UNIVERSITY OF SOUTHAMPTON
FACULTY OF SOCIAL SCIENCES
Department of Clinical Psychology

What is the role of magical thinking in Obsessive Compulsive Disorder (OCD)?

Is magical thinking a function of perceived threat?

by

Charlotte Keeling, BSc., MSc.

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Thesis Abstract

The literature review examines the question, what is the role of magical thinking in obsessive-compulsive disorder (OCD)? OCD is defined along with an overview of Salkovskis' responsibility theory, as this is a well-established account of how the symptoms develop and are maintained. Magical thinking is then described and is evaluated in relation to OCD. As there is a lack of consensus as to why individuals think magically this review explores some of the variables that may influence the presence of these thoughts. Personal variables such as culture, religion, age, education and locus of control, in addition to environmental factors such as situational threats, and the commonality of magical thinking in other clinical disorders are reviewed. Finally, the evidence suggesting a relationship between magical thinking and OCD is appraised, followed by the evidence against this relationship.

The experimental paper investigates threat and its influence on thinking magically. Five scenarios, which evoked responsibility for harm, were read aloud to participants and they were asked how they would cope. Threat was manipulated by altering the level of controllability of each scenario into two conditions, high and low control. In a sample of 160 University participants, 41% demonstrated magical thinking in low control scenarios and 32% demonstrated magical thinking in high control scenarios. In the low control condition locus of control, magical ideation and OCD symptomatology did not differentiate between participants in those that used magical thinking to control the threat presented and those who did not. Level of OCD symptomology and magical ideation was associated with magical thinking in

high control scenarios. The empirical paper concluded magical thinking may be a product of anxiety, which is linked by the feeling of being out of control in situations.

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Literature Review

What is the role of magical thinking in Obsessive Compulsive Disorder (OCD)?

Charlotte Keeling, BSc. MSc.

Department of Clinical Psychology

University of Southampton

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(see Appendix A notes for Contributors)

What is the role of magical thinking in OCD?

Abstract

An overview of obsessive-compulsive disorder (OCD) encompassing the long-term prevalence and diagnostic symptoms are presented. Salkovskis' cognitive theory of OCD is appraised, as this is a well-established account of the development and maintenance of the symptoms of OCD.

A definition of the concept and differing classifications of magical thinking are presented. Magical thinking is then evaluated in relation to OCD. As there is a lack of consensus as to why individuals think magically this review explores some of the variables that may influence the presence of these thoughts. Personal variables such as culture, religion, age, education and locus of control are considered. Environmental factors such as situational threats and the commonality of the presence of magical thinking in other clinical disorders are also appraised.

Finally, the evidence that suggests there is a relationship between magical thinking and OCD will be considered, followed by the evidence against this relationship.

What is the role of magical thinking in OCD?

1. Introduction

What is OCD?

Obsessive-compulsive disorder (OCD) is a debilitating anxiety disorder that has received a prolific amount of research attention. OCD is now considered the 'fourth most common psychiatric disorder after phobias, substance abuse, and major depression' (Abramowitz, Brigidi, & Roche, 2001, pp.358). Epidemiological studies from community surveys indicate that the prevalence of clinical OCD is between 1% and 3% of the general population (Salkovskis & Kirk, 1997), with lifetime prevalence indicated to be 2.5% (Karno, Golding, Sorenson, & Burnam, 1988). The course of OCD is more chronic in males with a gradual onset and more severe symptomatology (Richter, Cox, & Direnfeld, 1994). Males are also reported to experience less interference from their symptoms in their everyday function (Beckstein, 2001). Females on the other hand typically have episodic and acute stages of onset (Pigott, 1998). The mean age of onset for OCD is 20-30 years (Weisman, Bland, Canino, Greenwald, Hwu, & Lee, 1994) with the symptoms being remarkably consistent across cultures (Sobin, Blundell, Weiller, Gavigan, Haiman, & Karayiorgou, 2000). Consequently OCD is a relatively common disorder with considerable treatment costs afforded to the National Health Service.

OCD is characterised by recurrent obsessions and subsequent compulsive behaviours. In order to meet diagnostic criteria, the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV, APA, 1994) stipulates that both the

obsessions and compulsions must be distressing, time-consuming and interfere with everyday functioning.

Obsessions are unwanted 'recurrent and persistent thoughts, impulses or images' that are 'intrusive and inappropriate and cause marked anxiety or distress' (DSM-IV, 1994, p.422). Common obsessions concern thoughts about contamination (e.g. 'I will contract AIDS if I touch other people'), repeated doubts (e.g. 'did I lock the door when I left the house?'), aggressive impulses (e.g. 'I will stab my baby with this kitchen knife') and sexual imagery (e.g. 'I keep having homosexual thoughts') (Wells, 1998).

Compulsions, sometimes called neutralising behaviours, are intentional 'repetitive behaviours or mental acts' (DSM-IV, 1994, p.423) that are completed to reduce the distress caused by the obsession. An example of a compulsion is handwashing in response to an obsession about contamination. Alternatively, compulsions may be performed in accordance to certain rules, such as checking three times before you leave the house that the stove is switched off. Compulsions can be overt (observed) such as cleaning, or covert (cognitive) such as thinking a good thought to replace a bad thought.

Obsessions and compulsions in the general population

The majority of the general population experience unpleasant intrusions and perform certain neutralisations that are practically indistinguishable to the obsessions and compulsions found in clinically diagnosable OCD (Abramowitz, et al., 2001; Berle & Starcevic, 2005; Einstein & Menzies,

2004a; Freeston, Ladouceur, Gagnon, & Thibodeau, 1991; Zucker, Craske, Barrios, & Holguin, 2002). Obsessions and compulsions in the general population tend to be less frequent, shorter in duration and are naturally dismissed as harmless and morally irrelevant than those found in the clinical population (Rachman & De Silver, 1978; Salkovskis & Kirk, 2000).

Ninety two percent of university students were recently reported to experience intrusive obsessions and used neutralisation at least some of the time (Freeston et al., 1991). Examples of the students' intrusive obsessions were contamination concerns and repeated doubts about performance in exams. Examples of the neutralisation strategies included reassuring oneself about an intrusive thought, trying to replace the thought with another thought and distracting oneself. Consequently, the symptoms of clinical OCD can be thought of as being at the more severe end of a continuum of anxiety with the general population. Having discussed the main symptoms and prevalence rates of OCD within the general population Salkovskis' theory outlining the development and maintenance of OCD will now be considered.

Salkovskis' cognitive theory of OCD

Salkovskis' (1985, 1989, 1996, 1999; Salkovskis & McGuire, 2003) cognitive theory is the most widely accepted account of the development and maintenance of OCD (Barrett & Healy, 2003). Salkovskis' theory explains how normal intrusions turn into clinical obsessions. He argued that intrusive cognitions become obsessional as a result of how they are appraised. Consequently, individuals with OCD interpret the occurrence and / or content

of an intrusive thought, as an indication that they may be responsible for bringing about or preventing harm to themselves or others. In particular, intrusive thoughts are interpreted as morally repugnant, needing restorative action in the form of neutralising behaviours. Salkovskis and McGuire (2003) argue that the individual with OCD 'tries too hard' to prevent harm by engaging in neutralising behaviours. Neutralising behaviours generate an immediate reduction in the level of distress, although the period of relief is transitory. The use of such behaviours therefore reinforces the belief that the thought was dangerous and threatening and that the neutralising behaviour was necessary to reduce the anxiety (Freeston & Ladouceur, 1997). This leads to a maintenance cycle of negative thinking and neutralising responses.

Salkovskis' theory claims that individuals with OCD make negative appraisals as a result of an extreme life event or as a result of underlying beliefs that develop during childhood. These may be beliefs about responsibility, known as thought-action fusion (TAF) e.g. 'having a thought about an action, means the action will occur'. The concept of TAF will be discussed in more detail later.

In summary, Salkovskis' theory claims cognitive biases and interpretations of events are paramount in increasing an individual's vulnerability to developing and maintaining symptoms of OCD (Salkovskis, 1999). Controversially, more recently responsibility beliefs have been shown not to predict OCD symptomatology (Clark, Purdon, & Byers, 2000; Tolin, Woods, & Abramowitz, 2003). This particular finding is inconsistent with Salkovskis' cognitive model,

which describes responsibility beliefs as a crucial factor in the development and maintenance of OCD. As a result, there is some variability within the literature concerning the specific variables that influence OCD symptomatology. The concept of magical thinking has also been discussed within the cognitive model and shall now be considered.

What is Magical Thinking?

Definition of magical thinking

There are numerous definitions of magical thinking within the literature. Zusne and Jones (1989) define magical thinking as 'a belief that (a) transfer of energy or information between physical systems may take place solely because of their similarity or continuity in time and space, or (b) that one's thoughts, words or actions can achieve specific physical effects in a manner not governed by the principles of ordinary transmission of energy or information' (p.13). More recently, Keinan (1994) defines magical thinking as 'any explanation for a behaviour or experience that contradict the laws of nature .....usually refers to powers, principles, or entities that lack empirical evidence or scientific foundation' (p.15). Both definitions involve reasoning without knowledge of, or on the basis of some sort of misconception about causality. Magical thinking and magical ideation are used interchangeably in research studies, but the terms mean essentially the same thing. Magical ideation is a general tendency to think non-rationally, which varies from individual to individual. Magical thinking involves providing explanations of events in the world that contradict the accepted laws of nature.

Magical thoughts are distinguished from morbid obsessional thoughts as they are connected with a magical cause or attribution. Individuals start to believe that harm can be brought about by unlucky numbers in their multiples, by unlucky colours, by contact with certain places or by thinking about events or people in a certain way. As a result, both cognitive and physical processes can trigger these beliefs. An example of a magical belief is 'because I walked past a public toilet wearing this coat, it may be contaminated' (Fairbrother, Newth, & Rachman, 2005). This contamination belief is considered magical, as it is improbable as well as implausible and the belief of contamination is made via a magical attribution. Whether magical thinkers make this attribution themselves, or whether it is part of the obsession itself, is unclear (Fairbrother, et al., 2005).

Examples of magical thinking

Everything from spells, curses and voodoo through to simple superstitions (Frost, Krause, McMahon, Peppe, Evans, & McPhee et al., 1993), extraordinary powers (Peltzer, 2003), witchcraft and even overvalued wishes (Sica, Novara, & Sanavio, 2002), are all thought to be examples of magical ideation. A common form of magical thinking is that one's own thoughts can influence events, either beneficially by creating good luck, or malevolently as in divine punishment for bad thoughts. Another form of magical thinking occurs when individuals believe that words can directly affect the world. This can mean avoiding talking about certain subjects as they hold beliefs such as 'speak of the devil and he will appear', or using euphemisms instead of certain

words, or believing that certain prayers, chants or phrases will change events in the future.

The literature documents superstition, magical thinking and beliefs in the supernatural to be relatively uncommon amongst adults (Subbotsky, 2004; Woolley, 1997). Stanovich (1994) reported that 46% of the general population believed in faith healing, 49% believed in demonic possession and 14% in fortune telling. More recently, 25% of the general population claim to believe in telepathy (Bentall, Corcoran, Howard, Blackwood, & Kinderman, 2001, p1143). Consequently, there is evidence that a small proportion of the general population are prone to thinking magically.

Furthermore, because magical beliefs are based on criteria that are not open to empirical verification, they are highly resistant to change, even in the light of contradictory evidence (Zusne & Jones, 1989, p.254).

Theories of magical thinking

A range of theories have been proposed as to why individuals may think magically in certain situations. The psychoanalytical approach suggests that magical thinking is a regressive attempt to deal with stress (Freud, 1901). Freud stated that individuals with magical thoughts respond maladaptively to conflicts between unacceptable, unconscious, sexual or aggressive impulses and the demands of conscience and reality. Freud agreed with Piaget's theory, that there is a stage in children's development in which magical thinking is dominant. Consequently, when adults are faced with a threat that

arouses anxiety, Freud proposed that they regress to a magical mode of thinking.

Jean Piaget's theory of cognitive development (1929, 1973) encompasses ideas of magical thinking in children. According to Piaget's theory, magical thinking is present through the concrete operations period, until the age of 11 to 12 years. He proposes that young children's confusion between thoughts and things result in a variety of mistaken beliefs about the relations between the mind and the physical world (Woolley, 1997). Piaget's theory includes what can be considered as four different classifications of magical thinking.

Vyse (1997) summarises the four classifications into firstly 'magic by participation between actions and things', which Piaget proposed represented a superstitious hope that an act or thought within the child, would bring some good or stave off something bad. According to Piaget, belief in the magical participation between actions and things is produced by a form of realism that confuses a symbolic action, with the cause of a subsequent event (Piaget, 1929).

The second classification was 'magic by participation, between thoughts and things'. Piaget proposed that this stage of development involved the child staving off thinking about their desires. The child may even sometimes think the opposite, to keep from jinxing something that they badly wanted. This stage involved the principle of realism that would lead a child to believe that

their private thoughts have an external reality that can affect objects and events in the physical world.

The third classification was 'magic by participation between objects'. This classification was generated from Piaget's view that children believe certain events or objects to be ominous or emblematic. In this third stage of classification, seeing a white horse for example may be viewed by some children as lucky. Children believe in this stage that physical entities share some occult connection and that objects themselves interact.

The fourth classification of magical thinking identifiable within Piaget's theory was 'animism'. This stage proposes that children believe that inanimate objects are living things, or even that objects are obedient. Consequently, within Piaget's theory of child development there are examples of four different types of magical thinking.

Piaget (1973) later hypothesised that magical thinking occurs in situations which involve the following (1) involuntary imitation (e.g. when someone on television has a husky voice and one finds oneself clearing ones throat) (2) anxiety (nervousness about giving a talk may result in superstitious behaviour such as wearing a lucky garment and believing that this will help you give a good talk) (3) desire or fear, or situations in which one really wants or does not want something to happen (the belief that if one brings an umbrella to work, this will guarantee a sunny day) (Woolley, 1997).

More recently, within the child literature there have been similar classifications of magical thinking that have not been linked to a specific age range. The first is 'thought over matter magic' (Subbotsky, 2004), which involves children trying to move an object, by wishing it to move. Other examples of magical thinking include 'coming to life magic' (Subbotsky, 2004) such as teddy bears acquiring spontaneity in addition to 'transformation magic' (Subbotsky, 2004) such as the belief that 'old people can become young again'.

In summary, the concept of magical thinking is not a recent phenomenon and it is documented in well-known theories within the child development literature. Research demonstrates that there is little agreement as to what influences an individual to adopt a magical thought however and furthermore why this is relevant to OCD. As a result of the lack of agreement, this literature review will attempt to address some of the variables that may contribute to an individual thinking magically. More specifically, it will explore the role of magical thinking within OCD.

Magical thinking in OCD

Magical thinking has been discussed profusely within the anxiety disorders and in particular the literature on OCD (Bolton, Dearsley, Madronal-Luque, & Baron-Cohen, 2002; Einstein & Menzies, 2004a, 2004b; Farkas, 2003; Garcia-Montes, Perez-Alvarez, Balbuena, Garcelan, & Cangas, in press; Lee, Cougal, & Telch, 2005; Peltzer, 2003; Subbotsky, 2004).

Obsessional fears have also been documented within the OCD literature to exhibit a magical quality, as in Riggs and Foa's (1993) example of a patient who feared getting accidentally sealed inside an envelope and subsequently trapped inside a mailbox (p.194).

Magical thinking has been conceptualised as a form of magical neutralisation, which is a specific OCD-style strategy for coping with threat (Lee, Cougal & Telch, 2005). An example of one type of obsession may be recurrent sexual thoughts about children. Generating sexual thoughts about adults of the opposite sex can be thought of as a magical neutralisation strategy, with the aim of counteracting the original thought. Individuals with OCD may have the preoccupation that harm may come to their family, which may prompt them to recite 'magical' numbers or words to neutralise their fears, for example 'as long as I have a good number in my head when I think of my children, they will be safe' (Fairbrother, et al., 2005). These neutralisation strategies are magical in nature as they violate culturally and scientifically accepted cause and effect relationships. Magical compulsions are defined as magical as the connection to the compulsion is magical in nature such as counting or touching objects or avoidance of magically bad words, numbers, objects or colours. If the perceived harm is thought to have magical origins, the compulsions that are invented are frequently also magical. There are complex magical compulsions that resemble the practice of magic and tend to follow precise steps and strict rules that must be kept pure and perfect, if they are to undo certain rituals.

On the other hand, some obsessions and compulsions are clearly nonmagical, for example some contamination obsessions and washing compulsions are exaggerated forms of commonly accepted health and safety practices.

In summary, not all obsessions or compulsions are magical in nature. Consequently, the question remains as to what are the influential variables that generate magical thinking in OCD?

