack of intention-to-treat analyses, and exclusive focus on effect size at the cost of more clinically meaningful measures. The meta-analysis included 5 control conditions, 18 ERP conditions, 5 CT conditions and 5 CBT conditions. Pre- versus post-treatment effect sizes were large for ERP (1.53), CT (1.54) and CBT (1.39). While 'percent recovered' was higher for CT than ERP, 'percent improved' was higher for ERP. Intention-to-treat analyses were also included and showed the same trend. This information was not available for the CBT trials. This meta-analysis provides a broader range of clinically relevant statistics for consideration. Overall, it suggests ERP and CT may be equivalent in efficacy.

1.4.3.2 The effectiveness of cognitive behaviour therapy for children.

CBT protocols have been developed for the treatment of childhood OCD (Albano, March, & Piacentini, 1999; March & Mulle, 1998). Compared to adult interventions, these tend to include an increased emphasis on psychoeducation and cognitive modification to help improve engagement. Family involvement is encouraged with parents often recruited into a co-therapist position. In the UK, CBT for childhood OCD is recommended by NICE (2005).

Barrett, Healy-Farrell and March (2004) compared individual and group cognitive-behavioural family-based therapy to a waiting list control in 77 children aged 7-17 years. Children were either medication free, or agreed to a stable regimen over the treatment period. A manualised protocol, which was checked for treatment integrity, was used in an outpatient setting making the study treatments replicable and generalisable. Both treatments led to significant improvement in OCD diagnostic status and symptom severity with a 65% and 61%

reduction in the CY-BOCS score for the individual and group intervention respectively. This compared to a 5% increase in CY-BOCS scores for the waiting list control. Treatment gains were maintained at an 18-month follow up at which 90% of participants were retained (Barrett, Farrell, Dadds, & Boulter, 2005). Compared to the control group, treatment effect sizes at the end of treatment were 2.84 for the individual therapy, and 2.63 for the group therapy. Although this study appears to be highly supportive of CBT interventions, the family component included makes it difficult to extricate the mechanism of change.

The POTS RCT (2004) compared CBT alone, medication alone (SSRI), CBT and medication combined and a medication placebo in the treatment of OCD in 112 children and young people aged 7 to 17. Children with co-morbid anxiety and externalising disorders were included. Remission rates were: 54% for the combined treatment, 39% for CBT alone, 21% for medication and 4% for the placebo. There was no significant difference between the combined treatment and CBT alone or between medication alone and CBT alone. Overall effect sizes, calculated relative to the placebo, were 1.4, 0.97 and 0.67 for combined, CBT alone and medication alone respectively. Results are limited by relatively small group sample sizes and a lack of follow up data. A significant site-by-treatment interaction was also found indicating the influence of site-specific factors.

Williams and colleagues (2010) compared a CBT intervention based on responsibility cognitions, with a waiting list control in 21 young people aged 9 to18 years. Ten participants had co-morbid psychological diagnoses and seven were taking medication. CBT was superior to the waiting list condition with a large between-group effect size of 1.07 on the interviewer administered CY-BOCS. On self report measures however, no significant group effect was found.

Asbahr and colleagues (2005) compared group-based CBT to medication (SSRI) in a randomised trial involving 40 treatment-naive Latino 9 to 17 year olds. Standardised assessment measures were used to assess participants at multiple time points. Both treatment conditions resulted in significant improvements by the end of treatment with no significant group

differences found. By nine months post-treatment, the group-based CBT arm had a lower rate of relapse.

The impact of the intensity of CBT delivery has also been investigated (Franklin et al., 1998; Storch et al., 2007). Neither included a comparison or control group. Franklin and colleagues used a CBT intervention with a primary focus on ERP, with 14 10 to 17 year olds. Participants were non-randomly allocated to the intense or weekly group. CY-BOCS scores in both groups reduced by an average of 67%, and were maintained at a nine month follow up. No effect of intensity was found. Storch and colleagues (2007) conducted a randomised trial of intensive versus weekly family-based CBT with 40 children aged 7 to 17 years. The intensive group was significantly younger and had more severe OCD obscuring the results to some extent. Remission rates were 75% for the intensive group and 50% for the weekly group. The intensive group also showed a greater decrease in family accommodation of OCD symptoms. Both groups showed similar improvements in psychosocial functioning, and by three months, no difference was seen between the groups across the outcome measures.

Barrett, Farrell, Pina, Peris and Piacentini (2008) identified 16 studies, including 2 rigorous RCTs (Barrett, et al., 2004; Pediatric OCD Treatment Study Team, 2004), 4 less stringent treatment trials, and 10 uncontrolled trials, in their review of psychosocial interventions for children and adolescents with OCD. Each study was considered for methodological rigour using Nathan and Gorman's (2002) classification system. They concluded that exposure-based individual CBT meets the requirements to be designated a 'probably efficacious treatment' (Chambless & Hollon, 1998), as does family-focused CBT and combination treatment of CBT and medication. No treatments met the criteria for a 'well established treatment' which requires two 'good' studies demonstrating superiority to pill placebo or alternate treatment. This is so far lacking for CBT interventions for childhood OCD.

Overall, the research suggests that CBT is an effective treatment for OCD among young people. Its superiority to ERP alone is still questionable.

1.5 Biological Models of OCD

It is important to be aware of the biological models of OCD in order to contextualise the research into psychological models. While biological models have helped to identify certain risk factors and neurological differences associated with the disorder, the research is conflicting and fails to demonstrate a causal connection between biological abnormalities and OCD. It also fails to explain the remitting courses of OCD, different aged onsets, the heterogeneous nature of the condition, and the success of psychological therapies in treating the disorder. Nevertheless, a brief overview reminds us of the complexity of the disorder and the extent of the unknown.

1.5.1 Neurological characteristics of children with OCD.

There is a growing set of evidence for a biological substrate of OCD. Various brain regions have been implicated including the basal ganglia, the frontal cortex and the limbic structures (Rauch & Jenike, 1993).

Structural differences between the brains of those with OCD compared to controls have been demonstrated. Specifically, enlarged ventricles have been found amongst adolescents with OCD (Behar et al., 1984). Baxter and colleagues (1987) found elevated glucose metabolic rates in those with OCD, suggestive of a fronto-striatal abnormality (neural pathways connecting frontal lobe regions with the basal ganglia). Swedo, Schapiro and colleagues (1989) found a correlation between right orbital glucose metabolic activity and a measure of OCD symptom severity. More persuasive still is evidence of improvements in these anomalies following treatment (Baxter et al., 1992; Swedo et al., 1992). This is strongly suggestive of an association but not evidence of causality. Similarly, Lázaro and colleagues (2008) demonstrated a hyperactivation of the middle frontal gyrus amongst children with OCD, and a significant reduction in the activation of the basal ganglia following treatment.

Bringing together findings from the various modalities, Khanna (1988) concluded that there was substantial support for the theory of frontal lobe dysfunction amongst those with OCD. A frontal lobe dysfunction, which would affect executive skills of cause and effect reasoning, attention shifting, cognitive flexibility, habitual responding and impulse control, may

fit with both cognitive and behavioural models of OCD. Neuropsychological testing of adults with OCD also supports this view (Purcell, Maruff, Kyrios, & Pantelis, 1998; Schmidtke, Schorb, Winkelmann, & Hohagen, 1998; Veale, Sahakian, Owen, & Marks, 1996). Amongst children, neuropsychological deficits have been evidenced but are again varied and inconclusive (Thomsen, 1994).

1.5.2 Infectious diseases and OCD onset.

Obsessive compulsive symptoms have been observed following infection with Group A beta-hemolytic streptococci (Swedo et al., 1998). Such incidences are referred to under the heading of PANDAS (Paediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infections). Obsessive compulsive symptoms within this subset of childhood OCD are often severe with a sudden onset and a relapsing-remitting course that sees exacerbations occurring following re-infection (Swedo, Rapoport, Leonard, et al., 1989). This group is generally seen to be distinct from other OCD patient groups (Snider & Swedo, 2004). The suggested pathophysiology is the cross-reaction of the antibodies with components of the basal ganglia in genetically susceptible children; a similar mechanism to that suggested in Sydenham's chorea, a condition also associated with the onset of OCD (Swedo, 1994; Swedo, Rapoport, et al., 1989). This provides strong evidence of a biological component of OCD-type behaviours.

1.5.3 Neurochemistry in OCD.

There is evidence to suggest that a specific serotonin metabolism abnormality is involved in OCD. Yaryura and Bhagavan (1977) first reported that OCD patients had lower levels of serotonin and that their symptoms improved after they were given Clomipramine, a potent serotonin reuptake inhibitor. Zohar, Mueller, Insel, Zohar-Kadouch and Murphy (1987) offered an alternative hypothesis: that it is an increased serotonergic responsiveness, rather than a deficiency, that is associated with OCD. It is generally agreed however that a single neurotransmitter imbalance could not account for the complex and diverse presentation of OCD.

Some of the more effective drug treatments for OCD have limited selectivity for serotonin reuptake inhibition (Jenike et al., 1990).

1.6 Psychological Models of OCD

Biological models of OCD have provided some insight into the physical components of the illness. However, they have not contributed to an understanding of the nuances and subtleties of the disorder in the same way as psychological theories have. Psychological theories have provided an explanation and alternate treatment for those with OCD.

1.6.1 Behavioural theory of OCD.

One of the early explanations of OCD was based on learning theory. According to Mowrer (1960), the acquisition of fear and subsequent avoidance can be explained by a two-stage model involving classical and operant conditioning. Dollard and Miller (1950) suggested that through classical conditioning, a neutral stimulus, such as a door handle or a thought, becomes paired with an unconditioned stimulus (anxiety, fear or nausea). The neutral stimulus acquires the properties of the unconditioned stimulus and elicits fear and anxiety in its own right. This pairing could result from an aversive or traumatic experience, or a coincidence of timing, arousal and attention.

In Mowrer's second stage, new behaviours become learned through operant conditioning. Avoidance or compulsion behaviours temporarily reduce feelings of anxiety and the behaviour is negatively reinforced. The behaviours continue and fear related to the conditioned stimulus is not extinguished.

The second stage of this model has received good empirical support. Exposure to the feared stimulus, for example possible contamination, provokes marked anxiety and an urge to complete compulsions (Rachman, de Silva, & Roper, 1976). Compulsions are then followed by a temporary reduction in anxiety and discomfort and are thereby reinforced (Rachman, et al., 1976; Rachman, Shafran, Mitchell, Trant, & Teachman, 1996). ERP challenges these associations and has been shown to be efficacious (see section 1.4.2). The first stage of classical

conditioning however, has received less empirical support. Jones and Menzies (1998) found little evidence of associative learning in the development of OCD with just three, of a sample of 23 people with OCD, identifying an associative learning event. In a non-OCD comparison group, similar numbers of potential learning experiences were identified. The use of retrospective self reports means that these cannot be considered reliable data. However, it has also been noted that people fail to acquire fears in fear-evoking situations and in laboratory experiments (Rachman, 1977). This theory also fails to explain the gradual onset sometimes seen and the changing obsessions reported in the absence of a new conditioning experience (Hanna, 1995; Walitza, et al., 2011).

1.6.2 Cognitive theories of OCD.

Interest in the role of cognitive processes in OCD has risen since the first cognitive-behavioural formulation of obsessive compulsive neurosis in 1979 (McFall & Wollersheim). The subsequent publication of a cognitive model of anxiety in 1985 (Beck, Emery, & Greenberg) led to a significant re-conceptualisation of the nature and treatment of anxiety disorders. Beck hypothesised that situations do not in themselves cause an emotional reaction. Instead, it is the meaning attached, and the interpretation made that determines the emotional response. In OCD, the 'situation' is often the experience of an intrusive thought. Cognitive models of OCD have provided more individualised formulations for those with OCD which help to explain the development and maintenance of obsessions and compulsions. They have also led to the development of an alternative treatment model (see section 1.4.3).

Rachman and de Silva (1978) noted that intrusive thoughts were universal, with little difference in content reported by individuals with OCD and those without a mental health diagnosis. Rachman (1997) proposed that if we interpret thoughts, images or impulses to hold some meaning or power, then these normal intrusions can become obsessions (Rachman, 1997, 1998). Subsequent anxiety results in efforts to control these intrusions, which paradoxically results in more intrusions and escalating distress (Wegner, Schneider, Carter, & White, 1987). A number of misinterpretations and appraisals have been identified as central to OCD with several

models emerging. The Obsessive Compulsive Cognitions Working Group (1997) cited six belief domains likely to be important within OCD, including inflated responsibility, over-importance of thoughts, excessive concern about the importance of controlling thoughts, overestimation of threat, intolerance of uncertainty and perfectionism. Thought-action fusion (TAF) was included within over-importance of thought. However, TAF is a distortion which may underlie several of these belief domains. TAF also has similarities to magical thinking, a thinking style typically seen in children. When considering childhood OCD, this is a distortion worthy of further investigation.

1.6.2.1 Thought-action fusion.

In investigating the relationship between obsessions, responsibility and guilt, Rachman (1993) observed that responsibility for thoughts can "extend to a psychological fusion of the thought and the action" (p.151). It is believed that intrusive thoughts, which may be unacceptable and distressing, can influence events in the world. Rachman (1997) identified two forms of TAF. Likelihood TAF refers to the belief that having an intrusive thought about an adverse event increases the likelihood of that event occurring. This can be broken down into likelihood-self in which the adverse event involves oneself, and likelihood-other in which the adverse event involves someone else. In morality TAF, having an unwanted intrusive thought is seen as morally equivalent to carrying out an act. These two constructs have been shown to be distinct but related (Rassin, Merckelbach, Muris, & Schmidt, 2001; Shafran & Rachman, 2004).

1.6.2.2 Magical thinking and developmental considerations.

Likelihood TAF is similar to magical thinking which is often seen in children (Bolton, et al., 2002; Chapman, Chapman, & Miller, 1982; Evans, Milanak, Medeiros, & Ross, 2002; Woolley, 1997). Magical thinking refers to ideas and beliefs which defy laws of causality. For children, magical thinking typically involves beliefs in fantasy, magic, wishing and their own ability to influence external events.

Magical thinking is typically seen in young children, aged between 2 and 8 years (Harris, Brown, Marriott, Whittall, & Harmer, 1991; Rothbaum & Weisz, 1988; Vikan &

Clausen, 1993; Woolley & Wellman, 1993). Pretend play, imaginary friends, childhood rituals and belief in the supernatural are at their height between the ages of 3 and 8 (Leonard, 1989; Taylor, Cartwright, & Carlson, 1993). However magical thinking is thought to continue throughout the concrete operations period of cognitive development, up to the age of 11 or 12 (Piaget, 1952). While then considered to decrease with age (Piaget, 1952; Subbotsky, 2005; Woolley, 1997), Bolton and colleagues (2002) have demonstrated that it is still present into adolescence.

Astington (1993) suggested that children struggle to distinguish between the mind and reality leaving them prone to magical ideation. Piaget (1960) hypothesised that children may overestimate their control over events by attributing causality based on a single salient instance of association. In the same way, it is proposed that TAF beliefs may develop following the chance pairing of a thought and a negative event (Salkovskis, Shafran, Rachman, & Freeston, 1999; Tallis, 1994). When lacking an alternative explanation, children are liable to use magic as an explanatory tool (Phelps & Woolley, 1994). Magical thinking is also felt to be used to achieve a sense of control when there may be an absence of real control. In states of anxiety, adults have been shown to regress to magical ideation (Werner, 1948).

Bolton and colleagues (2002) hypothesised that cognitive processes involved in OCD are "persistent expressions of developmentally normal magical thinking" (p483). Given the developmental component and parallels between magical thinking and TAF it warrants further consideration in relation to childhood OCD.

1.6.2.3 Cognitive models of OCD and thought-action fusion.

1.6.2.3.1 Rachman's misinterpretation of significance model of OCD.

The cognitive distortion of TAF forms the basis of Rachman's misinterpretation of significance model of OCD (1997, 1998; 1999). Rachman (1997) suggests that obsessive compulsive behaviours are the result of erroneous beliefs about the power and significance of thoughts. He argued that a catastrophic misinterpretation results from seeing thoughts as "important, personally significant, revealing and threatening" (p794). Likelihood TAF beliefs

following an intrusive thought can result in an individual feeling distressed, anxious, guilty and dangerous. This can provoke efforts to suppress thoughts, neutralise thoughts through mental rituals or to take steps to prevent the feared event occurring through avoidance and physical compulsions (Shafran, Thordarson, & Rachman, 1996). If these efforts reduce immediate feelings of anxiety they are negatively reinforced. Similarly, actions are negatively reinforced when the feared event does not happen. TAF beliefs remain unchallenged and the individual remains hyper-vigilant to their thoughts, paradoxically increasing their frequency and threat salience. Morality TAF ('thinking bad things is as bad as doing bad things') can result in similar feelings of anxiety and distress as well as feelings of being a bad or mad person.

1.6.2.3.2 *Salkovskis' inflated responsibility model of OCD.*

According to Salkovskis (1985), people with OCD interpret intrusive thoughts about harm to themselves or others as particularly significant, primarily because they assume personal responsibility for any future negative events. This inflated responsibility for harm causes them significant distress and initiates efforts to prevent negative events occurring by using rituals and neutralising behaviours. Salkovskis viewed TAF as a particular example of inflated responsibility for harm. He suggested that if someone believes their thoughts could cause an aversive event to happen, that they are likely to feel inflated responsibility and act to prevent the feared event (Shafran, et al., 1996).

Salkovskis' model has received extensive empirical support. Salkovskis and colleagues (2000) found that adults with OCD had higher levels of inflated responsibility than those with other anxiety disorders. Rhéaume, Freeston, Dugas, Letarte and Ladouceur (1995) found that measures of responsibility accounted for up to 37.7% of variance in obsessive compulsive symptoms in a large student sample. Experimental studies add weight to Salkovskis assertion. Bouchard, Rhéaume, & Ladouceur (1999) found that a non-clinical sample of 51 adults showed more hesitations and checking behaviours in a high responsibility sorting task than in a low responsibility sorting task. The within group design provided strong evidence of a causal relationship between responsibility and compulsive symptoms, but not obsessive symptoms.

Lopatka and Rachman (1995) similarly found that participants diagnosed with OCD experienced significant declines in discomfort and urges to check when responsibility was reduced in a checking or cleaning task. Increases in responsibility resulted in increases in discomfort and urges but this did not reach significance. The dependent variables were based on self-report measures. Nevertheless, this provides additional causal evidence in a more ecologically valid task.

The role of inflated responsibility in OCD has also been examined in young people. Barrett and Healy (2003) used an idiographic approach to illustrate higher ratings of responsibility among those with OCD compared to a non-clinical control. This did not differentiate them from an anxious comparison group. Libby, Reynolds, Derisley and Clark (2004) however, demonstrated that young people with OCD had higher levels of inflated responsibility compared to both an anxious comparison group and non-clinical control group. In addition, inflated responsibility independently predicted OCD symptom severity amongst young people who had OCD.

Using an experimental manipulation, Reeves, Reynolds, Coker and Wilson (2010) found a significant effect of responsibility level on measures of time, checking and hesitation seen within a sorting task completed by 81 non-clinical 9-12 year olds. In contrast, Barrett and Healy-Farrell (2003) found that higher levels of inflated responsibility, again achieved through experimental manipulation, did not lead to increased distress or neutralising. This study recruited 43 7-17 year old children with OCD and used an individually tailored exposure and response prevention task. Responsibility was manipulated using signed contracts declaring differing levels of responsibility should harm occur. However, some participants were reluctant to accept high levels of responsibility. In addition, the objective dependent variable used was efforts to ritualise, despite the ERP task requiring abstinence from ritualising. This may account for the contrasting results.

Inflated responsibility has been implicated as a possible mediator between TAF and obsessive compulsive symptoms. A preliminary study ($N = 32$) which experimentally

manipulated responsibility within a TAF task supported this view (Rachman, Shafran, Teachman, Trant, & Maltby, 1997). Those in the high responsibility condition responded to the TAF induction task with higher anxiety, guilt, feelings of moral wrong doing and increased urges to neutralise.

1.6.2.3.3 Well's meta-cognitive model of OCD.

A meta-cognitive model of OCD has also been proposed (Wells, 1997; Wells & Matthews, 1994). This model emphasises beliefs about the significance, power and meaning of intrusions, as well as beliefs about the need to control thoughts and perform rituals. Meta beliefs about intrusive thoughts include those of TAF as well as others such as thought-event fusion (thinking I have hit someone with my car means I must have done it) and thought-object fusion (I can contaminate objects with my negative thoughts). This model suggests that such beliefs are central to the aetiology and persistence of OCD, with cognitive distortions such as inflated responsibility resulting from them (Gwilliam, Wells, & Cartwright-Hatton, 2004).

Empirical support for this model has been reported. In a large cross sectional study, meta-cognitions were positively associated with obsessive compulsive symptoms even when controlling for worry and responsibility. In the same study, meta-cognitions, including TAF, were predictive of obsessive compulsive symptoms (Gwilliam, et al., 2004). Associations between responsibility appraisals and obsessive compulsive symptoms were not significant when meta-cognitions were controlled for (Myers & Wells, 2005).

Research has also demonstrated the importance of meta-cognitive beliefs in young people. Matthews, Reynolds and Derisley (2007) reported that meta-cognitive beliefs were significantly associated with obsessive compulsive symptoms. Inflated responsibility and meta-cognitive beliefs were significant independent predictors of obsessive compulsive symptoms. However, in contrast to Myers and Wells (2005), inflated responsibility partially mediated the relationship between meta-cognitions and obsessive compulsive symptoms. Using the same measures and a similar sample, Mather and Cartwright (2004) found that meta-cognitions remained an independent predictor of obsessive compulsive symptoms even when controlling

for responsibility. Unlike Matthews and colleagues (2007), they controlled for depression before examining these relationships.

1.7 The Role of Thought-Action Fusion in OCD in Adults

1.7.1 Cross sectional research.

In a cross sectional study of 291 non-clinical adults, Rachman, Thordarson, Shafran and Woody (1995) found that TAF was a coherent factor that was significantly correlated with obsessionality and guilt. The association between TAF and self-reported obsessive compulsive symptoms has been demonstrated in questionnaire studies with non-clinical participants (Amir, Freshman, Ramsey, Neary, & Brigidi, 2001; Coles, Mennin, & Heimberg, 2001; Rassin, Merckelbach, et al., 2001).

TAF has also been investigated in clinical samples (Abramowitz, Whiteside, Lynam, & Kalsy, 2003; Einstein & Menzies, 2004a; Rassin, Diepstraten, Merckelbach, & Muris, 2001; Rassin, Merckelbach, et al., 2001; Shafran, et al., 1996) with higher TAF-likelihood scores reported by those with OCD compared to non-clinical controls. Shafran and colleagues (1996) reported that TAF was significantly higher in those with OCD compared to a non-clinical student sample. In the OCD group, there were moderate correlations between all components of TAF and checking compulsions ($r = .31$ to .38), but just one significant correlation between TAF-likelihood-other and cleaning compulsions ($r = .18$).

The specificity of TAF to OCD has been questioned. TAF appears to be elevated in individuals who present with other clinical diagnoses, including those with panic disorder, social phobia, generalised anxiety disorder and eating disorders (Abramowitz, et al., 2003; Hazlett-Stevens, Zucker, & Craske, 2002; Rassin, Diepstraten, et al., 2001; Rassin, Merckelbach, et al., 2001; Shafran, et al., 1999). It has therefore been suggested that TAF may be a pervasive bias associated with psychopathology rather than OCD specifically (Berle & Starcevic, 2005). Coles, Mennin and Heimberg (2001) found that obsessive features and worries could be distinguished by the construct of TAF. However, this study was limited to a non-

clinical student sample, and it is possible that TAF is more highly correlated with worry in clinical samples.

The relationship between TAF-morality and obsessive compulsive symptoms is less well established than the relationship between TAF-likelihood and OCD. Typically correlations are more modest (Rassin, Diepstraten, et al., 2001; Rassin, Merckelbach, et al., 2001) and are not significant after controlling for depression (Abramowitz, et al., 2003; Shafran, et al., 1996). Because of this TAF-morality may be more common and less pathological than TAF-likelihood (Abramowitz, et al., 2003).

It has been suggested that the relationship between TAF and OCD may not be direct. Various mediating factors have been advanced. For example, Abramowitz and colleagues (2003) found that negative affect partially mediated the relationship between likelihood TAF and OCD. Similarly Rees, Draper and Davis (2010) found that negative affect partially mediated the relationship between both TAF and magical thinking, and obsessive compulsive symptoms. The relationship between TAF-morality and OCD was mediated by inflated responsibility in a Turkish sample (Altın & Gencoz, 2011). This is in contrast to evidence that meta-cognitions, including TAF, are predictive of obsessive compulsive symptoms independently of inflated responsibility (Gwilliam, et al., 2004). Einstein and Menzies (2004a) found that a general magical thinking tendency underpinned associations between TAF, superstitiousness and OCD. The nature of the relationship between TAF and OCD therefore remains unclear.

1.7.2 Experimental research.

Experimental research offers the chance to investigate and clarify causal as opposed to correlational relationships. Rassin, Merckelbach, Muris and Spaan (1999) used an experimental manipulation to induce TAF in 45 non-clinical participants. Using a fake EEG recording system, participants, aged 16 to 20, were informed that should they think the word 'apple', electrical shocks would be administered to another person. This 'TAF-induction' resulted in more intrusions of the target word 'apple' and more discomfort, resistance and neutralising

behaviour. Discomfort and resistance were measured using visual analogue scales. Neutralising behaviour included pressing a 'signal-interrupting' button. There was a significant association between the number of intrusions and the frequency of these button presses. The button was pressed after an intrusion 50% of the time. Only those in the experimental condition completed a measure of responsibility and guilt. With no comparison, this did not clarify changes in feeling as a result of TAF.

A number of limitations can be noted for this study. TAF-induction was based only on experimenter instruction that someone would receive an electric shock. As such, it relied on participants believing the researcher. No manipulation check was administered. In addition, a specific 'danger' word was offered, potentially encouraging thought suppression efforts (Wegner, et al., 1987) and masking the true effect of TAF.

Sentence paradigms have also been used to induce TAF. Participants are asked to complete a sentence such as "I hope X is in a car accident" with the name of a loved one, to write it down and to visualise it in order to generate an obsessional, unacceptable thought. Rachman, Shafran, Mitchell, Trant and Teachman (1996) found that this procedure evoked anxiety, guilt and a strong urge to neutralise in 63 undergraduate students. A number of verbal analogue scales were used as measures. This has since been replicated by others, again with non-clinical samples, demonstrating that TAF can be easily activated (Bocci & Gordon, 2007; Rassin, 2001; van den Hout, Kindt, Weiland, & Peters, 2002; van den Hout, van Pol, & Peters, 2001). This induction process has been used to investigate neutralising behaviour. Anxiety was found to decline following neutralisation or naturally over time (Bocci & Gordon, 2007; van den Hout, et al., 2002; van den Hout, et al., 2001).

Two of these studies reported a relationship between baseline scores on a measure of TAF-likelihood and the use of neutralising following TAF-induction (Bocci & Gordon, 2007; van den Hout, et al., 2002). Van den Hout (2002) also reported a positive correlation between baseline TAF-likelihood scores and the increase in anxiety after writing down the induced thought. With no measure of induced-TAF, the causal nature of this relationship cannot be

commented on. Bocci and Gordon (2007) reported that the 75.5% of participants who neutralised had higher levels of magical thinking, distress and responsibility, and reported an increased likelihood of the accident occurring.

In Rassin (2001) the mediating role of thought suppression was considered. Contrary to expectation (Rassin, Muris, Schmidt, & Merckelbach, 2000), thought suppression did not result in a higher number of intrusions, nor higher VAS scores. Those in the suppression group reported their participation to be less morally wrong and estimated the likelihood of the accident happening to be smaller. It is suggested this finding may be the result of a non-clinical sample.

Zucker, Craske, Barrios and Holguin (2002) demonstrated that TAF could be corrected using an educational message. In delivering this prior to a sentence paradigm TAF-induction task, TAF scores, anxiety and urge to neutralise were reduced compared to a control group who received a placebo message about stress. Visual analogue scale measures of guilt, likelihood of accident and perceived responsibility showed no difference between groups.

While offering preliminary evidence for the causal role of TAF in obsessive compulsive symptoms, the sentence paradigm does not offer an ecologically valid version of TAF. Firstly, thinking of a loved one in a car accident is a personal, aversive experience that could induce anxiety in itself. Secondly, the method relies on pre-existing TAF beliefs. It provides an intrusive thought related to an aversive event, but does not necessarily induce a belief that by thinking about it, the likelihood of the event is increased.

1.8 The Role of Thought-Action Fusion and Magical Thinking in OCD among Children

In order to review studies on TAF in young people, a systematic literature search was conducted. The search strategy is outlined, followed by a critical evaluation of included studies. Two questions are to be answered:

1. Is TAF or magical thinking associated with childhood OCD or OCD-like behaviours?

2. Does TAF or magical thinking predict OCD-like behaviours in children?

1.8.1 Literature review search strategy.

MEDLINE (1950 to present), PsychINFO (1806 to present) and EMBASE (1980 to present) were searched on 9th March 2012 through The NHS National Library for Health. Specifically, the following search terms and Boolean connectors were used:

1. "Thought-action fusion" OR "magical thinking" (title and abstract)

2. Child* OR adolescent* OR juvenile OR youth OR "young pe*" (title and abstract)

3. "Obsessive Compulsive Disorder" OR worry OR anxiety OR compulsion OR obsession (title and abstract)

4. 1 AND 2 AND 3

A total of 56 articles were identified. To be included, studies had to investigate the presence or role of TAF or magical thinking in obsessive compulsive behaviours, specifically among those below the age of 18. Exclusion criteria were: secondary reviews, research on adults, research considering the role of TAF with no specific consideration of obsessive compulsive features, and research considering obsessive compulsive features among children with no consideration of TAF or magical thinking. Nine articles met criteria. A final search on PubMed also resulted in 51 results. One further article meeting criteria was found. The reference lists of these articles were then consulted using the aforementioned key terms. The databases were searched again using the names of key authors. One additional article was found. A total of 11 papers have therefore been included (Table 1). The articles are grouped into those using non-clinical samples, and those using clinical samples. TAF-based studies are considered first in chronological order, followed by magical thinking-based studies. For each study, the findings are described and the methods are evaluated. All the studies were cross-sectional and so inferences of causal relationships are speculative.

Table 1

Summary of Studies Investigating Thought-Action Fusion and Magical Thinking in Children and Adolescents

Study	Sample	Procedure	Measures Used	Factors Investigated
1. Muris, Meesters, Rassin, Merckelbach & Campbell (2001)	Non-clinical 427 13-16 year-olds	Self-report questionnaire study	TAFQ-A (Muris, et al., 2001) STAIC (Spielberger, 1973) LOI-CV (Bamber, Tamplin, Park, Kyte, & Goodyer, 2002) SCAS (Spence, 1998) CDI (Kovacs, 1981)	TAF, trait anxiety, OCD, anxiety and depression
2. Matthews, Reynolds & Derisley (2007)	Non-clinical 223 British 13-16 year olds.	Self-report questionnaire study	TAFQ-A (Muris, et al., 2001) LOI –CV (Bamber, et al., 2002) RAS (Salkovskis, et al., 2000) MCQ-A (Cartwright-Hatton et al., 2004)	TAF, inflated responsibility, meta-cognitive beliefs and OCD
3. Evans, Hersperger & Capaldi (2011)	Non-clinical 313 7-14 year olds	Self-report and parent-report questionnaire study	TAFIC (Evans, et al., 2011) RCMAS (Castaneda, McCandless, & Palermo, 1956) CRI (Sytsma, Kelley, & Wymer, 2001)	TAF, compulsive behaviours, perfectionist tendencies and anxiety.

Study	Sample	Procedure	Measures Used	Factors Investigated
4. Evans, Milanak, Medeiros & Ross (2002)	Non-clinical 31 3-8 year olds	Parent self-report questionnaire, administered tasks and interviews.	Questions on magic, tricks, wishing and supernatural entities. Performance on conservation tasks, and hypothetical scenarios. CRI (Sytsma, et al., 2001)	Magical thinking, parent-reported compulsivity, and concrete operations.
5. Bolton, Dearsley, Madronal-Luque & Baron-Cohen (2002)	Non-clinical 127 5-17 year olds	Self-report questionnaire study.	MTQ (Bolton, et al., 2002) SCAS (Spence, 1998)	Magical thinking and anxiety subtypes.
6. Simonds, Demetre & Read (2009)	Non-clinical 102 5-10 year olds	Self-report questionnaire study.	MTQ (Bolton, et al., 2002) LOI-CV (Bamber, et al., 2002) SCAS (Spence, 1998) SDQ-T (Goodman, 1997)	Magical thinking, OCD, anxiety subtypes, emotional and behavioural strengths and difficulties.

Study	Sample	Procedure	Measures Used	Factors Investigated
7. Barrett and Healy (Barrett & Healy, 2003)	Clinical OCD and anxiety and non-clinical control 59 7-13 year olds	Parent and child interviews, clinician ratings, self report measures, administered cognitive tasks.	Idiographic cognitive assessment task ADIS-P (Silverman & Albano, 1996) NIMH-GOCS (Insel, Hoover, & Murphy, 1983) CY-BOCS (Goodman et al., 1989) CBCL (Achenbach, 1991) MASC (March, Parker, Sullivan, Stallings, & Conners, 1997) CDI (Kovacs, 1981)	Cognitive assessment of TAF, diagnosis verification, severity rating, internalizing and externalizing behaviours, anxiety and depression.
8. Libby, Reynolds, Derisley & Clark (2004)	Clinical OCD and anxiety and non-clinical control 118 11-18 year olds.	Parent and child interviews, self report questionnaires.	TAF-scale (Shafran, et al., 1996) ADIS-C and ADIS-P (Silverman & Albano, 1996) LOI-CV (Bamber, et al., 2002) RAS (Salkovskis, et al., 2000) MPS (Frost, Marten, Lahart, & Rosenblate, 1990)	TAF, diagnosis verification, OCD severity, responsibility and perfectionism.

Study	Sample	Procedure	Measures Used	Factors Investigated
9. Farrell & Barrett (2006)	Clinical OCD 111 across three age groups: 6-66 years old.	Parent and child interviews, self report questionnaires, administered cognitive tasks.	Idiographic cognitive assessment task (Barrett & Healy, 2003) ADIS-P/ADIS-A (Silverman & Albano, 1996) CY-BOCS/Y-BOCS (Goodman, et al., 1989) Revised TAF scale (Shafran, et al., 1996) DTQ (Clark & de Silva, 1985) RAS (Salkovskis, et al., 2000) WBSI (Wegner & Zanakos, 1994)	Cognitive assessment of TAF, diagnosis verification, OCD severity, TAF, distressing thoughts, responsibility attitudes, thought suppression.
10. Farrell, Waters & Zimmer-Gembeck (2011)	Clinical (OCD) 46 7-17 year olds and their mothers	Parent and child interviews, clinician ratings, self report questionnaires (for child and mothers).	ADIS-P/ADIS-A (Silverman & Albano, 1996) CY-BOCS/Y-BOCS (Goodman, et al., 1989) RAS (Salkovskis, et al., 2000) Revised TAF scale (Shafran, et al., 1996) WBSI (Wegner & Zanakos, 1994) MCQ-A (Cartwright-Hatton, et al., 2004)	Diagnosis verification, OCD severity, responsibility attitudes, TAF, thought suppression, meta-cognitive beliefs.

Study	Sample	Procedure	Measures Used	Factors Investigated
11. Verhaak & de Haan (2007)	Clinical (OCD) 39 8-18 year olds	Structured interviews and self report questionnaires.	MTQ (Bolton, et al., 2002) CY-BOCS (Goodman, et al., 1989) CATS (Schniering & Rapee, 2002)	Magical thinking, OCD severity and negative automatic thoughts.

1.8.2 Research with non-clinical groups.

Muris, Meesters, Rassin, Merckelbach and Campbell (2001) reported significant correlations between TAF and symptoms of OCD ($r = .34$), panic and agoraphobia ($r = .27$), social phobia ($r = .27$), generalised anxiety ($r = .31$), depression ($r = .33$) and trait anxiety ($r = .31$). When trait anxiety was controlled, correlations between TAF and symptoms were reduced but remained significant for OCD ($r = .18$), generalised anxiety ($r = .11$) and depression symptoms ($r = .16$). The strongest partial correlation was between TAF and OCD symptoms suggesting TAF is relevant to OCD among young people. Well validated measures were used with a large sample adding to the study's reliability. The TAF measure was newly developed by the authors and demonstrated satisfactory psychometric properties.

Matthews, Reynolds and Derisley (2007) found that TAF was correlated with the number ($r = .35$) and severity ($r = .41$) of OCD symptoms. Inflated responsibility was also correlated with the number ($r = .58$) and severity ($r = .56$) of OCD symptoms. Regression analyses indicated that responsibility attitudes, meta-cognitions and TAF accounted for 35% of variance in OCD symptom scores. TAF did not make a significant independent contribution. Instead, inflated responsibility fully mediated the relationship between TAF and OCD. The authors suggest this could be the result of some overlap between the measures and the use of a non-clinical sample.

Evans, Hersperger and Capaldi (2011) found that in a sample of 7 to14 year-olds, older children reported less TAF than younger children. The use of a dichotomous TAF variable here (0 items endorsed versus >0 items) may have exaggerated the relationship seen. For the remaining analysis, full TAF scores from the Thought-Action Fusion Inventory for Children (TAFIC) were used. In the youngest group (age 7 to 9 years), the best predictor of compulsive-like behaviour was physiological anxiety, measured by the Revised Children's Manifest Anxiety Scale (RCMAS) (Castaneda, et al., 1956). In the next eldest group (age 9 to 11 years), TAF, and in particular, the harm-avoidance subscale, was the best predictor of compulsive-like behaviour. In the oldest group (age 11 to 14), TAF-self was the best predictor of compulsive-

like behaviour. Although difficult to compare to others, this study demonstrates the changing nature of TAF with age in normal development. The TAF-self subscale also predicted variance in the physiology and worry subscales of the RCMAS to a differing extent dependent on age group (range of $r = .28$ to .44). This again suggests TAF is not specific to OCD. The TAFIC has not been well validated and so limits the reliability of the results. In addition, the Childhood Routines Inventory (CRI) was completed by parents and therefore relied on parental knowledge. The CRI also reflects a narrow view of compulsive features thereby reducing generalisability.

A number of studies have reported data relating to the broader cognitive style of magical thinking. Evans, Milanak, Medeiros and Ross (2002) measured magical thinking based on responses to a series of open-ended questions, two magic tricks and a series of hypothetical scenarios. Children also completed a conservation task to assess their concrete operations. This creative methodology improves upon those discussed in terms of ecological validity. However, by coding the open-ended questions dichotomously as magical or logical, the quality of the data was lost.

The conservation tasks did not predict magical thinking, suggesting that magical thinking is not related to a developmental stage of perceptual reasoning. Magical thinking was significantly associated with compulsive-like behaviour, as measured by the parent completed CRI, after controlling for age ($r = .39$). There were also significant correlations between children's beliefs about the causal nature of wishes (a close parallel to TAF-likelihood), and the frequency and intensity of their compulsive-like behaviour (mean CRI score) ($r = .40$). While not a direct or validated measure of TAF, this may corroborate the link between TAF-type beliefs and obsessive compulsive behaviours in young children. What this study does not do is link such findings to feelings of anxiety.

Bolton, Dearsley, Madronal-Luque and Baron-Cohen (2002) investigated magical thinking across six school year age groups. Magical thinking did not decline overall with age. For boys, magical thinking increased during childhood before decreasing at age 12 to 13. Older

boys of 14 and above showed levels similar to that found in the youngest group. For girls there was no change in magical thinking across age.

There were significant correlations between obsessive compulsive symptoms and magical thinking, both overall ($r = .42$) and by subscale: 'action' ($r = .42$) and 'thought' ($r = .38$). Magical thinking was also significantly correlated with symptoms of panic ($r = .40$), separation ($r = .33$) and generalised anxiety ($r = .28$) for boys but not for girls, as measured by the Spence Children's Anxiety Scale (SCAS) (Spence, 1998). Although using a broader magical thinking measure as opposed to TAF, this study replicates the findings of Muris and colleagues (2001). The Magical Thinking Questionnaire (MTQ), developed by the authors provided a more replicable measure of magical thinking compared to Evans and colleagues (2002).

Simonds, Demetre and Read (2009) found a significant positive correlation between magical thinking and OCD symptoms on the SCAS (Spence, 1998) ($r = .28$) and the SLOI-CV (Bamber, et al., 2002) ($r = .37$). Again, this was seen when analysing the separate subscales within the MTQ: 'thought' (SCAS-OC = .27, SLOI-CV = .35) and 'action' (SCAS-OC = .23, SLOI-CV = .32). Comparison of the coefficients confirmed these correlations to be significantly greater for boys than for girls, with none of the correlations between the SCAS-OC and the MTQ scales reaching significance for girls. This differs from Bolton and colleagues findings. There were also significant correlations between magical thinking and other forms of anxiety including panic, separation anxiety, generalised anxiety and social phobia, as measured by the SCAS subscales, again for boys only. None were significant for the girls. This is in line with Bolton and colleagues' findings.

A significant difference in mean age was noted between the genders with girls being 10-months older on average. In finding a stronger relationship between obsessive compulsiveness, as measured by the Short Leyton Obsessional Inventory – Child Version (SLOI-CV), and magical thinking in the youngest group, this may help to explain the gender difference. However, no such age differences were noted between the SCAS scores and magical thinking. Overall, the findings suggest magical thinking does not differentiate obsessive compulsive

behaviour from other anxiety disorder symptoms. Regression analyses showed that magical thinking did not contribute to the prediction of obsessive compulsive symptoms beyond general anxiety.

While the research outlined provides insight into associations between TAF and obsessive compulsive symptoms, the level of symptoms seen in non-clinical groups can be too low to fully illuminate patterns. Non-clinical phenomenology may not equate to clinical phenomenology. Particularly when considering the specificity of TAF to OCD, levels of symptoms seen within non-clinical groups may not be enough to discriminate between anxiety disorders.

1.8.3 Research with clinical groups.

Research with clinical samples can provide a more valid picture of disorder phenomenology. Barrett and Healy (2003) recruited a clinical OCD group, a clinical anxiety disorder group, and a non-clinical control group. While the groups were small and differed significantly in size, they allowed for two comparison groups. The two clinical groups however had co-morbidities with a large cross-over of generalised anxiety disorder. TAF was assessed idiographically.

For the OCD group, children were asked to complete a sentence stem (If I think _____) with their most frequent intrusive thought. For the comparison groups, a standardised non-OCD thought was used (e.g. If I think I have lost my new sports watch and mum won't replace it). The relative difference in personal salience and likely emotional arousal is questionable. Multiple choice options were then given about the likelihood of something bad happening. The OCD group made significantly higher ratings of TAF compared to the non-clinical group. The differences between the OCD and anxious group, and the anxious and non-clinical group, were not significant.

Libby, Reynolds, Derisley and Clark (2004) compared three groups of young people: 28 with OCD, 28 with other anxiety disorders and 62 non clinical controls. 'TAF-likelihood other'

was significantly higher in the OCD group than in the anxious and non-clinical group; a clearer differentiation than found by Barrett and Healy (2003). The anxious group did however, have higher TAF-likelihood scores than the non-clinical group. TAF-Likelihood other was positively correlated with obsessive compulsive symptoms ($r = .51$). The authors observed that higher levels of TAF were seen among this sample compared to that seen in adults and suggested TAF may be particularly important in the presentation of OCD in young people. However, inflated responsibility was the only significant independent predictor of OCD symptom severity. Depression and anxiety were not controlled.

Farrell and Barrett (2006) extended Barrett and Healy's study to investigate cognitive processing across the developmental trajectory with 34 children, 39 adolescents and 38 adults, all of whom had a diagnosis of OCD. There was no non-clinical control or comparison group. The authors used the same idiographic task previously described and a self report measure of TAF. There was no difference in self report or idiographic TAF across the age groups. There were significant positive correlations between symptom severity and TAF-likelihood-self ($r = .27$) and TAF-likelihood-other ($r = .30$). Symptom severity and TAF-morality were not significantly correlated ($r = .18$).

Farrell, Waters and Zimmer-Gembeck (2011) investigated cognitive biases in a clinical sample of 46 children (7 to 11 years) and adolescents (12 to 17 years) with OCD, and their mothers. Using well validated measures, responsibility, thought suppression and meta-cognitions were associated with OCD symptoms among adolescents but not children. There was no association between TAF and OCD symptoms in children or adolescents. In addition, maternal TAF was not associated with child or adolescent OCD symptoms. Due to a large number of analyses, the risk of Type 1 errors was heightened.

Finally, Verhaak and de Haan (2007) reported a small pilot study investigating magical thinking. Thirty-nine participants completed the CY-BOCS (Goodman, et al., 1989) and the MTQ (Bolton, et al., 2002). No formal diagnostic interview was conducted. There were no significant correlations between the severity of OCD and the MTQ subscales. However, with no

comparison or control group, limited conclusions can be drawn. Given the small sample, power may have been too limited to detect an association.

1.8.4 Summary of findings.

1.8.4.1 Is TAF or magical thinking associated with childhood OCD or OCD-like behaviours?

TAF appears to be a feature of OCD in children and adolescents. Data from research with clinical and non-clinical participants show moderate associations between OCD symptom severity and TAF beliefs. Correlations between a magical thinking style and obsessive compulsive symptoms have also been demonstrated in several non-clinical studies. Just one clinical study has looked at magical thinking. Verhaak and de Haan (2007) found no association between magical thinking and symptom severity. However, given the methodological flaws outlined this conclusion is questionable.

TAF may be a transdiagnostic characteristic. Several non-clinical studies suggest that both TAF and magical thinking are present to some degree in participants with other anxiety disorder symptoms and depression symptoms (Bolton, et al., 2002; Muris, et al., 2001; Simonds, et al., 2009). In contrast, Libby and colleagues' (2004) clinical study reported that there was a clear distinction in TAF levels in young people with OCD and young people with other anxiety disorders.

1.8.4.2 Does TAF or magical thinking predict OCD-like behaviours in children?

TAF does not independently predict OCD symptoms. Matthews and colleagues (2007) found that the relationship between TAF and OCD was fully mediated by inflated responsibility. Libby and colleagues (2004) also found that TAF did not predict OCD symptom severity but that inflated responsibility did. Simonds and colleagues (2009) reported that magical thinking did not predict OCD symptoms when controlling for anxiety.

However, all such studies are cross sectional thereby limiting the strength of their conclusions. They do not demonstrate the causal role of TAF. The child-based literature is

limited by its lack of experimental studies. However, in a recent study Sillence (2010) developed an experimental paradigm to evaluate the causal role of TAF in OCD type behaviours in children.

1.9 An Experimental Paradigm of Thought-Action Fusion among Children

Sillence (2010) designed an experimental task to manipulate TAF in non-clinical 9-11 year-olds. This was based on Rassin and colleagues study (1999) in which participants were hooked up to a fake EEG recording system and told that should they think the word 'apple', an electrical shock would be administered to another person. Sillence adapted this experiment to be suitable for children.

Children were asked to wear a helmet that was connected to a computer. They were told that the helmet had been designed to help children with communication problems and could 'read thoughts'. After completing initial baseline measures of anxiety, responsibility attitudes and TAF, children were asked to try to change the colour of pictures presented on the computer screen by 'thinking and seeing red'. Children in the experimental group (induced TAF) were exposed to images that changed colour (i.e. they became more and more red). The control group saw unaltered images. Following the TAF-induction period, participants were asked to continue wearing the helmet for a 'baseline' reading. They were told that 'high energy thoughts' could damage the computer and that if they had a thought that might damage the computer they could press a button which would disconnect the helmet and 'prevent the thought reaching the computer'. Button pressing was the key dependent variable and was conceptualised as an indicator of neutralising behaviour. In addition the child's anxiety, feelings of responsibility and strength of belief in TAF were assessed.

Sillence's (2010) paradigm improved on Rassin and colleagues' (1999) original experiment in a number of ways. In Rassin and colleagues' task, induced TAF beliefs were based on instruction provided by the experimenter. In Sillence's adaptation on-screen visual feedback was given to children in the experimental group who were able to 'see' the effects of their thoughts. It was thought that this was potentially a more powerful induction process. In

addition, Rassin and colleagues' experiment firmly planted a target 'danger' word, thereby encouraging thought suppression (Wegner, et al., 1987). Sillence's paradigm was designed to reflect the TAF model in which an erroneous belief in the power of thoughts *directly* results in feelings of anxiety. According to Tallis (1994), causality may be assumed following a pairing of thoughts with real life events. By providing the general concept of a 'high-energy thought', it was hypothesised that children may assume causality and attach priority or concern to particular thoughts in the same way.

Sillence was able to successfully manipulate TAF in the experimental group (large effect size of 2.26). However, few of the dependent variables were significantly different between the groups; only the level of reported thought control was statistically significant with a medium effect size of 0.55.

The children did not report even mild anxiety; most children were extremely positive during the task and positive mood was greater in the experimental group who observed the pictures becoming redder. Sillence suggested that the experimental manipulation had an unintentional positive mood-induction effect which may have interfered with the impact of TAF on neutralising behaviours. This is consistent with the findings of Abramowitz and colleagues (2003), who argued that negative affect mediated the relationship between thought-action fusion and OCD symptoms. In addition, Rachman (1997) suggested that the function of neutralising is to reduce anxiety. Without increased anxiety it is unlikely that neutralising and the other dependent variables would differ between the two groups.

Sillence also observed that the children did not appear to be concerned about damaging the computer. She suggested that this was inhibited by the positive mood induction and by the fact that no evidence of damage was seen by the children.

Finally, the timing of measures used within Sillence's study may not be suited to capture negative affect at its highest point. The experimenter reassured the children that the computer was not damaged before they completed self report measures of responsibility and probability of harm. In addition, anxiety was measured after the children could see that the

computer was not damaged, and had already had a chance to 'neutralise' any concerning thoughts through button pressing.

1.10 Rationale for the Current Study

Although TAF is associated with childhood OCD, the role it plays in the development and maintenance of OCD is unclear. Some models suggest that there is a direct causal link between TAF and OCD (Rachman, 1997, 1998; Wells, 1997; Wells & Matthews, 1994). Others suggest that the relationship may be mediated by responsibility beliefs (Salkovskis, 1985) or by efforts to suppress thoughts (Rassin, Muris, et al., 2000). To clarify the role of TAF in relation to OCD aetiology, experimental research is needed.

Sillence's (2010) experimental task demonstrated a powerful method of manipulating TAF among non-clinical children. This study aims to refine the experimental method and to reduce the potential impact of unintended confounds. A measure of magical thinking will also be included.

1.11 Research Questions and Hypotheses

1.11.1 Question 1: Does TAF cause OCD-like behaviours?

1) There will be a significant between group differences in induced TAF, with children in the experimental group showing higher levels of induced TAF belief. This will form a manipulation check.

2) Children in the experimental group will show significantly more neutralising behaviour (button pressing) and higher levels of anxiety, responsibility for harm, probability of harm and thought control than children in the control group.

3) Children's baseline levels of TAF belief (TAFQ-A scores) will be positively correlated with button pressing, anxiety, responsibility for harm, probability of harm and thought control.

4) The level of induced TAF will positively correlate with button pressing, anxiety, responsibility for harm, probability of harm and thought control.

1.11.2 Question 2: What is the relationship between responsibility, TAF and OCD-like behaviours?

5) Baseline responsibility beliefs (RAS) will be negatively correlated (given reverse scoring of the RAS) with button pressing, anxiety, responsibility for harm, probability of harm and thought control.

6) The relationship between induced TAF and the dependent variables will be moderated by baseline responsibility beliefs.

7) The relationship between induced TAF and the dependent variables will be partially mediated by experimentally induced responsibility beliefs.

1.11.3 Question 3: Does induced TAF predict thought control?

8) The level of induced TAF will predict efforts to control thoughts.

1.11.4 Question 4: Is TAF correlated with magical thinking?

9) There will be a significant positive correlation between magical thinking and baseline TAF beliefs.

10) There will be a significant positive correlation between magical thinking and experimentally induced TAF.

Chapter 2

Method

2.1 Chapter Overview

This chapter details the method used in this study. It includes information on the design of the study, the participants and the recruitment process. It outlines the measures used and considers the psychometric properties of each. It explains the experimental task and the computer programme central to it. Finally, it considers relevant ethical issues and the plan for analysis of data.

2.2 Design

A between-groups experimental design was used in which the independent variable of induced TAF was manipulated. Two groups were included: TAF (experimental condition), and no TAF (control condition). Non-clinical children aged 9 to 11 were randomly allocated to either group using a computerised method which balanced children for age and gender across the two groups. The effect of the manipulation on the following dependent variables was examined:

- Level of self reported anxiety

- Number of 'disconnect' button presses acting as a measure of efforts to neutralise intrusive thoughts

- Perception of TAF

- Perception of responsibility for harm and probability of harm

- Efforts to control thoughts

Each child completed self report anxiety measures at three time points during the experiment. The experimental design ensures that a causal relationship can be studied by removing most of the 'plausible alternative explanations' (Cook & Campbell, 1979). Several

methods to reduce researcher bias were incorporated including a procedural script and audio recordings which were assessed by an independent researcher.

2.3 Participants

The participants were 100 non-clinical children aged between 9 and 11 years-old. Magical thinking and TAF develop and increase throughout childhood, peak at around age 10, before fluctuating in adolescence (Bolton, et al., 2002). Sillence (2010) found that children aged 9 to 11 years believed the basic premise of the experiment. In addition, children aged 9 to 11 have developed responsibility beliefs (Barrett & Healy, 2003), thereby allowing the impact of responsibility appraisals to be examined.

2.3.1 Inclusion and exclusion criteria.

Children at participating schools were included if they were 9 to 11 years-old. Exclusion criteria were: non-English speakers, children with special educational needs (as determined by a teacher), children with colour blindness, children with a diagnosis of epilepsy, children with fears or worries that impacted on their life, as reported by parents, or who scored above the clinical cut-off (raw score >24 for girls or >21 for boys) on a screening tool for anxiety (Multidimensional Anxiety Scale for Children Short Version; MASC-10) (March, 1998). Children who self reported elevated anxiety took part in an adapted version of the experiment (Appendix U) which did not induce anxiety. Their results were not included in the experimental dataset or subsequent analyses.

2.3.2 Sample size.

Few studies of this nature have been conducted and as such, it was difficult to determine an appropriate sample size. Rassin, Merckelbach, Muris and Spaan (1999) reported an effect size (Cohen's d) of 0.9 for the number of intrusions (reported post-experiment), and an effect size of 1.4 for efforts to avoid thinking the target word. Further measures of 'signal-interrupting' button pressing and feelings of responsibility were answered by the experimental group only and as such effect sizes cannot be calculated. In an experiment manipulating

responsibility, Reeves, Reynolds, Coker and Wilson (2010) found effect sizes ranging from 0.56 to 0.80 for obsessive-compulsive type behaviours post manipulation.

In a more direct comparison, Sillence (2010) reported a medium effect size of 0.55 (Cohen, 1992) for the between-group difference of thought control. The modified experiment used here was designed to induce a stronger sense of thought-action fusion and elevated levels of temporary anxiety. Given this, a medium effect size of 0.5 was assumed. Along with a power of 0.8 and a statistical significance of .05, a power calculation indicated that 50 children per group would be required, resulting in a total of 100 children.

2.3.3 Recruitment.

Participants were recruited from three primary schools in Peterborough. Twenty schools were contacted by letter (Appendix A) and given information about the study (Appendix B). Eighteen schools were chosen at random from an online school directory while two schools were contacted due to a connection with the researcher. Letters were followed by a phone call to assess interest and offer the opportunity to ask questions. Three schools demonstrated an interest in taking part. The researcher arranged to meet the head teacher to discuss the study in more detail. All three consented to taking part. Information about these schools is in Appendix C. Participating schools were offered a £2 book voucher for every child taking part.

An opt-in procedure was used for recruitment. The researcher presented information about the project to appropriate year groups at school assemblies. Information packs were then handed out and taken home by each child. These contained information sheets for parents (Appendix D) and children (Appendix E), a demographic questionnaire (Appendix F) and a consent form (Appendix G), along with an envelope for returning the form to the school office. The researcher's contact details were included allowing parents to get in touch with questions should they want to.

Following the initial assemblies, 120 information packs were handed out to school A, a further 110 were handed out at school B and 55 handed out at school C (a one-form entry

school). As the research was conducted in school, additional children showed interest and asked for another information pack to take home. These were not given to those whose parents had already said no. A further 65 were handed out to school A, a further 32 at school B and 20 at school C. 57 consent forms were returned at school A (31%), 23 were returned at school B (16%), and 26 were returned at school C (35%). This was an overall response rate of 26%.

A total of 106 children were given consent to take part. Of these, teachers advised that three should not take part: one due to a moderate learning disability, and two due to insufficient English language abilities, with English being a second language. Of the 103 taking part, one child was entered into the modified version of the experiment due to a MASC score above the cut-off set. One child struggled to attend to the full experiment and failed to complete the computer task. One child's data was lost due to computer error. The final data set consisted of 100 participants; 47 within the experimental group and 53 within the control group.

2.3.4 Demographics.

The final 100 participants were all between the ages of 9 and 11. Forty-four participants were 9 years-old, 46 were 10, and just 10 were 11 years-old (due to the time of year, only those with birthdays between September and November had turned 11). The mean age was 10 years and 1 month. 48% were male and 52% were female. 63% were White British, 24% were Asian or Asian British, 6% described themselves as Mixed ethnicity, 3% were Black or Black British and 2% were Chinese or of other ethnic origin. 2% did not report their ethnicity.

2.4 The Experimental Task

2.4.1 Development of the experimental task.

The experimental task was heavily based on that designed by Sillence (2010) (outlined in section 1.9). This was based on an earlier experimental paradigm by Rassin and colleagues (1999).

While successfully manipulating TAF, Sillence's design required further refinement to remove the previously discussed confounds. The TAF induction was extended to include a

negative event (the 'crashing' of the computer), which may or may not be the result of 'strong thoughts'. This was expected to counter any positive mood induction, more closely reflect the likelihood TAF concept, and deliver the required feelings of anxiety. In addition, a measure of magical thinking was included, three visual analogue scales (VAS) of anxiety were used allowing assessment of reliability, further thought control items were included, and the timing of the measures was altered to capture feelings at their peak.

2.4.2 The modified experimental task.

All children taking part were told that the researcher was testing a special helmet designed to help children who cannot speak easily. They were told that the researcher was interested in how they felt about using the helmet and whether they thought it worked. To start with, they were asked to complete some questionnaires and the anxiety screening measure. They were then randomly allocated to the experimental or control group. The helmet was placed on the child. Children then completed the first of three visual analogue scales for anxiety. They were then shown a series of images on the computer and asked to think about and visualise the colour red to try to alter the colour of the images.

Children in the experimental condition were shown images that became 'redder'. The series of images ended with a blue screen reporting an 'unexpected error'. The error message outlined three possible causes of the error including 'strong thoughts causing electromagnetic overload' (TAF). This message was read aloud by the researcher who acted surprised.

Children in the control group were shown images that remained the same colour throughout. The images ended with a neutral screen (no TAF). See section 2.5.2 on picture selection and tinting.

Both groups were then told that:

"The computer needs to do some background readings so we'll let it read your brainwaves. You don't have to think about anything in particular, just remember that the computer is very sensitive and very expensive, and can be damaged by strong thoughts. If you have a thought that

you worry could damage the computer, you can press the disconnect button which will

disconnect the helmet from the computer for a second so that your thought doesn't reach the

computer. You can do this every time you have a thought that you worry might damage the

computer".

Before the 'background reading' began, children completed a second VAS. During the 'background reading', a moving status bar suggested the computer was actively reading brainwaves. A disconnect button was visible beneath. At the end of the 'background reading', children completed a third VAS. The helmet was then removed and the children were asked to complete the final questionnaire while the researcher 'checked the computer'.

The final experimental paradigm is shown in Figure 2 at the end of this chapter. The task instructions are included in Appendix H.

2.5 Experimental Equipment

2.5.1 The helmet.

The helmet was that used by Sillence (2010). Based on the Emotive EPOC neuroheadset by Emotiv Systems, the helmet was designed and constructed by a professional model maker (Figure 1). It was plastic and designed to fit different head sizes. It has a connected wire with a bogus USB port, making it connectable to a computer. Particular attention was paid to carefully handling and 'fitting' the helmet on participants, adding to the illusion of it being expensive technological equipment.

Figure 1: The helmet.

2.5.2 IAPS picture selection and picture tinting.

A series of 60 images used by Sillence (2010) were shown to all children. The images were selected from the International Affective Picture System (Lang, Bradley, & Cuthbert, 2005), designed to provide standardised colour images rated for affective valence and emotional arousal. Sillence selected images rated as neutral in valence, and low in arousal (i.e. between 4.5 and 6.5 for valence, and below 6 for arousal). Images deemed to be inappropriate for children, or too red in colour, were excluded and sixty images were randomly selected from those remaining (Appendices I and J).

For the experimental group, the images were tinted to become increasingly red after four images. This delay was built in to help convince participants that the helmet had 'tuned' into their thoughts. The increasing tint varied around a mean. Specific settings are outlined in Appendix K. The control images were not changed.

2.6 Measures

2.6.1 Demographic questionnaire.

A demographic questionnaire was completed by parents to collect information on children's age, gender and ethnicity as well as data relating to the exclusion criteria (Appendix F).

2.6.2 Baseline variable measures.

2.6.2.1 Multidimensional Anxiety Scale for Children Short Version: MASC-10 (March, 1998).

The MASC-10 is a 10-item self-report scale used as a screening tool for anxiety symptoms among young people aged 8 to 19. Each item contains a short statement and a four-point scale to indicate agreement (1 = never, 4 = often). The MASC-10 has excellent test-retest reliability (intraclass correlation coefficient (ICC) = 0.85) among children aged 8 to 12 years (March, Sullivan, & Parker, 1999). Internal consistency is satisfactory (α = .90) (March, et al.,

1997). Rynn and colleagues (2006) have also demonstrated that the MASC-10 can distinguish between anxiety and depression in a clinical paediatric population.