Thought action fusion (TAF)

As briefly mentioned previously TAF is present in some individuals with OCD and contributes to the faulty attributions individuals make regarding the influence of their thoughts. Rachman and Shafran's (1999) theory proposes that individuals with OCD make negative appraisals as a result of underlying responsibility beliefs, which can be increased by the concept TAF. TAF will now be considered in relation to the role it plays in contributing to magical thinking in OCD.

TAF refers to a set of cognitive biases involving faulty causal relationships with one's own thoughts and external reality. This faulty relationship increases an individual's perception of personal responsibility for their thoughts (Shafran, Thordarson, & Rachman, 1996). TAF consists of two components TAF-likelihood and TAF-moral (Rachman, 1993; Shafran, et al., 1996). TAF-likelihood has been further divided into TAF-likelihood-self, which refers to the

likelihood of events happening to oneself. The second bias, TAF-likelihood-other, refers to the likelihood of events happening to other people.

Rachman (1993) highlighted the concepts TAF-moral and TAF-likelihood to have magical qualities in relation to OCD. The first cognitive bias, TAF-likelihood, involves individuals believing their intrusive thoughts have a direct influence on the probability of threat. Thus, thinking about becoming ill makes it more likely to happen. The second bias, TAF-moral, involves individuals believing that obsessional thoughts are morally equivalent to forbidden actions. Thus, having a repugnant thought about swearing in Church is as wrong as acting out the thought.

Interestingly, more recent studies identify the concept TAF-likelihood-self and other, to be controversially two separate constructs within non-clinical samples (Rassin, Merckelbach, Muris, & Schmidt, 2001). This view is in sharp contrast to previous, longstanding ideas that TAF-likelihood-self and other were related constructs (Rachman & Shafran, 1999). This contentious recent research raises the question therefore of whether the concept TAF refers to a specific cognitive appraisal style (Berle & Starcevic, 2005; McLean, Whittal, Thordarson, Taylor, Sochting, & Koch, et al., 2001), or a more enduring personality outlook, or a combination of both?

Despite this controversy, several studies have nevertheless demonstrated a significant relationship between TAF and OCD symptoms (Amir, Freshman, Ramsey, Neary, & Brigidi, 2001; Coles, Mennin, & Heimberg, 2001; Einstein &

Menzies, 2004a, 2004b; Rassin et al., 2001) with stronger correlations for TAF-likelihood than for TAF-moral (Abramowitz, Whiteside, Lynam, & Kalsy, 2003). There is further controversy within the literature about the role of cognitive biases and whether TAF itself is a specific form of general magical thinking (Amir et al., 2001; Einstein & Menzies, 2004a) this controversy however is beyond the scope of this review. Nevertheless as there is evidence to suggest that the concept TAF shares similarities with and may be considered a form of magical thinking, the literature on TAF will be included in this review.

TAF in the general population

In addition to magical thinking, TAF beliefs have also been commonly found in the general population (Freeston, et al., 1991; Muris & Merckelbach, 2003; Rassin et al., 2001). Participants with clinical OCD do typically score higher on the TAF scale (Shafran et al., 1996) nevertheless, an overlap between clinical and non-clinical samples does sometimes occur on this scale (Abramowitz, et al., 2003).

TAF has been found in undergraduate students and was found to trigger thought suppression and generated OCD symptomatology. Rassin, Merckelbach, Murris, and Spaan (1999) demonstrated that TAF influences an individual's appraisal of the significance of their intrusions. Rassin et al. (1999) informed 19 undergraduate participants that they were connected to an Electroencephalogram machine and that the machine would pick up their thoughts, with reasonable accuracy. Participants were informed that when the

machine detected the word 'apple', that one of the other participants in the study would receive an electric shock. An option was offered to participants to prevent the electric shock by pressing a button after the thought occurred. The manipulation of TAF-likelihood produced an increase in discomfort, anger, number of intrusions and resistance towards the originally neutral word. As a result, the perception of a threatening consequence to one's thoughts transformed normal thoughts, into obsessive intrusions. Furthermore, participants with obsessional symptoms were found to display higher levels of TAF, than participants without such symptoms (Shafran et al., 1996). In summary, in undergraduates TAF triggered thought suppression; furthermore thought suppression generated obsessive-compulsive symptomatology (Rassin et al., 1999).

In summary, there is controversy concerning the concepts TAF-likelihood-self and other and whether they should be considered two separate or related constructs. These constructs are significantly related however to OCD and they are also present in analogue samples. Furthermore, TAF-likelihood and other have been reported to have magical qualities. Inducing a perception of responsibility has been found to generate discomfort and attempts to suppress thoughts. Rassin et al's (1999) finding is supported by Salkovskis and Kirk's view (2000) that there is a subtle variation between the concepts TAF and inflated responsibility. Consequently, an individual's perception and interpretation of situations may be an influential mechanism for developing and maintaining magical thoughts. Having discussed the magical qualities of

TAF and the role it plays in generating OCD symptomatology, variables that may influence thinking magically will now be considered.

What influences magical thinking?

There is a lack of consensus about why individuals think magically and as a result some of the variables that may influence it will now be considered. Is magical thinking influenced by personal variables such as the culture that individuals grow up in, their religion, their age, their type of education or their locus of control? All of these factors would contribute to the view that an individual's perception and interpretation of situations are critical in influencing magical thinking, thus supporting Salkovskis cognitive theory. Or is magical thinking influenced by the environment that an individual is in, in particular the level of perceived threat that they face in certain situations? Or is magical thinking present in any other clinical disorder and as such does it share commonalities in its use in relation to particular fears? Each of these elements will now be considered and the current literature on each variable will be presented.

Does personality influence magical thinking?

There is debate within the literature about magical thinking and whether certain personality types use it (Claridge, 1997; Eckblad & Chapman, 1983; Farias, Claridge, & Lalljee, 2005). Magical thinking has been referred to as a symptom of schizotypy and recommendations have been made that it should be treated as a medicalised symptom (Claridge, 1997). On the other hand, magical thinking has been considered to represent a personality trait, that

does not necessarily lead to or stem from a pathology type (Tolin, Abramowitz, Kozak, & Foa, 2001). This lack of consensus indicates a reason for considering some of the personality variables that may influence thinking magically.

Does culture influence magical thinking?

It can be argued that most cultures support and maintain magical beliefs to a certain degree. Children in the western culture are actively encouraged to believe in Father Christmas, the Easter Bunny and the Tooth Fairy. These sorts of fantasy figures are often strongly tied to religious beliefs, and, as such, it is possible that non-Christian children lack many of these associated experiences (Subbotsky, June 2004).

There are difficulties in comparing magical thinking styles both within cultures and between individuals within cultures. In Asia, many coincidences and contingencies are explained in terms of karma, in which a person's past life affects current events. Karma may be thought of by some in the Western culture as a form of magical thinking rather than a culture specific explanation of events. As such, what is considered magical thinking differs between cultures (see review, Einstein & Menzies, 2004a). Additional difficulties arise when comparing what is considered magical across individuals within cultures. There have been significant differences in the content and interpretations of obsessions and compulsions across individuals from the same culture, however this is beyond the scope of this review (for further information see Sica, Novara, Sanavio, Coradeschi, & Dorz, 2001).

Subbotsky compared British and Mexican adults cultural beliefs about magical explanations of events and presented them with a causal effect that looked like real magic in his experiments (Subbotsky & Quinteros, 2002). In Mexican culture there is a widely held magical belief that Nahual is an individual who can occasionally turn into an animal (Subbotsky & Quinteros, 2002). The Mexican sample was hypothesised to be more tolerant of magical explanations of events, as a result of their culture. The methodology involved participants' credit cards being placed into an apparently empty box and a magic spell being cast upon the box, ordering the credit card to be burned. When the credit card was then removed from the box, the card had prolific scratches on its surface. Cost was manipulated within the study; in high cost situations participants were asked to repeat the experiment substituting their hands for the credit card; in the low cost situations participants were asked to substitute their driving licence for the credit card.

The results showed that culture only affected beliefs to a certain degree. In the high cost situation Western and non-Western adult participants were likely to engage and believe in magical practices, to an approximately equal extent. Whereas in the low cost situation, Western participants were significantly more rational and scientifically orientated, than non-Western participants who engaged in more magical practices (Subbotsky & Quinteros, 2002). Furthermore, there was a significant difference in participants' verbal judgements between the samples with British adults denying and Mexican adults agreeing that it was possible to cause destruction of the contents of a wooden box, via a magical spell. Generalisability of the study's results are

limited however as the Mexican participants' mean ages were almost a generation greater than those of the British participants. Cohort age effects, in addition to between culture effects, may have significantly influenced the studies results. Nevertheless, this study highlighted that in high cost situations a belief in magical explanations for events is high, but when the situational cost is low, culture appeared to influence the belief in magical explanations.

In summary, research suggests a blurring when comparing different cultures of the boundaries of what is considered reality and rationality. What one culture considers is an example of magical thinking, another explains in a culture specific way. Furthermore, cost to the individual is a significant factor influencing beliefs in magical explanations for events. As such, culture can be argued to influence individual attributions and does have an impact on the use of magical thinking. Religion will now be considered as a variable that may influence magical thinking.

Does religion or education influence magical thinking?

The literature on whether religion influences magical thinking is scant. Research has shown that TAF has been linked to the strength of religiosity, in a predominantly Christian sample (Rassin & Koster, 2003). Rassin and Koster's (2003) study showed that Protestants had a higher level of religiosity and TAF than Catholics, in Dutch and Belgian samples (Rassin & Koster, 2003). Relationships have also been found between religiosity and obsessive-compulsive symptomatology (Sica, et al., 2002).

New Age religions have been described as having a high level of magical attributions in everyday life (Farias, 2004; Houtman & Mascini, 2002). Farias, et al.'s (2005) study explored the cognitive underpinnings and personality traits of individuals with New Age religious beliefs. Ninety-nine participants from the general population completed a battery of self-report tests, including measures of New Age beliefs and religiosity, as well as scales of schizotypy, neuroticism and cognitive looseness. The methodology used a random display of changing dots to measure participants' cognitive looseness. The results indicated a significant relationship between New Age beliefs and schizotypal personality traits, characterized by magical ideation and a cognitive disposition towards looseness of associations and emotional hypersensitivity. Women were found to be more likely to be drawn to New Age practices and beliefs and also had higher associations with magical thoughts (Farias et al., 2005). No relationship was evident between traditional religiosity and personality. The findings suggest that an individual may be attracted to New Age religions by virtue of its magical belief system, which encourages finding meanings for unusual experiences and developing a loose cognitive style and emotional sensitivity. In summary, this study showed that women have a greater emotional cognitive style and as such make more magical attributions (Farias et al., 2005). Furthermore, magical thinking was associated with an increased imaginative capacity and spiritual experiences (Farias, et al., 2005).

Only one study to date has examined education as an influential variable in relation to magical thinking (Persinger & Makarec, 1990). Church attendance

and traditional, religious or exotic (alien intelligence, reincarnation) beliefs in university participants were analysed over a 10-year period (Persinger & Makarec, 1990). Regular church attendance was hypothesised to correlate with traditional beliefs more than non-regular attendance. The results showed a relative stability in religious beliefs despite university education. Furthermore, individuals who reported that they had their first religious experience before adolescence were more likely as adults to hold magical and religious beliefs than individuals who did not. Consequently these results suggest that the acquisition of education does not change beliefs in religion and more importantly does not influence the tendency to think magically.

In summary, significant correlations were shown between the concepts of religion and magical thinking. None of the studies analysing religion have suggested that religious teachings cause TAF beliefs to develop; alternatively that individuals who endorse TAF beliefs, may be prone to becoming religious (Rassin & Koster, 2003). As such an individual's conviction or perception of excessive fear of punishment is critical in developing TAF beliefs. Furthermore, evidence highlights that women make more causal magical attributions, which is interesting to consider in relation to the fact that they are also reported to have more acute stages of onset of OCD (Beckstein, 2001). No correlations were identified for education being an influential factor in relation to magical thinking. As only one study to date looks at the effects of education and its influence on magical thinking, it may be premature to generalise these results and more studies are needed to strengthen the evidence for this conclusion. Age was indicted in to be influential in affecting

whether individuals develop religious in addition to magical beliefs. Age will now be considered further in it role in affecting magical ideation.

Does age influence magical thinking?

Children

Magical thinking generates the possibility of altering events, as a result of our thoughts. Books tapping into this type of imagination such as Harry Potter and The Lord of the Rings have proven to be very successful with both children and adults. For children the belief in magical ideas fosters independence and power and so has demonstrable beneficial effects (Subbotsky, 2004).

As mentioned earlier magical thinking tendencies have been considered to occur within a phase of normal childhood development (Piaget, 1929 / 1973). Controversially, more recent studies suggest the opposite view, that magical thinking is not influenced by age and that younger children have been shown, in many contexts, to distinguish reality from imagination (Bolton, et al., 2002; Subbotsky, 2001; Subbotsky, 2004; Subbotsky, June 2004).

Subbotsky (2004) presented five and six year old children with a causal effect that looked like real magic in his experiments. The same principal was used in this study with children as in the study described previously with Mexican and British participants (Subbotsky & Quinteros, 2002). A new postage stamp was placed in an apparently empty box and a magic spell was cast on the box, ordering the postage stamp to be burned. Before seeing the magical effect most children did not believe in magic. After the experiment however, most

five and six year old children abandoned their scepticism and acknowledged that this was an instance of true magic. Young children's verbal disbelief was found to be superficial and at a young age, approximately four to five years old, children were happy to be persuaded that magic was real. At six to nine years old however, children were found to easily abandon their magical beliefs (Subbotsky, 2004, June).

Very little research has focussed on older school aged children and adolescents' beliefs in magical thinking (Clark, 1995). It is at this age that children outgrow magical beliefs such as Father Christmas, the tooth fairy, and imaginary companions. One theory has been suggested that magical beliefs and / or beliefs in religion may fill the void left by earlier beliefs in fantasy (Clark, 1995). Clark proposes that the imaginal experience involved in believing in fantasy figures increases children's capacity for later faith in other forms. This hypothesis supports the findings from Persinger and Makarec (1990) that if individuals held religious beliefs before adolescence then they were more likely as adults to have both religious and magical beliefs. Unfortunately, probing the interrelatedness of magical thinking and religion in the adolescent's world is a question that has received almost no attention in the developmental literature (Woolley, 1997).

Undergraduates

When undergraduate participants were presented with magical effects similar to the ones described above with the adult participants (Subbotsky & Quinteros, 2002), there was a fifty-fifty split in participants believing in magical

explanations (Subbotsky, 2001). All participants were presented with a wooden box and were asked about their beliefs in the proposed danger. Cost was manipulated again in the low condition by causing potential damage to participants' driving licences; the high condition had the potential for causing possible damage to participants' hands. Half of the undergraduates refused to take part in the study as they believed in the damaging power of the spell and thus the magical explanation for the study (Subbotsky, 2001).

In summary, children naturally have a tendency to think magically at a certain age, typically seven to 12 years. Nevertheless, even the children in this age have been found to be able to clearly differentiate reality from imagination. Further research is needed to analyse older school aged children and adolescents beliefs in magical thinking, as there is a paucity of knowledge in this area. Age is a significant variable influencing magical thinking with more magical beliefs fostered in those individuals who were encouraged to believe in magical thoughts at a younger age. Locus of control will now be considered as a potential influential variable of magical thinking.

Does locus of control influence magical thinking?

Locus of control is considered a personality trait and refers to an individual's perception of the main causes of events in life (Rotter, 1966). Individuals with an internal locus of control believe that they are masters of their own fate. On the other hand, individuals with an external locus of control believe that they are at the mercy of circumstances beyond their control. Differences in these belief systems would suggest a difference in behaviours. Participants with an

internal locus of control have been shown to engage in behaviours to enhance their control more than participants with an external locus of control (Friedland, Keinan, & Regev, 1992). Zusne and Jones (1989) proposed that the belief that one's fate being controlled externally is due to personality factors that are related to magical thinking.

Research has examined the relationship between locus of control and OCD (Kennedy, Lynch, & Schwab, 1998). Individuals with anxiety disorders are more likely than a control group, with no symptoms of anxiety, to believe that their lives were under the control of chance forces or powerful others. Interestingly though individuals with OCD were more internally oriented than the anxiety or control group. Kennedy et al. (1998) described the results as being consistent with the view that individuals with OCD develop heightened attempts to maintain personal control, through their compulsive behaviours.