The MASC was used to identify children with high levels of anxiety who were unsuitable for the experiment. This measure is not included in the appendices due to copyright.

2.6.2.2 Responsibility Attitude Scale: Adapted version: RAS-A (Salkovskis, et al., 2000).

The RAS is a 26-item questionnaire designed to assess general beliefs about responsibility using a seven-point scale ranging from 'totally agree' to 'totally disagree'. This measure has excellent internal consistency ($\alpha = .92$) and test-retest reliability ($r = .94$) in adults (Salkovskis, et al., 2000). The RAS has been adapted (RAS-A) for use with adolescents aged 13 to 17 years (Mather & Cartwright-Hatton, 2004). The RAS-A has good internal consistency ($\alpha = .90$) and test-retest reliability (ICC = .90) (Nunnally, 1978). The RAS has also been used with children as young as 10 (Reeves, et al., 2010). This 20-item version has been shown to have acceptable internal consistency ($\alpha = .78$). Scores range from 20 to 140 with low scores indicative of high levels of inflated responsibility. This measure was used in this study to assess and control for inflated responsibility beliefs. Adjustments to the wording of two items, made by Sillence (2010) to improve understanding, were included (Appendix L).

2.6.2.3 Thought-Action Fusion Questionnaire – Adolescent version: TAFQ-A (Muris, et al., 2001).

This measure, designed to assess TAF-morality and TAF-likelihood, consists of 15 short vignettes, each followed by a statement and a four-point scale of 'not at all true' to 'very true' (Appendix M). Satisfactory psychometric properties were demonstrated for a Dutch adolescent sample with high internal consistency ($\alpha = .84$) (Muris, et al., 2001). This measure has not been normed on a younger population but was used successfully by Sillence (2010) with minor changes to the wording of one item. This version has been used to measure and control for baseline thought action fusion beliefs.

2.6.2.4 Magical Thinking Questionnaire: MTQ (Bolton, et al., 2002).

The MTQ is a self-report measure designed for use with children (Appendix N). It contains 20 questions relating to both thought and action-based magical thinking. Responses are made on a 3-point scale of yes, no or maybe. These are given scores of 2, 0 and 1 respectively giving a possible range of 0 to 20 for each subscale and an overall magical thinking score of between 0 and 40. It also includes 10 items designed to assess bias for responding 'yes' or 'no'. It is the only measure available devised specifically for children, that assesses a broader magical thinking style. Test-retest reliability has been shown to be high in a sample of 5 to 17 year-olds ($r = .91$) (Bolton, et al., 2002). There is no information available on the validity of the MTQ.

2.6.3 Dependent variable measures.

2.6.3.1 Visual Analogue Scales for anxiety: VAS (Bernstein & Garfinkel, 1992).

The original VAS for anxiety is a single item taken from the Visual Analogue Scale for Anxiety-Revised (VAA-R). It is sensitive to changes over short time periods (Bernstein et al., 1994). A computerised version, as used by Sillence (2010), is used in this study. Participants are asked to indicate, using the cursor, their level of anxiety on a continuous line from 'jittery/nervous' to 'steady'. The program records the placement of the cursor, translating it into quantitative data. To increase reliability, two additional VASs were included (Appendix O), one of which was reversed to reduce acquiescence bias ('calm/chilled' to 'worried/uneasy', and 'scared/afraid' to 'unafraid/confident').

2.6.3.2 Measure of TAF-manipulation, probability of harm, responsibility and thought control efforts.

Fifteen items with five-point scales ranging from 'completely agree' to 'completely disagree' were used (Appendix P). These were based on those used by Sillence (2010) and Reeves and colleagues (2010). Sillence's four-item measure of responsibility for harm included two items relating to responsibility, one item relating to severity and one item relating to probability of harm. In this study, two additional items relating to probability of harm were

included and this was treated as a distinct dependent variable. The severity item was removed and in its place, an additional responsibility for harm item was included. Items were also added to improve the reliability of the thought control measure and reverse items were introduced to reduce acquiescence bias. The final fifteen items assessed perception of TAF ('I was able to make the pictures redder with my thoughts', 'I found it difficult to make the pictures redder' and ' I am confident that I changed the colour of the pictures with my thoughts'), probability of harm ('Some of my thoughts might have damaged the computer', 'It is unlikely my thought have damaged the computer' and 'It is possible my thoughts have damaged the computer'), responsibility for harm (If the computer has been damaged it will NOT be my fault', 'If the computer has been damaged it will be because of my thoughts' and 'If the computer has been damaged I will feel bad'), efforts to control thoughts ('I tried not to think any strong thoughts in case I damaged the computer', 'I tried to stop thinking altogether', 'I tried to think about things that wouldn't damage the computer' and 'I didn't change what I was thinking about') and reasons for button pressing ('I pressed the button only when I had a thought that could damaged the computer' and 'I pressed the button to be on the safe side'). To understand worrying thoughts, and efforts made to control thoughts, two open questions were also included.

2.6.3.3 Thought neutralising (button pressing).

A 'disconnect' button is displayed on screen during the final stage of the experiment. Children were instructed to use this button to disconnect the helmet if they had a 'strong thought' which they worried could damage the computer. This was recorded automatically and used as an index of neutralising efforts. Two questions with five-point scales were included on the final questionnaire, to be completed only by those who had pressed the button.

2.7 Ethical Considerations

This research followed the ethical guidelines of the British Psychological Society, the American Psychological Association and the Royal College of Paediatrics. It was reviewed and approved by the University of East Anglia, Faculty of Health Research Ethics Committee (Appendix Q).

2.7.1 Consent.

Written consent from a parent was required to participate. Parents were sent information sheets (Appendix D) explaining the study. The need for short term deception of the children was explicitly described, along with the reason for this. Contact details of the researcher were included. If they were happy for their child to participate, parents were asked to complete and return a consent form.

Child assent was also gained. Child-friendly information sheets (Appendix E) were sent home in the information packs and also read aloud by the researcher. All participants were told that they did not have to take part and that they could withdraw from the research at any point without providing a reason. An opportunity to ask questions was provided. Children who wanted to take part completed an assent form (Appendix R).

2.7.2 Anonymity and confidentiality.

All data were managed in accordance with the Data Protection Act. All participants were identified using unique identity numbers. The raw data were anonymous and confidential. It was stored in a locked cupboard at the researcher's home. Consent and assent forms were stored separately from the experimental data and destroyed after the data were analysed and written up. The audio recordings were also kept anonymous and confidential. The independent assessor was the only person aside from the researcher to hear the recordings and was given no additional information about the participants. The audio-recording device was stored in a locked cupboard. Once uploaded to a computer, the recordings were stored in a password protected file and destroyed when the research was completed. No identifying material relating to the participants, the parents or the schools is included in this report.

2.7.3 Deception.

Parents were fully informed of the research prior to giving consent. They explicitly consented to their child taking part in an experiment in which there was deception. Children were told what the procedure involved but were not aware of the deception. Children were fully

debriefed in a group once all participating children from that school had completed the experiment.

The British Psychological Society (BPS) guidance on deception in research (Working Party on Ethical Guidelines for Psychological Research, 2010) states that deception is acceptable only when an essential element of the research would be otherwise compromised, providing this is done in a way as to protect those involved. For the experimental manipulation to work in this study, some deception was essential. The BPS guidance was followed in full and the effects of the deception were minimised in the manner outlined below.

The extent of the deception was that children were told that the helmet was real. The purpose of the study, that the researcher wanted to know their thoughts and feelings about the task, was truthfully told. The research protected the dignity of the participants throughout by respecting their willingness to take part, minimising the extent of the deception, making the experiment an enjoyable experience for them, and by debriefing in a manner to minimise embarrassment. They were told that the helmet was designed to look like real helmets thereby making it highly convincing. They were also told that some children saw images that did change colour while others did not; explaining why some believed that the helmet worked more than others.

In withholding information from participants, potential for harm was minimised. In the unlikely event that distress was experienced, strategies for managing were fully described. Furthermore, it was felt that the deception was unlikely to result in feelings of discomfort, anger or distress given that Sillence (2010) reported no adverse reactions from participants. This is deemed a central factor in determining the acceptability of deception (Working Party on Ethical Guidelines for Psychological Research, 2010). The children were fully debriefed and provided with the reasons for the required deception (Appendix T). During the debrief session, children were provided an opportunity to ask questions and offer feedback on their experience. They were thanked for their contribution to the research.

2.7.4 Managing distress.

Given that some elements of the procedure were designed to induce temporary mild anxiety, careful consideration was given to minimising and managing any distress among participants:

1. More vulnerable children, who were reported to have high levels of anxiety according to their parents, were excluded from the research.

2. Children's anxiety levels were monitored prior to the experiment using the Multidimensional Anxiety Scale for Children (MASC-10). Each child's score was checked before beginning the procedure. One child had a score above the clinical cut off and so was entered in the modified version of the experiment (Appendix U).

3. By introducing the experiment and completing initial measures in small groups, the researcher was able to build a trusting rapport with the children, thereby putting them more at ease.

4. Anxiety and distress were monitored throughout the experiment, explicitly by asking the child to self report using the visual analogue scales, and indirectly through observation. The researcher, experienced in working with, and conducting research with children, was present throughout and alert to any signs of distress.

5. The children were given a 'stop' sign which they could hold up to stop the procedure at any point. None of the children chose to do this.

6. If any child had become distressed, the experiment would have been stopped immediately and the researcher would have provided comfort and reassurance. All children were informed prior to the procedure that should they become distressed, the incident would be mentioned to their teacher. None of the children became distressed.

7. During debriefing, the researcher checked that no child was upset once the deception had been revealed. Children were given the opportunity to provide feedback on their experience.

2.8 Procedure

The procedure is outlined is Figure 2 and verbatim instructions are outlined in Appendix H.

Children from schools in and around Peterborough were recruited to take part in the research. Having met with the school head teacher, arrangements were made for the researcher to speak at Key Stage Two (Years 5 and 6) assemblies. This was used to talk about psychology and research, to raise awareness and encourage children to discuss taking part with their parents. Information packs were sent home with children on the same day, with consent and demographic forms to be returned to the school office within a deadline of a week.

Children who had parental consent were invited to take part in the research study during school hours. Children were taken in groups of five to a private room to read through an information sheet (Appendix E). They were invited to ask questions and the voluntary nature of the study was emphasised. Children who agreed to take part were asked to complete an assent form (Appendix R) and the MASC-10 anxiety screening tool. These were scored by the researcher before continuing. One child scoring above the clinical cut-off (raw score >24 for girls or >21 for boys), was entered into a modified version of the task (Appendix U) to allow them to take part without the risk of them becoming anxious. In line with ethical procedures, a letter outlining the child's elevated levels of anxiety was sent home (Appendix S).

While in their groups, the children were asked to complete the RAS-A, the TAFQ-A and the MTQ (Appendices L-N). They were then asked one at a time, to complete the experiment while the rest of the group returned to their classroom.

Once seated at the computer, the child's age, gender and participant number was entered into the computer by the researcher. The computer randomly assigned the child to the experimental or control group. The child was asked to complete the computerised VAS at the start with instructions and a demonstration given. The helmet was then placed on the child.

The instructions for the first part of the task, thinking about the colour red, were read aloud. Included within this was the introduction of a 'STOP' card which children could use to stop the experiment at any time. The children were told to click the 'next' button when they were ready. The children watched a series of 60 photographs. The images appeared on the computer screen at the rate of 1 per second. Showing all pictures took one minute. The researcher sat in the corner of the room, pretending to attend to a different task to ensure the child did not feel observed. The researcher monitored the child for any signs of distress.

Experimental group: The experimental group were shown images which had been made approximately 30% redder. At the end of the images, a blue error screen appeared reporting that an unexpected error had occurred and that application had been terminated. It stated that:

"A fatal exception OE has occurred at 0028:C0068f8 in HELMETDRV.SYS[01] + 000059F8. The current application has been terminated.

This error can be caused by:

- *Insufficient processing capacity*

- *Strong thoughts causing electromagnetic overload*

- *Damaged or faulty hardware*

Please contact an administrator for assistance"

On notification from the child, the researcher read the statement aloud. The computer was then 'rebooted' (by pressing SHIFT and X; a command unknown to the children) and the 'finish' screen, seen by the control group, appeared.

Control group: The control group saw the same set of photographs without the additional red effect. At the end of the images, a 'finish' screen appeared instructing them to let the researcher know.

From here, the next set of instructions were read aloud to both groups, including the introduction of the button-pressing to prevent worrisome intrusive thoughts 'reaching' the computer. The researcher moved the screen on by clicking 'next'. Children completed the VAS Time 2 before the second phase of the task (the background brainwave reading) commenced. Again, the researcher attended to a different task while remaining alert to any signs of distress. If any child had appeared distressed at any point throughout the experiment, the researcher would have stopped the experiment and reassured the child before notifying their teacher.

The 'brainwave reading' lasted for one minute. Onscreen, a moving 'signal level' bar indicated that the helmet was 'reading' thoughts, while a status bar displayed progress. It was hoped this might inform the children how long this element of the task would last keeping them concentrating for the full length of time. A 'disconnect' button was displayed clearly below. This could be pressed as many times as they liked within the time frame, although freezing for a second each time it was pressed to represent the disconnection.

Once completed, a third VAS appeared and children were asked to complete it. No other acknowledgement or reassurance was given. On clicking 'next', a screen indicating the end of the experiment appeared. The helmet was removed and the child was asked to fill in the final questionnaire relating to their experiences of the experiment (Appendix P). Once finished, the child was reassured that the computer was not damaged and that they had done a good job. They were given a small prize, and taken back to their classroom.

The experiment itself lasted approximately 15 minutes once the baseline questionnaires were completed (a total time of approximately 45 minutes). Once all participating children from the school had taken part, they were brought together for debriefing (Appendix T). This was done to ensure the experiment was not discussed and invalidated before all children had participated. The schools were given a £2 book voucher for every child that participated.

2.9 Blinding

Participants did not know that there were two conditions or that they had been randomised. However, due to the 'computer crashing' element in the procedure, the researcher was not blind to the allocation. To minimise potential bias, verbatim instructions were given to each child and were audio-recorded. An independent researcher, who was blind to the randomisation, listened to 40% of the recordings, selected at random, and was asked to assess which condition the recording came from. This formed a check of researcher bias.

Figure 2: Procedure. Diagram of Procedure, with modifications made in italics.

Redder images *ending with computer 'crashing'*
Error message read aloud

Experimental group

RAS
MTQ
Recruitment → MASC → (randomised) → VAS T1 → Instruction to → Shown images
(Scored by researcher) TAFQ-A **think 'red'**

Control group

Normal images

(Any above clinical cut off complete modified version and excluded from results)

Calibration screen. Background reading needed. → *VAS T2* → **Background reading** → *VAS T3* → **Measure of** *thought control,* → **Reward**
"Just remember strong thoughts can damage **(Button pressing)** **responsibility, probability of** **and**
the computer" **harm and strength of belief** *reassurance*
(Button pressing introduced)

Chapter 3

Results

3.1 Chapter Overview

This chapter presents the results of data analysis. Demographic data are presented, along with the internal consistencies of the measures used, data screening and the descriptive statistics of each variable. Group comparisons of baseline variables are included as a further check. Primary analysis is then presented, including a manipulation check and group comparison on the dependent variables. Each hypothesis is considered in turn with analysis of the association between TAF and the dependent variables, followed by the association between responsibility and the dependent variables. Thought control is then considered, followed by the relationship between magical thinking and TAF. Additional analyses have been included. The chapter ends with a summary of the results, considering each hypothesis in turn.

3.2 Treatment of Data

Data were entered into PASW Statistics Data Editor (SPSS 18.0). The data was screened for inaccuracies, outliers and missing data. Data from one participant were lost due to computer error. Another participant failed to complete the computer task so their data were excluded from analysis. One participant was not randomly allocated because their score on the MASC was above the clinical cut off. Their data were removed from further analysis. Missing data points from the questionnaire data were minimal and appeared random. Pairwise deletion was used.

3.3 Demographic Data

The demographics of the sample as a whole, and the two groups were examined. Table 2 below displays the gender distribution across the two groups. There was no significant association between gender and group membership, $\chi^2 (1) = 0.334$, $p = .564$.

Table 2

Gender Distribution for the Whole Sample and Two Groups.

	N	Females	Males
Whole Sample	100	52	48
Control Group	53	29	24
Experimental Group	47	23	24

The mean age for the overall sample was 9.66 years (0.66 SD). The range was from 9 years 2 months, to 11 years 2 months. There was no between groups difference in age ($F = 0.68$, $p = .946$).

The sample was predominantly White British (63%) with a further 24% Asian or Asian British, 6% of Mixed ethnicity, 3% Black or Black British, 2% Chinese or other ethnic origin, and 2% unreported. Pearson's Chi-Square test again revealed no significant difference in ethnicity across the two groups, $\chi^2(4) = 5.135$, $p = .274$.

3.4 Internal Consistency of Measures

The internal consistency of the scales used was checked using Cronbach's alpha (α) (Table 3). An alpha value of .80 and above is considered indicative of high internal consistency or reliability (Bryman & Cramer, 1990) although others suggest .70 and above is acceptable (Spector, 1992). As expected, the published, pre-tested questionnaires, including the MTQ and the RAS-A had high internal consistencies. The MTQ-Action subscale was just below the accepted level. This was increased to .693 by removing item 8 and item 15. The latter caused some confusion, from the researcher's observations, and was missed out by 8 participants. This 8-item version of the MTQ-Action is used from here on. The TAFQ-A, designed for adolescents, was reported to have acceptable internal consistency (Sillence, 2010) and this was replicated.

The dependent measures designed by the researcher had low internal consistency, suggesting that the items did not all reliably capture the same construct. These were improved where possible, removing items with lower item-total correlations. A two-item version of the probability of harm measure and the thought control measure were higher in internal reliability and so used for analysis. The internal reliability for the responsibility for harm measure was low and could not be improved upon. It was decided that this measure would be used for analysis with appropriate caution in subsequent interpretation. The VAS scale demonstrated very high internal consistency.

Table 3

Internal Consistency of Measures

Measure	Cronbach's Alpha (α)	Items
MTQ-Thought	.809	Items 3, 6, 11, 13, 18, 19, 22, 25, 28 and 29
MTQ-Action (10 items)	.676	Items 1, 4, 7, 8, 9, 14, 15, 20, 24 and 27
MTQ-Action (8 items)	.693	Items 1, 4, 7, 9, 14, 20, 24 and 27. Items 8 and 15 removed.
MTQ-Total	.829	MTQ-thought + MTQ-Action (8 items)
RAS-A	.849	Items 1-20
TAFQ-A-Likelihood	.723	Items 2, 4, 6, 8, 10, 12 and 14
TAFQ-A-Morality	.848	Items 1, 3, 5, 7, 9, 11, 13 and 15
TAFQ-A-Total	.817	TAFQ-A-Likelihood + TAFQ-A-Morality
Induced TAF (3 items)	.854	Items 1, 2 and 3.
Probability of harm (3 items)	.568	Items 4, 5 and 6.
Probability of harm (2 items)	.751	Items 4 and 6. Item 5 removed.
Responsibility for harm (3 items)	.231	Items 7, 8 and 9.
Thought control (4 items)	.432	Items 10, 11, 12 and 13.
Thought control (2 items)	.637	Items 10 and 12. Items 11 and 13 removed.
VAS1	.932	VAS 1, 2 and 3 at time 1

3.5 Descriptive Data

Descriptive data for the baseline and dependent variables are shown in Tables 4 and 5 respectively. For the RAS-A only, a lower score reflects higher inflated responsibility. For the VAS, scores have been reflected for ease of interpretation; a higher score represents increased anxiety. Each variable was reviewed by group using P-P plots. Skewness and kurtosis values were also calculated for each variable by group. Since in a large sample, the null hypothesis can be rejected even with small deviations from normality, the outcome of these more formal inference tests were considered in line with the shape of the distribution seen.

Table 4

Descriptive data for the baseline variables

	Experimental Group				Control Group			
	Mean (*n*)	*SD*	Skew	Kurtosis	Mean (*n*)	*SD*	Skew	Kurtosis
MASC-10	8.45 (47)	5.13	0.46	-0.94	8.89 (53)	5.13	0.56	0.44
MTQ-Total	9.22 (46)	6.63	0.83	0.15	8.98 (52)	5.32	0.21	-0.78
MTQ-Thought	5.30 (46)	4.13	1.03*	0.97	5.33 (52)	3.41	0.15	-1.07
MTQ-Action (8 items)	2.96 (47)	2.73	0.93*	0.35	2.79 (53)	2.32	1.01*	1.58
RAS-A	74.81 (47)	19.42	1.10*	1.59	69.13 (52)	17.98	-0.08	-0.30
RAS-A-LG10 (transformed)	1.86 (47)	0.11	0.27	0.56	1.82 (52)	0.12	-0.78	0.43
TAFQ-A-Total	27.20 (46)	7.56	-0.01	-0.83	28.40 (53)	8.36	0.38	-0.57
TAFQ-A-Likelihood	10.11 (46)	3.30	1.57*	2.79*	10.87 (53)	3.57	0.87*	-0.23
TAFQ-A-Morality	17.26 (47)	6.58	0.22	-0.77	17.53 (53)	6.14	0.31	-0.61
VAS1	24.65 (47)	23.52	1.18*	1.39	25.48 (53)	24.78	1.12*	1.33

*Note: *p <.01. Standard errors for skewness = Experimental: 0.347 when n = 47, 0.350 when n = 46. Control: 0.327 when n = 53, 0.330 when n = 52. Standard errors for kurtosis = Experimental: 0.681 when n = 47, 0.688 when n = 46. Control: 0.644 when n = 53 and 0.650 when n = 52.*

Table 5

Descriptive data for the dependent variables

	Experimental Group				Control Group			
	Mean (*n*)	*SD*	Skew	Kurtosis	Mean (*n*)	*SD*	Skew	Kurtosis
VAS2	27.99 (47)	26.46	0.87	0.16	28.62 (53)	25.49	0.85*	0.57
VAS3	21.16 (47)	24.69	1.22*	1.07	23.69 (53)	25.15	1.30*	1.65
Button presses	0.34 (47)	0.94	3.53*	13.94*	0.38 (53)	1.00	2.72*	6.45*
Induced TAF	3.06 (47)	0.95	-1.35*	1.74	1.57 (53)	1.09	0.17	-0.88
Probability of Harm (2 items)	3.06 (47)	2.48	0.37	-0.60	2.21 (53)	2.11	0.76	-0.14
Responsibility for Harm	2.52 (47)	0.83	0.27	-0.67	2.58 (53)	0.82	0.09	-0.69
Thought control (2 items)	3.00 (47)	1.18	-1.10*	0.33	3.43 (53)	0.69	-0.86*	-0.67

*Note: *p <.01. Standard error for skewness = Experimental: 0.347, Control: 0.327. Standard error for kurtosis = Experimental: 0.681, Control: 0.644.*

A conservative significance value for skewness and kurtosis was used due to the large sample size. *Z* values of 2.58 and above were viewed as significant. Taking this, and the distribution plots into account, the following baseline variables were not normally distributed: the thought and action subscales of magical thinking, responsibility attitudes, TAF-likelihood, and state anxiety (VAS1). Transformations were attempted for each. Responsibility attitudes (RAS-A) was positively skewed. A logarithmic transformation (to the base 10) improved the distribution. Values of skewness and kurtosis for the transformed variable were non-significant. In addition, a Kolmogorov-Smirnov test was non-significant confirming no significant deviations from normality. For all others, transformations did not significantly improve the distributions. As the assumption of normality needed for parametric testing was not met, non-parametric analyses were used for these variables.

For the dependent variables, the following were judged to be non-normal: state anxiety at time 2 (VAS2) and 3 (VAS3), button presses, induced TAF and thought control. Again transformations were attempted but did not improve the distributions sufficiently to fulfil the assumption of normality. Non-parametric analyses were used instead. The variable 'button presses' was particularly non-normal. As only 16 participants had pressed the button, this was recoded into a dichotomous variable of 'presses' and 'no presses' (Table 6) and was not included in correlational analyses.

Table 6

Button presses as a dichotomous variable

	N	Presses	No presses
Experimental Group	47	8	39
Control Group	53	8	45

3.6 Comparisons by Group on Baseline Variables

The groups were successfully matched on age and gender. Baseline variables that were normally distributed, were compared by group using a Multivariate Analysis of Variance (MANOVA), chosen to reduce the chances of type one error. The assumptions of testing were met. Each variable was normally distributed and the data randomly sampled. Levene's test of equality of variances was non-significant for each variable. In addition, Box's M test revealed that the variance-covariance matrices were not significantly different across the groups, indicating that the assumption of homogeneity of covariance was met, $F(15, 34369) = 1.847$, $p = .23$. As a result of listwise deletion in multivariate testing, the total number in the analysis was 96.

The MANOVA was non-significant, indicating there was no significant difference between the two groups on any of these baseline variables, Wilks $\varLambda = 0.964$, $F(5, 90) = 0.679$, $p = 0.641$. All univariate F values were non-significant: MASC-10 ($F(1, 94) = 0.282$, $p = .597$), TAFQ-Morality ($F(1, 94) = 0.176$, $p = .676$), TAFQ-Total ($F(1, 94) = 0.687$, $p = .409$), RAS-A ($F(1, 94) = 2.774$, $p = .099$) and MTQ-Total ($F(1, 94) = 0.053$, $p = .819$).

For baseline variables that were not normally distributed, the non-parametric equivalent of Wilcoxon rank-sum test (or Mann Whitney test) was used. There were no significant differences between the two groups on these measures: TAFQ-Likelihood ($U = 1074$, $z = -1.024$, $p = .306$), MTQ-Thought ($U = 1133.5$, $z = -0.447$, $p = .655$), MTQ-Action ($U = 1244$, $z = -0.010$, $p = .992$) and VAS1 ($U = 1242$, $z = -0.024$, $p = .981$).

3.7 Manipulation Check: Induced TAF Across the Groups

Given that the aim of this experiment was to manipulate TAF beliefs the groups were compared on the dependent measure of induced TAF. Hypothesis one predicted that the experimental group would report higher levels of induced TAF. The Mann Whitney test showed that there was a significant between groups difference in induced TAF, $U = 376$, $z = -6.03$, $p <.001$, $r = -0.60$, with the experimental group demonstrating higher TAF belief than the control

group. This is equivalent to a large effect size of $r = 0.60$ (Rosenthal, 1991), indicating a successful experimental manipulation.

3.8 Comparisons by Group on Dependent Variables

Hypothesis two predicted that children in the experimental group would show significantly more neutralising behaviour (button pressing) and higher levels of anxiety, responsibility for harm, probability of harm and thought control than children in the control group. To assess the normally distributed variables of responsibility for harm and probability of harm, a MANOVA was used. Again, the assumptions for testing were met. Levene's test of equality of variance was not significant confirming homogeneity of variance across the two groups. Box's M was also not significant confirming homogeneity of the variance-covariance matrices, $F(3, 3278778) = 0.835$, $p = .475$.

The MANOVA was non-significant, Wilks $\Lambda = 0.962$, $F(2, 97) = 1.907$, $p = .154$. Univariate F values suggested that there were no differences in responsibility for harm, ($F(1, 98) = 0.136$, $p = .713$) or probability of harm ($F(1, 98) = 3.486$, $p = .065$) between the groups, although probability of harm approached significance.

To assess the non-normal variables, non-parametric Mann Whitney Tests were used with a bonferroni correction to account for the increased risk of type one error associated with multiple testing. There was no significant difference between the groups on state anxiety at time 2 ($U = 1199$, $z = -0.323$, $p = .747$), or time 3 ($U = 1193$, $z = -0.369$, $p = .712$) or on thought control ($U = 1039$, $z = -1.507$, $p = .132$).

Having recoded the button presses dependent variable into a categorical variable of 'presses' and 'no presses', Pearson's chi-square test was used to look for any association by group. There was no significant association between group membership and button pressing, $\chi^2(1) = 0.069$, $p = .793$.

3.8.1 **Differences in anxiety over time.**

Despite no significant differences in anxiety levels between the groups, changes in anxiety over the three time points were still of interest. The mean anxiety scores for each group are displayed in Figure 3 below. To examine change in anxiety over time, a Friedman's ANOVA was used. This allows a comparison of several related groups of non-parametric data (Field, 2009). Looking at the sample as a whole ($N = 100$), anxiety scores did significantly change over the three time points, $\chi^2(2) = 14.90$, $p = .001$. Split by group, these significant changes remained: experimental group ($n = 47$), $\chi^2(2) = 6.68$, $p = .035$ and control group ($n = 53$), $\chi^2(2) = 10.34$, $p = .006$.

Figure 3. Change in anxiety. Line graph illustrating mean anxiety at time 1, 2 and 3 by group.
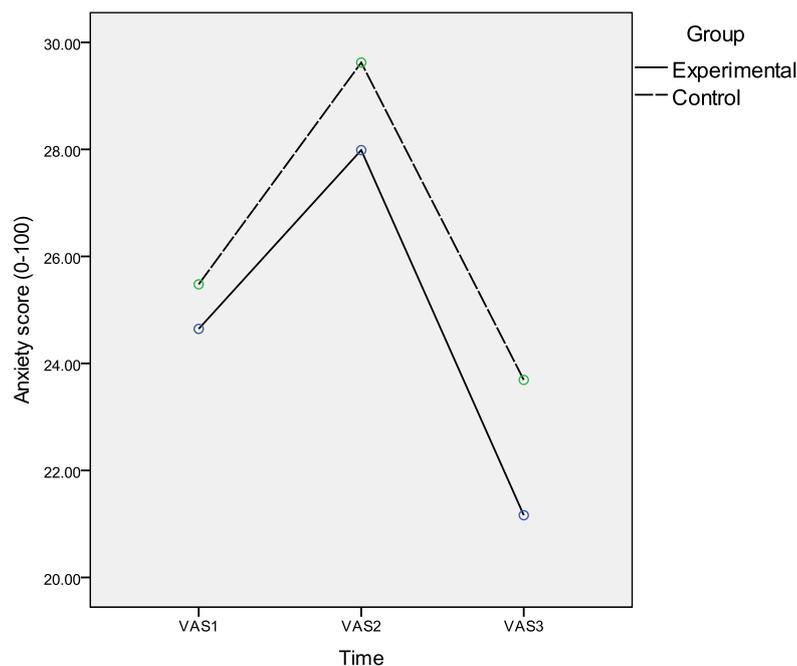
Wilcoxon Signed-Rank Tests were conducted post hoc for each change, for each group. To correct for multiple testing (6 comparisons), the Bonferroni correction was applied (0.05/6 = 0.008). For the experimental group, there was no significant difference between time 1 and time 2 ($z = 0.370$ $p = .711$, $r = -0.04$), or between time 1 and time 3 ($z = 2.031$, $p = .042$, $r = -0.21$). There was however, a significant decrease in anxiety between time 2 and time 3 ($z = 3.172$, $p = .002$, $r = -0.33$). Similarly for the control group, there was no significant difference in anxiety

between time 1 and 2 ($z = 1.439$, $p = .150$, $r = -0.14$), or between time 1 and 3 ($z = 0.726$, $p = .468$, $r = -0.071$). There was however a significant decrease in anxiety between time 2 and 3 ($z = 3.276$, $p = .001$, $r = -0.32$).