Individuals with OCD who engaged in magical obsessions and compulsions were predicted by Thomas (2000) to score significantly more externally than those individuals who did not. This hypothesis was based on the evidence that external control orientations are generally associated with psychopathology (Kennedy, et al., 1998). As such it was predicted that participants with OCD who engaged in magical obsessions and compulsions would score significantly more externally than those who did not. Externally orientated individuals were hypothesised to be passive help-seekers who would perceive psychoeducational techniques as aversive and threatening. Internally orientated individuals were hypothesised to participate more actively

in therapy and be more likely to accept responsibility for their treatment. Thomas assessed the controllability participants had over their obsessions using the internal powerful others chance scales (Levenson, 1972).

The results showed that having an external locus of control did not predict use of magical actions (Thomas, 2000). Furthermore, there was a significant interaction between obsession controllability and locus of control. Contrary to her prediction, externally orientated individuals engaged in fewer magical rituals than did internally oriented individuals when obsession controllability was high. Consequently, Thomas' results provided support for Kennedy, et al.'s (1998) original hypothesis. As Thomas' study was purely correlational in nature, assumptions with regards to causal relationships would be premature. In addition, the methodology was flawed as the experimenter, rather than the participants, determined the perceived controllability level of the participants' obsessional fears. As such her thesis was subject to experimenter bias and limits the generalisability of the findings.

Some personality variables are influential in affecting whether individuals think magically or not when facing threats. Culture does influence an individual's attribution and consequently has an impact on thinking magically. There are difficulties in comparing cultures however as there are differences between cultures about what is considered magical. Relationships have been found between religion and OCD, in addition to magical thinking. There is evidence to highlight a difference in gender, with more women making more magical attributions. Both children and adults have been shown to have the capacity to

regularly think magically, but also have the capacity to differentiate reality from fantasy. Rather than age being an influential variable the evidence suggests social encouragement of magical explanations of events influences magical beliefs. Furthermore, there is no strong evidence to suggest locus of control or education significantly influence magical attributions and consequently cannot be considered influential variables. Consequently some personality variables are influential and some have no effect on influencing magical thoughts. The effects of the environment will now be appraised in relation to influencing magical thoughts.

Does the environment influence magical thinking?

Can magical thinking be considered a resource for coping with high emotion in stressful situations? Do high levels of emotion generated from a lack of understanding of the situation interact with the ability to distinguish between reality and fantasy and does this contribute to thinking magically? The literature on magical thinking in relation to the illusion of control will now be discussed and may offer suggestions to these questions.

Illusion of control

Thinking magically can function to aid our control over circumstances that may be perceived as out of our control (Zusne & Jones, 1982). The illusion of control has an important adaptive feature such as generating the possibility of coping with diversity and the unpredictable nature of everyday life. In circumstances such as plane journeys, individuals typically resort to knocking on wood or crossing fingers in an attempt of keep themselves safe, through

the use of magical behaviours. Magical thinking is frequently employed in occupations and pastimes where chance and uncertainty prevail, such as professional sports (Bleak & Frederick, 1998), gambling and the performing arts (Zusne & Jones, 1989). A theme common to these findings is the notion of uncertainty, in which danger is high and the chance of significant loss is great. Barlow (1988) suggested that individuals with OCD employ magical rituals "in a vain attempt to re-establish a small haven of safety" (p.598). Additionally, Dudley (1999) demonstrated that in a controlled experiment most undergraduate participants engaged in significantly more magical thinking when presented with unsolvable versus solvable word puzzles.

Consequently, if the sense of danger generated by a situation is strong enough, the need to enhance perceived control may increase. Submitting to an illusory sense of control appears to offer more comfort and is preferential to having no sense of control. The environment does influence thinking magically particularly in uncertain stressful circumstances. Now the literature on magical thinking in relation to types of obsessions will be considered as particular threats may fuel magical thinking.

Type of obsession

Obsessions that require the suspension of scientific laws to neutralise perceived threat have been shown to correlate with magical thinking (Einstein & Menzies, 2004a). Interestingly checking and cleaning neutralising behaviours in Einstein and Menzies (2004a) study displayed distinct profiles in undergraduate participants. Checking behaviour was significantly associated

with magical ideation, whereas cleaning behaviour was not. Einstein and Menzies hypothesised that the nature of the neutralising behaviours, explained the association. Checking behaviour was suggested to require individuals to question their tactile and visual sensory experiences. For example, an individual can stand at a door and feel and see it flush against the doorframe, and still doubt that the door is locked. Magical thinking therefore may be required to deny the evidence that is obtained by touching and seeing a locked door. In contrast, cleaning behaviours may not always require the suspension of scientific laws. The general public are aware that germs are invisible and prolific. A compulsive washer does not need magical thinking tendencies to imagine that whilst washing their hands some invisible germs have remained untouched (Einstein & Menzies, 2004a). Nevertheless, individuals with cleaning compulsions do, at times, imagine that contamination can be spread in ways that defy scientific laws, such as magical chains of contagion (Tolin, Worhunsky, & Maltby, 2004). Consequently, the type of threat generated by an obsession determines whether an individual would be prone to magical thinking tendencies.

In summary, the type of obsession and inadvertently the type of ritual performed to neutralise the threat of the obsession can explain a relationship between magical thinking and OCD. Obsessions that require the suspension of scientific laws to neutralise threat, appear more likely to require magical neutralisation strategies. The literature on whether magical thinking is present in any other clinical disorder will now be considered as this may support the

hypothesis that the types of environmental threats perceived by individuals may influence magical thoughts.

Is magical thinking present in any other clinical disorder?

Psychopathological states have been hypothesised to distort the thinking process to a degree where fantasy and magical thinking replace causal thinking (Zusne & Jones, 1989, p.14). This finding was also related to the change in the emotional state of an individual who experiences such states. In the case of panic disorder, a common magical belief is that 'a panic attack could kill the sufferer', even if patients are repeatedly subject to the symptoms of panic and the feared catastrophe never occurs.

Examples of magical thinking in depression are more of the good luck charm variety, where magical thinking is used to create confidence. A surrogate object is typically invoked to bolster confidence. Additionally, a more aggressive associative magic can be used to curse others, often to vent frustration and to give the individual some feeling that they have acted against the perceived aggressor (Zusne & Jones, 1989).

Individuals suffering from a psychotic or schizophrenic experience may believe that their thoughts are being magically broadcast to others and that certain ideas have been inserted into their minds, or that unrelated events, behaviours and objects hold secret messages for them (Garcia-Montes et al., 2006).

A number of studies have demonstrated that OCD is associated with schizotypal traits (Lee, et al., 2005; Sobin, et al., 2000; Tolin, et al., 2001) and that both disorders share similar cognitive biases, in particular magical thinking (Bolton, et al., 2002; Muris & Merckelbach, 2003). Furthermore studies have found that if individuals have the propensity to use magical actions to try to control events, then they are more likely to be vulnerable to auditory or visual hallucinations (Garcia-Montes, et al., 2006; Muris & Merckelbach, 2003). Magical thinking in auditory hallucinations has been associated with beliefs about the omnipotence of thoughts (Birchwood & Chadwick, 1997). In addition, there are positive associations between TAF and schizotypy, and between schizotypy and OCD symptoms in particular magical thinking (Lee et al., 2005). Consequently, the relationship between OCD and schizotypy supports the notion of the continuity between neurosis and psychosis (Freeman & Garety, 2003). Interestingly, there is a controversial recent debate as to whether OCD fits into a category of an anxiety disorder or whether it is a form of schizotypy (Lee et al., 2005), but this is beyond the scope of this review.

Magical ideation has also been linked to olfactory hallucinatory experiences in both German and Japanese participants. Mohr, Hubener, and Laska (2002) assessed olfactory sensitivity, magical ideation and deviant olfactory experiences in forty-two age and gender matched participants. The results highlighted that Germans had significantly higher magical ideation scores and a higher frequency of deviant olfactory experiences, than Japanese

participants. In German participants, the occurrence of deviant olfactory experiences was correlated with higher magical ideation scores.

Perceived loss of control of one's thoughts is a key complaint in OCD and may also be related to the capacity to think magically (Purdon & Clark, 2002). Magical thinking is often used in individuals with OCD in a ritualistic fashion, to ameliorate the dread and risk of dangerous possibilities, regardless of whether it has real effects on the object of fear. It contributes more to peace of mind, in that the individual feels that they can engage in the risky behaviour more safely due to thinking magically. This is not unlike magical thinking as described earlier, in the general population.

Magical thinking has been suggested to be generated by a variable common to many anxiety disorders the perceived overestimation of the likelihood of threat (Sica et al., 2002). This variable is common in OCD, post traumatic stress disorder (PTSD), generalised anxiety disorder (GAD), trait anxiety, and to some degree in depression (Purdon & Clark, 2002; Sica et al., 2002). TAF will now be considered in relation to other clinical disorders as it has also been related to magical beliefs (Amir, et al., 2001).

TAF is not specific to OCD and is present in other anxiety disorders (Abramowitz et al., 2003; Rassin et al., 2001). TAF is present in the preoccupation involved in eating disorders, for example the belief that 'thinking about food, will influence weight gain' (the concept thought shape fusion, see Shafran, Teachman, Kerry, & Rachman, 1999). TAF is also

common in psychosis and schizophrenia in the form of thought broadcasting delusions, for example the belief that 'one's thoughts can be read by others and can therefore influence external events' or ideas of reference where an individual may believe that 'the occurrence of an event such as a train crash was related to something that I had been thinking about' (Berle & Starcevic, 2005). Consequently TAF is common amongst other clinical conditions and has been found to influence the overestimation of the perceived likelihood of threat. As such the literature on TAF helps guide conclusions when analysing whether magical thinking is common amongst other clinical conditions. It also helps to form opinions about variables that may influence magical thinking, as the literature on this topic is so scant.

In summary, TAF and magical thinking are sometimes present in a variety of clinical disorders and this way of thinking is not specific to OCD. Furthermore, magical thinking may be indicative of a particular way of coping with specific emotional threats, which are common to a variety of clinical disorders. Variables that are common to the range of disorders presented are a perceived loss of control of one's thoughts and an overestimation of the likelihood of threat. The relationship between magical thinking and OCD will now be critically appraised. Support for the relationship will be considered first, followed by the evidence against this relationship.

What is the relationship between magical thinking and OCD?

Support for the relationship between magical thinking and OCD

An association between magical thinking and OCD has been suggested for many years (Zusne & Jones, 1989), however little research has directly addressed the relationship between them (Emmelkamp & Aardema, 1999). Some researchers argue that the concepts overlap to some degree (Weigartz, Carmin, & Pollard, 2002), how this overlap manifests itself however is unclear.

It has also been proposed that TAF-likelihood is a more specific form of magical thinking (Amir et al., 2001) and that individuals with OCD may have beliefs about the magical properties of objects, in a more general form of magical thinking (Amir et al., 2001).

There is another view that magical thinking is a particularly strong form of TAF in which the obsessional thought content has no logical relationship to the feared outcome (Warren, Gershuny, & Sher, 2002).

In contrast, a distinction has been drawn between the two concepts magical thinking and TAF (Bolton et al., 2002). Magical thinking has been described as a belief that rationally unconnected thoughts and actions can alter events in reality, both in a negative and a positive way (Bolton et al., 2002). The definition of TAF however has been confined to the consequence of negative events only (Bolton et al., 2002).

Controversially, TAF-likelihood has also been proposed by some researchers more recently to be a derivative of magical thinking (Amir, et al., 2001; Einstein & Menzies, 2004a).

In summary, the literature offers no clear view when examining the research into the relationship between magical thinking and OCD. Controversially there is evidence for the two concepts being associated, the same concept and two distinctly different concepts.

Non-clinical participants

Magical thinking has been highlighted as the central construct underpinning the association between TAF-likelihood and compulsive symptoms, in non-clinical participants (Einstein & Menzies, 2004a). The Magical Ideation Scale, the TAF-likelihood and the Lucky Beliefs and Behaviours Scales were significantly related to obsessive-compulsive symptoms in undergraduate participants, when measured by the Maudsley Obsessive Compulsive Inventory and the Padua Inventory. When magical ideation was held constant however, relationships between the other questionnaire measures and obsessive-compulsive symptoms were no longer significant. In contrast, when each of the other questionnaire measures were held constant, the correlation between magical ideation and obsessive-compulsive symptoms remained significant. Consequently, this study suggests that TAF-likelihood is a derivative of magical thinking. Furthermore, that magical thinking is the construct underpinning the association between TAF-likelihood and compulsive symptoms.

Clinical samples

Einstein and Menzies replicated and extended their initial undergraduate study (2004a) with a clinical sample (2004b). They examined whether the previously obtained relationship between magical ideation, TAF, superstitiousness and obsessive-compulsive symptoms was still present. The results demonstrated that magical ideation was again related to the TAF-likelihood subscales, superstitiousness scales and OCD measures. Of all the belief scales, magical ideation was most closely related to obsessive-compulsive symptomatology. TAF-likelihood and superstitiousness was related to OCD symptoms, largely by virtue of their relationship with magical ideation. Thus, magical thinking has support for being the main feature underlying the relationship between TAF-moral and obsessive-compulsive symptomatology (Amir et al., 2001 Einstein & Menzies, in press). Furthermore, that this relationship is present in both analogue and clinical samples (Einstein & Menzies, 2004a, 2004b).

An interesting finding from Einstein and Menzies clinical sample was that the washing behaviour did not appear to be related to magical thinking, as it was in the previous undergraduate sample. The relationship between checking and magical thinking was less clear-cut. In contrast to the findings from the non-clinical sample, magical ideation was not significantly correlated with checking. In the clinical sample, the correlations identified that magical thinkers were more likely to exhibit counting compulsions. These results are consistent with the definition that magical thoughts are beliefs that defy

scientific laws of causality; for example, counting numbers in one's head cannot influence the outcome of events in the external world. Furthermore, there was a high correlation with the subscale-impaired control over mental activities and the presence of magical ideation. The mental activities scale incorporated a range of concerns such as pathological doubt, responsibility, lateness, aggressive worries (e.g. concern over hurting someone), the occurrence of intrusive thoughts, a tendency to catastrophise and difficulties in concentrating and making decisions. There was a high correlation with magical thinking particularly related to aggressive urges (e.g. need to break or damage things, throw oneself under a train or out of a window, the urge to steal, or to drive into a person or object). As a result, Einstein and Menzies suggested that magical thinking might be particularly pertinent to individuals with aggressive and atypical symptomatology. In addition, the only individuals with OCD that were not expected to exhibit magical thinking were compulsive washers with contamination concerns.

Furthermore, magical ideation was found to be the result of a particular belief system and TAF was found to be a particular derivative of magical ideation. Unfortunately, there were no measures of anxiety or depression, in either of Einstein and Menzies analogue or clinical studies. Consequently, it is hard to draw generalisable conclusive results on the basis of these studies alone as these extreme mood states may have significantly influenced thinking magically.

Child and adolescent samples

Further support for the view that magical thinking is linked to obsessive-compulsive thoughts has been demonstrated in children and adolescents, between five and 17 years of age (Bolton et al., 2002). Magical thinking as measured by the Magical Thinking Questionnaire (MTQ; Bolton, et al., 2002) was found to be statistically significantly correlated with obsessive compulsion as measured by the Spence Children's Anxiety Scale (SCAS; Spence, 1998) in the group as a whole and additionally in both genders. The MTQ related directly to magical thinking, specifically to the beliefs that the occurrence of events in reality can be altered by thoughts and actions unconnected to them. A significant positive correlation between measures of magical thinking and obsessive-compulsive symptoms have been shown in females (Bolton et al., 2002). The males in the sample demonstrated strong correlations between measures of separation anxiety, generalised anxiety, panic, agoraphobia and magical thinking, in addition to magical thinking and OCD symptoms. There was also a significant fluctuation in magical thinking with age in the male participants only with younger children using more magical thinking.

In summary the literature to date suggests support for a relationship between magical thinking and OCD, however there is conflicting evidence in how this overlap manifests itself. The type of ritual performed has been suggested to influence the use of magical thinking in OCD. Additionally, it may explain the reason as to why some individuals with OCD use magical thinking and others do not. Inadvertently, this also suggests a link between the types of threat faced and the perceived level of controllability of threat.

Evidence against the relationship between magical thinking and OCD

In contrast to Einstein and Menzies (2004a) results Lee et al. (2005) used a multiple regression model to analyse results in a non-clinical sample from three scales: the Paranoid Ideation scale, the Unusual Perceptual Events Scale and Magical Ideation Scale. The results demonstrated that magical thinking was positively associated with OCD symptomatology and that magical thinking predicted TAF-likelihood (Lee et al., 2005). In contrast to Einstein and Menzies results however, magical thinking was not significant in predicting OCD symptomatology when TAF-likelihood was entered into the regression. This study is in direct conflict with the overwhelming evidence presented that magical thinking is related to OCD symptomatology via the relationship with TAF-likelihood (Einstein & Menzies, 2004a, 2004b). As this research is relatively controversial it perhaps warrants further investigation so as to confirm its findings.

Further research

One of the difficulties with investigating the role of magical thinking is the accessibility of such beliefs. Most studies rely on questionnaire methods, accessing beliefs through verbal self-reports. This is not helped by the paucity of available measures that are often not well established. Furthermore, Subbotsky (2001) found more of his participants exhibited more magical behaviours than they alluded to in their verbal reports, highlighting a difficulty when relying on verbal self-report measures. It is important that future studies develop experimental methods to investigate both magical thinking and OCD symptomatology. Furthermore, there is a gap in the research on the effects of

culture and it is clear that this further impacts upon attitudes and rates of self-disclosure of instances of magical thinking.

Unfortunately, as with many of the studies investigating the association of magical thinking in OCD research groups have failed to include measures of anxiety in their studies (Amir et al., 2001; Einstein & Menzies, 2004a, 2004b). Although magical thinking is suggested to be of greater relevance to OCD than other anxiety disorders (Muris et al., 2001; Rassin et al., 2001), studies have also demonstrated a strong association between magical thinking and other anxiety disorders in addition to OCD. It is therefore important that anxiety is taken into account in future studies when analysing the association of magical thinking to OCD.

There is also a lack of evidence concerning the impact of magical ideas and beliefs on adolescents (Clark, 1995; Woolley, 1997). Further research is needed on the transition through life and assessing whether encouraging childhood magical beliefs fosters a propensity to think magically with age. Further research is required also to understand the dynamic between religion and magical thoughts.

Research to date implicates perceived threat as an important variable to further investigate in relation to thinking magically. Individuals with OCD have been shown to overestimate the likelihood of threat and be concerned about a perceived loss of control of their thoughts. Magical thinking may be a product of lack of control faced by the individual in stressful situations, in an attempt to

reduce perceived situational threat. Further research is needed to investigate the role of threat in relation to magical thinking and OCD.

In addition, considering the theoretical importance of neutralising behaviour there is sparse research on this area (Freeston & Ladouceur, 1997). Future experimental methods to investigate the use of neutralising behaviour may further develop our understanding of OCD and may help to clarify the questions raised in this literature review concerning its role.

In conclusion, more research needs to be completed to help formulate clear conclusions as to the factors that contribute to thinking magically. Some personality factors are influential in whether an individual adopts magical thoughts. There is support for variables such as culture, religion and social encouragement of magical explanations for events being influential in an individual using magical thoughts. There is a lack of support for education, age and locus of control affecting magical ideation. Furthermore, the environment conjointly appears to play an influential role in whether an individual adopts magical thoughts. Stress and threat are influential variables as they contribute to the need to control unpredictability and uncertainty. A number of characteristics that are considered to lead to magical thinking in adults are exactly those that are often thought to characterise children's thinking more generally: lack of information, conditions of uncertainty and an inability to explain phenomenon. In addition, there was a strong continuity between children and adults use of magical ideas when situational and individual cost was high. The evidence supports the view that there is a strong

relationship between magical thinking and OCD and that both occur at times of high emotion. Consequently, there is evidence for some personal factors and some environmental factors influencing the use of magical thoughts. Magical thinking is something in which some of us engage, to different degrees, and with more or less conviction, as individuals and as cultures, throughout the life span and throughout history.

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Empirical Paper

Is magical thinking a function of perceived threat?

Charlotte Keeling, BSc., MSc.

Department of Clinical Psychology
University of Southampton

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(see Appendix B for Notes to Contributors)

Is magical thinking a function of perceived threat?

Abstract

Obsessive-compulsive disorder (OCD) is associated with fears that are uncontrollable such as death, games of chance, disaster and illness. This study explores the function of perceived control over threat in relation to magical thinking. Five stories, which evoked responsibility for harm, were read aloud to participants and they were asked how they would cope. Control was manipulated by altering the level of controllability of these scenarios. There were two versions of each scenario, representing high and low controllability. In the high control scenarios, there were several possible practical and psychological actions, which would have allowed the threat to be controlled. In the low control scenarios, no practical solutions were available, only psychological actions to control the threat presented. As a manipulation check two visual analogue scales measured participant's perceived ratings of anxiety and controllability, for each of the five scenarios. Participants also completed three questionnaires, the Padua Inventory-Revised, the Locus of Control Scale and the Magical Ideation Scale.

In a sample of 160 University participants 41% demonstrated magical thinking in low control scenarios and 32% demonstrated magical thinking in high control scenarios. When threat was uncontrollable however locus of control, magical ideation and OCD symptomatology did not differentiate between participants in those that used magical thinking to control the threat presented and those who did not. Level of OCD symptomology and magical ideation was associated with magical thinking in high control scenarios. The empirical

paper concluded that magical thinking might be a function of anxiety, which is linked by the feeling of being out of control in situations.

Is magical thinking in OCD a function of perceived threat?

1. Introduction

1.1. Cognitive theory of OCD

Threat and danger have long been hypothesised to be central variables in the development and maintenance of anxiety disorders (Barlow, 2002; Beck & Clark, 1997). A number of studies have proposed that a range of OCD fears are uncontrollable such as death, illness and disaster (Clark, Purdon, & Byers, 2000; Frost & Stekette, 2002). This study explores the function of magical thinking in a non-clinical sample in relation to perceived threat in situations. A non-clinical sample was chosen as obsessions and compulsions have been identified in the general population as indistinguishable in content to those seen in clinical OCD (Muris, Merckelbach, & Clavan, 1997; Rachman, Shafran, Mitchell, Trant, & Teachman, 1996; Van den Hout, Kindt, Weiland, & Peters, 2002; Van den Hout, Van Pol, & Peters, 2001).

According to Salkovskis' (1985, 1989, 1996, 1999; Salkovskis & McGuire 2003) cognitive theory, the significance that individuals with OCD attribute to their obsessional thoughts is what distinguishes them from normal intrusive thoughts. As such, individuals diagnosed with OCD are hypothesised to be vulnerable to cognitive biases. These cognitive biases generate an overestimation of threat, in addition to overvalued feelings of responsibility and harm (Rachman, 1998; Salkovskis, 1999). These appraisals lead individuals with OCD to interpret intrusive thoughts as important, personally relevant and overly threatening (Rachman, 1998).

1.2. Overestimation of threat biases

It has been argued that the general public naturally assume safety, unless there is tangible evidence of danger (Barlow, 1988). Individuals with OCD however perceive situations as dangerous until they have been proven safe, creating a positive bias toward fear of harm (Kozak, Foa, & McCarthy, 1987; Van Open & Arntz, 1994). Furthermore, individuals with anxiety disorders often overestimate how frightened they will be, when confronted with threatening events (Freeston, Rheaume, & Ladouceur, 1996; Taylor & Rachman, 1994; Van Oppen & Arntz, 1994). These overpredictions are maladaptive, as they serve to maintain anxious and fearful responding such as the rituals observed in OCD. As exposure to feared situations in which no harm occurs does not result in assumptions of general safety, rituals do not provide sustained reassurance and are subsequently repeated. Frequent thoughts about harm, combined with catastrophic appraisals have been proposed to contribute to an overestimation of the probability that harm will actually occur (Butler & Matthews, 1983). Beliefs such as the overestimation of threat overlap conceptually in OCD with many cognitive domains such as intolerance of uncertainty (Freeston et al., 1996), perfectionism (Freeston et al., 1996), doubts about actions (Frost, Marten, Lahart, & Rosenblate, 1990), the importance and control of thoughts (Rassin, Merckelbach, Muris, & Schmidt, 2001) and beliefs and information processing distortions related to cognitive biases such as thought-action fusion (TAF) (Rachman, 1993).

1.3. Prediction and control

Barlow (2002) reported that unpredictability and uncontrollability are at the heart of anxiety disorders. Strategies that increase prediction and control have been demonstrated to effectively reduce anxiety in treatment using cognitive behaviour therapy (CBT) (Eifert, Coburn, & Seville, 1992; Zvolensky, Lejuez, & Eifert, 2000) and as such are of theoretical and empirical importance.

Degrees of predictability are used during exposure to feared events, to reduce the frequency of symptoms in psychological therapy. Panic attacks are frequently categorised by distinguishing whether they are expected or unexpected and 'uncued' (unpredictable) or 'cued' (predictable), by identifying sensations that occur in close proximity to the panic attacks (Barlow, 1988). Despite the recognised importance of prediction in reducing anxiety in therapy, it has not been defined nor operationalised in an unambiguous manner in the literature (Zvolensky, et al., 2000).

When personal control is threatened the natural instinct is to regain it (Swann, Stephenson, & Pittman, 1981). If the restoration of control fails however learned helplessness (Seligman, 1975) and withdrawal are likely to ensue (Bolton & Hill, 1996; Rotter, 1966). Despite the recognised need for regaining a sense of control in overcoming threat, control has not yet been studied in any detail in relation to OCD (Zvolensky, et al., 2000). As many fears in OCD relate to uncontrollable events, this raised the question - how individuals with such obsessions manage these fears?

1.4. Illusory perceptions of control

An illusion of control has been manipulated in research studies, of individuals with OCD (Friedland, Keinan, & Regev, 1992). Friedland et al. (1992) hypothesised that stress-induced motivation to maintain or regain control would be sufficiently strong that individuals would seek control, even in situations that are essentially uncontrollable. In addition, the researchers proposed participants would act in ways that enhance their sense of control, even if the later was completely illusory.

Participants were asked to choose to bet on (1) the outcome of a rolled dice either prior to it being rolled, or after it had been rolled and (2) the outcome of a lottery ticket by either marking their own numbers or leaving it to chance, by letting the machine choose the numbers manually (Friedland et al., 1992). Thus, if participants assumed that the event was uncontrollable, they would hypothetically be indifferent to prediction versus postdiction. On the other hand, if the event were seen as controllable, then one would expect that participants would prefer to influence the situation, before the event occurred. Participants were asked to either choose to influence the events themselves or to leave events to chance; by letting the machines complete the actions.

Friedland et al.'s study was a replication of Rothbart, Weisz, and Snyder (1970) and Strickland, Lewicki, and Katz' (1966) studies, with an incorporated improvement of asking participants for their motivations behind their choices. In addition, they also included a locus of control measure. Friedland et al. (1992) hypothesised that stressed participants would prefer the option that

would instil a greater sense of control: prediction rather than postdiction. In addition, participants with an external locus of control were hypothesised to view themselves as being at the mercy of circumstances that were beyond their control. Participants with an internal locus of control, being masters of their own fate, were predicted to try to engage in behaviours to enhance their control over situations. As hypothesised, the results showed stressed participants preferred prediction to postdiction. In summary, in a stressful situation, participants preferred the illusion of control, rather than being subject to chance events.

1.5. Magical thinking as a function of uncontrollability of threat

Although magical thinking is a relatively uncommon phenomenon in normal adult experience (Bocci, 2004), studies suggest that it is more likely to arise during conditions of uncertainty or lack of control over the cause or long-term effects of an event (Thomas, 2000). In addition, magical ideation has been found in conditions such as depression (Zusne & Jones, 1989); generalised anxiety disorder (Haslett-Stevens, Zucker, & Craske, 2002); post-traumatic stress disorder (Abramowitz, Whiteside, Lynam, & Kalsy, 2003); eating disorders (Shafran, Teachman, Kerry, & Rachman 1999) and schizophrenia (Garcia-Montes, Perez-Alvarez, Balbuena, Garcelan, & Cangas, in Press; Lee, Cougal, & Telch, 2005). Magical thinking may be considered a consequence of the particular fears experienced by OCD sufferers; that are generated by threatening and uncontrollable situations (Bleak & Frederick, 1998; Kennedy, Lynch, & Schwab, 1998; Zusne & Jones, 1989). A theme

common to these findings is the notion of uncertainty, in which danger is high and the chance of significant loss is great (Sica, Novara, & Sanavio, 2002).

1.6. OCD and the controllability of events

There is a paucity of research to draw on in relation to OCD and perception of controllability in situations. Most studies do not clearly distinguish instances when avoidance and escape of an aversive event were available (Averill & Rosen, 1972). Some researchers have highlighted however particular characteristics of threatening events such as intensity and duration, but these are not consistent and can vary across situations (Miller & Grant, 1979). Controversially, other studies have demonstrated where participants prefer predictable or controllable events, a percentage of participants prefer unpredictable or uncontrollable events (Miller, 1981). Consequently, there are no conclusive, or up-to-date studies analysing the influence of perception of control on OCD symptomatology (Frost, Krause, McMahon, Evans, McPhee, & Holden, 1993).

1.7. Association between locus of control and OCD

Locus of control is considered a personality trait and refers to an individual's perception of the main causes of events in life (Rotter, 1966). It is a belief about whether the outcomes of our actions are contingent on what we do (internal control orientation), or on events outside our personal control (external control orientation) (Rotter, 1992).

Similarly, the relationship between locus of control and OCD has received little research attention. Kennedy et al. (1998) showed that individuals with anxiety disorders, were more likely than a control group with no symptoms of anxiety, to believe that their lives were under the control of chance forces or powerful others. Interestingly, they found that individuals with OCD scored lowest on the locus of control measure, than individuals with a diagnosis other than OCD. These results are consistent with the hypothesis that individuals with OCD make heightened attempts to maintain personal control in their lives, through their compulsive behaviours.

Thomas (2000) examined if magical neutralisation strategies (strategies that are not grounded in cause and effect relationships that reduce the perception of the threat of the obsession in OCD were a function of threat in relation to the obsession controllability, locus of control or schizotypy. Seventy-five participants (27 males, 48 females) aged 17 to 71 years, diagnosed with OCD, completed questionnaires and a telephone interview, concerning their symptoms. Thomas showed that magical compulsions tended to arise when the corresponding obsession was uncontrollable, in that there was no nonmagical adaptive response available. In addition, as expected, an external locus of control did not predict use of magical neutralisation strategies. There was a significant interaction however between the obsession controllability and the participants' locus of control. Contrary to her prediction, externally orientated individuals engaged in fewer magical rituals, than internally orientated participants, when obsession controllability was high.

1.8. Experimental investigation of control

The present study is similar to Thomas' study in that magical actions are also assessed in relation to the controllability of threat and locus of control. Thomas' study was correlational in nature and her results are contrary to her predictions and as such the study needs to be replicated. As the present study is the first study to present hypothetical scenarios and manipulate their controllability it is appropriate and ethical to use an undergraduate sample.

Thomas' methodology used the Maudsley Obsessive Compulsive Inventory (MOCI; Hodgson & Rachman, 1977), Locus of Control Scales (LoC Scale; Rotter, 1966), Internal Powerful Others Chance Scales (Levenson, 1974), Beck Depression Inventory II (Beck, 1996) and the Per Mag Scales (Chapman, Chapman, & Raulin, 1978) (Combination of the Perceptual Aberration Scale and the Magical Ideation Scale), in addition to a structured telephone interview.

The present study improves on Thomas' study as it experimentally manipulates perceived controllability by presenting either a high or low control condition for each of the five generated scenarios. This manipulation enables control to be confirmed or disconfirmed as a causal factor in influencing magical thinking. The high control scenarios described threat that could be alleviated by using a rational, non-magical, as well as a magical action. The low control scenarios generated threat that could only be alleviated by using a psychological method such as a magical action.

Correlations are completed in the present study between measures of OCD symptomatology: the Padua Inventory Revised (PI-R; Burns, et al., 1996), the Locus of Control Scale (LoC Scale; Rotter, 1966) and the Magical Ideation Scale (MIS; Eckblad & Chapman, 1983) in addition to whether participants used magical actions in each of the two conditions. All the scales chosen for this research have been proven to have high internal consistency and are consistent with the experimental design.

Furthermore, recommendations highlighted by Thomas were incorporated into the present study: participants were asked to complete two VAS assessing their perceptions of the controllability of the threat presented in each condition and the level of anxiety they experienced for each of the five scenarios. Ethics Committee approval was granted from Southampton University (See Appendix M).

2.0. Hypotheses

1. More participants will use magical actions in the low control scenarios, than in the high control scenarios.

2. Scenario threat will interact with psychological variables so that in the low control scenarios: participants who use magical actions will be those with higher MIS scores, higher PI-R scores and higher external LoC scores, and in the high control scenarios: there will be no significant difference in MIS scores, PI-R scores and LoC scores between participants who use magical actions and participants who do not use magical actions.

3.0. Method

3.1. Preliminary study

A two-part pilot study was completed with 17 Trainee Clinical Psychologists a month before the main study. Part one looked at whether the perceived controllability of the 10 hypothetical scenarios generated for this study were similar for all the high and all the low control scenarios. Part two examined whether there was enough of a division between the two conditions. Following the pilot study five scenarios were selected for the main experiment, on the basis that they produced high anxiety and low perceived controllability in the low control scenarios and low anxiety and high-perceived controllability in the high control scenarios.