3.9 Associations Between TAF and Dependent Variables

3.9.1 Baseline TAF beliefs.

Hypothesis three stated that children's baseline TAF beliefs would be positively correlated with the dependent variables of button pressing, anxiety, responsibility for harm, probability of harm and thought control. A series of Pearson's and Spearman's correlations were used, depending on whether the assumption of normality had been met. These were conducted on the sample as a whole, and split by group (Table 7).

In general there were few significant correlations with no clear correlations across the board. Baseline TAF was not associated with efforts to control thoughts. TAF-likelihood and responsibility for harm were positively correlated within the control group ($r_s = .452$, $p < .001$) and the sample as a whole ($r_s = .303$, $p = .001$) but not the experimental group ($r_s = .104$, $p = .246$). TAF-total was significantly positively correlated to probability of harm within the experimental group ($r = .264$, $p = .038$), and within the sample as a whole ($r = .175$, $p = .042$) but not in the control group ($r = .134$, $p = .170$). TAF-morality was not associated with efforts to control thoughts, feelings of responsibility for harm or probability of harm.

Spearman's correlations were conducted on baseline TAF and state anxiety at time 2 (VAS2) and 3 (VAS3). Again there were no clear correlations across the board. TAF-likelihood was positively correlated with VAS2 within the control group only ($r_s = .248$, $p = .037$). For VAS3, contrasting results were found between the experimental group and the control group. VAS3 was significantly negatively correlated with TAF-likelihood within the experimental group, ($r_s = -.427$, $p = .002$) while VAS3 was significantly positively correlated with TAF-likelihood within the control group, ($r_s = .435$, $p = .001$). TAF-morality was not correlated with state anxiety at either time point.

To further investigate the correlation between baseline TAF and anxiety levels throughout the task, partial correlations were conducted in which anxiety at time 1 (VAS1) was controlled for. Given the VAS data was not normally distributed, the results of this need to be interpreted with caution. The control group correlation at time 2 disappeared. In the experimental group, TAF-likelihood ($r = -.477$, $p < .001$) was negatively correlated to anxiety at time 3, when controlling for VAS1.

Table 7

Correlations between baseline TAF measures and dependent variables

	Whole Sample			Experimental Group			Control Group		
	TAF-Likelihood[1]	TAF-Morality	TAF-Total	TAF-Likelihood[1]	TAF-Morality	TAF-Total	TAF-Likelihood[1]	TAF-Morality	TAF-Total
Responsibility for Harm	.303**	.094	.221*	.104	-.017	.034	.452**	.199	.361*
Probability of Harm	.127	.099	.175*	.095	.187	.264*	.153	.014	.134
Thought Control[1]	.132	.031	.063	.190	.077	.112	.075	-.027	.011
VAS2[1]	.061	-.140	-.088	-.156	-.093	-.150	.248*	-.155	-.017
VAS3[1]	.041	-.117	-.096	-.427**	-.140	-.336*	.435**	-.076	.111
VAS 2[2]	-.019	-.142	-.121	.121	-.136	-.065	-.032	-.119	-.104
(zero order correlations)	(.168)	(-.118)	(-.020)	(.370)	(-.195)	(-.153)	(.264)	(-.051)	(-.076)
VAS 3[2]	-.100	-.119	-.136	-.477**	-.276	-.450**	.250	.022	.108
(zero order correlations)	(.206)	(-.070)	(.034)	(-.345)	(-.278)	(-.391)	(.603)	(.102)	(.332)

Notes: One tailed. *$p < .05$. **$p < .01$. Pearson's correlation unless [1] = Spearman's correlation coefficient. [2]Partial Correlation controlling for VAS1

3.9.2 Induced TAF.

Hypothesis four stated that induced TAF would be positively correlated with the dependent variables. Induced TAF was not normally distributed and so Spearman's correlations were used. Table 8 shows that there were few significant correlations between induced TAF and the dependent measures. Induced TAF was positively correlated with responsibility for harm within the experimental group only ($r_s = .285$, $p = .026$). Other correlations between induced TAF and the dependent variables were not significant although the correlation between induced TAF and thought control within the experimental group approached significance ($r_s = .215$, $p = .073$). Partial correlations between induced TAF and state anxiety at time 2 and 3 were conducted, controlling for anxiety at time 1. These were non-significant for both groups.

Table 8

Correlations between Induced TAF and dependent variables

	Induced TAF	
	Experimental Group	Control Group
Responsibility for Harm	.285*	.021
Probability of Harm (2 item)	-.205	-.137
Thought Control (2 item)	.215	-.106
VAS2	-.101	.104
VAS3	-.116	.043
VAS2 [1]	-.002	.203
VAS3[1]	-.082	.100

Notes: One tailed. *$p <.05$. Spearman's correlation coefficient unless [1] = partial correlation controlling for VAS1

3.10 Associations Between Responsibility and Dependent Variables

3.10.1 Baseline responsibility beliefs.

Hypothesis five stated that baseline responsibility beliefs (RAS) would be negatively correlated with the dependent variables (because RAS-A is reverse scored). A series of one tailed Pearson's and Spearman's correlations were used (Table 9). Baseline responsibility beliefs were significantly associated with subsequent responsibility for harm beliefs within the control group ($r = -0.493$, $p < .001$) but not the experimental group. There was a significant correlation for the experimental group between baseline responsibility and anxiety at time 2 (but not at time 3), and for the control group between baseline responsibility and anxiety at time 3 (but not at time 2). Finally, stronger baseline responsibility beliefs were associated with increased efforts to control thoughts but only within the control group ($r_s = -0.241$, $p = .043$).

Table 9

Correlations between baseline responsibility beliefs and dependent variables

	RAS-A (transformed)	
	Experimental Group	Control Group
Responsibility for Harm	-.115	-.493**
Probability of Harm (2 items)	-.133	-.207
Thought Control (2 items)[1]	-.060	-.241*
VAS2[1]	-.269*	-.154
VAS3[1]	-.100	-.270*

Notes: One tailed. *$p < .05$. **$p < .01$. Pearson's correlation unless [1] = Spearman's correlation

Hypothesis six stated that the relationship between induced TAF and the dependent variables would be moderated by responsibility beliefs. The only relationship found between induced TAF and the dependent variables was a significant positive correlation between induced TAF and responsibility for harm within the experimental group. Therefore only this relationship could be tested for a moderator in the form of baseline responsibility beliefs.

As recommended by Frazier, Tix and Barron (2004), the predictor (induced TAF) and moderator (RAS-A) variables were first centred by subtracting their sample means (using the experimental group data only). This reduces problems of multicollinearity, often seen when entering an interaction term into the regression equation. A product term representing the interaction between the (centred) predictor and moderator variable was then created (induced TAF x RAS-A). Exploratory correlations found no significant correlation between this interaction term and the outcome variable of responsibility for harm within the experimental group. As this correlation was not significant a multiple regression analysis was not performed. It can be concluded that baseline responsibility beliefs did not moderate the relationship between induced TAF and responsibility for harm beliefs.

Table 10

Correlations between outcome, predictor and moderator variables and interaction term in the experimental group

	Induced TAF (Predictor)[1]	RAS-A (Moderator)	Induced TAF x RAS-A (Interaction)
Responsibility for Harm (Outcome variable)	.285*	-.115	.000

Notes: One tailed. *$p < .05$. **$p < .01$. Pearson's correlation unless [1] =Spearman's correlation

3.10.2 Responsibility for harm beliefs.

Hypothesis seven stated that the relationship between induced TAF and the dependent variables would be partially mediated by experimentally induced responsibility beliefs. Within the experimental group there was a significant positive correlation between induced TAF and responsibility for harm but no significant association between induced TAF and the other dependent variables. As such, there is no scope for responsibility for harm to be playing a mediatory role.

*3.10.2.1 **Exploratory analyses: correlations with other dependent variables.***

Given the evidence for the association between inflated responsibility and symptoms among young people (Barrett & Healy, 2003; Libby, et al., 2004), exploratory correlations between experiment-related responsibility beliefs and the remaining dependent variables were conducted (Table 11). Responsibility for harm was associated with efforts to control thoughts within the experimental group. Responsibility for harm was associated with anxiety levels at time 2 and 3 in the control group only. Responsibility for harm and probability of harm were not significantly correlated.

Table 11

Correlations between Responsibility for Harm and other dependent variables

	Responsibility for Harm	
	Experimental Group	Control Group
Probability of Harm (2 items)	.029	.227
Thought Control (2 items)[1]	.294*	.172
VAS2[1]	.118	.244*
VAS3[1]	-.046	.366**

Notes: One tailed. *p <.05. **p <.01. Pearson's correlation unless [1] = Spearman's correlation

3.11 Thought Control

Given Sillence's (2010) findings of a significant association between induced TAF and efforts to control thoughts, hypothesis eight stated that induced TAF would predict thought control. There was no significant correlation between induced TAF and thought control and so further regression analyses were not conducted.

3.12 Magical Thinking and Thought Action Fusion

Hypothesis nine stated that magical thinking and baseline TAF beliefs would be positively correlated. Due to the directional hypothesis, a one-tailed test was conducted (using

the whole sample given these were baseline measures). Magical thinking and TAF were significantly positively correlated, $r = .214$, $p = .018$.

Examination of correlations between magical thinking and TAF subscales (Table 12) indicated that TAF- likelihood, and not TAF-morality, was associated with magical thinking, including both thought and action subscales.

Hypothesis ten predicted that magical thinking would be positively correlated with induced TAF. This was not the case; induced TAF was not significantly correlated with magical thinking, thought or action (Table 12).

Table 12

Correlations between TAF and magical thinking

	MTQ-Thought[1]	MTQ-Action (8 item)[1]	MTQ-Total
TAFQ-Likelihood[1]	.406**	.269*	.405**
TAFQ-Morality	.096	.071	.053
TAFQ-Total	.209*	.165	.214*
Induced TAF[1]	-.026	.080	.023

Notes: One tailed. *$p <.05$, **$p <.01$. Pearson's correlation coefficient unless [1] = Spearman's correlation coefficient.

3.13 Additional Analyses

3.13.1 Associations between anxiety and dependent variables.

The association between children's baseline anxiety, as measured by the VAS1, and the dependent variables was examined (Table 13). As the assumption of normality for VAS1 was not met and no prior predictions had been made, a series of two tailed Spearman's correlations

were conducted. As would be expected, self reported anxiety at baseline and at time 2 and time

3 were significant. Baseline anxiety was not significantly associated with subsequent

responsibility for harm, probability of harm or thought control in the experimental group. There

was a significant association between baseline anxiety and probability of harm in the control

group.

Table 13

Correlations between baseline anxiety and dependent variables

	VAS1	
	Experimental Group	Control Group
Responsibility for Harm	.074	.240
Probability of Harm (2 items)	-.210	.383**
Thought Control (2 items)	<.001	.028
VAS2	.672**	.556**
VAS3	.736**	.810**

Notes: Two tailed. *p <.05. **p <.01. Spearman's correlation

3.13.2 Button pressing.

Two questions relating to button pressing were included in the outcome measure

questionnaire. For the 16 children who pressed the disconnect button during the task, these

results can be considered a validation check to see if they pressed it in response to a intrusive

'strong' thought that may damage the computer, or whether they pressed it to be on 'safe side'.

A high score on each indicates agreement with the statement. Since some children pressed the

button more than once, it was possible for them to have agreed with both. Data were

significantly skewed (Table 14) and could not be transformed. A Wilcoxon signed-rank test

showed that there was no significant difference in the endorsement of each reason (z = 1.191, p

= .234).

Table 14

Descriptive data for questions relating to button pressing

	Experimental Group (*n* = 8)				Control Group (*n* = 8)				Whole Sample (*n* = 16)			
	Mean	*SD*	Skew	Kurtosis	Mean	*SD*	Skew	Kurtosis	Mean	*SD*	Skew	Kurtosis
Damage question	2.50	1.69	-0.83	-0.98	3.75	0.46	-1.44	<0.001	3.13	1.36	-1.71*	2.04
'Safe side' question	3.13	1.46	-1.76*	2.69	2.38	1.06	-0.05	-0.94	2.75	1.29	-0.74	-0.43

*Notes: *p <.05

3.13.3 Correlations among baseline variables.

There is evidence of an association between anxiety, TAF-likelihood and responsibility in children and young people (Matthews, et al., 2007; Muris, et al., 2001; Rachman, 1993; Rassin, et al., 1999; Salkovskis, et al., 2000). To investigate associations between baseline variables, Pearson's and Spearman's correlations were used.

Trait anxiety (MASC-10) was significantly correlated with state anxiety (VAS1), responsibility, TAF-likelihood and TAF-morality (Table 15). Trait anxiety was not significantly correlated with magical thinking. State anxiety at baseline (VAS1) was positively correlated with TAF-likelihood and negatively correlated with MTQ-Action. Responsibility and TAF (including both subscales) were also significantly correlated.

Table 15

Correlations between baseline variables

	$VAS1_1$	RAS-A (transformed)	TAF-Likelihood$_1$	TAF-Morality	TAF-Total	MTQ-Thought$_1$	MTQ-Action (8 item)$_1$	MTQ-Total
MASC-10	.334**	-.359**	.266**	.251*	.338**	-.072	-.054	-.070
$VAS1_1$		-.145	.212*	-.038	.039	-.104	-.213*	-.121
RAS-A (transformed)			-.254*	-.338**	-.421**	.020	.039	.034
TAF-Likelihood$_1$				-	-	.406**	.405**	.269**
TAF-Morality					-	.096	.071	.053
TAF-Total						.209*	.165	.214*
MTQ-Thought$_1$							-	-
MTQ-Action (8 item)$_1$								-

Notes: Two tailed. *p <.05, **p <.01. Pearson's correlation coefficient unless [1] = Spearman's correlation coefficient.

3.13.4 Open TAF questions.

Two open questions were included to gain some insight into the children's approach to, and experience of, the task; if they tried to be careful about what they thought about, how did they do this? What thoughts did they worry might damage the computer? The latter was used to see what, if any, thoughts they identified as 'strong thoughts' which could do damage to the computer. The answers were coded and categorised into themes.

As shown in Figure 4, 81% of participants made some attempt to be careful about what they thought about. 5%, all from the experimental group, said they made no attempt to be careful and 14% did not answer. The strategies used are broken down in Table 16.

Figure 4. Were the children careful about what they thought about? Bar graph, separated by group.
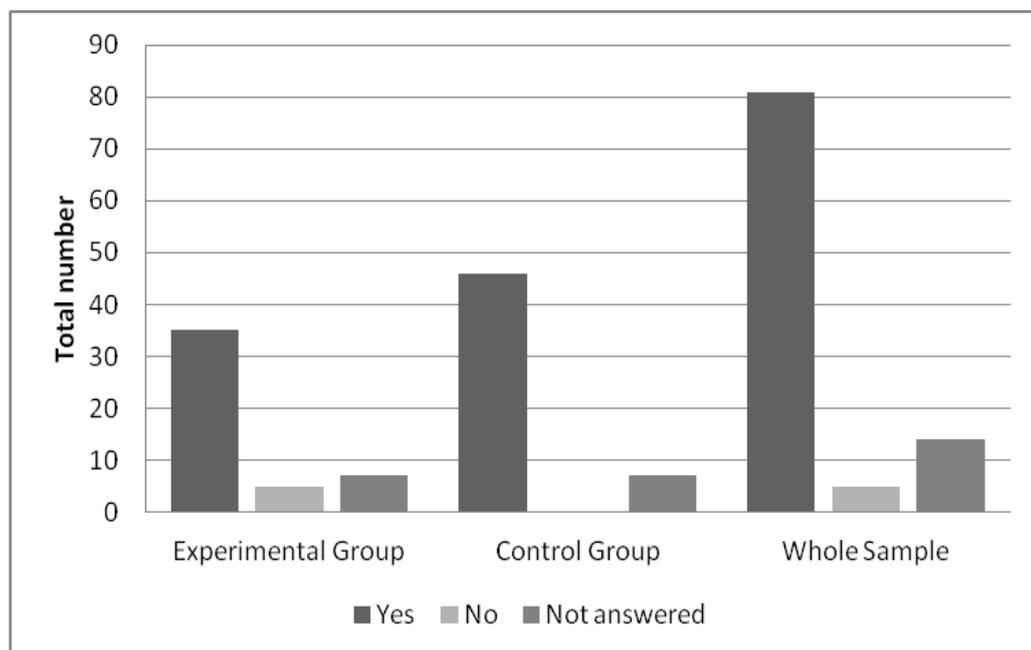
Table 16

How were they careful about what they thought about?

		Experimental Group	Control Group	Whole Sample
Thought control	Focus on one thought only	2	3	5
	Focus on 'red'	3	5	8
	Thinking about happy/nice/simple/calm things	12	22	34
Thought suppression	Avoided 'strong' thoughts	4	1	5
	Avoided painful/scary/upsetting/worrying thoughts	5	5	10
	Tried to stop thinking	5	2	7
	Pressed button	0	2	2
	Other	2	2	4
	No strategy	14	11	25
	Total	47	53	100

Table 16 highlights the mixture of strategies induced by the experimental task. A similar pattern can be seen across the groups. Of more interest are the three categories of thought suppression (22%), which has been linked to TAF-likelihood and the perpetuation of OCD symptoms (Altın & Gencoz, 2011; Rassin, Merckelbach, & Muris, 2000): avoidance of 'strong thoughts', avoidance of negatively charged emotional thoughts and efforts to stop thinking all together. Efforts to control thoughts accounted for 47%, 34% of which were efforts to focus on happy, nice, simple or calming thoughts, deduced by participants to be the opposite of 'strong thoughts'.

Many of the participants did show concern over the power of particular thoughts (Table 17). No discernible difference can be seen amongst the groups. 14% of participants cited specific distressing thoughts which they feared held the power to damage the computer. A

further 15% described emotionally charged thoughts, including angry, nasty or horrible thoughts. It is possible these related to specific examples which the children chose not to disclose or detail. Importantly 55% of participants offered no thoughts that they were concerned about.

Table 17

What thoughts did they worry could damage the computer?

	Experimental Group	Control Group	Whole Sample
Big/strong thoughts	5	5	10
Specific thoughts: Illness/blood/pain/fights/trouble/secrets/car crashes/dead people or animals	5	9	14
General emotional thoughts: Angry/negative/nasty/horrible/bad/ silly/excited thoughts	8	7	15
Deep or complicated thoughts: the future, maths	2	1	3
Red or other colours	1	2	3
No answer	26	29	55
Total	47	53	100

3.13.5 Check for Researcher Bias

As a check for researcher bias which may have been introduced into the instructions given following the experimental manipulation (after which point the researcher was not blind to the condition), a randomly selected sample of 40 extracts from the audio recordings were taken. An independent researcher, blind to the randomisation, was asked to listen to the recordings and assign each to the experimental or control condition. An accuracy rate of 43% was achieved; a rate below the 50% chance level. This is supportive of no researcher bias being present.

Chapter 4

Discussion

4.1 Chapter Overview

This chapter offers a summary of the main findings in relation to each hypothesis. This is followed by a methodological critique of the experimental procedure and the measures used. The main findings are then discussed and compared to previous literature. The implications for the theoretical understanding of OCD, as well as for the clinical assessment and treatment of OCD are considered. Ideas for future research are offered, followed by a final summary and conclusion.

4.2 Summary of Main Findings

4.2.1 Hypothesis 1: Manipulation check.

Children in the experimental group showed higher levels of experimentally induced TAF compared to those in the control group, supporting the hypothesis and verifying the manipulation.

4.2.2   Hypothesis 2: Between group differences.

Children in the experimental group did not have more neutralising behaviour (button pressing) or report higher levels of anxiety, responsibility for harm, probability of harm or efforts to control thoughts compared to those in the control group. This finding did not support the hypothesis. Overall levels of anxiety and button pressing were low. Both groups showed the same pattern of change in anxiety, with a significant reduction in anxiety between time 2 and 3.

4.2.3 Hypothesis 3: Associations between baseline TAF beliefs and dependent variables.

The hypothesis that children's baseline TAF beliefs would be positively correlated with the dependent variables was partly supported. TAF-total was positively correlated with probability of harm in the whole sample and the experimental group. TAF-likelihood was

positively correlated with responsibility for harm in the whole sample and the control group. TAF-likelihood was negatively correlated with anxiety at time 3 within the experimental group but positively correlated within the control group. TAF-morality was not correlated with any of the dependent variables. None of the TAF scales correlated with thought control.

4.2.4 Hypothesis 4: Associations between induced TAF and dependent variables.

This predicted that the strength of induced TAF would positively correlate with the dependent variables. In line with this hypothesis, induced TAF was positively correlated with responsibility for harm but within the experimental group only. No other significant correlations were found.

4.2.5 Hypothesis 5: Associations between baseline responsibility beliefs and dependent variables.

The hypothesis that baseline responsibility beliefs would be negatively correlated with the dependent variables (given reverse scoring on the RAS-A) was partially supported. Responsibility beliefs were correlated with experiment-related responsibility for harm beliefs in the control group. Responsibility beliefs were not correlated with probability of harm beliefs in either group. In the experimental group, responsibility beliefs were correlated with state anxiety at time 2 (but not time 3). In the control group, responsibility beliefs were correlated with anxiety at time 3 (but not time 2). Responsibility beliefs were correlated with thought control within the control group only.

4.2.6 Hypothesis 6: Baseline responsibility beliefs as a moderator.

Baseline responsibility beliefs did not act as a moderator between induced TAF and experiment-related responsibility for harm beliefs, contrary to the hypothesis.

4.2.7 Hypothesis 7: Responsibility for harm as a mediator.

This hypothesis predicted that the relationship between induced TAF and the dependent variables would be partially mediated by experiment-related responsibility for harm beliefs.

Given there were no significant correlations between induced TAF and the remaining dependent variables, there was no scope for responsibility for harm to play a mediatory role, failing to support the hypothesis.

There was a significant correlation between responsibility for harm and thought control in the experimental group. Significant correlations were also found between responsibility for harm and anxiety at time 2 and 3 within the control group.

4.2.8 Hypothesis 8: Thought control.

The hypothesis that induced TAF would predict efforts to control thoughts was not supported in the current study.

4.2.9 Hypothesis 9: Association between baseline TAF beliefs and magical thinking.

TAF-likelihood was positively correlated with magical thinking, both thought and action subscales, in line with the hypothesis. TAF-morality did not correlate with magical thinking.

4.2.10 Hypothesis 10: Association between induced TAF beliefs and magical thinking.

The hypothesis that levels of induced TAF would positively correlate with magical thinking was not supported.

4.2.11 Additional analyses.

4.2.11.1 Association between baseline anxiety and dependent variables.

State anxiety at baseline was positively correlated with state anxiety at time 2 and 3. State anxiety at baseline was also positively correlated with probability of harm within the control group only. It was not correlated with responsibility for harm or thought control.

4.2.11.2 Correlations among baseline variables.

Trait anxiety was significantly correlated with baseline state anxiety, responsibility, TAF-likelihood and TAF-morality. State anxiety was positively correlated with TAF-likelihood. Responsibility was correlated with baseline TAF. Baseline anxiety and responsibility were not correlated with magical thinking.

4.2.11.3 Open TAF questions.

The experience of intrusive thoughts and thought control efforts did not differ between groups. A large majority of participants said they were careful with what they thought about during the experimental phase of the task. Many participants were concerned about the power of particular thoughts including specific distressing events and more general emotionally charged thoughts. Thought suppression and thought control efforts to minimise 'strong thoughts' were recorded.

4.3 Methodological Critique

4.3.1 Design.

This study used a between-groups experimental design in which TAF was manipulated. With the exception of Sillence (2010), previous research into TAF among children has made use of correlational designs allowing only associations to be inferred. This has limited our understanding of the role of TAF in the development of obsessive compulsive behaviours. The strength of this experimental design is that it allows for the manipulation of a particular independent variable (TAF) and the randomisation of participants into an experimental and comparable control group. This has allowed a causal relationship between TAF and OCD-type behaviours to be examined in a non-clinical sample by removing most of the 'plausible alternative explanations'(Cook & Campbell, 1979).

4.3.2 Experimental manipulation.

Rassin and colleagues (1999) were the first to develop an experimental method to manipulate TAF. Based on this, Sillence (2010) developed a method to manipulate TAF in non-clinical children. She argued that this was also a more ecologically valid method because the children could "see the effects of their thoughts on a real life object" (p74). In addition, a self report measure of TAF belief was included. While TAF was successfully manipulated, a number of caveats were noted, as is often the case in developing experiments. In the current study, several adaptations were made to overcome some of the problems noted by Sillence (2010).

Firstly, while children were able to see the 'power' of their thoughts, they were not provided with evidence of a possible adverse event; the key to TAF-likelihood. As a result, Sillence found that children's anxiety was low at baseline and decreased throughout the experiment. In the current study, the TAF induction was extended to include a negative event (the 'crashing' of the computer), which may or may not be the result of 'strong thoughts'. This was expected to more closely reflect the likelihood TAF concept and deliver the required feelings of anxiety.

Higher levels of state anxiety at time 2 and probability of harm were found, compared to Sillence (2010). This suggests that the children were more aware and concerned by the *likelihood* of damage to the computer. This may form a strength of the study. However, these higher levels were seen across both groups. While the blue error screen may have raised anxiety in the experimental group, the 'possible damage' warning given to both groups may have elevated anxiety levels across the board. This warning was somewhat stronger in the current study. It was assumed that without evidence of their thoughts impacting the computer, the control group would be less concerned by this warning. This may not have been the case. It may be that while they did not believe they were personally influencing the computer, they believed it was possible in theory and so damage was still a risk. Indeed, the procedure may have

unexpectedly introduced a smaller level of TAF in the control group, limiting the success of the experiment and accounting for the lack of group differences seen.

Overall, levels of anxiety still remained relatively low. There was no between-groups difference. The children may therefore not have been anxious enough to fully elicit TAF beliefs. Given the strong evidence for the relationship between TAF and anxiety in the literature, it is most likely that the experiment format used here was not optimal.

A second caveat noted by Sillence (2010) was a possible positive mood-induction effect which may have interfered with the impact of TAF on neutralising behaviour. The inclusion of the negative event in the induction process was expected to counter any positive mood induction in the current study. From observations, the error message did cause children to become more serious, even when appearing to enjoy 'making' the images redder previously. However, without a measure of positive affect, the possibility of a positive-mood induction in the experimental group cannot be eliminated entirely.

Another possible weakness of the experimental design was that the inclusion of the blue error screen may have had an unanticipated effect, namely by its absence later in the experiment. For the experimental group, it is possible that without the blue error screen reappearing in the second phase of the task, they were reassured that the computer was not damaged, perhaps affecting levels of thought control and responsibility admitted to at the end of the task. This reassurance not available to the control group. In addition, to ensure the children did not definitively feel they had caused the damage, the error message provided several options, only one of which was due to strong thoughts. Again the control group were not provided with these alternatives. This may have altered levels of anxiety and responsibility experienced by the groups throughout the task, explaining some of the null and unexpected results seen.

4.3.3 Timing of measures.

A number of improvements were made to the timing of measures through the experimental procedure. In Sillence (2010), children were reassured that the computer was not damaged before they completed the final self report measures. In the current study, the researcher continued to 'check' the computer for damage while these measures were being completed. In addition, state anxiety was not captured at optimum times in the previous study; children could see that the computer was not damaged, and had already had a chance to neutralise any concerning thoughts before a post-baseline measure of anxiety was taken. In the current study, VAS2 was completed immediately after instructions for the experimental phase were given i.e. after warnings of damage to the computer were given but before any opportunity for neutralisation. VAS3 was taken at the end of the experimental phase, after neutralisation could have been completed but before reassurance about damage to the computer was given. This aimed to capture the process of anxiety expected within an OCD-type presentation and appears to have succeeded.

4.3.4 Blinding.

As a result of the experiment modifications, the study was not double blinded. While the researcher was initially blind to allocation, the researcher became aware of which group they were in according to whether a blue error screen appeared. Although not ideal, this was felt to be the best format for the study. This was considered during the planning stage and the influence of researcher bias was minimised through verbatim scripts and the checking of audio recordings by an independent researcher. An accuracy rating of 43% was achieved; a rate below the 50% chance level. This is therefore supportive of no researcher bias being present and forms a strength of the study.

4.3.5 Sample.

Sample size was based on a power calculation assuming a medium effect size. Groups were not of equal size due to randomisation by the computer and therefore the experimental

group was just below the target of 50. The sample of children was relatively diverse in terms of socio-economic status. It included children from minority ethnic groups, although reflected the predominantly White British population of the geographical area. Gender and ethnicity were balanced across the groups.

4.3.6 Baseline measures.

A number of well-validated baseline measures were used in this study. The RAS-A has good psychometric properties and provided a measure of responsibility beliefs comparable to much of the literature. Wording adjustments made by Sillence (2010) proved acceptable. Internal reliability was high. Similarly, the MASC-10 proved valuable in quickly identifying those with anxiety levels above a clinical cut-off. The MASC-10 has excellent psychometric properties for this age group.

The TAFQ-A again has good psychometric properties but has not been normed on the younger age range used here. It was noted that a small minority of the younger participants needed support with this measure. This introduces the risk of inaccurate responding and made the researcher's role in offering support vital. Positively, internal reliability proved acceptable suggesting no items were consistently misunderstood. This measure allowed comparison with findings by Sillence (2010) and by Muris and colleagues (2001) but not with that most commonly used in adult TAF studies; the Thought-Action Fusion Scale-Revised (Shafran, et al., 1996).

The inclusion of the MTQ proved valuable in the current study, allowing some exploration of the overlap between TAF and magical thinking. The MTQ was brief and acceptable to the participants. While testing of the MTQ is so far limited, available results show good psychometric properties. While the internal reliability of the measure as a whole and of the MTQ-Thought subscale was high, the internal reliability of the MTQ-Action subscale fell just below the acceptable level. This was improved by removing 2 items (questions 8 and 15).

The VAS for anxiety proved effective, brief to complete and acceptable to the children. VAS1, used as a baseline measure, correlated highly with the MASC-10 suggesting it was a valid measure of anxiety. For each time point, three VAS were used, allowing reliability to be calculated. Internal reliability was very high. A similar measure of mood may have proved useful, allowing changes in affect, other than anxiety, to be monitored.

4.3.7 Dependent measures.

The dependent measures used in this study were specific to the study, designed to capture experiment-related beliefs. A series of Likert scales were used, some of which had been used successfully in previous experimental studies (Reeves, et al., 2010; Sillence, 2010). A key strength of this study was the inclusion of the induced TAF measure which provided a valuable manipulation check for the study, as well as allowing further correlational analyses. This had high internal reliability.

The remaining dependent measures were less successful and prove a key limitation of the study. The responsibility for harm, probability of harm and thought control measures all had low internal reliabilities. It is not clear why this was the case. Reverse items had been introduced to reduce acquiescence bias but inter-item correlations were checked for any negative values. Face validity appeared reasonable and there was no evidence of misunderstanding.

The probability of harm and thought control measures were improved by removing items. The 2-item probability of harm measure met an acceptable level. The 2-item thought control measure fell just short of this level. The measure of thought control was expanded compared to that used by Sillence in an effort to establish this as an important variable and check reliability. It is hoped these final measures provided an adequate measure of these variables. However, given the contrasting results found relating to thought control (Sillence, 2010), it may be that the modified measure did not tap into the concept as well.