3.2. Participants

The participants were 160 undergraduate students at the University of Southampton. The mean age was 19 years, ranging from 17 to 56 years. One hundred and forty participants (87.5% of the sample) were female.

3.3. Measures

3.3.1. Locus of Control Scale (LoC scale; Rotter, 1966; Appendix Ci)

This is a 23 item true-false instrument that is intended to measure perceived control over life events. Higher scores on this scale reflect an external locus of control. The following example is a reflection of external locus of control 'many of the unhappy things in peoples' lives are due to bad luck'. An internal locus of control contrast is 'peoples' misfortunes result from the mistakes they make'. The scale has demonstrated adequate test-retest reliability ranging

from 0.49 to 0.83 (Rotter, 1992, p.13). Coefficient alpha for this scale was 0.71 in a sample of 405 undergraduate students (Philips & Gully, 1997).

3.3.2. Magical Ideation Scale (MIS; Eckblad & Chapman, 1983; Appendix Cii)

The MIS is a 30 item self-report inventory, which explores magical beliefs using true or false scoring of the items. An example of items that are scored in the true direction are 'Horoscopes are right too often for it to be a coincidence'; items that are scored false are 'Good luck charms don't work'. Higher scores on the MIS scale indicate higher scores of magical ideation. The scale has been demonstrated to show construct validity and is reported to have internal consistency between 0.82 and 0.85 (Tolin, Abramowitz, Kozak & Foa, 2001).

3.3.3. Padua Inventory-Revised (PI-R; Burns et al., 1996; Appendix Ciii)

The PI-R was developed as a measure of OCD proneness for use in non-clinical samples. It consists of 60 items covering a full range of OCD symptomatology, measuring severity of each item on a 0-4 point likert scale. The questionnaire has good levels of internal consistency, test-retest reliability and convergent validity (Feske & Chambless, 2000). The PI-R can be analysed into five categorizations (1) Obsessional thoughts about harm to oneself or others; (2) Obsessional impulses to harm oneself or others; (3) Contamination obsessions and washing compulsions; (4) Checking compulsions; (5) Dressing and grooming compulsions (Burns et al., 1996).

The PI-R includes items reflecting ruminations and impulses that are not included in the majority of OCD measures.

3.3.4 Five scenarios

The researcher generated five scenarios to induce responsibility for harm in participants (Appendix I). Each scenario was adapted to manipulate the level of control that the participants had when they were asked what they would do to put their minds at rest in each situation. Each scenario had a high and a low control version. Control was specifically manipulated in the scenarios by the amount of information given and the hypothetical distance that participants were from the source of threat.

3.3.5 Visual Analogue Scales (VAS; Rachman, et al., 1996).

Participants rated their perceived level of anxiety and controllability, for each of the five generated scenarios, on a 10cm scale with a range from 0cm representing no anxiety or controllability over the scenario, to 10cm representing the most anxiety / controllability participants could possibly have. Scores were then converted to percentages based on their position on the scale. Visual analogues correlate with other mood scales and are particularly sensitive to short-term fluctuations of mood (Lindsay & Powell, 1994; McCormack, Horne, & Sheather, 1988).

The Independent Variable was threat, which was manipulated into high and low perceived control. The Dependent Variable was whether or not participants used magical actions, in addition to their ratings of their perceived

control and anxiety as a result of the five scenarios on visual analogue scales. Scores on the MIS, LoC scale and PI-R were also dependent variables.

4.0. Procedure

Prior to commencing this study all participants were individually checked for recently experienced traumatic events and informed of their right to withdraw from the experiment at any time (British Psychological Society, 2000, point 6 of Code of Conduct for Psychologists).

The experimental procedure was conducted with groups of participants ranging in size from one to a maximum of six participants. Participants were spaced widely and asked to ignore the other individuals in the room. Participants were then asked to read the information sheet (Appendix D) and to complete the statement of consent (Appendix E). The experimenter then read the instructions of the experimental procedure from a script (see Appendix F).

At the beginning of each scenario participants were asked to identify a loved one, relative or best friend and to write their name into the space provided at the top of each scenario, in their response booklet (Appendix G & H). Participants were then asked to close their eyes and to imagine that the scenario being read aloud by the experimenter, was happening to the individual they identified. Participants were asked to make a mental representation of the imaginary scenario (Rassin, et al., 2001). Following this

imagery induction, participants were asked to write what they would do in such situations, to put their minds at rest.

All participants were given five scenarios in random order. The version of each scenario presented was equally counterbalanced across the two conditions: -

Condition 1 High Control: Contained three high control stories: scenario 1, 3 and 5, (allowing for magical and rational actions to control the threat presented) interspersed with two low control stories: scenario 2 and 4, (where only psychological methods such as magical actions can control the threat presented) (Appendix G).

Condition 2 Low Control: This condition had three of the low control versions of scenario 1, 3 and 5 interspersed with two high control versions of the scenario 2 and 4 (Appendix H). Following responding to each scenario, participants were asked to rate how controllable and how anxious the scenarios made them feel on the VAS. Participants then completed the PI-R, the MIS and the LoC Questionnaires. At the end of the experiment all participants were informed about the nature of the study and given a debriefing statement (Appendix K).

5.0. Analysis

Qualitative analysis examined the coping methods used by participants. Freeston and Ladouceur's (1997) study helped to inform the categorisations made to differentiate the participants' responses. See Appendix L for the categorisations of the responses given by the participants. The participants'

responses were categorised into (1) magical actions, (2) practical actions, (3) rational explanations, (4) emotional coping, (5) reassurance from others, (6) avoidance or distraction, (7) religious strategies or (8) unclassifiable. The response to each scenario was coded for presence or absence of each type of action. Inter-rater reliability was used to examine the accuracy of 40% of the study's categorisations. There was a 92% level of agreement for the accuracy of the categories chosen between raters. As a result, this was considered accurate enough to enable further analysis to be completed.

Manipulation check

SPSS version 13 was used for all quantitative analysis. T-tests were used to check the manipulation i.e. that the low control scenarios elicited (1) lower subjective ratings of controllability and (2) more anxiety, than the high control scenarios.

Explanation of analysis of hypotheses

Hypothesis one was analysed whether participants used magical actions or not between the high and low control scenarios. A McNemar Chi Square (Howitt & Cramer, 2005) analysed the results as the study used repeated measures.

A 2x2 ANOVA was used for hypothesis two. The analysis had two factors. The first factor was high versus low control of the scenario and the second factor was use of magical action versus no magical action used.

The questionnaire scores were entered into the analysis as a 'dependent variable' however this study is actually correlational in nature, and therefore does not really have a dependant variable. This analysis was completed to determine if there was an interaction between use of magical actions, psychological variables and the perceived controllability of scenarios.

6.0. Results

6.1. Examples of responses from each category

Magical Action

'I've had a warning. He had dreams that tend to come true- the ability has passed to me, as he needs my help. I will think that they will be ok and then they will'.

'Imagine mum never hiring a moped'.

Practical Action

'Use someone's phone to contact them, to warn friends of danger, make an action plan of what to do'.

Rational Action

'She is probably drunk and I am just thinking the worst, she could be fine and there is another explanation for my thoughts'.

Emotional Action

'Deep breathes to calm myself down so that I can think clearly'.

Reassurance from others

'Phone my mum and ask her advice about what I should do'.

Avoidance / Distraction

'I would try to think of something else to stop myself from worrying about the situation'.

Religious Strategy

'I would pray to God to keep John safe as this would prevent any harm from coming to him'.

Unclassifiable

'I would shout shit and swear a lot'.

In comparing the five high and low control scenarios there was a great deal of variability of actions suggested by participants to deal with the threat presented. In all five scenarios most participants used a practical action to deal with the threat. The second most common action was a rational explanation for the scenario. Then the results vary considerably between the conditions of the scenarios. Avoidance and distraction was only used in scenario 4 and 5. Furthermore avoidance and reassurance was used more frequently in scenario 4, than any other scenario, to deal with the threat. In summary, there was some variability in the actions used by participants to deal with the threats in addition to variability of actions between the scenarios. For bar charts to show the frequency of actions used in response to the five scenarios (see Figures 7-11, Appendix J).

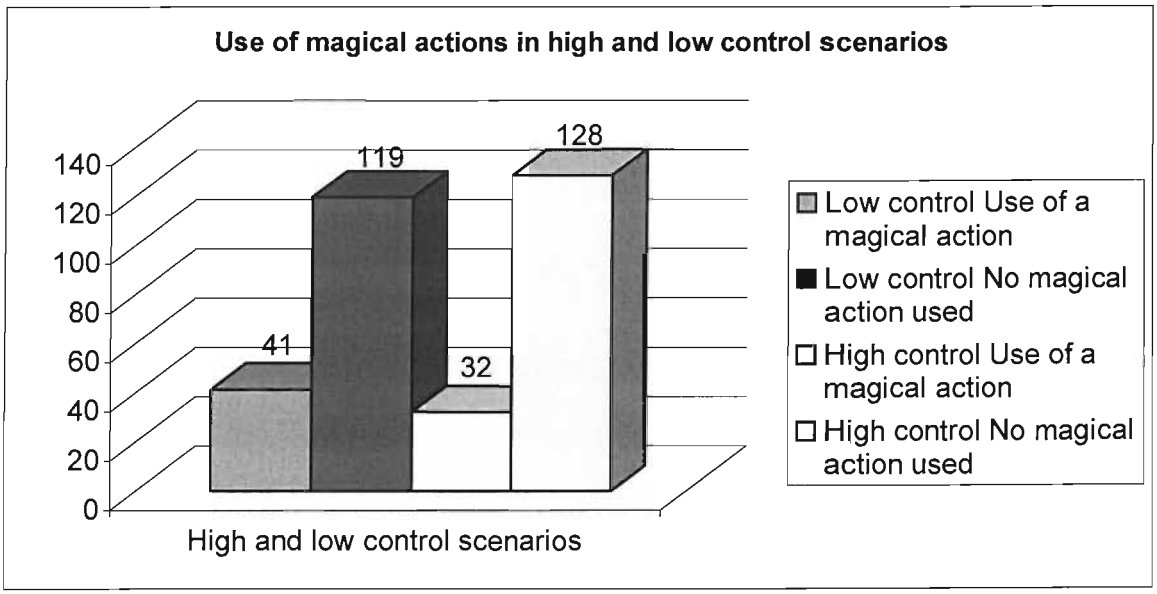
6.2. Analysis of hypotheses

SPSS version 13 was used for all quantitative analysis.

6.2.1 Hypothesis 1: More participants will use magical actions in the low control scenarios, than in the high control scenarios.

The number of participants who used magical actions in both high and low control scenarios are illustrated in figure 1.

Figure 1: Use of magical action in high and low control for all 5 scenarios



McNemar's test was used to analyse hypothesis one. There was a significant influence of perceived control that participants had in the high and low control scenarios, on the use of a magical actions $X_{(1)}=48.98$, $p < .001$. As predicted, more participants used magical actions in the low control scenarios.

6.2.2 Hypothesis 2: Scenario threat was predicted to interact with psychological variables so that in the low control scenarios: participants who use magical actions will be those with higher MIS scores, higher PI-R scores and higher external LoC scores, and in the

high control scenarios: there will be no significant difference in MIS scores, PI-R scores and LoC scores between participants who use magical actions and participants who do not use magical actions.

The descriptive statistics for the questionnaire scores are illustrated in table 1.

Table 1: Means and standard deviations for the LoC scale, MIS and PI-R.

	Padua Inventory-Revised	Magical Ideation Scale	Locus of Control Scale
N	160	160	160
Mean	22.69	5.74	12.66
Std. Deviation	15.16	4.01	3.64
Norms	21	5	8

A 2x2 ANOVA was used to assess how the questionnaire scores related to reporting of magical actions. The ANOVA had two factors (high control scenario, low control scenario) and each of these had two levels (used magical strategy, no magical strategy reported). Thus there were four cells in the ANOVA (never offered magical strategy, offered magical strategy in response to high control scenario, offered magical strategy in response to low control scenarios, always offered magical strategy). As the groups were defined in part by participants' behaviour, there were different numbers of participants in each group.

6.2.2.1 Locus of Control (LoC)

When analysing the results of the LoC scale there was no significant differences or interactions (*Fs*<1). As a result, there was no evidence that an

individual's locus of control influenced their use of magical actions, in either high or low control situations.

6.2.2.2 Magical Ideation Scale (MIS)

When analysing the results of the MIS there was a significant difference in the MIS scores between participants who did and did not use magical actions, in the high control condition ($F(1,156) = 6.05$, $p = .02$). The participants who had higher MIS scores used more magical actions when the scenario could have been controlled with a rational action (high control). There were no group differences when looking at the low control scenarios ($F(1,156) = .49$, $p = 0.497$) and no significant interactions ($F(1,156) = 1.01$, $p = .32$). The descriptive statistics for the ANOVA on the MIS and use of magical actions in both high and low control conditions are illustrated in table 2.

Table 2: ANOVA results for the MIS and use of magical actions in both high and low control conditions

		High control scenarios		
Low		Magic	Non-magic	Total
control	Magic	17	24	41
scenarios	Non-magic	15	104	119
	Total	32	128	160

6.2.2.3 Padua Inventory-Revised (PI-R)

When analysing the results of the PI-R total score there was a trend towards a significant difference in the OCD symptomatology between users and non-

users of magical actions, in the high control condition ($F(1,156) = 3.74$, $p = .06$). The results demonstrate a trend towards participants who are higher in OCD scores using more magical actions when the scenario could have been controlled with a rational action (high control scenarios).

There was no significant difference in OCD symptomatology between the group who did and the group who did not use magical actions in response to the low control scenarios ($F(1,156) = 0.24$, $p = 0.63$). The interaction was not significant ($F(1,160) = 0.23$, $p = 0.64$). Contrary to the hypothesis there was a trend towards a significant difference in the OCD symptomatology between users and non-users of magical actions, in the high control scenarios, rather than the low control scenarios. The descriptive statistics for the ANOVA on the PI-R total score and use of magical actions in both high and low control conditions are illustrated in table 3.

Table 3: ANOVA results for the PI-R total score and use of magical actions in both high and low control conditions

		High control scenarios		
Low		Magic	Non-magic	Total
control	Magic	17	24	41
scenarios	Non-magic	13	106	119
	Total	30	120	160

In summary, when there was a significant difference in the PI-R scores between participants who did and did not use magical actions, this was only significant in the high control scenarios, which was contrary to the hypothesis.

6.2.2.3.1 Post Hoc Analysis- Padua Inventory-Revised (PI-R)

The subscales of the PI-R were analysed separately using Burns et al.'s (1996) re-categorisation for undergraduate participants. The categories that were analysed were (1) Obsessional thoughts of harm to self and other, (2) Obsessional impulses to harm self and other, (3) Contamination, obsession and washing compulsions, (4) Checking compulsions and (5) Dressing and grooming compulsions. It appeared that the trend to a difference was carried by the subscales (1) Obsessional thoughts of harm to self and other, and (3) Contamination obsession and washing compulsions.

(1) Obsessional thoughts of harm to self and other subscale: demonstrated a significant difference in the OCD symptomatology of participants who did, compared to participants who did not, use magical actions in the high control condition ($F(1,156)= 7.87$, $p = .006$). Participants rating higher on the 'Obsessional thoughts of harm to self and other' subscale used more magical actions, when the scenario could have been controlled with a rational action (high control scenario). There was no significant difference in the OCD symptomatology between the group that used magical actions, in response to the low control scenario ($F(1, 156) = 0.51$, $p = .48$). The interaction was not significant ($F(1, 160) = .09$, $p = .76$).

***(2) Obsessional impulses to harm self and other subscale*:** demonstrated no significant differences between the groups for the high control condition $F(1, 156) = 1.43$, $p = .23$), or for the low control condition $F(1, 156) = .54$, $p = 0.464$) and no interaction was found $F(1, 160) = .04$, $p = .84$).

(3) Contamination, obsession and washing compulsions subscale: demonstrated significant differences in the use of magical actions, in the high control scenarios ($F(1,156) = 6.67$, $p = .01$) with participants rating higher on the 'Contamination, obsession and washing compulsions' subscale using more magical actions, when the scenario could have been controlled with a rational action (high control scenario). There were no differences in the subscale scores between participants who did and did not use magical actions, in the low control scenarios $F(1, 56) = .01$, $p = .93$), and there was no interaction $F(1, 160) = .01$, $p = .93$).

(4) Checking compulsions subscale: demonstrated no significant differences between the groups on the high control scenarios ($F(1, 156) = 0.11$, $p = .74$), or on the low control scenarios ($F(1, 156) = .10$, $p = .76$, and there was no interaction between the groups ($F(1, 160) = .49$, $p = .49$).

***(5) Dressing and grooming subscale*:** demonstrated no significant differences between the groups on the high control scenarios ($F(1, 156) = .03$, $p = .86$), or on the low control scenarios ($F(1, 156) = .01$, $p = .93$, and there was no interaction between groups ($F(1, 160) = 1.70$, $p = .20$).

In summary, the two subscales that showed a difference in OCD symptomatology between participants who did and did not use magical actions, (1) Obsessional thoughts of harm to self and other subscale, and (3) Contamination, obsession and washing compulsions subscale, were only

significant in the high control scenarios, rather than the low control scenarios as predicted.

6.3. Was perceived lack of control associated with anxiety?

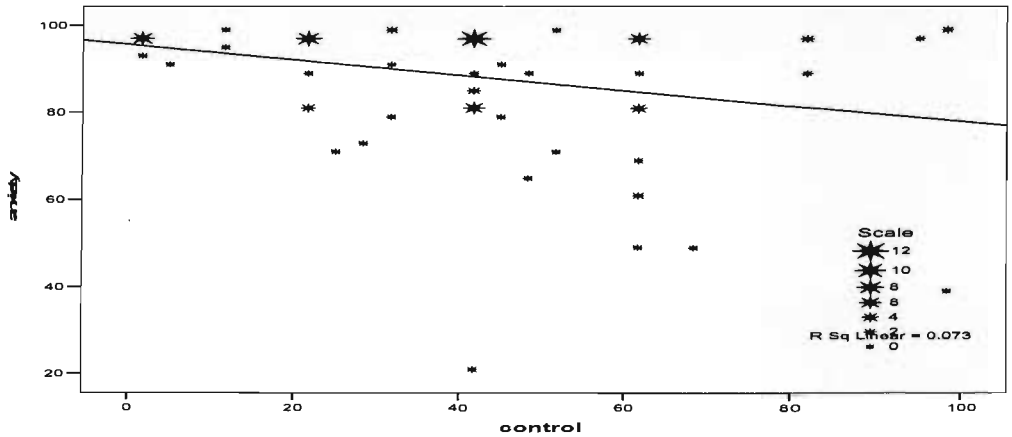
To check that anxiety was related to perceived lack of control the perceived anxiety and controllability VAS scores were correlated and scatterplots were drawn (figs. 2 - 5). Overlapping data points are represented by "sunflowers". All of the scenarios were examined and the significantly correlated scenarios are illustrated using scatterplots.

(1) Low control scenarios

Scenario 1 did not show a significant correlation in the low control condition $r_{(81)} = -.12$, $p = .31$.

Scenario 2 showed a significant correlation between anxiety and control at the 0.05 level (2 tailed) $r_{(81)} = -.27$, $p = .02$. Thus, in the low control version of scenario 2 participants who felt in less control, felt more anxious.

Figure 2: Scatterplot for Scenario 2, Low control

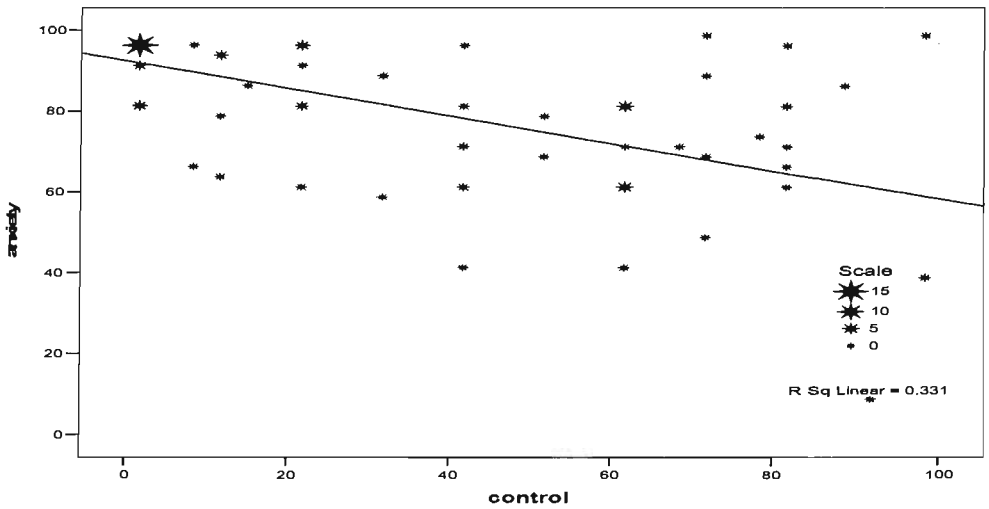


Scenario 3 did not generate a significant correlation, in the low control condition, between anxiety and control $r_{(81)} = .16$, $p = .32$.

Scenario 4 did not show a significant correlation between anxiety and control in the low control condition $r_{(81)} = .01$, $p = .97$.

Scenario 5 did show a significant correlation between anxiety and control, at the 0.01 level (2 tailed) $r_{(81)} = -.58$, $p < 0.001$. In the low control version of scenario 5 participants who felt in less control felt more anxious.

Figure 3: Scatterplot for Scenario 5, Low control



In summary, in the low control condition, scenario 2 and scenario 5's perceived anxiety and controllability scores were significantly correlated. Participants who felt they would have little control over the situation were more anxious.

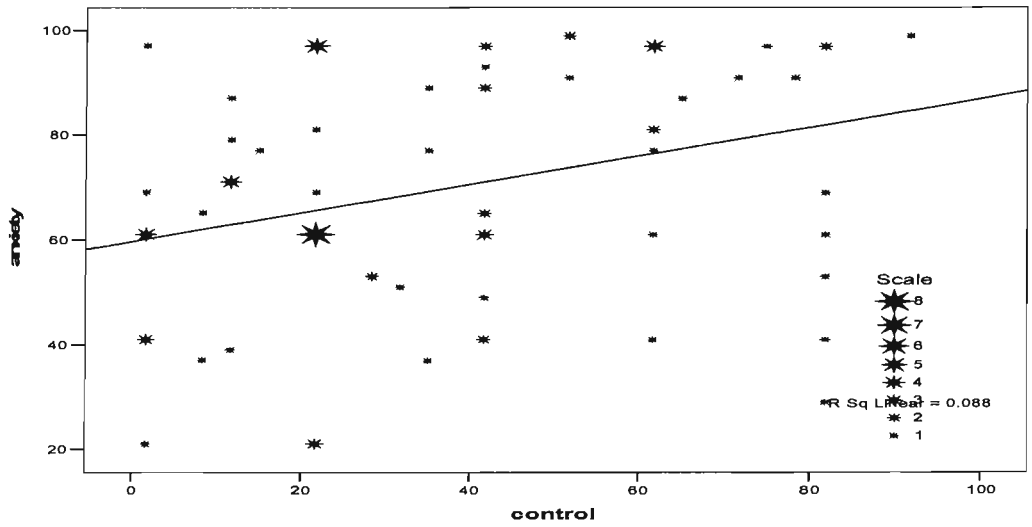
(2) High control scenarios

In **scenario 1**, high control, there was no significant correlation between anxiety and control $r_{(79)} = -0.13$, $p = 0.25$.

Scenario 2 did not significant demonstrate any significant correlation $r_{(79)} = -.07$, $p = .55$; and **scenario 3** did not demonstrate a significant correlation $r_{(79)} = -.19$, $p = .09$.

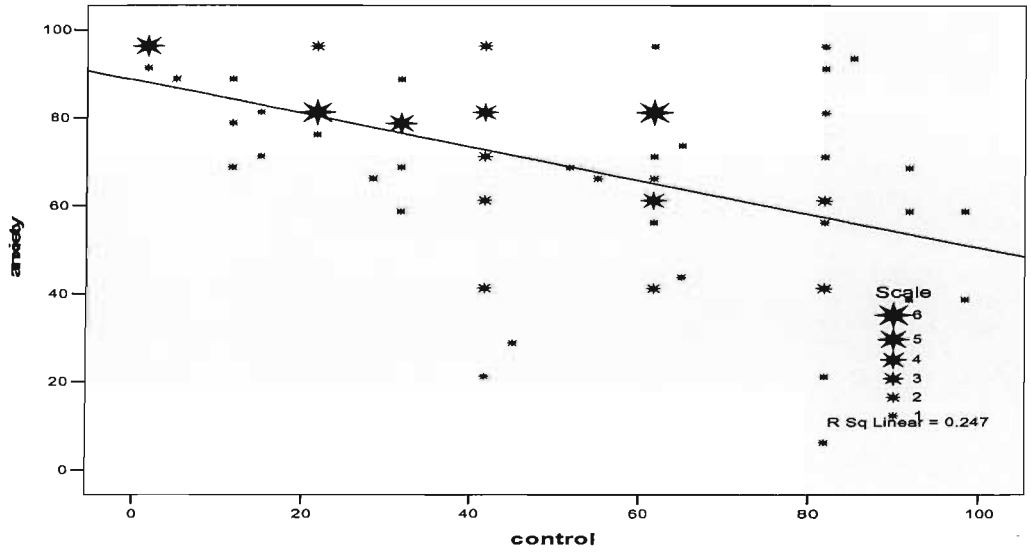
Scenario 4 did show a significant correlation between anxiety and control at the 0.05 level (2 tailed) $r_{(79)} = .30$, $p = .01$. In the high control version of scenario 4 participants who felt in more in control, felt more anxious.

Figure 4: Scatterplot for Scenario 4, High control



Scenario 5 showed a significant correlation between anxiety and control, at the 0.05 level (2 tailed) $r_{(79)} = -.50$, $p < 0.001$. In the high control version of scenario 5, participants who felt more in control, felt less anxious.

Figure 5: Scatterplot for Scenario 5, High control



In summary, in the high control condition, scenario 4 and 5's perceived anxiety and controllability scores were significantly correlated. Participants who felt they had less control over the situation experienced more anxiety than those who felt they would have more control.

6.4 Manipulation check

6.4.1. Does each scenario manipulate controllability?

T-tests were used to check the manipulation for the low control scenarios eliciting (1) lower subjective ratings of controllability and (2) more anxiety, than the high control scenarios. The mean ratings for control and anxiety for both conditions for each scenario are displayed in figure 6.

Where Levene test showed evidence for significant departures from the homogeneity of variance assumption the correction provided by SPSS was used, indicated by Equal variances not assumed [EVNA]. Uncorrected degrees of freedom are reported.

(1) Control

There was evidence for a significant difference in perceived controllability of scenario 1 $t(158) = 2.95$, $p < 0.004$, and scenario 5 $t(158) = 10.82$, $p < 0.001$ between the high and low control scenarios. The low control scenarios generated lower ratings of perceived controllability. There was no evidence for a difference in perceived controllability of the other three stories, scenario 2 $t(158) = .25$, $p = .80$, scenario 3 $t(158) = 1.19$, $p = .23$ and scenario 4 $t(158) = -1.65$, $p = .10$. In summary, scenario 1 and 5 significantly manipulated perceived controllability.

(2) Anxiety

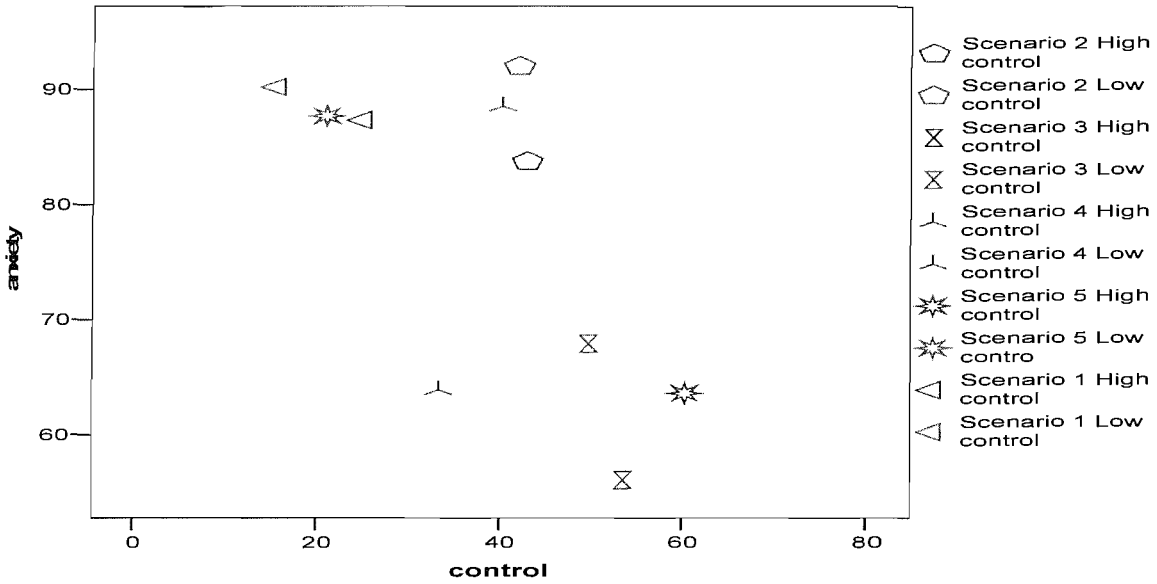
There was no evidence of a significant difference in anxiety level of scenario 1 $t(158) = -1.42$, $p = .16$ between the high and low control scenarios.

There was evidence for a significant difference in perceived anxiety of all the other four stories scenario 2 $t(158) = -3.95$, $p < 0.001$ [EVNA], scenario 3 $t(158) = -3.90$, $p < 0.001$, scenario 4 $t(158) = -7.74$, $p < 0.001$ [EVNA] and scenario 5 $t(158) = -9.16$, $p < 0.001$ [EVNA]. In summary, scenario 2, 3, 4 and 5 significantly manipulate perceived anxiety.

6.4.2 Does the level of anxiety induced by a scene correlate with perceived level of control?

The average rating for controllability for each scenario was $r(10)$ $t=18.21$, $p < 0.001$ and the average rating for anxiety for each scenario was $r(10)$ $t=8.35$, $p < 0.001$. In summary, control did significantly correlate with anxiety.

Figure 6: Mean ratings for control and anxiety for both conditions for all 5 scenarios



This scatterplot demonstrates that overall the participant's level of anxiety was higher, for low control scenarios. Furthermore, there was a large discrepancy between the means for scenario 5 (indicated by blue and red stars) with significantly more anxiety being experienced and significantly less control in the low control, and significantly less anxiety and more control in the high control version of the scenario. Consequently, scenario 5 was the most effective manipulation generated for this experimental papers methodology.

6.5 Reanalysis of the hypotheses using data from scenario 1 & 5 only

As a result of the manipulation check, reanalysis of the data generated from scenario 1 and 5 only was completed as these scenarios significantly manipulated the variable control, between the high and low control conditions.

6.5.1. Reanalysis of Hypothesis 1

As the reanalysis was a between groups test, rather than a repeated measures test as in the first analysis, a Pearson's Chi square was used see Table 4 for the results.

Table 4: Pearson's Chi square reanalysis of the use of magical actions in scenario 1 & 5 only

	Scenario 1 & 5		
	No magical actions used in scenario 1 & 5	**Magical actions used in scenarios 1 & 5**	**Total**
Low control	63	18	81
High control	68	11	79
Total	131	29	160

The reanalysis of scenario 1 and 5's data only did not generate significant results $X_{(1)} = 1.86$. The use of magical actions was not significantly related to the perceived controllability of the two scenarios. When interpreting these results however it must be considered that there was a considerably reduced power in this reanalysis. As a result, further reanalysis of the hypotheses was not considered reliable.

6.5 Overview of results

The results support the first hypothesis that more participants used magical thinking when faced with an uncontrollable rather than controllable threat. More magical strategies were produced in response to 'low control' scenarios (41%) than 'high control' scenarios (32%). The data from scenario 1 and 5 only was reanalysed as these scenes were found to significantly manipulate

controllability. The results did not concur with the original analysis and as a result were considered unreliable, due to the reduced power.

Anxiety was associated with feeling out of control of the situation in scenario 2 and 5 in the low control condition and scenario 4 and 5 for the high control conditions.

Post hoc analysis identified that participants who used magical actions in the high control condition had higher scores on the (1) Obsessional thoughts of harm to self and other and (2) Contamination, obsession and washing compulsion subscales of the PI-R.

The manipulation check showed that scenes 1 and 5 significantly manipulated controllability between the conditions and scene 2, 3, 4 and 5 significantly manipulated anxiety between the conditions.