The responsibility for harm measure is a bigger concern in this study. The internal reliability was particularly low and could not be improved. It may not have reliably captured the construct. Two items were the same as that used by Sillence. One additional one was added but its removal did not improve consistency. Results derived from this measure need to be interpreted with caution.

A further disadvantage of these measures is that they cannot be easily compared to available literature. In addition, given that they are so linked to the task and the risk of damage to the computer, there is a risk of a social desirability effect in the children's answering. Nevertheless, they do maintain the benefits of being adaptable, brief and specific to the experiment.

The button presses dependent variable provided limited information in this study due to the small number of children opting to use the disconnect button. This is likely to reflect the low levels of anxiety experienced overall. It does however provide a creative measure of efforts to neutralise intrusive thoughts which adds to the illusion of, and engagement with, the task.

Finally, the inclusion of two open questions in the current study provided a unique insight into the intrusive thoughts experienced by children. It highlighted intrusions which were concerning to children, and the subsequent efforts they made to control these thoughts. These data were analysed using quantitative methods but could have been analysed using qualitative analysis.

4.4 Evaluation of Findings

The main findings of the experiment will be now be discussed in relation to theory and existing research. This is limited for a number of reasons: (a) there are a limited number of experimental studies available for comparison, (b) with the exception of Sillence (2010), all are based on adult samples, and (c) differing methods and measures are used.

4.4.1 Between group differences.

4.4.1.1 Button presses.

The overall rate of button pressing was low and did not differ between the groups. Rassin and colleagues (1999) reported a far higher amount of 'signal interrupting' button pressing with a mean of 5.2. This is likely to reflect the more severe consequence of *not* neutralising as well as the specific target word of 'apple'.

Behavioural neutralising has also been evidenced following experimental manipulation of TAF through sentence paradigms (Bocci & Gordon, 2007; van den Hout, et al., 2002; Zucker, et al., 2002). Bocci and Gordon (2007) reported that 75.5% of participants used at least one spontaneous neutralising strategy. Again, these behaviours are in response to a specific induced intrusive thought.

4.4.1.2 Anxiety.

Self reported anxiety did not differ between the groups and was low overall. This is inconsistent with existing experimental research in which TAF was manipulated. Anxiety has been shown to increase following manipulation (Bocci & Gordon, 2007; Rachman, et al., 1996; Rassin, et al., 1999; van den Hout, et al., 2002; van den Hout, et al., 2001; Zucker, et al., 2002). It is possible that the content of the TAF manipulation used in these studies was more anxiety provoking than that used in the current study. They implied harm to a loved one (Bocci & Gordon, 2007; Rachman, et al., 1996; van den Hout, et al., 2002; van den Hout, et al., 2001; Zucker, et al., 2002) or to another person (Rassin, et al., 1999) rather than to a computer. Anxiety levels in a non-clinical sample may be too low, limiting the reaction to the TAF-induction.

The significant drop in anxiety seen between time 2 and time 3 could be for several reasons. Participants may have used neutralisation strategies (besides button pressing) to alleviate feelings of anxiety (Rachman, et al., 1996; van den Hout, et al., 2001). Alternatively,

they may have experienced relief in finishing the task with no obvious signs of computer damage.

4.4.1.3 Responsibility for harm.

Levels of responsibility for harm did not differ between the groups. These findings are consistent with that found by Sillence (2010). Other experimental studies of TAF have not directly compared perceived responsibility in a TAF condition and no-TAF condition. Zucker (2002) found no group difference in levels of perceived responsibility when all participants had completed a TAF-induction procedure, but the experimental group had an educational message designed to reduce the effects of TAF.

4.4.1.4 Probability of harm.

Probability of harm did not significantly differ between the groups. Mean scores were higher and the between-group difference was closer to significance than that found by Sillence (2010). This may reflect the increased emphasis on potential damage to the computer in the current paradigm. A small to medium effect size of 0.37 (cohen's d) was calculated (Cohen, 1992). While unlikely, this may be indicative of limited power in the current sample. Again, none of the other experimental studies of TAF had a direct comparison of perceived probability of harm in a TAF condition and no-TAF condition.

4.4.1.5 Thought control.

In contrast to Sillence (2010), efforts to control thoughts did not differ between the groups. This null result may be due to measure and procedural changes (see sections 4.3.2 and 4.3.7). Rassin and colleagues (1999) found highly significant group differences in efforts to 'avoid thinking' following TAF manipulation. This may be the result of a more severe consequence if they thought the target word of 'apple'. In providing a specific target word, thought suppression efforts were perhaps more likely to be used.

While not directly comparable, other studies showed evidence of neutralising efforts, including thought suppression, following a sentence paradigm TAF-induction. In Bocci and

Gordon's study (2007), five participants made efforts to 'clear their mind'; one of many strategies. It may be that in the current study other tactics to prevent damage were being used by the experimental group and were not captured in the measures used.

4.4.2 Associations between TAF beliefs and the dependent variables.

TAF-likelihood beliefs were correlated with responsibility for harm beliefs in the control group, but not in the experimental group. However, induced TAF was positively correlated with responsibility for harm beliefs within the experimental group only. This suggests that those with stronger induced TAF felt more responsible for harm. Alternatively, these results may be reflective of the responsibility for harm measure and its limitations as discussed. This may explain why Sillence (2010) did not find a significant correlation between induced TAF and responsibility for harm beliefs.

Sillence (2010) also found no correlations between baseline TAF and the dependent variables. However, only TAF-likelihood was considered, and groups were not separated. In line with findings from the current study, Rachman and colleagues (1996) found a significant correlation between TAF and probability of harm and responsibility for harm.

TAF-likelihood was negatively correlated with anxiety at time 3 within the experimental group but positively correlated within the control group. Rachman (1996) and Van den Hout and colleagues (2002) found a positive correlation between TAF and evoked anxiety. Conversely, Bocci and Gordon (2007) and Van den Hout and colleagues (2001) found no correlation between TAF and anxiety. Rassin and colleagues (1999) found no correlation between TAF and levels of discomfort. The mixed results from this study therefore reflect contradictions in the existing literature. Finally, TAF-morality was not correlated with any of the dependent variables. This is in line with findings by Rachman and colleagues (1996).

4.4.3 Associations between responsibility beliefs and the dependent variables.

Baseline responsibility beliefs were significantly correlated with state anxiety at time 2 for the experimental group and with state anxiety at time 3 for the control group. This suggests

that while baseline responsibility beliefs may be connected to the experience of anxiety following TAF manipulation, this role is not clear cut and may be influenced by other factors. A different pattern was seen for experiment-related responsibility for harm beliefs. Significant correlations were found between responsibility for harm beliefs and anxiety at time 2 and 3 within control group, but not the experimental group. It may be that the impact of responsibility beliefs varied throughout the experiment. The impact of the blue error screen may have distorted levels of responsibility and anxiety felt in the experimental group.

There was a significant correlation between baseline responsibility beliefs and thought control within the control group but not the experimental group. This might suggest that the TAF-induction overruled this association in children in the experimental group. Indeed, there was a significant correlation between experiment-related responsibility for harm beliefs and thought control in the experimental group. This may suggest that the TAF manipulation formed an influencing factor; when TAF had been induced, responsibility for harm beliefs became dominant and were associated with thought control efforts. Without induced TAF, specific responsibility for harm beliefs were less important in the process of thought control. Instead baseline responsibility beliefs were. However, the fact that there was not a significant correlation between induced TAF and thought control makes this unlikely. Moreover, difficulties with the responsibility for harm measure have been acknowledged.

No other experimental study of TAF also investigated a baseline variable of responsibility. Only one other experimental study of TAF has investigated the relationship between experiment-related responsibility beliefs and other variables. Zucker and colleagues. (2002) found large correlations between experiment-related responsibility beliefs and probability of the accident occurring, urge to neutralise and state trait anxiety post task. In experimental studies manipulating responsibility levels in children, high levels of responsibility were associated with more checking behaviours (Reeves, et al., 2010) but not distress or neutralising behaviours (Barrett & Healy, 2003).

4.4.4 Associations between TAF beliefs and magical thinking.

This aspect of the study aimed to understand the overlap between TAF and the broader thinking style of magical thinking in children. TAF-likelihood and MTQ-thought are most closely related conceptually and had the strongest correlation of .41. MTQ-Action was also correlated with TAF-likelihood ($r = .27$).

TAF is hypothesised to be a specific type of magical thinking (Berle & Starcevic, 2005; Einstein & Menzies, 2004a). No child-based studies have investigated both magical thinking and TAF. Several adult-based studies have. While making use of different measures, Einstein and Menzies (2004a) evidenced similar correlations in a study of adults with OCD. Magical ideation correlated with TAF likelihood for others (.51) and for self (.54). In a comparable study with undergraduate students, the same correlations were .35 and .38; showing similar but smaller trends (Einstein & Menzies, 2004b). Rees, Draper and Davis (2010) also demonstrated significant correlations between magical ideation and TAF-likelihood (.49) and TAF-total (.31) in an Australian undergraduate sample. The results from the current study suggest a similar pattern can be seen in childhood. What remains unclear is the relationship between them. Magical thinking may reflect an underlying belief style that serves as a vulnerability to a TAF appraisal in response to an intrusive thought. Given the correlations are not higher, particularly during childhood when magical thinking should be at its height, it may be that some other factor is also involved.

In the current study, TAF-morality did not correlate with either magical thinking subscale. This contrasts to findings from a sample of adults with OCD in which TAF-moral was found to be correlated with magical ideation ($r = .42$) (Einstein & Menzies, 2004a). However in non-clinical undergraduate samples, this significant correlation has not been found (Einstein & Menzies, 2004b; Rees, et al., 2010).

4.4.5 Additional findings.

4.4.5.1 Correlations among baseline variables.

Trait anxiety was significantly correlated with baseline state anxiety, responsibility and TAF-likelihood. State anxiety was also positively correlated with TAF-likelihood. This is supportive of some existing research. Correlations between trait anxiety and TAF have been reported in adult and adolescent samples (Abramowitz, et al., 2003; Amir, et al., 2001; Coles, et al., 2001; Hazlett-Stevens, et al., 2002; Muris, et al., 2001). Similarly correlations have been demonstrated between trait anxiety and responsibility (Rhéaume, Ladouceur, Freeston, & Letarte, 1994). The significant correlation between the MASC-10 and VAS1 suggests that the VAS used was a valid measure of anxiety. All of these findings support the findings of Sillence (2010).

Also in line with Sillence (2010), trait anxiety was significantly correlated with TAF-morality. Previous studies have found limited correlations between TAF-morality and anxiety disorder symptoms, particularly once controlling for depression (Abramowitz, et al., 2003; Rassin, Merckelbach, et al., 2001). While not being able to control for mood, the results here contrast to the literature.

Responsibility correlated with baseline TAF on both subscales of likelihood and morality. This is again supportive of existing research (Gwilliam, et al., 2004; Libby, et al., 2004; Matthews, et al., 2007; Rachman, et al., 1997; Sillence, 2010; Smári & Hólmsteinsson, 2001) and suggests the two domains are connected in both child and adult samples.

The results from the current study of non-clinical children support the generally held view that TAF, responsibility and anxiety are interconnected. The inclusion of the magical thinking questionnaire offers an interesting addition. Baseline anxiety and responsibility were not correlated with magical thinking. This may suggest that magical thinking is a general thinking style which differs from the specific distortion of TAF which is associated with both.

This contrasts to research by Bolton and colleagues (2002) who evidenced strong correlations between anxiety symptoms and MTQ scores.

4.4.5.2 Children's experiences of intrusive thoughts and thought control efforts.

A large majority of participants said they were careful with what they thought about during the experimental phase of the task. Thought suppression and thought control efforts to minimise 'strong thoughts' were recorded. This fits with Wegner's theory of thought suppression (1987) although this occurred even without a specific 'danger' word being provided as was the case in Rassin's study (1999). It may be that this is the first stage of a process towards obsessive compulsive behaviours (Rassin, Diepstraten, et al., 2001; Rassin, Merckelbach, et al., 2000). Many participants were concerned about the power of particular thoughts including specific distressing events and more general emotionally charged thoughts. This is interesting given that no explanation of a 'strong thought' was provided; children readily believed these more salient thoughts had more 'power' to inflict damage.

The experience of intrusive thoughts and thought control efforts did not differ between groups. Children in the control group were concerned enough about the impact of their thoughts to use some thought monitoring strategies. Although the groups did differ in the strength of the induced TAF, this could be an indication as to why no significant between group differences were noted.

4.5 Theoretical Implications

4.5.1 The role of TAF in obsessive compulsive-type cognitions and emotions.

The current study demonstrates that non-clinical children, aged 9 to 11 years, endorse TAF beliefs and that TAF can be successfully manipulated. However, the effects of the TAF-induction were minimal and had no effect on children's anxiety, neutralising behaviour, responsibility for harm, probability of harm or thought control. This may mean that TAF-likelihood does not play a causal role in the development of OCD-type symptoms in children.

Alternatively, factors related to the experimental method and measures may account for the null results, making interpretation difficult.

Levels of probability of harm were higher than those found by Sillence (2010). This might attest to a more conceptually valid experimental manipulation. While probability of harm did not differ significantly between the groups, a small to medium effect size was calculated which while unlikely, may be indicative of limited power in the current sample. If higher levels of induced TAF did lead to significantly higher estimates of the likelihood of harm, this would fit with the theory of TAF-likelihood (Rachman, et al., 1997). It may be that probability of harm beliefs are the first step towards the expression of OCD-type emotions and behaviours.

It may be that anxiety acts as a moderating variable between TAF and OCD-type behaviours, and was simply not high enough in this study to see an accurate demonstration of the effects of TAF. Cognitive models of OCD highlight the role of anxiety in OCD behaviours. Rachman (1997) describes the distress, anxiety and guilt resulting from TAF beliefs as provoking efforts to suppress thoughts or neutralise them using rituals and compulsions. Salkovskis (1985), who viewed TAF as a particular example of inflated responsibility, also suggested these beliefs cause feelings of distress which initiate efforts to prevent the feared event from happening. Abramowitz and colleagues (2003) have evidenced the role of negative affect in mediating the relationship between TAF and OCD symptoms. Without significantly higher feelings of anxiety in the experimental group, the lack of group differences seen is unsurprising.

While there was a significant difference in induced TAF-beliefs, it may be that the control group also developed some belief in the power of their thoughts, having been told by an adult/researcher it was possible. This could account for the rise in anxiety seen across the sample. Again the null results are difficult to interpret.

Alternatively, it may be that young children are more robust to the effects of TAF, being generally more used to magical thinking (Bolton, et al., 2002; Piaget, 1952). They may be more used to tolerating and coping with such experiences, and so less likely to demonstrate any

consequences. It is hypothesised by Bolton and colleagues (2002) that OCD cognitions are "persistent expressions of developmentally normal magical thinking" (p483). As such, it may be there is a critical developmental period after which point magical thinking, and perhaps TAF beliefs, are more likely to be associated with anxiety disorders. It may be that typically developing children are more robust to TAF and an unidentified vulnerability plays a role in children with OCD.

The correlational analyses provide some support for the importance of TAF in OCD-type cognitions and behaviours. The correlation between induced TAF beliefs and thought control was close to significant. In addition, induced TAF beliefs were correlated with levels of responsibility for harm in the experimental group. Baseline TAF beliefs were correlated with the probability of harm and to baseline anxiety scores. This suggests TAF beliefs are at least involved in the presentation of OCD-type cognitions and behaviours. The *causal* role of TAF however has not been supported here.

4.5.2 Thought control.

Two of the main findings from Sillence (2010) were a significant group difference in thought control following TAF manipulation, and a significant correlation between induced TAF and thought control. These findings led Sillence to conclude that inducing TAF had *caused* thought control. Thought control is thought to maintain and perpetuate OCD symptoms in three ways: (a) by preventing exposure and subsequent disconfirmation of beliefs (Rachman & Hodgson, 1980), (b) by encouraging a hyper-vigilance for these thoughts (Rachman, et al., 1997), and (c) by causing a paradoxical increase in unwanted intrusive thoughts (Wegner, et al., 1987). The relationship between thought suppression, one form of thought control, and OCD symptoms has been demonstrated in adults (Amir, Cashman, & Foa, 1997; Smári & Hólmsteinsson, 2001) and children (Farrell & Barrett, 2006). Although, Farrell and Barrett (2006) found lower levels of thought suppression in children.

The results from the current study do not support Sillence's findings. A significant between-group difference in thought control was not found. This contrasting result may be

reflective of modifications made to Sillence's paradigm: (a) extending and altering the measure of thought control (b) altering the timing of the measure (c) altering the TAF induction to include a possible negative consequence for the experimental group (d) strengthening the warning of possible damage for both groups.

However, thought control was used by participants in both groups. The two open questions and the mean thought control score suggest efforts to control thoughts were initiated. As suggested, it may be that some level of TAF, albeit different levels, was induced in both groups and therefore provoked thought control. Alternatively, the warning message about possible damage may have concerned the control group enough to induce thought control efforts. Regardless, it is clear that thought control was a commonly used strategy to prevent possible harm caused by their own 'strong thoughts'. The majority of children offered particular, more salient thoughts that they worried had more 'power' to inflict damage. Given that this sample of non-clinical children were so open to believing their thoughts had the power to cause harm, and that they then spontaneously used thought control strategies to limit this impact, it remains highly feasible that TAF and thought control play important roles in OCD-type symptoms.

In addition, the significant drop in anxiety seen between time 2 and 3 for both groups, may suggest that thought control/suppression was effective in delivering short term relief in anxiety, in line with theory and evidence (Rachman, et al., 1996; Rassin, 2001; van den Hout, et al., 2002; van den Hout, et al., 2001). Neutralisation in the form of button pressing was used by a minority. It may be that thought control efforts proved effective in reducing intrusive thoughts for the short task and so limited the need for button pressing. There is evidence for the short term effectiveness of thought suppression in reducing intrusive thoughts in children (Gaskell, Wells, & Calam, 2001). This was shown to be less effective in anxious children, but as described, overall anxiety levels were low in the current study.

4.5.3 Responsibility beliefs.

Responsibility beliefs, both baseline and experiment-related, appear to be closely related to a number of dependent variables. Both were correlated with anxiety and thought control in at least one group. This is supportive of the Salkovskis model of inflated responsibility for harm (1985) which suggests that feelings of responsibility cause feelings of distress and initiate efforts to prevent the feared event, in this case, controlling 'strong' thoughts. This is also in line with findings by Reeves and colleagues (2010), but not those by Barrett and Healy-Farrell (2003). In the latter, responsibility was manipulated using contracts. It may be that the current study induced stronger feelings of responsibility, with a specified and realistic 'negative event' in the form of damage to the computer.

With no between-group difference in responsibility for harm following TAF manipulation, the relationship between TAF and responsibility for harm has not been clarified. Again this null result could be due to methodological reasons. Induced TAF and responsibility for harm were correlated in the experimental group however, suggesting the two are related concepts. There is a possibility that the two combined may lead to thought control efforts.

Baseline responsibility beliefs made a significant contribution to the prediction of responsibility for harm beliefs. This indicates that inflated responsibility beliefs can be easily activated by specific events, and thus form an underlying vulnerability, in line with theory (Salkovskis, 1985).

4.5.4 TAF and magical thinking.

Children in the current study endorsed magical thinking to a similar extent to that found by Bolton and colleagues (2002). These magical thinking scores were significantly correlated with levels of baseline TAF. This relationship has so far only been demonstrated in adults. The results from the current study are supportive of a similar pattern in childhood. This pattern is perhaps supportive of the hypothesis that TAF is a specific type of magical thinking (Berle & Starcevic, 2005; Einstein & Menzies, 2004a). However, given the correlations are moderate at

best, particularly during childhood when magical thinking should be at its height, it may be that some other moderating or mediating factor is also involved. Alternatively, it may be that the two concepts are related but more distinct phenomenon than first thought.

TAF-likelihood was more highly correlated with the MTQ-thought subscale. Conceptually, these are the most similar; both involving the power of thoughts. Interestingly, TAF was also correlated with MTQ-action, suggesting that a propensity to believe in the power of thoughts can be seen alongside a broader belief in the power of objects and actions. This may fit with the hypothesis that children use magic as a broad explanatory tool in an effort to achieve a sense of control (Phelps & Woolley, 1994). MTQ-Action scores were however lower than MTQ-thought scores, suggesting action-based magical thinking was less likely to be endorsed by this age group. It may be that developmentally, this age group have moved beyond this way of thinking. TAF-morality did not correlate with magical thinking, suggesting TAF-morality to be a more distinct concept.

Crucially, whereas TAF, both likelihood and morality, correlated with baseline anxiety and responsibility, magical thinking did not. As such, TAF is more closely aligned with OCD-related cognitions and emotions. The focus on this specific distortion, as opposed to magical thinking, in the childhood OCD literature is therefore justified. Magical thinking may reflect a more general underlying belief style, typically seen in children, that serves as a vulnerability to a TAF appraisal in response to an intrusive thought. The normality of magical thinking and the levels of correlation seen here, suggest other vulnerability factors would have to be involved in this process.

4.6 Clinical Implications

While not demonstrating a clear causal role for TAF in OCD-symptoms in children, the current study has demonstrated the relevance of this cognitive distortion to OCD-related cognitions, emotions and behaviours. The TAF manipulation was easily believed and acceptable to this group of non-clinical children. Many children used some thought control efforts to prevent possible harm to the computer, caused by their own 'strong thoughts'. Probability of

harm and responsibility for harm were shown to be closely related concepts to TAF; two cognitions known to be associated with OCD in children. As such, it is fair to say that TAF should be considered carefully when working with children with OCD presentations.

TAF should be routinely assessed in children with OCD in clinical settings. There is also evidence that TAF may be involved in wider anxiety disorders and so it could be considered more broadly in clinical practice. The TAFQ-A tool used in the current study was acceptable to most children. For younger children, a Likert scale, similar to the induced-TAF one used here may be quicker and easier to complete. An idiographic Likert scale, specific to the child's OCD beliefs would aid in assessment and measurement of change.

When formulating difficulties with a child with OCD, attention is generally paid to beliefs around probability of harm and responsibility for harm (March & Mulle, 1998). Given the findings here, it would be sensible to also gauge and include belief in TAF-likelihood which may at least be adding to these beliefs. Findings from the current study, and available evidence would support strategies designed to educate about, and challenge, these beliefs. Zucker and colleagues (2002) successfully used a brief psycho-educational intervention to offset the anxious response to intrusive thoughts in people with high-TAF. While the longevity of this intervention's effectiveness was not assessed, integrating the approach into an evidence-based CBT approach (National Institute of Health and Clinical Excellence, 2005) is likely to be worthwhile.

A number of techniques can be used to make psycho-education for children more developmentally appropriate. March and Muelle (1998) recommend the use of nicknames, concrete metaphors, games and drawings in their CBT manual for childhood OCD. In addition, Friedberg, McClure and Garcia (2009) emphasise the need for simple language, creativity, active participation and individualisation to keep young people engaged and interested. Identifying and naming cognitive distortions is common place in CBT for anxiety disorders. Framing TAF as a 'trick your mind plays on you' can help to explain and externalise TAF as a cognitive error (Friedberg, et al., 2009).

TAF-beliefs lend themselves to behavioural experiments designed to challenge specific beliefs and distortions (Rachman, 2003). Making use of a graded hierarchy approach, positive TAF can be challenged first. For example, asking children to estimate how likely they are to win a children's TV competition if they think hard about it, and then testing this out. In this way, the power of their thoughts can be challenged. More anxiety-inducing experiments, such as thoughts of accidents or illness, can be introduced over time to challenge the more negative TAF-likelihood beliefs.

Given the evidence for the use of thought control and suppression, some focus should also be given to these as neutralising safety behaviours, particularly in children with high levels of TAF. These may be more likely than overt neutralising or compulsive rituals. In the current study, children were able to clearly identify thoughts that they were most concerned about and had tried not to think about. The paradoxical effects of thought suppression can be illustrated using the classic 'white bear' example (Wegner, et al., 1987). Again, graded behavioural experiments can work up to testing the effects of suppressing/controlling more feared or 'powerful' thoughts.

At each stage of assessment and treatment, the importance of including parents and families has been recognised (Barrett, et al., 2005; Barrett, et al., 2004; March & Mulle, 1998). Recruiting parents into a 'co-therapist' position is recommended, helping parents to encourage and support the challenging of OCD thoughts and behaviours in the home (March & Mulle, 1998).

4.7 Future Research

Research on TAF in childhood OCD is relatively limited. As one of just two studies using experimental methods to assess the role of TAF in childhood, there is significant scope for developing and extending the current study. The current paradigm offers a high degree of promise, having allowed for the successful manipulation of TAF-likelihood. However, a number of caveats have been identified.

There is a possibility that a low level of TAF was inadvertently induced in the control group. In the least, they were concerned about damage to the computer which may have obscured the true effects of TAF. Consideration should be given to the instructions given. It may be that a reduced focus on the 'capabilities' of the helmet and possible damage to the computer should be given by the researcher, leaving more to the 'evidence' provided by the equipment. This may avoid children in the control group believing their thoughts held power 'in principle' having been told by the researcher it was possible.

However, anxiety levels remained low in this study. Reducing the warning of potential damage given by the researcher may risk lowering this further. While careful consideration has to be given to the ethics of deception and the well-being of participants, it may be possible to elevate anxiety levels slightly more for a short duration, making use of the equipment and onscreen feedback given to the experimental group to do so.

A pre- and post-manipulation measure of induced-TAF could be used to assess the change in both groups. It would then be possible to eliminate any TAF-induction in the control group.

To further improve the paradigm, some consideration should be given to the possible unanticipated effects of the blue error screen outlined. It may be feasible to include an error screen in the control condition which outlines possible causes of error other than the effects of strong thoughts. It could be made explicit that the effects of their thoughts did not cause the error. This would ensure that the control group were equally aware of the sensitivity of the computer, and were equally 'reassured' by its absence in the second half of the task. However, the key difference about the 'power' of their thoughts would remain.

A further improvement for the study would be to include additional VAS measures on the computer. A measure of mood could be included to more formally eliminate a positive mood induction effect. Further refinement and piloting of the experiment-related Likert scales is also required.

The experimental procedure shows potential for examining the relationships between cognitions associated with childhood OCD further. A responsibility manipulation could be included with a 'TAF-low responsibility' condition and a 'TAF-high responsibility' condition. Mediatory and moderating roles could be explored further in a more powerful version of the experiment.

The open questions included provided rich and valuable information about thought control efforts and the identification of more worrying intrusive thoughts. Future research could consider expanding the use of these measures to explore children's thinking processes further. Understanding the process of assigning importance to particular thoughts would prove valuable. Thought control and thought suppression appear to be highly relevant to the conceptualisation of childhood OCD. Developing a better understanding of the subsequent impact of thought control and thought suppression in this age group would be crucial for detailing the maintenance processes involved in childhood OCD.

More broadly, more child-based studies are needed for exploring alternative models and cognitions thought to be involved in OCD. Exploration of the presence of meta-cognitions in children and childhood OCD would be valuable. As proposed by Wells and Matthews (1994), TAF may be just one of many meta-beliefs about intrusive thoughts. Given the heterogeneous nature of OCD, these are worthwhile considering.

Non-clinical samples are well suited to experimental research. However anxiety levels, the strength of belief in cognitive distortions and the expression of OCD-type behaviour, are all likely to be lower. It may not be ethically sound to use a clinical sample in the paradigm used here. However, a less anxiety-provoking version may be considered. Clinical child samples should also be used for further cross-sectional research looking at the correlates of high levels of TAF, including magical thinking, thought control and wider negative affect such as guilt and discomfort.

4.8 Final Summary and Conclusions

When experienced in childhood, OCD can cause significant distress to the child and their family, while interfering with a critical phase of social and personal development (Hanna, 1995; Piacentini, et al., 2003). The onset of OCD during childhood is associated with increased symptom severity and poorer treatment outcomes (Rosario-Campos, et al., 2005). Understanding the development and maintenance of this disorder in childhood is therefore crucial.

Cognitive models of OCD have attempted to understand the cognitive vulnerabilities and distortions involved in OCD. While the role of these distortions is more established among adults, the applicability of cognitive models to developing children cannot be assumed. Present in some form within each of the cognitive models is the distortion of TAF (Rachman & Shafran, 1999; Shafran, et al., 1999). TAF has been shown to be associated with OCD in children (Libby, et al., 2004; Muris, et al., 2001). However, understanding of the *role* of TAF has been limited by the lack of experimental studies which allow causal relationships to be inferred. Sillence (2010) devised a successful experimental paradigm for manipulating TAF in non-clinical children. The aim of the current study was to modify Sillence's paradigm to: (a) more closely reflect the concept of TAF-likelihood, (b) to counter any positive-mood induction effect, (c) to increase temporary feelings of anxiety, (d) to make the timing of measures more optimal and (e) to investigate the overlap between TAF and magical thinking.

By manipulating TAF in 9 to 11 year olds, using a computer task, the effects on: anxiety, neutralising behaviour, responsibility for harm, probability of harm and thought control were examined. Children of this age endorsed TAF beliefs and the manipulation proved successful. However, no group differences on the dependent variables were found. While this may suggest that TAF-likelihood does not play a causal role in the development of OCD-type symptoms in children, it is more probable that these findings are the result of a number of methodological limitations.

In both groups, a significant decrease in anxiety was seen between times 2 and 3 i.e. at the end of the task, following opportunity to neutralise or control thoughts. Baseline TAF was correlated with probability of harm and anxiety, while induced-TAF was correlated with responsibility for harm in the experimental group. This provides further support for the involvement of TAF beliefs in OCD-related cognitions and emotions, but does not corroborate a causal role.

In contrast to findings by Sillence (2010), the role of TAF in causing thought control was not established. However, both groups made use of thought control strategies aimed at minimising potential 'damage' caused by the power of their thoughts. Many identified particular negative or emotionally charged thoughts that they feared had the 'power' to do damage. It therefore remains highly feasible that TAF and thought control play important roles in OCD-type symptoms. The decrease in anxiety following opportunity for thought control supports existing research that thought suppression may be effective in providing short term relief from anxiety (Gaskell, et al., 2001). Responsibility beliefs also appear highly relevant with significant correlations with anxiety and thought control demonstrated.

Magical thinking was correlated with TAF-likelihood beliefs. TAF was correlated with responsibility and anxiety while magical thinking was not. This is supportive of magical thinking as a general underlying belief style, and TAF as a more specific cognitive distortion associated with OCD. It may be that magical thinking serves as a vulnerability to using TAF appraisals in response to particular intrusive thoughts.

In summary, the current study offers limited support to suggest that cognitive models of OCD, developed with adults in mind, may also be applicable to children. There is evidence for the relevance of TAF, thought control and responsibility appraisals in the development of OCD-type symptoms. While a causal role has not been demonstrated, methodological limitations associated with the experimental paradigm may account for the null results. Recommendations for future research have been outlined including further adaptations to the experimental

procedure. Further research on the causal role of responsibility, and the implications of thought control, are justified.

Clinically, the assessment of TAF and its inclusion in individualised formulations could be considered. There is evidence that TAF beliefs are open to change (Zucker, et al., 2002). Psycho-education and the challenging of identified TAF beliefs through graded behavioural experiments are suggested.

The presence of TAF beliefs has been demonstrated in non-clinical children. The current study offers a promising development in an experimental paradigm suitable for children. Future research to clarify the role of TAF in the development of OCD symptoms is justified and needed.

References

Abramowitz, J. S. (1996). Variants of exposure and response prevention in the treatment of obsessive-compulsive disorder: A meta-analysis. *Behavior Therapy, 27*, 583-600.

Abramowitz, J. S. (1997). Effectiveness of psychological and pharmacological treatments for obsessive-compulsive disorder: A quantitative Review. *Journal of Consulting and Clinical Psychology, 65*, 44-52.

Abramowitz, J. S., Franklin, M. E., & Foa, E. B. (2002). Empirical status of cognitive-behavioral therapy for obsessive-compulsive disorder: A meta-analytic review. *Romanian Journal of Cognitive & Behavioral Psychotherapies, 2*, 89-104.

Abramowitz, J. S., Whiteside, S., Lynam, D., & Kalsy, S. (2003). Is thought–action fusion specific to obsessive–compulsive disorder?: a mediating role of negative affect. *Behaviour Research and Therapy, 41*, 1069-1079.

Abramowitz, J. S., Whiteside, S. P., & Deacon, B. J. (2005). The effectiveness of treatment for pediatric obsessive-compulsive disorder: A meta-analysis. *Behavior Therapy, 36*, 55-63.

Achenbach, T. M. (1991). *Manual for the child behaviour checklist/4-18 and 1991 profile*. University of Vermont: Department of Psychiatry.

Albano, A., March, J., & Piacentini, J. (1999). Cognitive behavioural treatment of obsessive compulsive disorder. In R. Ammerman, M. Hersen & C. Last (Eds.), *Handbook of prescriptive treatments for children and adolescents*. Boston: Allyn & Bacon.

Altın, M., & Gencoz, T. (2011). How Does Thought-Action Fusion Relate to Responsibility Attitudes and Thought Suppression to Aggravate the Obsessive-Compulsive Symptoms? *Behavioural and Cognitive Psychotherapy, 39*, 99-114. doi: doi:10.1017/S1352465810000524

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders : DSM-IV* (4th ed. ed.). Washington, D.C.: American Psychiatric Association.

Amir, N., Cashman, L., & Foa, E. (1997). Strategies of thought control in obsessive-compulsive disorder. *Behaviour Research and Therapy, 35*, 775-IN771. doi: 10.1016/s0005-7967(97)00030-2

Amir, N., Freshman, M., Ramsey, B., Neary, E., & Brigidi, B. (2001). Thought–action fusion in individuals with OCD symptoms. *Behaviour Research and Therapy, 39*, 765-776.

Apter, A., Fallon, T. J., King, R. A., Ratzoni, G., Zohar, A. H., Binder, M., . . . Cohen, D. J. (1996). Obsessive-Compulsive Characteristics: From Symptoms to Syndrome. *Journal of the American Academy of Child & Adolescent Psychiatry, 35*, 907-912.

Asbahr, F. R., Castillo, A. R., Ito, L. M., Latorre, M. R., Moreira, M. N., & Lotufo-Neto, F. (2005). Group Cognitive-Behavioral Therapy Versus Sertraline for the Treatment of Children and Adolescents With Obsessive-Compulsive Disorder. *Journal of the American Academy of Child and Adolescent Psychiatry, 44*, 1128-1136.

Astington, J. W. (1993). *The child's discovery of the mind*. Cambridge, MA: Harvard University Press.

Bamber, D., Tamplin, A., Park, R. J., Kyte, Z. A., & Goodyer, I. M. (2002). Development of a Short Leyton Obsessional Inventory for Children and Adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry, 41*, 1246-1252.

Barrett, P., Farrell, L., Dadds, M., & Boulter, N. (2005). Cognitive-Behavioral Family Treatment of Childhood Obsessive-Compulsive Disorder: Long-Term Follow-up and Predictors of Outcome. *Journal of the American Academy of Child & Adolescent Psychiatry, 44*, 1005-1014.

Barrett, P., Farrell, L., Pina, A., Peris, T., & Piacentini, J. (2008). Evidence-Based Psychosocial Treatments for Child and Adolescent Obsessive–Compulsive Disorder. *Journal of Clinical Child & Adolescent Psychology, 37*, 131-155.

Barrett, P., & Healy-Farrell, L. (2003). Perceived Responsibility in Juvenile Obsessive-Compulsive Disorder: An Experimental Manipulation. *Journal of Clinical Child & Adolescent Psychology, 32*, 430-441.

Barrett, P., Healy-Farrell, L., & March, J. (2004). Cognitive-Behavioral Family Treatment of Childhood Obsessive-Compulsive Disorder: A Controlled Trial. *Journal of the American Academy of Child & Adolescent Psychiatry, 43*, 46-62.

Barrett, P., & Healy, L. (2003). An examination of the cognitive processes involved in childhood obsessive–compulsive disorder. *Behaviour Research and Therapy, 41*, 285-299. doi: 10.1016/s0005-7967(02)00011-6

Baxter, L. R., Phelps, M. E., Mazziotta, J. C., Guze, B. H., Schwartz, J. M., & Selin, C. E. (1987). Local Cerebral Glucose Metabolic Rates in Obsessive-Compulsive Disorder: A Comparison With Rates in Unipolar Depression and in Normal Controls. *Archives of General Psychiatry, 44*, 211-218.

Baxter, L. R., Schwartz, J. M., Bergman, K. S., Szuba, M. P., Guze, B. H., Mazziotta, J. C., . . . Phelps, M. E. (1992). Caudate Glucose Metabolic Rate Changes With Both Drug and Behavior Therapy for Obsessive-Compulsive Disorder. *Archives of General Psychiatry, 49*(9), 681-689.

Beck, A. T., Emery, G., & Greenberg, R. L. (1985). *Anxiety disorders and phobias: A cognitive perspective*. New York: Basic Books.

Behar, D., Rapoport, J. L., Berg, C. J., Denckla, M. B., Mann, L., Cox, C., . . . Wolfman, M. G. (1984). Computerized tomography and neuropsychological test measures in adolescents with obsessive-compulsive disorder. *American Journal of Psychiatry, 141*, 363-369.

Berle, D., & Starcevic, V. (2005). Thought–action fusion: Review of the literature and future directions. *Clinical Psychology Review, 25*, 263-284.

Bernstein, G. A., Carroll, M. E., Crosby, R. D., Perwien, B. A., Go, F. S., & Benowitz, N. L. (1994). Caffeine effects on learning, performance and anxiety in normal school-age children. *Journal of the American Academy of Child and Adolescent Psychiatry, 33*, 407-415.

Bernstein, G. A., & Garfinkel, B. D. (1992). The visual analogue scale for anxiety-revised: Psychometric properties. *Journal of Anxiety Disorders, 6*, 223-239.

Bocci, L., & Gordon, P. K. (2007). Does magical thinking produce neutralising behaviour? An experimental investigation. *Behaviour Research and Therapy, 45*, 1823-1833.

Bolton, D., Collins, S., & Steinberg, D. (1983). The treatment of obsessive-compulsive disorder in adolescence. A report of fifteen cases. *The British Journal of Psychiatry, 142*, 456-464.

Bolton, D., Dearsley, P., Madronal-Luque, R., & Baron-Cohen, S. (2002). Magical thinking in childhood and adolescence: Development and relation to obsessive compulsion. *British Journal of Developmental Psychology, 20*, 479-494.

Bouchard, C., Rhéaume, J., & Ladouceur, R. (1999). Responsibility and perfectionism in OCD: an experimental study. *Behaviour Research and Therapy, 37*, 239-248.

Bryman, A., & Cramer, D. (1990). *Quantitative data analysis for social scientists*. London: Routledge.

Cartwright-Hatton, S., Mather, A., Illingworth, V., Brocki, J., Harrington, R., & Wells, A. (2004). Development and preliminary validation of the Meta-cognitions Questionnaire—Adolescent Version. *Journal of Anxiety Disorders, 18*, 411-422.

Castaneda, A., McCandless, B. R., & Palermo, D. S. (1956). The Children's Form of the Manifest Anxiety Scale. *Child Development, 27*, 317-326.

Chabane, N., Delorme, R., Millet, B., Mouren, M., Leboyer, M., & Pauls, D. (2005). Early-onset obsessive-compulsive disorder: a subgroup with a specific clinical and familial pattern? *Journal of Child Psychology and Psychiatry, 46*, 881-887.

Chambless, D. L., & Hollon, S. D. (1998). Defining empirically supported therapies. *Journal of consulting and clinical psychology, 66*, 7-18.

Chapman, L. J., Chapman, J. P., & Miller, E. N. (1982). Reliabilities and intercorrelations of eight measures of proneness to psychosis. *Journal of consulting and clinical psychology, 50*, 187-195.

Clark, D. A., & de Silva, P. (1985). The nature of depressive and anxious, intrusive thoughts: Distinct or uniform phenomena? *Behaviour Research and Therapy, 23*, 383-393.

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

Coles, M. E., Mennin, D. S., & Heimberg, R. G. (2001). Distinguishing obsessive features and worries: the role of thought–action fusion. *Behaviour Research and Therapy, 39*, 947-959.

Cook, T. D., & Campbell, D. T. (1979). *Quasi-experimentation: Design and analysis issues for field settings*. Chicago: Rand McNally.

Delorme, R., Bille, A., Betancur, C., Mathieu, F., Chabane, N., Mouren-Simeoni, M., & Leboyer, M. (2006). Exploratory analysis of obsessive compulsive symptom dimensions in children and adolescents: a Prospective follow-up study. *BMC Psychiatry, 6*, 1.

Delorme, R., Golmard, J., Chabane, N., Millet, B., Krebs, M., Mouren-Simeoni, M., & Leboyer, M. (2005). Admixture analysis of age at onset in obsessive–compulsive disorder. *Psychological Medicine, 35*, 237-243.

Dollard, J., & Miller, N. (1950). *Personality and Psychotherapy. An analysis in terms of learning, thinking, and culture, etc*. New York: McGraw-Hill Book Co.

Douglass, H. M., Moffitt, T. E., Dar, R., McGee, R. O. B., & de Silva, P. (1995). Obsessive-Compulsive Disorder in a Birth Cohort of 18-Year-Olds: Prevalence and Predictors. *Journal of the American Academy of Child & Adolescent Psychiatry, 34*, 1424-1431.

Eddy, K. T., Dutra, L., Bradley, R., & Westen, D. (2004). A multidimensional meta-analysis of psychotherapy and pharmacotherapy for obsessive-compulsive disorder. *Clinical Psychology Review, 24*, 1011-1030.

Eichstedt, J. A., & Arnold, S. L. (2001). Childhood-onset obsessive-compulsive disorder: A tic-related subtype of ocd? *Clinical Psychology Review, 21*, 137-157.

Einstein, D. A., & Menzies, R. G. (2004a). The presence of magical thinking in obsessive compulsive disorder. *Behaviour Research and Therapy, 42*, 539-549.

Einstein, D. A., & Menzies, R. G. (2004b). Role of magical thinking in obsessive–compulsive symptoms in an undergraduate sample. *Depression and Anxiety, 19*, 174-179. doi: 10.1002/da.20005

Emmelkamp, P. M. G., & Beens, H. (1991). Cognitive therapy with obsessive-compulsive disorder: A comparative evaluation. *Behaviour Research and Therapy, 29*, 293-300.

Emmelkamp, P. M. G., Visser, S., & Hoekstra, R. J. (1988). Cognitive therapy vs exposure in vivo in the treatment of obsessive-compulsives. *Cognitive Therapy and Research, 12*, 103-114.

Evans, D., Hersperger, C., & Capaldi, P. (2011). Thought-Action Fusion in Childhood: Measurement, Development, and Association with Anxiety, Rituals and Other Compulsive-like Behaviors. *Child Psychiatry & Human Development, 42*, 12-23.

Evans, D., Milanak, M. E., Medeiros, B., & Ross, J. L. (2002). Magical Beliefs and Rituals in Young Children. *Child Psychiatry & Human Development, 33*, 43-58.

Farrell, L., & Barrett, P. (2006). Obsessive-compulsive disorder across developmental trajectory: Cognitive processing of threat in children, adolescents and adults. *British Journal of Psychology, 97*, 95-114.

Farrell, L., Waters, A. M., & Zimmer-Gembeck, M. J. (2011). Cognitive Biases and Obsessive-Compulsive Symptoms in Children: Examining the Role of Maternal Cognitive Bias and Child Age. *Behavior Therapy*. doi: 10.1016/j.beth.2011.10.003

Field, A. (2009). *Discovering statistics using SPSS* (Third Edition ed.). London: Sage Publications.

Flament, M. F., & Cohen, D. (2002). Child and Adolescent Obsessive-Compulsive Disorder: A review. In M. Maj, Sartorius, N., Okasha, A, & Zohar, J. (Ed.), *Obsessive Compulsive Disorder* (Second Edition ed., pp. 147-183). Chichester: John Wiley & Sons Ltd.

Flament, M. F., Whitaker, A., Rapoport, J. L., Davies, M., Berg, C. Z., Kalikow, K., . . . Shaffer, D. (1988). Obsessive compulsive disorder in adolescence: an epidemiological study. *Journal of the American Academy of Child and Adolescent Psychiatry, 27*(6), 764-771.

Foa, E. B., Grayson, J. B., Steketee, G. S., Doppelt, H. G., Turner, R. M., & Latimer, P. R. (1983). Success and failure in the behavioral treatment of obsessive-compulsives. *Journal of consulting and clinical psychology, 51*, 287-297.

Foa, E. B., & Kozac, M. J. (1996). Psychological treatment for obsessive compulsive disorder. In M. Mavissakalian (Ed.), *Long term treatments of anxiety disorders.* Washington DC: American Psychiatric Press.

Foa, E. B., Liebowitz, M. R., Kozak, M. J., Davies, S., Campeas, R., Franklin, M. E., . . . Tu, X. (2005). Randomized, placebo-controlled trial of exposure and ritual prevention, clomipramine, and their combination in the treatment of obsessive-compulsive disorder. *American Journal of Psychiatry, 162*, 151-161.

Foa, E. B., Steketee, G. S., & Ozarow, B. J. (1985). Behaviour therapy with obsessive compulsives: from theory to treatment. In M. Mavissakalian (Ed.), *Obsessive Compulsive Disorder: Psychological and pharmacological treatment.* New York: Plenum.

Francis, G., & Gragg, R. A. (1996). *Childhood Obsessive Compulsive Disorder*. London: Sage Publications.

Franklin, M. E., Abramowitz, J. S., Kozak, M. J., Levitt, J. T., & Foa, E. B. (2000). Effectiveness of exposure and ritual prevention for obsessive-compulsive disorder: randomized compared with nonrandomized samples. *Journal of consulting and clinical psychology, 68*, 594-602.

Franklin, M. E., Kozak, M. J., Cashman, L. A., Coles, M. E., Rheingold, A. A., & Foa, E. B. (1998). Cognitive-Behavioral Treatment of Pediatric Obsessive-Compulsive Disorder: An Open Clinical Trial. *Journal of the American Academy of Child and Adolescent Psychiatry, 37*, 412-419.

Frazier, P. A., Tix, A. P., & Barron, K. E. (2004). Testing moderator and mediator effects in counseling psychology research. *Journal of Counseling Psychology, 51*, 115-134.

Friedberg, R. D., McClure, J. M., & Garcia, J. H. (2009). *Cognitive therapy techniques for children and adolescents: tools for enhancing practice*. New York: The Guilford Press.

Frost, R. O., Marten, P., Lahart, C., & Rosenblate, R. (1990). The dimensions of perfectionism. *Cognitive Therapy and Research, 14*, 449-468.

Gaskell, S. L., Wells, A., & Calam, R. (2001). An experimental investigation of thought suppression and anxiety in children. *British Journal of Clinical Psychology, 40*, 45-56. doi: 10.1348/014466501163472

Geller, D., Biederman, J., Jones, J., Park, K., Schwartz, S., Shapiro, S., & Coffey, B. (1998). Is juvenile obsessive-compulsive disorder a developmental subtype of the disorder? A review of the pediatric literature. *Journal of the American Academy of Child & Adolescent Psychiatry, 37*, 420-427.

Geller, D., Biederman, J., Stewart, S. E., Mullin, B., Martin, A., Spencer, T., & Faraone, S. V. (2003). Which SSRI? A meta-analysis of pharmacotherapy trials in pediatric obsessive-compulsive disorder. *American Journal of Psychiatry, 160*, 1919-1928.

Geller, D., Wagner, K. D., Emslie, G., Murphy, T., Carpenter, D. J., Wetherhold, E., . . . Gardiner, C. (2004). Paroxetine Treatment in Children and Adolescents With Obsessive-Compulsive Disorder: A Randomized, Multicenter, Double-Blind, Placebo-Controlled Trial. *Journal of the American Academy of Child & Adolescent Psychiatry, 43*, 1387-1396.

Gojer, J., Khannu, S., & Channabasavanna, S. M. (1987). Obsessive compulsive disorder, anxiety and depression. *Indian Journal of Psychological Medicine, 10*, 25-20.

Goodman. (1997). The Strengths and Difficulties Questionnaire: A Research Note. *Journal of Child Psychology and Psychiatry, 38*, 581-586.

Goodman, Price, L. H., Rasmussen, S. A., Mazure, C., Fleischmann, R. L., Hill, C. L., . . . Charney, D. S. (1989). The Yale-Brown Obsessive Compulsive Scale: I. Development, Use, and Reliability. *Archives of General Psychiatry, 46*(11), 1006-1011.

Greist, J. H. (1990). Treatment of obsessive compulsive disorder: psychotherapies, drugs, and other somatic treatment. *Journal of Clinical Psychiatry, 51 Suppl*, 44-50.

Gwilliam, P., Wells, A., & Cartwright-Hatton, S. (2004). Dose meta-cognition or responsibility predict obsessive–compulsive symptoms: a test of the metacognitive model. *Clinical Psychology & Psychotherapy, 11*, 137-144.

Haan, E. D., Hoogduin, K. A. L., Buitelaar, J. K., & Keijsers, G. P. J. (1998). Behavior Therapy Versus Clomipramine for the Treatment of Obsessive-Compulsive Disorder in Children and Adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry, 37*, 1022-1029.

Hackman, A., & McLean, C. (1975). A comparison of flooding and thought stopping in the treatment of obsessional neurosis. *Behaviour Research and Therapy, 13*, 263-269.

Hanna, G. L. (1995). Demographic and Clinical Features of Obsessive-Compulsive Disorder in Children and Adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry, 34*, 19-27.

Harris, P. L., Brown, E., Marriott, C., Whittall, S., & Harmer, S. (1991). Monsters, ghosts and witches: Testing the limits of the fantasy—reality distinction in young children. *British Journal of Developmental Psychology, 9*, 105-123.

Hazlett-Stevens, H., Zucker, B. G., & Craske, M. G. (2002). The relationship of thought–action fusion to pathologicial worry and generalized anxiety disorder. *Behaviour Research and Therapy, 40*, 1199-1204.

Heyman, I., Fombonne, E., Simmons, H., Ford, T., Meltzer, H., & Goodman, R. (2001). Prevalence of obsessive-compulsive disorder in the British nationwide survey of child mental health. *British Journal of Psychiatry, 179*, 324-329.

Hollingsworth, C. E., Tanguay, P. E., Grossman, L., & Pabst, P. (1980). Long-Term Outcome of Obsessive-Compulsive Disorder in Childhood. *Journal of the American Academy of Child Psychiatry, 19*, 134-144.

Honjo, S., Hirano, C., Murase, S., Kaneko, T., Sugiyama, T., Ohtaka, K., . . . Wakabayashi, S. (1989). Obsessive-compulsive symptoms in childhood and adolescence. *Acta Psychiatrica Scandinavica, 80*, 83-91.

Insel, T. R., Hoover, C., & Murphy, D. L. (1983). Parents of patients with obsessive-compulsive disorder. *Psychological Medicine, 13*, 807-811.

Jans, T., Wewetzer, C., Klampfl, K., Schulz, E., Herpertz-Dahlmann, B., Remschmidt, H., & Warnke, A. (2007). [Phenomenology and co-morbidity of childhood onset obsessive compulsive disorder]. *Z Kinder Jugendpsychiatr Psychother, 35*, 41-50.

Jenike, M. A., Hyman, S., Baer, L., Holland, A., Minichiello, W. E., Buttolph, L., . . . Ricciardi, J. (1990). A controlled trial of fluvoxamine in obsessive-compulsive disorder: implications for a serotonergic theory. *American Journal of Psychiatry, 147*, 1209-1215.

Jones, M. K., & Menzies, R. G. (1998). The relevance of associative learning pathways in the development of obsessive–compulsive washing. *Behaviour Research and Therapy, 36*, 273-283.

Khanna, S. (1988). Obsessive-compulsive disorder: is there a frontal lobe dysfunction? *Biol Psychiatry, 24*, 602-613.

Kovacs, M. (1981). Rating scales to assess depression in school-aged children. *Acta Paedopsychiatrica: International Journal of Child & Adolescent Psychiatry, 46*, 305-315.

Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (2005). International affective picture system (IAPS): Instruction manual and affective ratings. *Technical Report A*: The Center for Research in Psychophysiology, University of Florida.

Lázaro, L., Caldú, X., Junqué, C., Bargalló, N., Andrés, S., Morer, A., & Castro-Fornieles, J. (2008). Cerebral activation in children and adolescents with obsessive–compulsive disorder before and after treatment: A functional MRI study. *Journal of Psychiatric Research, 42*, 1051-1059.

Leonard, H. (1989). Childhood rituals and superstitions: Developmental and cultural perspective. In J. Rapoport (Ed.), *Obsessive compulsive disorder in children and adolescents*. Washington: American Psychiatric Press.

Leonard, H., Swedo, S. E., Lenane, M. C., Rettew, D. C., Cheslow, D. L., Hamburger, S. D., & Rapoport, J. L. (1991). A Double-blind Desipramine Substitution During Long-term

Clomipramine Treatment in Children and Adolescents With Obsessive-Compulsive
Disorder. *Archives of General Psychiatry, 48*, 922-927.

Leonard, H., Swedo, S. E., Lenane, M. C., Rettew, D. C., Hamburger, S. D., Bartko, J. J., &
Rapoport, J. L. (1993). A 2- to 7-Year Follow-up Study of 54 Obsessive-Compulsive
Children and Adolescents. *Archives of General Psychiatry, 50*, 429-439.

Leonard, H., Swedo, S. E., Rapoport, J. L., Koby, E. V., Lenane, M. C., Cheslow, D. L., &
Hamburger, S. D. (1989). Treatment of Obsessive-Compulsive Disorder With
Clomipramine and Desipramine in Children and Adolescents: A Double-blind
Crossover Comparison. *Archives of General Psychiatry, 46*, 1088-1092.

Libby, S., Reynolds, S., Derisley, J., & Clark, S. (2004). Cognitive appraisals in young people
with obsessive-compulsive disorder. *Journal of Child Psychology and Psychiatry, 45*,
1076-1084.

Lindsay, M., Crino, R., & Andrews, G. (1997). Controlled trial of exposure and response
prevention in obsessive-compulsive disorder. *The British Journal of Psychiatry, 171*,
135-139.

Lopatka, C., & Rachman, S. (1995). Perceived responsibility and compulsive checking: An
experimental analysis. *Behaviour Research and Therapy, 33*, 673-684.

Mancebo, M. C., Garcia, A. M., Pinto, A., Freeman, J. B., Przeworski, A., Stout, R., . . .
Rasmussen, S. A. (2008). Juvenile-onset OCD: clinical features in children, adolescents
and adults. *Acta Psychiatr Scand, 118*, 149-159.

March. (1998). *Manual for the Multidimensional Anxiety Scale for Children (MASC)*. Toronto:
MultiHealth Systems.

March, Biederman, J., Wolkow, R., Safferman, A., Mardekian, J., Cook, E. H., . . . Wagner, K.
D. (1998). Sertraline in Children and Adolescents With Obsessive-Compulsive
Disorder. *JAMA: The Journal of the American Medical Association, 280*, 1752-1756.

March, & Mulle, K. (1998). *OCD in children and adolescents: a cognitive-behavioral treatment
manual.* New York: The Guilford Press.

March, Parker, J. D. A., Sullivan, K., Stallings, P., & Conners, C. K. (1997). The Multidimensional Anxiety Scale for Children (MASC): Factor structure, reliability and validity. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*, 554-565.

March, Sullivan, K., & Parker, J. (1999). Test-retest reliability of the Multidimensional Anxiety Scale for Children. *Journal of Anxiety Disorders, 13*, 349-358.

Masi, G., Millepiedi, S., Perugi, G., Pfanner, C., Berloffa, S., Pari, C., . . . Akiskal, H. S. (2010). A Naturalistic Exploratory Study of the Impact of Demographic, Phenotypic and Comorbid Features in Pediatric Obsessive-Compulsive Disorder. *Psychopathology, 43*, 69-78.

Mather, A., & Cartwright-Hatton, S. (2004). Cognitive predictors of obsessive-compulsive symptoms in adolescence: a preliminary investigation. *Journal of Clinical Child Psychology, 33*, 743-749.

Matthews, L., Reynolds, S., & Derisley, J. (2007). Examining Cognitive Models of Obsessive Compulsive Disorder in Adolescents. *Behavioural and Cognitive Psychotherapy, 35*, 149-163.

McFall, M. E., & Wollersheim, J. P. (1979). Obsessive-compulsive neurosis: A cognitive-behavioral formulation and approach to treatment. *Cognitive Therapy and Research, 3*, 333-348.

McLean, P. D., Whittal, M. L., Thordarson, D. S., Taylor, S., Sochting, I., Koch, W. J., . . . Anderson, K. W. (2001). Cognitive versus behaviour therapy in the group treatment of obsessive compulsive disorder. *Journal of consulting and clinical psychology, 69*, 205-214.

Meyer, V. (1966). Modification of expectations in cases with obsessional rituals. *Behaviour Research and Therapy, 4*, 273-280.

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

Muris, P., Meesters, C., Rassin, E., Merckelbach, H., & Campbell, J. (2001). Thought-action fusion and anxiety disorders symptoms in normal adolescents. *Behaviour Research and Therapy, 39*, 843-852.

Myers, S. G., & Wells, A. (2005). Obsessive-compulsive symptoms: the contribution of metacognitions and responsibility. *Journal of Anxiety Disorders, 19*, 806-817.

Nathan, P. E., & Gorman, J. M. (2002). *A guide to treatments that work*. New York: Oxford University Press.

National Institute of Health and Clinical Excellence. (2005). *Obsessive compulsive disorder: Core interventions in the treatment of obsessive-compulsive disorder and body dysmorphic disorder.*

Nestadt, G., Samuels, J., Riddle, M., Bienvenu III, O. J., Liang, K., LaBuda, M., . . . Hoehn-Saric, R. (2000). A Family Study of Obsessive-compulsive Disorder. *Archives of General Psychiatry, 57*, 358-363.

Nunnally, J. O. (1978). *Psychometric Theory*. New York: McGraw Hill.

Obsessive Compulsive Cognitions Working Group. (1997). Cognitive assessment of obsessive-compulsive disorder. *Behaviour Research and Therapy, 35*, 667-681.

Pauls, D. L., Alsobrook, J. P., Goodman, W. K., Rasmussen, S., & Leckman, J. F. (1995). A family study of obsessive-compulsive disorder. *American Journal of Psychiatry, 152*, 76-84.

Pediatric OCD Treatment Study Team. (2004). Cognitive-behavior therapy, sertraline, and their combination for children and adolescents with obsessive-compulsive disorder: the Pediatric OCD Treatment Study (POTS) randomized controlled trial. *JAMA : the journal of the American Medical Association, 292*, 1969-1976.

Phelps, K. E., & Woolley, J. D. (1994). The Form and Function of Young Children's Magical Beliefs. *Developmental Psychology, 30*, 385-394.

Piacentini, J., Bergman, R. L., Keller, M., & McCracken, J. (2003). Functional Impairment in Children and Adolescents with Obsessive-Compulsive Disorder. *Journal of Child and Adolescent Psychopharmacology, 13*, 61-69.

Piaget, J. (1952). *The origins of intelligence in children*. New York: International Universities Press.

Piaget, J. (1960). *The child's conception of physical causality*. London: Routledge & Kegan Paul.

Purcell, R., Maruff, P., Kyrios, M., & Pantelis, C. (1998). Cognitive Deficits in Obsessive–Compulsive Disorder on Tests of Frontal–Striatal Function. *Biological Psychiatry, 43*, 348-357.

Rachman, S. (1977). The conditioning theory of fear acquisition: A critical examination. *Behaviour Research and Therapy, 15*, 375-387.

Rachman, S. (1993). Obsessions, responsibility and guilt. *Behaviour Research and Therapy, 31*, 149-154.

Rachman, S. (1997). A cognitive theory of obsessions. *Behaviour Research and Therapy, 35*, 793-802.

Rachman, S. (1998). A cognitive theory of obsessions: elaborations. *Behaviour Research and Therapy, 36*, 385-401.

Rachman, S. (2003). *The treatment of obsessions*. Oxford: Oxford University Press.

Rachman, S., & de Silva, P. (1978). Abnormal and normal obsessions. *Behaviour Research and Therapy, 16*, 233-248.

Rachman, S., de Silva, P., & Roper, G. (1976). The spontaneous decay of compulsive urges. *Behaviour Research and Therapy, 14*, 445-453.

Rachman, S., & Hodgson, R. J. (1980). *Obsessions and compulsions*. Englewood Cliffs ; London: Prentice-Hall.

Rachman, S., & Shafran, R. (1999). Cognitive distortions: thought–action fusion. *Clinical Psychology & Psychotherapy, 6*, 80-85.

Rachman, S., Shafran, R., Mitchell, D., Trant, J., & Teachman, B. (1996). How to remain neutral: an experimental analysis of neutralization. *Behaviour Research and Therapy, 34*, 889-898.

Rachman, S., Shafran, R., Teachman, B., Trant, J., & Maltby, G. (1997). *Perceived responsibility and thought-action fusion: An experimental analysis*. Paper presented at the European Association of Behavioural and Cognitive Therapies, Venice.

Rachman, S., Thordarson, D. S., Shafran, R., & Woody, S. R. (1995). Perceived responsibility: Structure and significance. *Behaviour Research and Therapy, 33*, 779-784.

Rady, A., Salama, H., Hamza, M., & Ketat, A. (2011). P01-562 - Cross sectional study of psychiatric comorbidities among adolescents with obsessive compulsive symptoms. *European Psychiatry, 26*, 566.

Rapoport, J. (1986). Childhood obsessive compulsive disorder. *Journal of Child Psychology and Psychiatry, 27*, 289-296.

Rapoport, J., Inoff-Germain, G., Weissman, M. M., Greenwald, S., Narrow, W. E., Jensen, P. S., . . . Canino, G. (2000). Childhood obsessive-compulsive disorder in the NIMH MECA study: parent versus child identification of cases. Methods for the Epidemiology of Child and Adolescent Mental Disorders. *Journal of Anxiety Disorders, 14*, 535-548.