7.0. Discussion

7.1 Review of hypotheses

Hypothesis one was supported suggesting that the controllability of a situation is an influential factor in the use of magical thinking.

Hypothesis two was not supported as scenario threat did not interact with psychological variables so that in the low control scenarios participants who used magical actions were those with higher MIS, PI-R, and LoC scores. There was support for threat interacting with the psychological variables of

MIS and PI-R in the high control scenarios however, which was contrary to the hypothesis.

7.2 Summary of main findings

One of the main questions of this paper aimed to assess whether individuals with OCD use magical actions to neutralise fears not because they are 'magical thinkers', but because their feared situation cannot be controlled by rational or practical measures or avoidance? 41% of the participants in response to 'low control' scenarios, and 32% of the participants in response to 'high control' scenarios, produced magical strategies. As such magical thinking was present in this sample of undergraduate students who are expected to be representative of the general population. Furthermore, these results suggest that individuals use more magical actions when their feared situation cannot be controlled by rational or practical measures or avoidance. In addition, when the situation was relatively controllable, in the 'high control' condition, this was when there was an interaction with psychological variables suggesting that individuals with more obsessional characteristics used more magical strategies. As there were more consistent differences in rated anxiety than controllability scores on the VAS, it could be the anxiety that the 'low control' scenarios provoked that influenced the level of magical thinking.

These results are contrary to Thomas' (2000) results that showed magical compulsions arose when the obsession was uncontrollable and there was no non-magical response available. The results from this study, in addition to the conflicting results of Einstein and Menzies (2004a; 2004b), Thomas (2000)

and Lee et al.'s (2005) results suggest that further research is necessary to determine the relationship between magical thinking and OCD.

Furthermore, locus of control was not significant in predicting use of magical actions thus supporting Thomas' (2000) results. Thomas did however find a significant interaction between obsession controllability and a participant's locus of control. In her study externally orientated participants engaged in fewer magical rituals when the obsession controllability was high. There was no significant interaction in this experiment however as a result of manipulating the perceived controllability of a situation.

Bolton et al. (2002) highlighted the importance of assessing the specificity of magical thinking in OCD by comparing control groups with other anxiety disorders in child and adolescent participants. Without controlling for anxiety it is unclear whether magical thinking is specific to OCD. The results found in this experiment suggest magical thinking to be a product of an anxiety, which is linked by the feeling of being out of control in situations.

The view that magical thinking is linked to anxiety supports many other studies indicating magical thinking is present within other clinical conditions such as schizophrenia (Garcia-Montes et al., in press; Lee, et al., 2005; Sobin, Blundell, Weiller, Gauigan, Haiman & Karayiorgou, 2000; Tolin, et al., 2001), eating disorders, generalised anxiety disorder (Purdon & Clark, 2002), post traumatic stress disorder (Sica et al., 2002) and psychosis (Abramowitz et al., 2003; Rassin et al., 2001).

In summary, when faced with both controllable and uncontrollable situational threats individuals used magical thinking to neutralise the threat presented. Magical thinking was present more frequently in the low control scenarios however. Surprisingly, this empirical paper's results suggest that an individuals' symptomatology and locus of control did not play a significant part in affecting propensity to think magically, when facing an uncontrollable threat. The results do highlight an interaction between thinking magically, magical ideation and OCD symptoms in response to threats that could be dealt with by rational means. As such, magical thinking is used both by individuals with and without OCD, in threatening situations when there are high levels of anxiety present.

7.3 Methodological considerations

Manipulation of perceived threat

The aim of this empirical study was to determine if magical thinking was a function of perceived threat. The experimental procedure specifically targeted control as a variable and attempted to separate high and low perceptions of controllability in threatening situations. There was some evidence that the manipulation created accurately distinguished two distinct categories of threat. There was a significant difference between the high and low control condition in the perceived level of anxiety induced by four of the scenarios excluding scenario 1, where no difference was found. More importantly, there was a significant difference in the perceived controllability between the high and low control conditions for scenario 1 and 5.

Scenario 5 was the most successful manipulation generating the highest anxiety scores and lowest perceived controllability scores in the low control condition, and the lowest anxiety scores and highest perceived controllability scores in the high control condition. Consequently, the methodology in this research was able to draw conclusive results with regards to whether high or low controllability of threat in situations affect the propensity to think magically. As such the methodology contributes to the knowledge of magical thinking and was considered effective.

As a result of the successful manipulation of controllability in scenario 1 and 5 the data from those stories was reanalysed. The reanalysis did not find control significantly influenced the use of magical actions and there may be a number of reasons as to why this was. The use of magical actions may have been due to something other than control such as increased anxiety, due to the threatening nature of the scenarios. This hypothesis is further strengthened, as there were more consistent differences in rated anxiety from the VAS. The use of magical actions may have been due to the variable control as this hypothesis was significant in the first analysis but the significantly reduced sample size from (N=160) to (N=79) may have affected the power of the analysis. The reanalysis was also problematic due to the lack of counterbalancing of the scenarios, as both scenarios were the high control condition of that scene. As the methodology generated a significant differentiation between high and low perceived controllability in scenario 1 and 5 they can be considered useful stories and thus methodology for assessing further issues of controllability.

The duration of exposure to imaginal threat for the participants was 10 minutes. Participants were asked to make a mental representation and imagine the impact of each of the five scenarios. Rachman et al.'s (1996) 'sentence paradigm' research required participants to write the name of a loved one in the gap in the following sentence 'I hope ..... dies in a car accident' and to imagine the sentence to be real. This paradigm has been repeatedly used to analyse participants coping mechanisms in relation to their OCD symptomatology. The methodology of this study elicited similar coping mechanisms due to inducing similar threats of responsibility, however it additionally offers the opportunity to specifically analyse participants' controllability perceptions. This methodology therefore contributes to the knowledge on responsibility and threat appraisals in relation to OCD symptomatology.

An unequal number of scenarios were used in the methodology. Ten scenarios were originally designed and tested out in the pilot study and only five scenarios met the criteria for inclusion. A further reason for only having five scenarios in the methodology was to reduce the impact of habituation to the level of anxiety.

Context of the research

This research was conducted in the Psychology Department of Southampton University where certain assumptions were inevitably made regarding the function and basis of the study. The study was also advertised to participants

as a 'magical thinking' study but the researcher considered that this did not significantly allude to the function of the research. Furthermore, the nature of the research was not disclosed to the participants until after the study had been completed and as such prior knowledge of the study can be assumed to be minimal.

Gender

The percentage of females (87.5%) in the study far outweighed the percentage of males (12.5%) and as a result warrants some consideration. The literature suggests males are reported to experience less interference with their everyday function as a result of their symptomatology for OCD (Beckstein, 2001). Consequently if there were more males in the study they may not have disclosed as much discomfort or thought of as many actions to control the threat presented as the female participants did. There were significantly more females in the study however, which must be born in mind when analysing the results.

Classification of participants' responses

A strength of this study was that participants' motivations were sought in explaining their choice of coping responses. The magical actions used by participants may be considered similar to neutralising behaviours seen in OCD as they had an ameliorative function (Zucker, Craske, Barrios, & Holguin, 2002). A number of participants stated for example that they imagined loved ones in situations 'in a different positive context' and their stated motivation was 'if I imagined them with a different outcome, this would

alter the events that happened to them'. Consequently, the researcher was categorically able to conclude that participants' incentives were not to distract themselves or to give themselves a sense of reassurance; they clearly thought that they would be able to alter events in the future, by thinking a certain way. Accurate reflection of participants' reasons behind their suggested actions was a significant benefit of the methodology and reduced potential effects of experimenter bias. Furthermore, the inter-rater reliability checks strengthened the accuracy in interpreting and categorising participants' responses.

Counterbalancing scenarios

A further strength of the research was counterbalancing the sequence of the stories as it prevented participants habituating to the sense of anxiety that was generated. The experience of imagining an aversive scenario may not have evoked the distress that is comparable to the distress experienced by individuals with OCD in response to their intrusions. It could be argued however that concentrating on the unpleasant content of an intrusive thought, rather than not attending to a fleeting thought, is similar to the experience of OCD.

Underreporting magical thinking

Previous studies investigating magical thinking have highlighted reluctance in participants to report behavioural strategies that are magical in nature (Subbotsky, 2001). This reluctance may have impacted on the results of this research. This was considered when devising the methodology and as a

result confidentiality was stressed and the participants were encouraged to write as many responses however unusual they may perceive them to be. There may have been reluctance however to write actions other than their immediate first thoughts, that may have been purely practical in nature. Participants may also not have been aware of fleeting strategies that they performed in response to the experiment (de Silva, Menzies, & Shafran, 2003).

7.4 Generalising findings

Sample size

This study had limitations in that it investigated phenomena that were largely absent from the sample being studied. The frequency of magical thinking in the clinical population is quite low (Bentall, Corcoran, Howard, Blackwood, & Kinderman, 2001) and as a result it was hypothesised to be even lower for a student sample, hence the large sample size. Power calculations based on previous analogue studies (Einstein & Menzies, 2000a; Bocci, 2004) suggest that the sample size in this study was more than sufficient to demonstrate effects of the analysis.

7.6 Reliability and validity of measures

Magical ideation scale

The MIS questionnaire has been used previously and has shown significant results both in analogue samples (Einstein & Menzies, 2004a) and with individuals with OCD (Einstein & Menzies, 2004b; Thomas, 2000; Tolin et al., 2001). It must be considered when analysing the results, that some of the

items of the MIS may overlap with some OCD symptoms (e.g. item 26: 'At times I perform certain rituals to war off negative influences'). Further study is required to determine whether the MIS is an appropriate measure for studies of magical thinking, as there may be potentially confounding associations with OCD. Furthermore, most of the items on the MIS inquire about the participant's interpretation of their own personal experiences, rather than belief in the theoretical possibility of magical forms of causation. As the MIS has shown good construct validity and is reported to have internal consistency of 0.82 and 0.85 (Tolin, et al., 2001) its use in this research was considered appropriate.

Padua Inventory-Revised

The Padua Inventory (PI; Sanavio, 1988) has been documented to measure worry in addition to obsessional aspects of OCD (Burns, et al., 1996; Freeston, Ladouceur, Rheaume, Letarte, Gagnon, & Thibodeau, 1994) and as a consequence, it is difficult to determine which symptoms are related to obsessions and which to worry, because the questionnaire measures both. The PI-R was chosen to measure OCD symptomatology in this study. One benefit of using the PI-R is that it has demonstrated the strongest association with magical thinking compared with other OCD questionnaires (Einstein & Menzies, 2004a, 2004b). Additionally, the PI-R demonstrates good levels of internal consistency and test-retest reliability and convergent validity (Feske & Chambless, 2000).

Nevertheless the PI-R (Burns et al., 1996) as a single measure of OCD symptomatology is problematic. OCD is argued to be a multidimensional and heterogeneous disorder (Calamari, Weizgartz, Riemann, Cohen & Greer et al., 2004), and measures of OCD that are based on specific symptom clusters, may omit other key symptoms. This study uses the PI-R analysis, thus focusing on a single set of symptoms based on the DSM-IV criteria for OCD (APA, 1994). Identifying OCD according to DSM criteria alone is criticised for representing a heterogeneous mix of clinical phenotypes, and this is argued to account for the many positive but inconsistent findings in studies of OCD (Sobin, et al., 2000).

Furthermore, when examining the subscales of the PI-R in the post hoc analysis significant correlations were found with (1) Obsessional thoughts of harm to self and other subscale and (3) contamination, obsession and washing compulsions subscales. Despite the revision of the PI some shared variance with worry still remains (Burns et al., 1996; Wells & Papageorgiou, 1998), and the obsessional thoughts of harm to self and other subscale is one of the two content areas strongly associated with worry, the other being the checking compulsions subscale (Freeston et al., 1994). The obsessional thoughts of harm to self and other subscale shares 14% of its variance with worry, which is the greatest overlap of any of the PI-R subscales (Burns et al., 1996). Consequently, the association of magical thinking with worry might account for the correlation between higher scores on the obsessional thoughts of harm to self and other subscale of the PI-R and participants reporting more magical actions.

7.7 Clinical implications and future research

Traditional cognitive therapy targets and challenges the content of thoughts whereas individuals with magical thoughts may benefit from targeting their style of thinking. Examining the likelihood of fears in addition to looking at why individuals are making connections between events and the process of thoughts and consequences may be beneficial for individuals who think magically. In traditional cognitive therapy if an individual has the belief that 'If I think of my partner dying, I will influence their death', individuals are encouraged to examine the likelihood of their partner dying. Examining whether thinking that thought can influence whether they will die or not may be more beneficial however to an individual with magical fears.

Additionally when considering the results from this study controllability appears to be an issue driving magical aspects of OCD. Consequently, encouraging distance from patients control agenda and using acceptance-based strategies derived from Acceptance and Commitment Therapy (Hayes, 2002) may also be crucial to consider in treatment approaches with magical thinkers.

8.0 Conclusion

The main question of this paper was to assess whether magical thinking is a function of perceived threat? The results support the view that magical actions are used more frequently in low control situations. Consequently, this study offers support for magical thinking being a function of perceived threat.

Furthermore, there was only a significant correlation with OCD symptomatology in the high control condition. Thus, when there were rational or practical measures available to control the threat presented, magical thinking was more evident in individuals who scored more highly for magical ideation and OCD symptomatology. Consequently there is some evidence for the view that individuals with more obsessive-compulsive symptomatology are more prone to use magical thinking in situations of low threat and high controllability.

This study represents the first step towards developing a methodology for measuring threat; more specifically, perceived controllability and its impact upon magical thinking. The results of this empirical paper suggest magical thinking to be a function of anxiety, which is linked by the feeling of being out of control in situations. It would be useful to repeat this methodology with a clinical sample, but this raises ethical difficulties considering its aversive nature.

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APPENDICES

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Appendix A Clinical Psychology Review

Clinical Psychology Review

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List: References should be arranged first alphabetically and then further sorted chronologically if necessary. More than one reference from the same author(s) in the same year must be identified by the letters "a", "b", "c", etc., placed after the year of publication.

Examples: Reference to a journal publication: Van der Geer, J., Hanraads, J. A. J., & Lupton R. A. (2000). The art of writing a scientific article. Journal of Scientific Communications, 163, 51-59.

Reference to a book: Strunk, W., Jr., & White, E. B. (1979). The elements of style. (3rd ed.). New York: Macmillan, (Chapter 4).

Reference to a chapter in an edited book: Mettam, G. R., & Adams, L. B. (1994). How to prepare an electronic version of your article. In B. S. Jones, & R. Z. Smith (Eds.), Introduction to the electronic age (pp. 281-304). New York: E-Publishing Inc.

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Appendix Ci The Locus of Control Scale (LoC)

Locus of Control Scale

(Rotter, 1966)

Instructions: For each pair of statements, circle the one you believe is most true. There are no right or wrong answers.

1. **a.** Children get into trouble because their parents punish them too much.
   b. The trouble with most children nowadays is that their parents are too easy with them.

2. **a.** Many of the unhappy things in people's lives are partly due to bad luck.
   b. People's misfortunes result from the mistakes they make.

3. **a.** One of the major reasons we have wars is because people don't take enough interest in politics.
   b. There will always be wars, no matter how hard people try to prevent them.

4. **a.** In the long run, people get the respect they deserve in this world.
   b. Unfortunately, an individual's worth often passes unrecognized no matter how hard he or she tries.

5. **a.** The idea that teachers are unfair to students is nonsense.
   b. Most students don't realize the extent to which their grades are influenced by accidental happenings.

6. **a.** Without the right breaks one cannot be an effective leader.
   b. Capable people who fail to become leaders have not taken advantage of their opportunities.

7. **a.** No matter how hard you try, some people just don't like you.
   b. People who can't get others to like them don't understand how to get along with others.

8. **a.** Heredity plays the major role in determining one's personality.
   b. It is one's experiences in life which determine what he or she is like.

9. **a.** I have often found that what is going to happen will happen.
   b. Trusting fate has never turned out as well for me as making a decision to take a definite course of action.

10. **a.** In the case of the well-prepared student, there is rarely if ever such a thing as an unfair test.
    b. Many times exam questions tend to be so unrelated to coursework that studying is really useless.

11. **a.** Becoming a success is a matter of hard work; luck has little or nothing to do with it.
    b. Getting a good job depends mainly on being in the right place at the right time.

12. **a.** The average citizen can have an influence on government decisions.
    b. This world is run by the few people in power, and there is not much the little guy can do about it.

13. **a.** When I make plans, I am almost certain that I can make them work.
    b. It is not always wise to plan too far ahead because many things turn out to be a matter of god or bad fortune anyhow.

14. **a.** There are certain people who are just no good.
    b. There is some good in everybody.