Rassin, E. (2001). The contribution of thought-action fusion and thought suppression in the development of obsession-like intrusions in normal participants. *Behaviour Research and Therapy, 39*, 1023-1032.

Rassin, E., Diepstraten, P., Merckelbach, H., & Muris, P. (2001). Thought-action fusion and thought suppression in obsessive-compulsive disorder. *Behaviour Research and Therapy, 39*, 757-764.

Rassin, E., Merckelbach, H., & Muris, P. (2000). Paradoxical and less paradoxical effects of thought suppression: A critical review. *Clinical Psychology Review, 20*, 973-995. doi: 10.1016/s0272-7358(99)00019-7

Rassin, E., Merckelbach, H., Muris, P., & Schmidt, H. (2001). The thought-action fusion scale: further evidence for its reliability and validity. *Behaviour Research and Therapy, 39*, 537-544.

Rassin, E., Merckelbach, H., Muris, P., & Spaan, V. (1999). Thought–action fusion as a causal factor in the development of intrusions. *Behaviour Research and Therapy, 37*, 231-237.

Rassin, E., Muris, P., Schmidt, H., & Merckelbach, H. (2000). Relationships between thought-action fusion, thought suppression and obsessive-compulsive symptoms: a structural equation modeling approach. *Behaviour Research and Therapy, 38*, 889-897.

Rauch, S., & Jenike, M. (1993). Neurobiological models of obsessive-compulsive disorder. *Psychosomatics, 34*, 20-32.

Rees, C. S., Draper, M., & Davis, M. C. (2010). The relationship between magical thinking, thought-action fusion and obsessive-compulsive symptoms. *International Journal of Cognitive Therapy*(3), 304-311.

Reeves, J., Reynolds, S., Coker, S., & Wilson, C. (2010). An experimental manipulation of responsibility in children: A test of the inflated responsibility model of obsessive-compulsive disorder. *Journal of Behavior Therapy and Experimental Psychiatry, 41*, 228-233.

Reinherz, H. Z., Giaconia, R. M., Lefkowitz, E. S., Pakiz, B., & Frost, A. K. (1993). Prevalence of Psychiatric Disorders in a Community Population of Older Adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry, 32*, 369-377.

Rhéaume, J., Freeston, M. H., Dugas, M. J., Letarte, H., & Ladouceur, R. (1995). Perfectionism, responsibility and Obsessive-Compulsive symptoms. *Behaviour Research and Therapy, 33*, 785-794.

Rhéaume, J., Ladouceur, R., Freeston, M., & Letarte, H. (1994). Inflated repsonsibility in obessive compulsive disorder: Psychometric studies of a semiidiographic measure. *Journal of Psychopathology and Behavioral Assessment, 16*, 265-276.

Riddle, M. A., Reeve, E. A., Yaryura-Tobias, J. A., Yang, H. M., Claghorn, J. L., Gaffney, G., . . . Walkup, J. T. (2001). Fluvoxamine for Children and Adolescents With Obsessive-Compulsive Disorder: A Randomized, Controlled, Multicenter Trial. *Journal of the American Academy of Child & Adolescent Psychiatry, 40*, 222-229.

Riddle, M. A., Scahill, L., King, R. A., Hardin, M. T., Anderson, G. M., Ort, S. I., . . . Cohen, D. J. (1992). Double-Blind, Crossover Trial of Fluoxetine and Placebo in Children and

Adolescents with Obsessive-Compulsive Disorder. *Journal of the American Academy of Child & Adolescent Psychiatry, 31*, 1062-1069.

Riddle, M. A., Scahill, L., King, R. A., Hardin, M. T., Towbin, K. E., Ort, S. I., . . . Cohen, D. J. (1990). Obsessive Compulsive Disorder in Children and Adolescents: Phenomenology and Family History. *Journal of the American Academy of Child & Adolescent Psychiatry, 29*, 766-772.

Rosa-Alcázar, A. I., Sánchez-Meca, J., Gómez-Conesa, A., & Marín-Martínez, F. (2008). Psychological treatment of obsessive–compulsive disorder: A meta-analysis. *Clinical Psychology Review, 28*, 1310-1325.

Rosario-Campos, M., Leckman, J. F., Curi, M., Quatrano, S., Katsovitch, L., Miguel, E. C., & Pauls, D. L. (2005). A family study of early-onset obsessive-compulsive disorder. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics, 136B*, 92-97.

Rosario-Campos, M., Leckman, J. F., Mercadante, M. T., Shavitt, R. G., Prado, H., Sada, P., . . . Miguel, E. C. (2001). Adults With Early-Onset Obsessive-Compulsive Disorder. *American Journal of Psychiatry, 158*, 1899-1903.

Rosenthal, R. (1991). *Meta-analytic procedures for social research* (Second edition ed.). Newbury Park, CA: Sage.

Rothbaum, F., & Weisz, J. R. (1988). *Child psychopathology and the quest for control*. New York: Sage.

Rynn, M. A., Barber, J. P., Khalid-Khan, S., Siqueland, L., Dembiski, M., McCarthy, K. S., & Gallop, R. (2006). The psychometric properties of the MASC in a paediatric psychiatric sample. *Journal of Anxiety Disorders, 20*, 139-157.

Salkovskis, P. (1985). Obsessional-compulsive problems: A cognitive-behavioural analysis. *Behaviour Research and Therapy, 23*, 571-583.

Salkovskis, P. (1998). Psychological approaches to the understanding of obsessional problems. In R. P. Swinson, M. M. Antony, S. Rachman & M. A. Richter (Eds.), *Obsessive compulsive disorder: theory, research and treatment.* Guidlford.

Salkovskis, P., Shafran, R., Rachman, S., & Freeston, M. H. (1999). Multiple pathways to inflated responsibility beliefs in obsessional problems: possible origins and implications for therapy and research. *Behaviour Research and Therapy, 37*, 1055-1072.

Salkovskis, P., Wroe, A. L., Gledhill, A., Morrison, N., Forrester, E., Richards, C., . . . Thorpe, S. (2000). Responsibility attitudes and interpretations are characteristic of obsessive compulsive disorder. *Behaviour Research and Therapy, 38*, 347-372.

Schmidtke, K., Schorb, A., Winkelmann, G., & Hohagen, F. (1998). Cognitive Frontal Lobe Dysfunction in Obsessive-Compulsive Disorder. *Biological Psychiatry, 43*, 666-673.

Schniering, C. A., & Rapee, R. M. (2002). Development and validation of a measure of children's automatic thoughts: the children's automatic thoughts scale. *Behaviour Research and Therapy, 40*, 1091-1109.

Shafran, R., & Rachman, S. (2004). Thought-action fusion: a review. *Journal of Behavior Therapy and Experimental Psychiatry, 35*, 87-107.

Shafran, R., Teachman, B. A., Kerry, S., & Rachman, S. (1999). A cognitive distortion associated with eating disorders: Thought-shape fusion. *British Journal of Clinical Psychology, 38*, 167-179.

Shafran, R., Thordarson, D. S., & Rachman, S. (1996). Thought-action fusion in obsessive compulsive disorder. *Journal of Anxiety Disorders, 10*, 379-391.

Sillence, A. (2010). *An experimental manipulation of thought-action fusion in children: A test of the role of thought-action fusion in OCD.* Doctorate in Clinical Psychology, University of East Anglia, Norwich.

Silverman, W., & Albano, A. (1996). *Anxiety Disorders Interview Schedule for DSM–IV Child Version: Parent Interview Schedule*. San Antonio: The Psychological Corporation - Harcourt Brace.

Simonds, L. M., Demetre, J. D., & Read, C. (2009). Relationships between magical thinking, obsessive-compulsiveness and other forms of anxiety in a sample of non-clinical children. *British Journal of Developmental Psychology, 27*, 457-471.

Smári, J., & Hólmsteinsson, H. (2001). Intrusive thoughts, responsibility attitudes, thought-action fusion and chronic thought suppression in relation to obessive-compulsive symptoms. *Behavioural and Cognitive Psychotherapy, 29*, 13-20. doi: doi:10.1017/S1352465801001035

Snider, L. A., & Swedo, S. E. (2004). PANDAS: current status and directions for research. *Mol Psychiatry, 9*, 900-907.

Sobin, C., Blundell, M. L., & Karayiorgou, M. (2000). Phenotypic differences in early- and late-onset obsessive-compulsive disorder. *Comprehensive Psychiatry, 41*, 373-379.

Spector, P. E. (1992). *Summated rating scale construction*. London: Sage Publications.

Spence, S. H. (1998). A measure of anxiety symptoms among children. *Behaviour Research and Therapy, 36*, 545-566.

Spielberger, C. D. (1973). *Manual for the State Trait Anxiety Inventory for children*. Palo Alto: Consulting Psychologists Press.

Stewart, S. E., Geller, D. A., Jenike, M., Pauls, D., Shaw, D., Mullin, B., & Faraone, S. V. (2004). Long-term outcome of pediatric obsessive–compulsive disorder: a meta-analysis and qualitative review of the literature. *Acta Psychiatrica Scandinavica, 110*, 4-13.

Storch, E. A., Geffken, G. R., Merlo, L. J., Mann, G., Duke, D., Munson, M., . . . Goodman, W. K. (2007). Family-Based Cognitive-Behavioral Therapy for Pediatric Obsessive-Compulsive Disorder: Comparison of Intensive and Weekly Approaches. *Journal of the American Academy of Child and Adolescent Psychiatry, 46*, 469-478.

Subbotsky, E. (2005). The Permanence of Mental Objects: Testing Magical Thinking on Perceived and Imaginary Realities. *Developmental Psychology, 41*, 301-318.

Swedo, S. (1994). Sydenham's chorea. A model for childhood autoimmune neuropsychiatric disorders. *JAMA, 272*, 1788-1791.

Swedo, S., Leonard, H. L., Garvey, M., Mittleman, B., Allen, A. J., Perlmutter, S., . . . Dubbert, B. K. (1998). Pediatric autoimmune neuropsychiatric disorders associated with

streptococcal infections: clinical description of the first 50 cases. *American Journal of Psychiatry, 155*, 264-271.

Swedo, S., Pietrini, P., Leonard, H. L., Schapiro, M. B., Rettew, D. C., Goldberger, E. L., . . . Grady, C. L. (1992). Cerebral Glucose Metabolism in Childhood-Onset Obsessive-Compulsive Disorder: Revisualization During Pharmacotherapy. *Archives of General Psychiatry, 49*, 690-694.

Swedo, S., Rapoport, J. L., Cheslow, D. L., Leonard, H. L., Ayoub, E. M., Hosier, D. M., & Wald, E. R. (1989). High prevalence of obsessive-compulsive symptoms in patients with Sydenham's chorea. *American Journal of Psychiatry, 146*, 246-249.

Swedo, S., Rapoport, J. L., Leonard, H., Lenane, M., & Cheslow, D. (1989). Obsessive-compulsive disorder in children and adolescents. Clinical phenomenology of 70 consecutive cases. *Archives of General Psychiatry, 46*, 335-341.

Swedo, S., Schapiro, M., Grady, C., Cheslow, D., Leonard, H., Kumar, A., . . . Rapoport, J. (1989). Cerebral Glucose Metabolism in Childhood-Onset Obsessive-Compulsive Disorder. *Archives of General Psychiatry, 46*, 518-523.

Sytsma, S., Kelley, M., & Wymer, J. (2001). Development and Initial Validation of the Child Routines Inventory. *Journal of Psychopathology and Behavioral Assessment, 23*, 241-251.

Tallis, F. (1994). Obsessions, responsibility and guilt: two case reports suggesting a common and specific aetiology. *Behaviour Research and Therapy, 32*, 143-145.

Taylor, M., Cartwright, B. S., & Carlson, S. M. (1993). A Developmental Investigation of Children's Imaginary Companions. *Developmental Psychology, 29*, 276-285.

Thomsen, P. H. (1994). Obsessive-compulsive disorder in children and adolescents. A 6-22-year follow-up study. Clinical descriptions of the course and continuity of obsessive-compulsive symptomatology. *European Child & Adolescent Psychiatry, 3*, 82-96.

Toro, J., Cervera, M., Osejo, E., & Salamero, M. (1992). Obsessive-Compulsive Disorder in Childhood and Adolescence: a Clinical Study. *Journal of Child Psychology and Psychiatry, 33*, 1025-1037.

Turner, S. M., & Beidel, D. C. (1988). *Treating obsessive compulsive disorder*. New York: Pergamon.

Valleni-Basile, L. A., Garrison, C. Z., Jackson, K. L., Waller, J. L., McKeown, R. E., Addy, C. L., & Cuffe, S. P. (1994). Frequency of obsessive-compulsive disorder in a community sample of young adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry, 33*, 782-791.

Valleni-Basile, L. A., Garrison, C. Z., Waller, J. L., Addy, C. L., McKeown, R. E., Jackson, K. L., & Cuffe, S. P. (1996). Incidence of obsessive-compulsive disorder in a community sample of young adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry, 35*, 898-906.

Van Balkom, A., De Haan, E., Van Oppen, P., Spinhoven, P., Hoogduin, K., & Van Dyck, R. (1998). Cognitive and Behavioral Therapies Alone versus in Combination with Fluvoxamine in the Treatment of Obsessive Compulsive Disorder. *The Journal of Nervous and Mental Disease, 186*, 492-499.

Van Balkom, A., Van Oppen, P., Vermeulen, A., Van Dyck, R., Nauta, M., & Vorst, H. (1994). A meta-analysis on the treatment of obsessive compulsive disorder: A comparison of antidepressants, behavior, and cognitive therapy. *Clinical Psychology Review, 14*, 359-381.

van den Hout, M., Kindt, M., Weiland, T., & Peters, M. (2002). Instructed neutralization, spontaneous neutralization and prevented neutralization after an obsession-like thought. *Journal of Behavior Therapy and Experimental Psychiatry, 33*, 177-189.

van den Hout, M., van Pol, M., & Peters, M. (2001). On becoming neutral: effects of experimental neutralizing reconsidered. *Behaviour Research and Therapy, 39*, 1439-1448.

Van Oppen, P., De Haan, E., Van Balkom, A., Spinhoven, P., Hoogduin, K., & Van Dyck, R. (1995). Cognitive therapy and exposure in vivo in the treatment of obsessive compulsive disorder. *Behaviour Research and Therapy, 33*, 379-390.

Veale, D. M., Sahakian, B. J., Owen, A. M., & Marks, I. M. (1996). Specific cognitive deficits in tests sensitive to frontal lobe dysfunction in obsessive–compulsive disorder. *Psychological Medicine, 26*, 1261-1269.

Verhaak, L., & de Haan, E. (2007). Cognitions in children with OCD. *European Child & Adolescent Psychiatry, 16*, 353-361.

Vikan, A., & Clausen, S. E. (1993). Freud, Piaget, or neither? Beliefs in controlling others by wishful thinking and magical behavior in young children. *Journal of Genetic Psychology, 154*, 297-314.

Walitza, S., Melfsen, S., Jans, T., Zellmann, H., Wewetzer, C., & Warnke, A. (2011). Obsessive Compulsive Disorder in Children and Adolescents. *Deutsches Arzteblatt International, 108*, 173-179.

Walitza, S., Zellmann, H., Irblich, B., Lange, K. W., Tucha, O., Hemminger, U., . . . Warnke, A. (2008). Children and adolescents with obsessive-compulsive disorder and comorbid attention-deficit/hyperactivity disorder: preliminary results of a prospective follow-up study. *Journal of Neural Transmission, 115*, 187-190.

Wegner, D. M., Schneider, D. J., Carter, S. R., & White, T. L. (1987). Paradoxical effects of thought suppression. *Journal of Personality and Social Psychology, 53*, 5-13.

Wegner, D. M., & Zanakos, S. (1994). Chronic Thought Suppression. *Journal of Personality, 62*, 615-640.

Wells, A. (1997). *Cognitive therapy of anxiety disorders: A practice manual and conceptual guide*. Chichester: John Wiley & Sons Ltd.

Wells, A., & Matthews, G. (1994). *Attention and Emotion: A clinical perspective*. Hove: Erlbaum.

Werner, H. (1948). *Comparative psychology of mental development*. New York: International Universities Press.

Wever, C., & Rey, J. M. (1997). Juvenile obsessive—compulsive disorder. *Australian and New Zealand Journal of Psychiatry, 31*, 105-113.

Wewetzer, C., Jans, T., Müller, B., Neudörfl, A., Bücherl, U., Remschmidt, H., . . . Herpertz-Dahlmann, B. (2001). Long-term outcome and prognosis of obsessive–compulsive disorder with onset in childhood or adolescence. *European Child & Adolescent Psychiatry, 10*, 37-46.

Whitaker, A., Johnson, J., Shaffer, D., Rapoport, J. L., Kalikow, K., Walsh, B. T., . . . Dolinsky, A. (1990). Uncommon Troubles in Young People: Prevalence Estimates of Selected Psychiatric Disorders in a Nonreferred Adolescent Population. *Archives of General Psychiatry, 47*, 487-496.

Williams, T., Salkovskis, P. M., Forrester, L., Turner, S. M., White, H., & Allsopp, M. (2010). A randomised controlled trial of cognitive behavioural treatment for obsessive compulsive disorder in children and adolescents. *European Child & Adolescent Psychiatry, 19*, 449-456.

Woolley, J. D. (1997). Thinking about Fantasy: Are Children Fundamentally Different Thinkers and Believers from Adults? *Child Development, 68*, 991-1011.

Woolley, J. D., & Wellman, H. M. (1993). Origin and Truth: Young Children's Understanding of Imaginary Mental Representations. *Child Development, 64*, 1-17.

Working Party on Ethical Guidelines for Psychological Research. (2010). *Code of Human Research Ethics*. The British Psychological Society.

Yaryura-Tobias, J. A., & Bhagavan, H. N. (1977). L-tryptophan in obsessive-compulsive disorders. *American Journal of Psychiatry, 134*, 1298-1299.

Zohar, Ratzoni, G., Pauls, D. L., Apter, A., Bleich, A., Kron, S., . . . Cohen, D. J. (1992). An epidemiological study of obsessive compulsive disorder and related disorders in Israeli adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry, 31*, 1057-1061.

Zohar, J., Mueller, E. A., Insel, T. R., Zohar-Kadouch, R. C., & Murphy, D. L. (1987). Serotonergic Responsivity in Obsessive-Compulsive Disorder: Comparison of Patients and Healthy Controls. *Archives of General Psychiatry, 44*, 946-951.

Zucker, B. G., Craske, M. G., Barrios, V., & Holguin, M. (2002). Thought action fusion: can it be corrected? *Behaviour Research and Therapy, 40*, 653-664.

Appendix A
Letter for Head Teachers

University of East Anglia

Elizabeth Fry Building
Postgraduate Research Office
Department of Psychological Sciences
University of East Anglia
Norwich NR4 7TJ
Tel: 01603 593310

[SCHOOL ADDRESS]

j.peterkin@uea.ac.uk

[DATE]

Dear [head teacher's name],

My name is Joanne Peterkin. I am a trainee clinical psychologist studying at the University of East Anglia. As part of my training, I am carrying out research with children in the local area. The aim of the research is to find out more about children's magical thinking.

Magical thinking in children can include beliefs about fantasy, magic and their own ability to influence external events. It is typically seen in children, with most growing out of it with age. However, for some it continues and becomes a problem. It is often associated with anxiety and obsessive compulsive disorder. In order to understand more about the role of magical thinking in these disorders, we want to find out more about it in normal children.

To do this, I am trying to recruit around 100 children, aged between 9 and 11, to take part in an experiment. As such, I am contacting local schools to see if they would like to take part. Attached is an information sheet with further details. In brief, the experiment

involves a computer task in which they are asked to try and influence images using their 'thoughts'. This task is engaging and enjoyable to do.

If you are interested in taking part, I would like to come and see you at your school to answer any questions you might have. This is a great opportunity for schools and children to become involved in research. The children will be offered a certificate and a small prize for taking part. If you agree to take part, a £2 book voucher will be offered to your school for every child that participates.

If you agree to take part, I would like to send parents information about the study and ask for their consent for their child to participate. Participation is entirely voluntary.

I am experienced in working with children and have an enhanced CRB check. This study has been approved by the UEA Faculty of Health Research Ethics Committee.

If you are interested in taking part or would like to find out more about the study, please contact me at j.peterkin@uea.ac.uk. Alternatively, you can contact my research supervisor, Professor Shirley Reynolds, using the above telephone number.

Thank you for taking the time to read this letter. I hope this study is of interest to you and I look forward to hearing from you.

Yours sincerely,

Joanne Peterkin

Trainee Clinical Psychologist

Appendix B
Information Sheet for Head Teachers

How Magical Thinking Develops in Children –

Information for Head Teachers

What is this project about?
Many children believe that their thoughts can influence things in the real world. This is called 'magical thinking' and is very typical in children but becomes less common as we grow up. However, for some children, magical thinking can become more of a problem and lead to feelings of anxiety. We want to learn more about magical thinking in normally developing children in order to understand more about how anxiety works. It is hoped this will help us develop more effective treatments.

We want to investigate magical thinking using a computerised task. We will ask children to try and 'influence' the computer by using their thoughts. Some children will see images on the computer change and some will not. We want to examine the effect of magical thinking on children's thoughts and behaviours.

We are looking for children aged between 9 and 11 who go to normal schools and are in good health.

What will the children be doing?
If parents are willing for their child to take part, I will meet the child at school and tell them about the study. If they are happy to take part, this is what will happen:

- I will ask them some questions about how they are feeling.
- Then they will complete a short task on the computer. This isn't difficult and is quite enjoyable! The children will be asked to try and change some images on screen by using their thoughts.
- They will be asked at different points in the task how they are feeling.
- Once all the children taking part have finished the task they will be given all the information about the study and given opportunity to ask any questions they might have. They will be given a certificate and a small prize (a small toy suitable to their age group) to take home.

What will parents and children be told about the study?
Parents will be given information sheets explaining the study in full, its purpose and what their child will be asked to do. They will be asked not to pass on this information to their child. If children knew that they could not influence the computer, their performance on the task would be affected. Children will be fully informed about the study once all children taking part have had a turn.

What are the potential benefits of taking part?
This is an opportunity for your school to get involved in research with the UEA that could contribute to our understanding of how children develop. This may be very helpful in developing treatments for children who do not develop as expected. For every child that takes part, a £2 book voucher will be given to your school. The children will receive a certificate and a small toy for taking part.

Are there any risks?
Most children enjoy taking part in the research. If any child became upset I would stop the task immediately, remove them from the study and make sure they were OK. They would be comforted, taken back to their classroom and their teacher would be notified.

Can parents and children change their mind?
Parents and children are free to withdraw consent at any point in the research.

What will happen with the results?
The results will be written up in a thesis and possibly published. No personal information will be included. Data management will follow the Data Protection Act. All children will be identified by unique identity numbers. I will not keep any information that could identify individual parents or children to someone else. Written records will be kept in a locked cupboard at the University of East Anglia. Only my research supervisor and I will have access to the data.

Who has reviewed the study?
The University of East Anglia, Faculty of Health Ethics Committee has reviewed and approved this research.

Who do I speak to if I have questions or if any problems arise?
If you have any questions or would like more information please contact either Joanne Peterkin (Trainee Clinical Psychologist) or Professor Shirley Reynolds (Clinical Psychologist):

Elizabeth Fry Building,   Tel: 01603 593310
School of Medicine, Health Policy and Practice,   j.peterkin@uea.ac.uk
University of East Anglia,
Norwich,
NR4 7TJ

Thank you for taking the time to read this.

Appendix C
Information about Participating Schools

Information taken from the latest Ofsted Inspection report available on the OFSTED website (www.ofsted.gov.uk accessed on 14th May 2012).

School A (report dated 11/12/2008)

School A is a larger than average city primary school with 416 pupils. Approximately half of the pupils are from different ethnic backgrounds, with most of Pakistani descent. One third of pupils are in the early stages of learning English. The proportion of pupils eligible for free school meals is below the national average, as is the number of pupils with learning difficulties or disabilities.

School B (report dated 18/04/2012)

School B is a larger than average city primary school with 430 pupils. A large proportion are from minority ethnic groups and speak English as an additional language. 18 languages are represented in the school. The proportion of pupils eligible for free school meals is above the national average. A higher than average proportion of pupils join or leave partway through their primary education.

School C (report dated 5/12/2007)

School C is an average sized city primary school with 207 pupils. The majority of pupils are from socially and economically advantaged backgrounds. Almost all pupils are White British and speak English fluently. Few pupils are eligible for free school meals. Few pupils have learning difficulties or disabilities. Attainment levels are generally above national expectations.

Appendix D
Parent Information Sheet

PARENT/GUARDIAN INFORMATION SHEET

Hello, my name is Joanne Peterkin. I would like to invite your child to take part in a research project. This is part of my training in Clinical Psychology at the University of East Anglia. I have described the study below. Please read it and if you would like any more information, or have any questions, please contact me on the number below. Thank you.

What is this project about?
Many children believe that their thoughts can influence things in the real world. This is called 'magical thinking' and is very typical in children but becomes less common as we grow up. We want to investigate magical thinking using a computerised task. We will ask children to try and 'influence' the computer by using their thoughts. Some children will see images on the computer change and some will not. We want to examine the effect of magical thinking on children's thoughts and behaviours.

We are looking for children aged between 9 and 11 who go to normal schools and are in good health. Your child's school has agreed to take part which is why your child has been invited to take part.

What will my child be told about the study?
I have included an information sheet for your child. We would be pleased if you would read this with your child and discuss the study with them. However, at this stage we will not tell your child about the images on the computer changing. This might affect how they do on the task. After they have taken part we will explain all about the study to the children, give them a small prize and a certificate to take home.

What will my child and I be asked to do?
- If you are willing for your child to take part, please fill in the consent form and provide some basic information on your child on the demographic sheet enclosed.
- I will then meet your child during school hours and tell them about the study.
- If they are happy to take part I will ask them some questions about how they are feeling.
- Then they will complete a short task on the computer. This isn't difficult and is quite enjoyable! The children will be asked to try and change some images on screen by using their thoughts.
- They will be asked at different points in the task how they are feeling.
- Once they have finished the task they will be given all the information about the study and given opportunity to ask any questions they might have.
- The task will be recorded using a voice recorder to make sure the experiment is conducted fairly.

What are the potential benefits of taking part?
This is an opportunity for your child to get involved in research that could contribute to our understanding of how children develop. This may be very helpful in developing treatments for children who do not develop as expected. For every child that takes part, a £2 book voucher will be given to your child's school.

Are there any risks to my child?
Most children enjoy taking part in the research. If they became upset I would stop the task immediately, remove them from the study and make sure they were OK. They would be comforted, taken back to their classroom and their teacher would be notified.

Will it affect my child's care or education?
No, your child's care and education will not be affected whether you say yes or no. The research is being carried out with the permission and co-operation of your child's school.

Can I change my mind?
Yes. It is up to you and your child whether or not to take part and you are free to withdraw consent at any point in the research.

What will happen with the results?
The results will be written up in a thesis and possibly published. No personal information will be included. Data management will follow the Data Protection Act. All children will be identified by unique identity numbers. I will not keep any information about you or your child that could identify you to someone else. Written records will be kept in a locked cupboard at the University of East Anglia. The audio recordings will be kept in a password protected file on a private computer before being destroyed following write up.

Who has reviewed the study?
The University of East Anglia, Faculty of Health Ethics Committee has reviewed and approved this research.

Who do I speak to if I have questions or if any problems arise?
If you have any questions or would like more information please contact either Joanne Peterkin (Trainee Clinical Psychologist) or Professor Shirley Reynolds (Clinical Psychologist):

Elizabeth Fry Building,   Tel: 01603 593310
School of Medicine, Health Policy and Practice,   j.peterkin@uea.ac.uk
University of East Anglia,
Norwich,
NR4 7TJ

OK, I want my child to take part – what do I do next?
If you are willing for your child to take part, please complete the consent form and the demographic information form included in this pack. Please send this back to school. Please discuss this with your child; they need to be happy to take part. I will then arrange to meet with your child at school.

Thank you for taking the time to read this. If you are interested, I look forward to hearing from you.

Thoughts and feelings in young people

YOUNG PERSON INFORMATION SHEET

Hello,

I'm doing some research and I would like to invite you to take part. Before you decide I would like you to read the following information.

What is the project about?

In this project, I will be asking children to put on a special helmet and try to change some pictures on a computer. I want to know how you go about doing this, what you think and how you feel while you are doing this task.

Why have I been asked to take part?

Your school has agreed to take part in the research. We are interested in children aged between 9 and 11 which is why you have been asked.

What would I have to do?

If you and your parents are willing to take part, this is what will happen:

- I will come and see you while you are at school
- I will ask you some questions about your feelings
- You will be asked to do a task on the computer. It is not difficult and other children say it's quite fun!
- I will ask you some more questions about your feelings once you have finished the task.
- I will use a voice recorder to record the task. This is just to make sure I have done my job properly. It isn't to look at anything you say!
- Once everyone who wants to has had a go at the task, I will tell you more about the research and what it is for.

Do I have to take part?

No, you do not have to take part in this project. It is up to you. If you say yes, you can always change your mind at any time without needing to give a reason. Nobody will mind and you won't get into trouble.

Who will know what I have said?

Only people involved in the project will know what you say (this includes me and my teacher at University).

Are there good things or risks in taking part?

The task should be good fun and you get to take part in some research which could help other children. There are no risks in taking part. There is nothing upsetting about the task. If for any reason you did get upset, then you can stop the experiment at any time and I will let your teacher know to make sure you're OK.

What will the information I give be used for?

The answers you and all the other children give me will be written up in a project for my University. No-one will know what you said. This project could also be shared with other people who are interested in learning more about how children think.

What happens next?

If you are willing to take part and your parents agree, then you can fill in the form called 'Child Assent form'. This just lets me know that you want to take part. This needs to go into the envelope along with your parents' forms and handed in at school.

If you have any more questions, you will have chance to ask them when I come to your school.

Thanks for reading this!

Joanne Peterkin

Appendix F
Demographic Questionnaire

Participant Identification Number:

BACKGROUND INFORMATION FORM

Title of project: An experimental manipulation of thought-action fusion in children: Investigating obsessive compulsive features

Name of researcher: Joanne Peterkin, Trainee Clinical Psychologist

In order for us to understand the make-up of our research sample we would like to collect some demographic information about your child. If you have any concerns about sharing these details please discuss this with the researcher.

Please complete the following details about your child:

Name of child   _____

Gender (please circle)   MALE   FEMALE

Date of birth   _ _/_ _/_ _ _ _

Ethnicity   White   ☐
                                          Mixed   ☐
                                          Asian or Asian British   ☐
                                          Black or Black British   ☐
                                          Chinese or other ethnic group ☐

Is your child colour blind?   YES   NO

(*We ask this as this task involves different coloured pictures*)

Does your child have a diagnosis of epilepsy   YES   NO

(*We ask this because the task involves rapidly changing images on a computer screen*)

Does your child have any worries or fears which interfere with usual life (e.g. going to school, making friends, going out, sports or hobbies)?   YES   NO

Have these been ongoing for more than 6 months?   YES   NO

(*We are only including children who do not have high levels of worries*)

Thank you for your help. Please return this with your consent form to the school office in the envelope provided.

Appendix G
Parent Consent Form

Participant Identification Number:

PARENT/GUARDIAN CONSENT FORM

Title of project: How Magical Thinking Develops in Children

Name of researcher: Joanne Peterkin, Trainee Clinical Psychologist

Please initial box

1. I confirm that I have read and understood the information sheet for the above study. I have had the opportunity to consider the information, ask further questions and have had these answered satisfactorily.

☐

2. I understand that my child's participation in the above study is voluntary and that I am free to withdraw my child and consent at any time without my child's treatment being affected.

☐

3. I understand that my child will not be given complete information about the experiment until after they have taken part.

☐

4. I agree that my child may take part in the above study if he/she wishes to do so

☐

Please complete the following:

_____   _____

Name of child   Name of school and class

_____   _____   _____

Name of Parent / Guardian   Date   Signature

Thank you for your help. Please return this to the school office in the envelope provided

Office use only

_____   _____   _____

Name of researcher   **Date**   **Signature**

Appendix H
Task Instructions

Task Instructions

1. Tell the child:

    'As you might have heard, I'd like you to help with an experiment that I'm doing. I'm asking children to put on a special helmet, think hard about the colour red and try to change some pictures on the computer screen. I want to find out how well the helmet works and what you think about the task'.

    'Before you do the task, I'll be asking you some questions about your thoughts and feelings. It's not like a test, because there are no right or wrong answers; I just want to know what you think. I won't be telling your teachers or your mum or dad about your answers, they are just for my project.

2. Give the child the information sheet to read or read this out loud to them. Tell the child:

    'It isn't likely that you will find this experiment upsetting in any way. If you do, I will stop the experiment and mention it to your teacher to make sure you're OK'.

3. Ask the child:

    'Are there any questions you'd like to ask me?'

4. If they are happy to participate give them the assent form to complete and give each child their participant number.

5. Tell the child:

    'Before you do the experiment with the helmet, I'd like you to answer some questions about your thoughts and feelings. We can go through these together.'

6. Give each child the MASC-10, RAS, TAFQA and MTQ.

7. Decide which child will do the experiment first and ask the other children to return to their class.

8. Show the child the helmet and computer equipment. Tell the child:

   'This is the special helmet. We're testing it to see if it can help children who can't speak easily. We're trying to see if it can read and translate their thoughts. The equipment is quite expensive so we have to be careful with it'.

9. Ask the child to put the helmet on and sit in front of the computer. Put in the child's age, gender and participant number. (If MASC score is above clinical cut-off, tick box to enter them into modified version). Click 'next'. Computer randomises to control or experimental group.

10. Tell the child:

    '*First of all, we would like to know how you are feeling. Some children feel a bit nervous or jittery; if that's how you feel you can use the mouse to drag the bar this way [point to screen]. Some children feel quite calm and steady and if that's you, you can drag the bar this way [point to screen]. You can do the same for the other two questions too. Just drag the bar to where you want on the line to let the computer know how you're feeling.'* Click Next.

11. Child completes VAS T1.

12. Tell the child:

    'You are going to see a series of pictures come up on the screen one after another. Think hard about the colour red; try to visualise it in your mind. The computer will try to pick up on what you're thinking and begin to turn the pictures red. It won't work straight away,

because the computer needs time to tune in and it doesn't always work so don't be disappointed. Just try your hardest. If you want to stop, for any reason, that's fine - just call my name or hold up this 'STOP' card. When the computers finished, let me know. When you're ready to begin click 'next'.'

13. Experimental or control images shown

14. For experimental group only, error message appears on screen:

    "A fatal exception OE has occurred at 0028:C0068f8 in HELMETDRV.SYS[01] + 000059F8. The current application has been terminated.

    This error can be caused by:

- Insufficient processing capacity

- Strong thoughts causing electromagnetic overload

- Damaged or faulty hardware

    Please contact an administrator for assistance"

    For control group, a screen saying "Please let the researcher know you have finished the experiment" will appear.

15. Child lets researcher know that A) the computer has crashed (experimental group) or B) that they have finished (control group).

    For the experimental group, act surprised and tell the child:

    'I'm not sure what has happened. This doesn't normally happen. Let's read the message'.

The current application has been terminated. This error can be caused by insufficient processing capacity, strong thoughts causing electromagnetic overload, damaged or faulty hardware.

'It looks like it could be for a few reasons. Let's restart the program and see what happens'.

Press Shift and X to 'restart' the programme. Screen saying "Please let the researcher know you have finished the experiment" will appear.

16. For both groups tell the child:

    'Right the computer needs to do some background readings so we'll let it read your brainwaves. You don't have to think about anything in particular, just remember that the computer is very sensitive and very expensive, and can be damaged by strong thoughts. If you have a thought that you worry could damage the computer, you can press this button which will disconnect the helmet from the computer for a second so that your thought doesn't reach the computer. You can do this every time you have a thought that you worry might damage the computer. Do you understand? Ok, now before that you just need to answer the computers questions about how you feel like we did at the beginning'. Click next now'

17. Child completes VAS T2. Tell the child:

    'Are you ready? This will take a few minutes. If you want to stop, for any reason, just call my name or hold up your 'STOP' card. When the computers finished, let me know. To start click 'next'.

18. Child lets researcher know they have finished.

19. Tell the child:

'Now we would like to know how you are feeling one more time. Just drag the bar to tell the computer how you feel'.

20. Child completes VAS 3.

21. Tell the child:

    'Now I have some questions to ask you, so I can find out what you thought about the experiment. There are no right or wrong answers, I just want to know what you thought. While you do that, I'm just going to check the computer.'

22. Give the child the questionnaire including measures of: induced thought-action fusion, probability of harm, responsibility, severity of harm, thought-control and reasons for button-pressing. Appear to be checking the computer.

23. Tell child:

    'Thank you for helping me; you've done a brilliant job! The computer is absolutely fine, you did great. Do you want to choose your prize?

    When everyone who is helping me has taken part, I'm going to call you all back so I can tell you a bit more about the experiment. Do you have anything you want to ask me before then?

    I'm going to ask [name next child] to have a turn now.

24. Check the child is reassured and accompany them back to their classroom.

Appendix I

Set of Images Shown to the Experimental Group
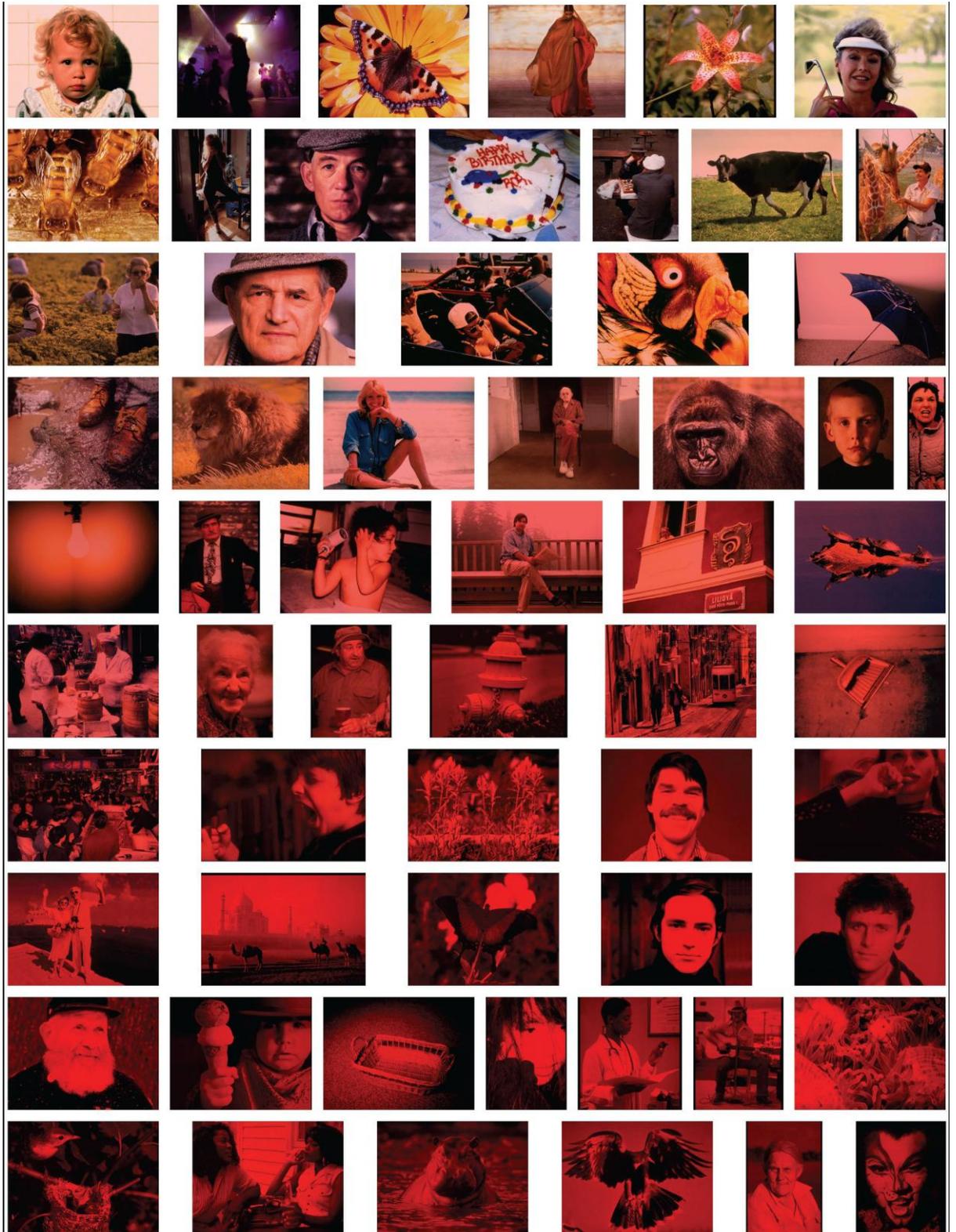
Appendix J

Set of Images Shown to the Control Group
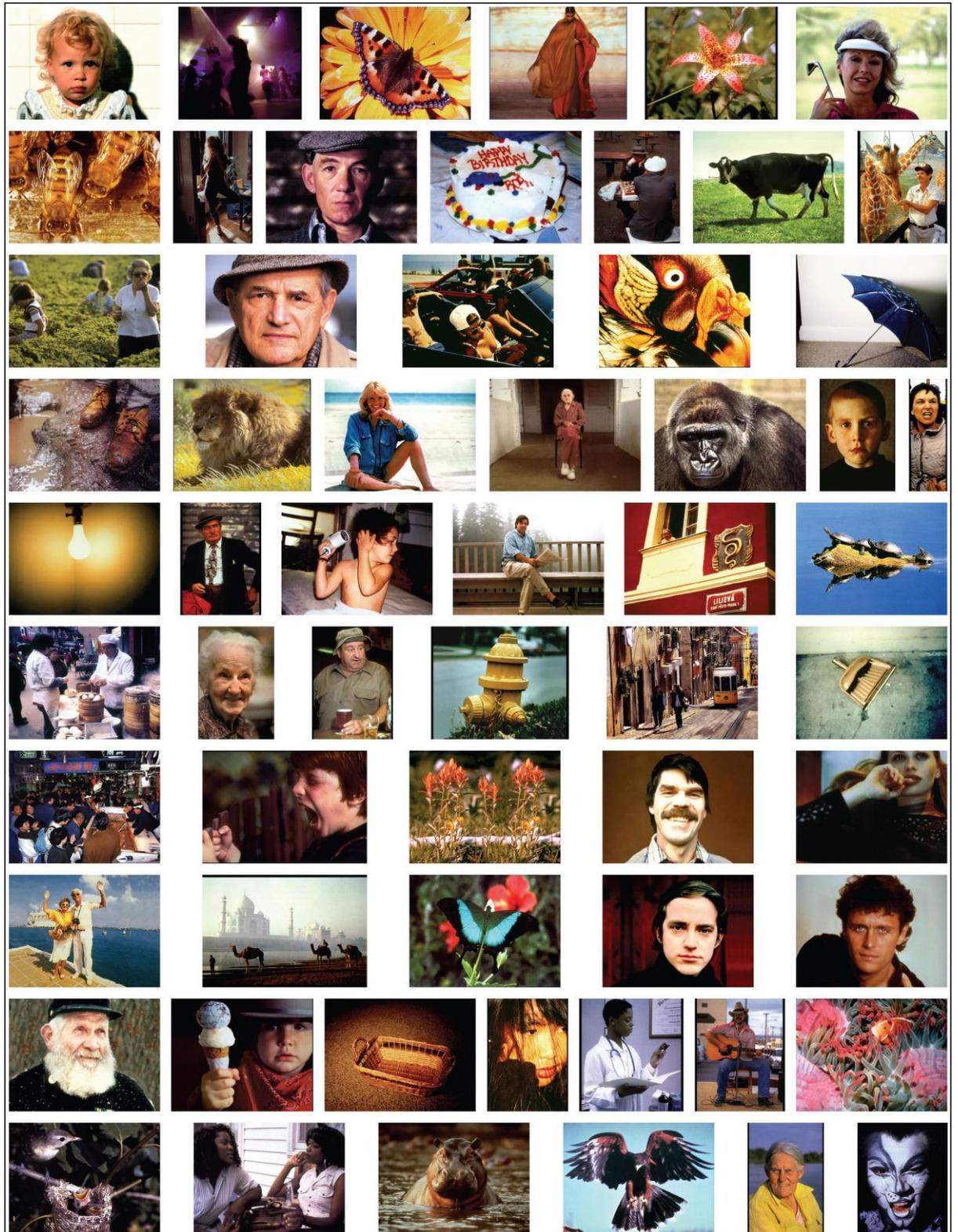
Appendix K

Settings Applied to Images

1) Baseline mean tint: 10%

2) Baseline tint SD: 17%

3) Max tint mean: 100%

4) Max tint SD: 20%

5) Tinting increased after 4 images

6) Tinting reaches its maximum after 45 images

Appendix L

Responsibility Attitude Scale - Adapted version: RAS-A (Salkovskis, et al., 2000)

Responsibility Attitude Scale

Participant identification number:

This questionnaire lists beliefs which people sometimes have. Read each statement carefully and decide how much you agree or disagree with it.

For each of the beliefs, put a circle round the words which BEST DESCRIBE HOW YOU THINK. Choose only one answer for each attitude. Because people are different, there are no right or wrong answers.

To decide whether a given attitude is like your way of looking at things, simply keep in mind what you are like MOST OF THE TIME.

1.   I often feel responsible for things that go wrong.

| TOTALLY AGREE | AGREE VERY MUCH | AGREE SLIGHTLY | NEUTRAL | DISAGREE SLIGHTLY | DISAGREE VERY MUCH | TOTALLY DISAGREE |

2.   If I think bad things, this is as bad as <u>doing</u> bad things.

| TOTALLY AGREE | AGREE VERY MUCH | AGREE SLIGHTLY | NEUTRAL | DISAGREE SLIGHTLY | DISAGREE VERY MUCH | TOTALLY DISAGREE |

3.   I worry a lot about what might happen because of things that I do or don't do.

| TOTALLY AGREE | AGREE VERY MUCH | AGREE SLIGHTLY | NEUTRAL | DISAGREE SLIGHTLY | DISAGREE VERY MUCH | TOTALLY DISAGREE |

4.   Not stopping bad things happening is as bad as making them happen.

| TOTALLY AGREE | AGREE VERY MUCH | AGREE SLIGHTLY | NEUTRAL | DISAGREE SLIGHTLY | DISAGREE VERY MUCH | TOTALLY DISAGREE |

5.   I should always try to stop harm happening, when I have thought it might.

| TOTALLY AGREE | AGREE VERY MUCH | AGREE SLIGHTLY | NEUTRAL | DISAGREE SLIGHTLY | DISAGREE VERY MUCH | TOTALLY DISAGREE |

6.   I must always think through what might happen as a result of even the smallest things I do.

| TOTALLY AGREE | AGREE VERY MUCH | AGREE SLIGHTLY | NEUTRAL | DISAGREE SLIGHTLY | DISAGREE VERY MUCH | TOTALLY DISAGREE |

7.   I often take responsibility for things which other people don't think are my fault.

| TOTALLY AGREE | AGREE VERY MUCH | AGREE SLIGHTLY | NEUTRAL | DISAGREE SLIGHTLY | DISAGREE VERY MUCH | TOTALLY DISAGREE |

8.   Everything I do can cause serious problems.

| TOTALLY AGREE | AGREE VERY MUCH | AGREE SLIGHTLY | NEUTRAL | DISAGREE SLIGHTLY | DISAGREE VERY MUCH | TOTALLY DISAGREE |

9.   There are often times when I nearly cause harm

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

10. I must protect others from harm.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

11. I should never cause even the smallest amount of harm to others

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGRI

12. People will think very badly of me because of my actions.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGRI

13. I must try to stop bad things from happening, if there is any chance that what I do might make a difference.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

14. Doing nothing when bad things might happen is the same as making it happen.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGRI

15. You should never be careless, when what you do might affect someone else.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

16. If I do nothing that can cause as much harm as doing something bad.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

17. I can't forgive myself, once I think it is possible that I have caused harm.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

18. Lots of things I have done, have been meant to prevent harm to others.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

19. If I am careful enough then I can prevent any harmful accidents.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

20. I often think that bad things will happen if I am not careful enough.

TOTALLY AGREE	AGREE VERY MUCH	AGREE SLIGHTLY	NEUTRAL	DISAGREE SLIGHTLY	DISAGREE VERY MUCH	TOTALLY DISAGREE

Appendix M

Thought-Action Fusion Questionnaire – Adolescent version: TAFQ-A (Muris, et al., 2001)

Participant Identification Number:

Thought Action Fusion Questionnaire

Each question describes a situation and has a sentence that you might or might not agree with. Read each sentence carefully and DECIDE HOW MUCH YOU AGREE OR DISAGREE with it.

Put a circle round the words which BEST DESCRIBE HOW YOU THINK. Choose only one answer for each attitude. Because people are different, there are no right or wrong answers.

1. You are with a friend. Suddenly without any reason you think that your friend is a stupid person

Having this thought is almost as bad as really saying to your friend that he is stupid.

not at all true   **somewhat true**   **rather true**   **very true**

2. Suddenly without any reason you have the thought that you are dying.

Having this thought increases the chance that you really are going to die.

not at all true   **somewhat true**   **rather true**   **very true**

3. You are alone in a church standing in front of a large statue of Jesus. Suddenly you have the thought of spitting on the statue.

Having this thought is almost as bad as spitting on the statue.

not at all true   **somewhat true**   **rather true**   **very true**

4. Suddenly without any reason you have the thought that your father loses his job and that there are money problems at home.

Having this thought increases the chance that your father really will lose his job.

not at all true   **somewhat true**   **rather true**   **very true**

5. You meet a classmate. Suddenly without any reason you think of a nasty name for this person.

Having this thought is almost as bad as calling this person a nasty name.

not at all true   **somewhat true**   **rather true**   **very true**

6. Suddenly without any reason you have the thought that you are hit by a car.

Having this thought increases the chance that you really will be hit by a car.

not at all true　　　**somewhat true**　　　**rather true**　　　**very true**

7. You are sitting in the classroom. All your classmates are quietly working. Suddenly you have the thought of shouting at the top of your voice.

Having this thought is almost as bad as really shouting at the top of your voice in the silent class.

not at all true　　　**somewhat true**　　　**rather true**　　　**very true**

8. Suddenly without any reason you have the thought that you will fall seriously ill.

Having this thought increases the chance that you really will fall seriously ill.

not at all true　　　**somewhat true**　　　**rather true**　　　**very true**

9. In a silent street, you meet a younger child. Suddenly without any reason you think of pushing the child down.

Having this thought is almost as bad as really pushing the child down.

not at all true　　　**somewhat true**　　　**rather true**　　　**very true**

10. Suddenly without any reason you have the thought of your father being in a car accident.

Having this thought increases the chance that your father really will have a car accident.

not at all true　　　**somewhat true**　　　**rather true**　　　**very true**

11. You walk on the street and meet an unfamiliar person. Suddenly you have the thought of making a rude gesture to this person.

Having this thought is almost as bad as really making the rude gesture to this person.

not at all true　　　**somewhat true**　　　**rather true**　　　**very true**

12. Suddenly without any reason you have the thought that your mother is dying.

Having this thought increases the chance that your mother really is going to die sometime soon.

not at all true   **somewhat true**   **rather true**   **very true**

13.   You have heard that the parents of one of your classmates are getting a divorce. Suddenly you have the thought of teasing the classmate with this information.

Having this thought is almost as bad as really teasing your classmate with this information.

not at all true   **somewhat true**   **rather true**   **very true**

14.   Suddenly without any reason you have the thought that you have to repeat a year at school.

Having this thought increases the chance that you really will repeat a year.

not at all true   **somewhat true**   **rather true**   **very true**

15.   You come across the purse of your mother. Suddenly you have the thought of stealing some money from the purse.

Having this thought is almost as bad as really stealing money from the purse.

not at all true   **somewhat true**   **rather true**   **very true**

Appendix N

Magical Thinking Questionnaire: MTQ (Bolton, et al., 2002)

Participant Identification Number:

Magical Thinking Questionnaire (MTQ)

Please read each question carefully and answer each question as it applies to you by circling 'yes', 'no' or 'maybe'. Please complete all the questions.

1. Is it possible to make tomorrow a sunny day by drawing a picture of the sun?

          YES   NO   MAYBE

2. Is it possible for dogs to fly?

          YES   NO   MAYBE

3. Is it possible that you could cause a car crash *just* by thinking about it?

          YES   NO   MAYBE

4. Is it possible that a friend could get the flu *just because* you argued with them?

          YES   NO   MAYBE

5. Is it possible to crash your bicycle by going too fast?

          YES   NO   MAYBE

6. Is it possible to make something good happen to you or someone else *just by* thinking about it?   YES   NO   MAYBE

7. Is it possible to do really well at a test at school *just by* crossing your fingers?

          YES   NO   MAYBE

8. Is it possible to lose a race just because you lost your lucky mascot or lucky charm?

          YES   NO   MAYBE

9. Is it possible for you to get the flu *just because* you were rude to your parents?

          YES   NO   MAYBE

10. Is it possible for stones to float in water?

          YES   NO   MAYBE

11. Is it possible that if mummy or daddy were quite ill, you could make them better by thinking or wishing it?

          YES   NO   MAYBE

12. Is it possible for snow to melt?

          YES   NO   MAYBE

13. Is it possible for a friend to get into trouble with a teacher at school *just because* you were thinking about it?

          YES   NO   MAYBE

14. Is it possible to make a rainbow disappear by clicking your fingers?

          YES   NO   MAYBE

15. Is it possible to make a bully leave your school *just by* avoiding walking past their house?

        YES   NO   MAYBE

16. Is it possible to burn yourself with cold water?

        YES   NO   MAYBE

17. Is it possible to show you are happy by smiling?

        YES   NO   MAYBE

18. Is it possible to move an object across a room *just by* thinking about it?

        YES   NO   MAYBE

19. Is it possible that you could win a bike in a raffle *just by* thinking really hard of your ticket?

        YES   NO   MAYBE

20. Is it possible to make something bad happen by standing on cracks in the pavement?

        YES   NO   MAYBE

21. Is it possible to think of a balloon floating in the sky?

        YES   NO   MAYBE

22. Is it possible for your mummy or daddy to change their job *just by* you thinking or wishing about it?

        YES   NO   MAYBE

23. Is it possible to ride a bicycle with no wheels?

        YES   NO   MAYBE

24. Is it possible to make a train run on time *just by* walking up and down the station platform?

        YES   NO   MAYBE

25. Is it possible to cause something bad to happen *just by* thinking about it?

        YES   NO   MAYBE

26. Is it possible for glass to break?

        YES   NO   MAYBE

27. Is it possible to prevent a plane crash *just by* touching wood?

        YES   NO   MAYBE

28. Is it possible to prevent an accident *just by* thinking or wishing it?

        YES   NO   MAYBE

29. Is it possible to cause an argument between mummy and daddy *just by* thinking about it?

        YES   NO   MAYBE

30. Is it possible for you to lift an elephant?

        YES   NO   MAYBE

Thank you.

Appendix O

Visual Analogue Scales for Anxiety: VAS (Bernstein & Garfinkel, 1992)

How I feel right now

Jittery
Nervous

Steady

How I feel right now

Calm
Chilled

Worried
Uneasy

How I feel right now

Scared
Afraid

Unafraid
Confident

Appendix P

Measure of TAF-manipulation, probability of harm, responsibility and thought control efforts

Participant Identification number:

Induced Thought-Action Fusion, Responsibility and Thought Control Measure

What did you think?

I am interested in how you feel and what you think about the task you just finished. Please read the following statements carefully and circle the number that shows how much you agree or disagree with the statements

	Completely disagree	Mostly disagree	Not sure if I agree or disagree	Mostly agree	Completely agree
I was able to make the pictures redder with my thoughts	0	1	2	3	4
I found it difficult to make the pictures redder	0	1	2	3	4
I am confident that I changed the colour of the pictures with my thoughts	0	1	2	3	4
Some of my thoughts might have damaged the computer	0	1	2	3	4
It is unlikely my thoughts have damaged the computer	0	1	2	3	4
It is possible my thoughts have damaged the computer	0	1	2	3	4
If the computer has been damaged it will NOT be my fault	0	1	2	3	4
If the computer	0	1	2	3	4

has been damaged it will be because of my thoughts					
If the computer has been damaged I will feel bad	0	1	2	3	4
I tried not to think any strong thoughts in case I damaged the computer	0	1	2	3	4
I tried to stop thinking altogether	0	1	2	3	4
I tried to think about things that wouldn't damage the computer	0	1	2	3	4
I didn't change what I was thinking about	0	1	2	3	4
I pressed the button only when I had a thought that could damage the computer	0	1	2	3	4
I pressed the button to be on the safe side	0	1	2	3	4

Just a couple more questions for you! Please write your answers below.

1) If you tried to be careful about what you thought about, how did you do this?

2) What thoughts were you worried might damage the computer?

Thank you for your help.

Appendix Q

Ethics Approval Letter

Faculty of Medicine and Health Sciences Research Ethics Committee

UEA
University of East Anglia

Joanne Peterkin
DCLINPSY
Elizabeth Fry Building
University of East Anglia
Norwich
NR4 7TJ

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11th July 2011

Dear Joanne

An experimental manipulation of thought-action fusion in children: Investigating obsessive compulsive features. Reference 2010/2011-42

The amendments to your above proposal have been considered by the Chair of the Faculty Research Ethics Committee and we can confirm that your proposal has been approved.

Please could you ensure that any amendments to either the protocol or documents submitted are notified to us in advance and also that any adverse events which occur during your project are reported to the Committee. Please could you also arrange to send us a report once your project is completed.

The Committee would like to wish you good luck with your project

Yours sincerely

Maggie Rhodes
Research Administrator

Cc Prof Shirley Reynolds

Appendix R

Child Assent Form

Participant Information Number:

CHILD ASSENT FORM

Title of project: How do children complete different computerised tasks?

Name of researcher: Joanne Peterkin, Trainee Clinical Psychologist

Please answer 'yes' or 'no' to these questions:

Have you read (or had read to you) information on this project?   YES / NO

Do you understand what this project is about?   YES / NO

Have you asked all the questions you want?   YES / NO

Have you had your questions answered in a way you understand?   YES / NO

Do you understand it is OK to stop taking part at any time?   YES / NO

Are you happy to take part?   YES / NO

Are you happy for your voice to be audio recorded during the task?   YES/NO

If you do want to take part, please write your name and today's date below

Name   _____

Date   _____

Thank you for your help.

_____

Office use only

Name of researcher _____

Signature   _____

Date   _____

Appendix S

Letter for Parents of Anxious Children

UEA
University of East Anglia

Elizabeth Fry Building
Postgraduate Research Office
Department of Psychological Sciences
University of East Anglia
Norwich NR4 7TJ
Tel: 01603 593310

[DATE]

[SCHOOL ADDRESS]

j.peterkin@uea.ac.uk

Dear Mr/Mrs,

Thank you once again for allowing (child's name) to take part in my study. As part of the study, (child's name) was asked to complete some questionnaires about how (she/he) feels. One of these questionnaires asked about worries (she/he) may have. (Name of child) reported that (she/he) worried about more things than most children of (her/his) age. Sometimes these responses may not be very accurate, or the worries reported may be short lived. However, if you are concerned about (name of child), you might find it helpful to talk to your GP or alternatively, with (her/his) teacher.

If you have any further questions about this letter or about the study itself, please do not hesitate to get in touch with me.

Thank you.

Yours sincerely,

Joanne Peterkin

Trainee Clinical Psychologist

j.peterkin@uea.ac.uk

Supervised by

Prof Shirley Reynolds

Professor of Clinical Psychology

Appendix T

Debriefing for Children

Children will be debriefed in a group once all participating children at the school have had a turn.

1. Thank all the children for taking part.

2. Tell the children:

'Because this was an experiment, I told you something that was not quite true. I told you that if you thought red, you might be able to make the pictures on the computer redder. In fact, the helmet I asked you to wear was just pretend. Electricity in our heads can't get into the wires in the computer, so our brainwaves cannot change the pictures on the screen'.

'For some of you, I changed the pictures on the computer so that they were more red, but this was not affected at all by your thoughts, the computer just showed you a different set of pictures. Some of you saw the pictures made redder, and some of you saw pictures that weren't changed'.

'There are very very expensive computers in a few laboratories in the world which can pick up electricity in our heads, but they are very special computers, built by scientists. None of the computers you can buy in the shops can do this and none of your computers at home will be able to'.

'I did this experiment with you because sometimes, people believe their thoughts can change things in the world and make things happen and this can make some people feel worried and upset. I wanted to understand a bit better what happens when people think their thoughts can change things. I hope that this knowledge will help us understand better how to help people who feel upset and worried'.

'You have really helped me by doing the study and I'm very grateful. Do you want to ask any questions?'

3. Ask children:

    'Sometimes people can feel a bit cross or disappointed when they find the helmet isn't real, does anyone feel that way?'

    'Does anyone feel a bit worried about what I've said?'

    'I told your mums and dads the truth about the task. I did this to check they thought you would be OK with the task. Does anyone have any questions or worries about the fact they knew?

4. Thank the children again. Invite them to come and ask questions individually if they want to.

Appendix U

Modified Experimental Task for Children Scoring Above the MASC-10 Clinical Cut-Off

For those children scoring above the clinical cut-off on the MASC-10 (>24 for girls, >21 for boys), a modified version of the experimental task was used, allowing them to participate without inducing anxiety. Using an unlabelled tick box, the children were entered into an alternative program on the computer. A procedure similar to the control procedure was used; the images did not turn red and no 'error' screen was shown. The following exceptions to the normal procedure were included:

- Children were told it was unlikely they would be able to influence the computer.

- No mention was given to the possibility of damaging the computer.

- Children did not complete the experimental phase of the task i.e. the 'baseline reading' therefore the concept of 'strong thoughts' was not used and they did not have to attempt to 'control' their thoughts.

- They completed a second VAS at the end of the images and this formed the end of the task.

- They did not complete the final measures regarding responsibility, probability of harm and thought control.

- A letter was sent to the child's parents explaining their higher than usual level of anxiety (Appendix S).

One child scored above the MASC-10 clinical cut-off and was entered into this alternative procedure.