15. **a.** In my case, getting what I want has little or nothing to do with luck.
    b. Many times we might just as well decide what to do by flipping a coin.

16. **a.** Who gets to be the boss often depends on who was lucky enough to be in the right place first.
    b. Getting people to do the right thing depends on ability; luck has little or nothing to do with it.

17. **a.** As far as world affairs are concerned, most of us are the victims of forces we can neither understand nor control.
    b. By taking an active part in political and social affairs, the people can control world events.

18. **a.** Most people don't realize the extent to which their lives are controlled by accidental happenings.
    b. There is really no such thing as luck.

19. **a.** One should always be willing to admit mistakes.
    b. It is usually best to cover up one's mistakes.

20. **a.** It is hard to know whether or not a person really likes you.
    b. How many friends you have depends on how nice a person you are.

21. **a.** In the long run, the bad things that happen to us are balanced by the good ones.
    b. Most misfortunes are the result of lack of ability, ignorance, laziness, or all three.

22. **a.** With enough effort we can wipe out political corruption.
    b. It is difficult for people to have much control over the things politicians do in office.

23. **a.** Sometimes I can't understand how teachers arrive at the grades they give.
    b. There is a direct connection between how hard I study and the grades I get.

24. **a.** A good leader expects people to decide for themselves what they should do.
    b. A good leader makes it clear to everybody what their jobs are.

25. **a.** Many times I feel that I have little influence over the things that happen to me.
    b. It is impossible for me to believe that chance or luck plays an important role in my life.

26. **a.** People are lonely because they don't try to be friendly.
    b. There's not much use in trying too hard to please people; if they like you, they like you.

27. a. There is too much emphasis on athletics in high school.
    b. Team sports are an excellent way to build character.

28. a. What happens to me is my own doing.
    b. Sometimes I feel that I don't have enough control over the direction my life is taking.

29. a. Most of the time I can't understand why politicians behave the way they do.
    b. In the long run the people are responsible for bad government on a national as well as on a local level.

Appendix Cii The Magical Ideation Scale (MIS)

M I Scale
(Eckblad & Chapman 1983)

Please read through the questions below. Give your answers to each item by placing a tick under either the 'true' or 'false' column. Do not miss out any items.

		True	False
1.	Some people can make me aware of them just by thinking about me.		
2.	I have had the momentary feeling that I might not be human.		
3.	I have sometimes been fearful of stepping on cracks on the pavement.		
4.	I think I could learn to read others' minds if I wanted to.		
5.	Horoscopes are right too often for it to be a coincidence.		
6.	Things sometimes seem to be in different places when I get home, even though no one has been there.		
7.	Numbers like 13 and 7 have no special powers.		
8.	I have occasionally had the silly feeling that a TV or radio broadcaster knew I was listening to them.		
9.	I have worried that people on other planets may be influencing what happens on earth.		
10.	The government refuses to tell us the truth about flying saucers.		
11.	I have felt that there were messages for me in the way that things were arranged.		
12.	I have never doubted that my dreams are the products of my own mind.		
13.	Good luck charms don't work		
14.	I have noticed sounds on my records that are not there at other times.		
15.	The hand motions that people make seem to influence me at times.		
16.	I almost never dream about things before they happen.		
17.	I have had the momentary feeling that someone's place has been taken by a look a-like.		
18.	It is not possible to harm others merely by thinking bad thoughts about them.		
19.	I have sometimes sensed an evil presence around me.		
20.	I sometimes have a feeling of gaining or losing energy when certain people look at me or touch me.		
21.	I have sometimes had the passing thought that strangers are in love with me.		

M I Scale (continued)

		True	False
22.	I have never had the feeling that certain thoughts of mine really belonged to someone else.		
23.	When introduced to strangers, I rarely wonder whether I have known them before.		
24.	If reincarnation were true, it would explain some unusual experiences I have had.		
25.	People often behave so strangely that one wonders if they are part of an experiment.		
26.	At times I perform certain little rituals to ward of negative influences.		
27.	I have felt that I might cause something to happen just by thinking too much about it.		
28.	I have wondered whether the spirits of the dead can influence the living.		
29.	At times I have felt that a professor's lecture was meant especially for me.		
30.	I have sometimes felt that strangers were reading my mind.		

Appendix Ciii The Padua Inventory Revised (PI-R)

The following statements refer to thoughts and behaviors which may occur to everyone in everyday life. For each statement, Choose the reply which best seems to fit you and the degree of disturbance which such thoughts or behaviors may create.

1	I feel my hands are dirty when I touch money.	Not at All	A little	Quite a Lot	A Lot	Very Much
2	I think even slight contact with bodily secretions (perspiration, saliva, urine, etc.) may contaminate my clothes or somehow harm me.	Not at All	A little	Quite a Lot	A Lot	Very Much
3	I find it difficult to touch an object when I know it has been touched by strangers or by certain people.	Not at All	A little	Quite a Lot	A Lot	Very Much
4	I find it difficult to touch garbage or dirty things.	Not at All	A little	Quite a Lot	A Lot	Very Much
5	I avoid using public toilets because I am afraid of disease and contamination.	Not at All	A little	Quite a Lot	A Lot	Very Much
6	I avoid using public telephones because I am afraid of contagion and disease.	Not at All	A little	Quite a Lot	A Lot	Very Much
7	I wash my hands more often and longer than necessary.	Not at All	A little	Quite a Lot	A Lot	Very Much
8	I sometimes have to wash or clean myself simply because I think I may be dirty or "contaminated".	Not at All	A little	Quite a Lot	A Lot	Very Much
9	If I touch something i think is "contaminated", I immediately have to wash or clean myself.	Not at All	A little	Quite a Lot	A Lot	Very Much
10	If an animal touches me, I feel dirty and immediately have to wash myself or change my clothing.	Not at All	A little	Quite a Lot	A Lot	Very Much
11	I feel obliged to follow a particular order in dressing, undressing, and washing myself.	Not at All	A little	Quite a Lot	A Lot	Very Much

12	Before going to sleep, I have to do certain things in a certain order.	Not at All	A little	Quite a Lot	A Lot	Very Much
13	Before going to bed, I have to hang up or fold my clothes in a special way.	Not at All	A little	Quite a Lot	A Lot	Very Much
14	I have to do things several times before I think they are properly done.	Not at All	A little	Quite a Lot	A Lot	Very Much
15	I tend to keep on checking things more often than necessary.	Not at All	A little	Quite a Lot	A Lot	Very Much
16	I check and recheck gas and water taps and light switches after turning them off.	Not at All	A little	Quite a Lot	A Lot	Very Much
17	I return home to check doors, windows, drawers, etc., to make sure they are properly shut.	Not at All	A little	Quite a Lot	A Lot	Very Much
18	I keep on checking forms, documents, checks, etc., in detail to make sure I have filled them in correctly.	Not at All	A little	Quite a Lot	A Lot	Very Much
19	I keep on going back to see that matches, cigarettes, etc., are properly extinguished.	Not at All	A little	Quite a Lot	A Lot	Very Much
20	When I handle money, I count and recount it several times.	Not at All	A little	Quite a Lot	A Lot	Very Much
21	I check letters carefully many times before posting them.	Not at All	A little	Quite a Lot	A Lot	Very Much
22	Sometimes I am not sure I have done things which in fact I knew I have done.	Not at All	A little	Quite a Lot	A Lot	Very Much
23	When I read, I have the impression I have missed something important and must go back and reread the passage at least two or three times.	Not at All	A little	Quite a Lot	A Lot	Very Much

24	I imagine catastrophic consequences as a result of absent-mindedness or minor errors which I make.	Not at All	A little	Quite a Lot	A Lot	Very Much
25	I think or worry at length about having hurt someone without knowing it.	Not at All	A little	Quite a Lot	A Lot	Very Much
26	When I hear about a disaster, I think it is somehow my fault.	Not at All	A little	Quite a Lot	A Lot	Very Much
27	I sometimes worry at length for no reason that I have hurt myself or have some disease.	Not at All	A little	Quite a Lot	A Lot	Very Much
28	I get upset and worried at the sight of knives, daggers, and other pointed objects.	Not at All	A little	Quite a Lot	A Lot	Very Much
29	When I hear about a suicide or a crime, I am upset for long time and find it difficult to stop thinking about it.	Not at All	A little	Quite a Lot	A Lot	Very Much
30	I invent useless worries about germs and disease.	Not at All	A little	Quite a Lot	A Lot	Very Much
31	When I look down from a bridge or a very high window, I feel an impulse to throw myself into space.	Not at All	A little	Quite a Lot	A Lot	Very Much
32	When I see a train approaching, I sometimes think I could throw myself under its wheels.	Not at All	A little	Quite a Lot	A Lot	Very Much
33	At certain moment, I am tempted to tear off my clothes in public.	Not at All	A little	Quite a Lot	A Lot	Very Much
34	While driving, I sometimes feel an impulse to drive the car into someone or something.	Not at All	A little	Quite a Lot	A Lot	Very Much
35	Seeing weapons excites me and makes me think violent thoughts.	Not at All	A little	Quite a Lot	A Lot	Very Much

36	I sometimes feel the need to break or damage things for no reason.	Not at All	A little	Quite a Lot	A Lot	Very Much
37	I sometimes have an impulse to steal other people's belongings, even if they are of no use to me.	Not at All	A little	Quite a Lot	A Lot	Very Much
38	I am sometimes almost irresistibly tempted to steal something from the supermarket.	Not at All	A little	Quite a Lot	A Lot	Very Much
39	I sometimes have an impulse to hurt defenseless children or animals.	Not at All	A little	Quite a Lot	A Lot	Very Much

Appendix D Information sheet

Appendix D **Participant Information Sheet**

Study of Magical Thinking
The University of Southampton

You are being invited to take part in a research project to investigate the role of magical thinking in anxiety. This research is being carried out as part of the Clinical Psychology Doctoral Program at the University of Southampton by Charlotte Keeling (Clinical Psychologist in training), under the supervision of Dr. Ken Gordon (Clinical Psychologist).

The study will involve you signing a consent form and filling out three questionnaires. The researcher will read five short scenarios aloud and you will be asked to write down what you would do if you were in such situations. The researchers on this project will be the only people who have access to personal information. Results from this study will not include any identifiable information.

Your participation is entirely voluntary if you would prefer not to take part, you do not have to give a reason. If you choose not to participate there will be no consequences to the credits you receive as student in the Psychology department. If you have any questions, please ask them now, or contact me Charlotte Keeling at (ckb103@soton.ac.uk).

Appendix E Statement of consent form

Appendix E Statement of Consent

I ..... [Participants name]
have read the above informed consent form.

I understand that I may withdraw my consent and discontinue participation at any time without penalty or loss of benefit to myself. I understand that the scenarios that will be presented to me will be distressing. I understand that data collected as part of this research project will be treated confidentially, and that published results of this research project will maintain my confidentially. In signing this consent letter, I am not waiving my legal claims, rights, or remedies. A copy of this consent letter will be offered to me.

I give consent to participate in the above study. Yes / No

(Circle Yes or No)

Signature_____ Date _____

Name _____ [Participant name]
I understand that if I have any questions about my rights as a participant in this research or if I feel that I have been placed at risk, I can contact the Chair of the Ethics Committee, Department of Psychology, University of Southampton, Southampton, SO17 1BJ. Telephone: (023) 859 3995.

Appendix F Instruction script

Appendix F Researchers instruction script

Thank you for participating in this experiment. I would like to remind you that your participation is completely voluntary and you may withdraw from this experiment at any time. This will not affect you being awarded credits for taking part. If you decide to stop please will you sit and wait for the others to finish so as not to disturb them. I am going to read out a set of instructions and would appreciate it if you would listen as closely as possible.

In front of you there are 3 separate piles of information. The first pile contains an information sheet, a consent form and a debriefing statement. The second pile contains a booklet entitled 'response sheet'. The third pile contains three questionnaires. I would like you all to sign the consent form in the first pile of information and to fill in the details required on the front sheet of the response sheet, which is in the second pile of information.

To start with I want you all to try to relax. Close your eyes if you wish (pause 10 seconds).Now you are feeling relaxed I would like you to turn the first page only over on the response sheet and to fill in the question on the first page (10 second pause).

I am now going to read five short scenarios to you. Each scenario is written on 2 separate sheets of your response booklet, should you like to read them through, after I have read them to you. [demonstrate the 2 pages]. The purpose of this experiment is for you to imagine the scenarios that are being read to you are as real as possible. I will ask you to think of someone you know and to write their names into the scenarios in the response booklet provided. Imagining that the scenario is happening to someone you know will help the scenarios appear more real. I would also prefer you to close your eyes to help you to imagine the situations. After I have read each short scenario aloud I will give you approximately 4 minutes to write down in the space provided what you would do, think or say to put your mind at rest in response to the situation that was read aloud.

I must stress that anything that you would do or say as a result of the scenarios, however strange or obscure is very important to include as I would like as full a response as possible. The scenarios will have an element of risk in them and people sometimes find that in risky situations they have an impulse that seems superstitious, but may seem reassuring to them. At the same time people often use practical ways of managing risk. This research is interested in looking at both ways. Try to use all of the time provided to describe in full what you might do, say, imagine or think to put your mind at rest in such situations. Does anyone have any questions before we start?
An example of a scenario and a range of responses will now be read aloud.

Christmas Shopping
Imagine that you are going to London on the tube to do some Christmas shopping. You are aware that there are pick pockets hoping to steal wallets and purses and so you have taken the precaution to secure your money in

your front right jean pocket. You have been careful to secure your money back into your front right jean pocket, after every purchase. You have enjoyed your day in London and have some shopping bags with you. Whilst walking back to your train you over hear someone telling their friend that they have had their purse stolen from their bag. You feel anxious that the same thing could happen to you.

Please list everything that you might try to do, or imagine, or say to yourself to put your mind at ease in such a situation. Then in the second column, please write the purpose of it (how it would help).

What I'd do, or imagine, or say to myself to put my mind at ease in such a situation.....	How I feel it could help
1. I may feel the pocket of my jeans to check that my money was still there.	1. This would reassure me that my money was still there.
2. I may say to myself that I have been careful with my money and I know that no-one could get to it in my front, right hand side pocket.	2. This would stop me worrying about my money
3. I may not stand so close to people.	3. This would prevent anyone trying to steal money from me
4. I may keep saying to myself in my head that my money is safe and pickpockets won't target me	4. This would help me to think more positively.
5. I may look people directly in the face and attempt to appear confident in my gait	5. This may help me to appear more confident and may put thieves off targeting me.

You may now turn over one page and read through the scenario that I have just read aloud (wait 4 mins)

****

Now I will go on to read the five scenarios in turn. Close your eyes and try to imagine the scenes as vividly as possible. Then I will tell you when you can turn over the sheets to fill in your responses.

Read Scenarios

Appendix G Response booklet – High control start

Appendix G Response Sheet

H.C. start

Date of Birth:

Gender:

Date:

Please listen carefully to the instructions and be careful not to turn more than one page over at a time,
and do not turn over the pages until you are instructed to do so.

I would rate my current level of anxiety as:.....%

0
(not at all anxious)

100
(very anxious)

DO NOT TURN THE PAGE OVER UNTIL INSTRUCTED TO DO SO

Christmas Shopping

Imagine that you are going to London on the tube to do some Christmas shopping. You are aware that there are pick pockets hoping to steal wallets and purses and so you have taken the precaution to secure your money in your front right jean pocket. You have been careful to secure your money back into your front right jean pocket after every purchase. You have enjoyed your day in London and have some shopping bags with you. Whilst walking back to your train you over hear someone telling their friend that they have had their purse stolen from their bag. You feel anxious that the same thing could happen to you.

Please list everything that you might try to do, or imagine, or say to yourself to put your mind at ease in such a situation. Then in the second column, please write the purpose of your actions (how it would help).

What I'd do, or imagine, or say to myself to put my mind at ease in such a situation	How I feel it could help.....
1. I may feel the pocket of my jeans to check that my money was still there.	1. This would reassure me that my money was still there.
2. I may say to myself that I have been careful with my money and I know that no-one could get to it in my front, right hand side pocket.	2. This would stop me worrying about my money
3. I may not stand so close to people.	3. This would prevent anyone trying to steal money from me
4. I may keep saying to myself in my head that my money is safe and pickpockets won't target me	4. This would help me to think more positively.
5. I may look people directly in the face and attempt to appear confident in my gait	5. This may help me to appear more confident and may put thieves off targeting me.

DO NOT TURN THE PAGE OVER UNTIL INSTRUCTED TO DO SO

1. H.C.

Imagine that you have heard from a relative that there is a fantastic job being advertised in West London. Your best friend is desperate for a job and it sounds to be just what they are looking for and you recommend that they apply for it. The job would require your friend to travel through Kings Cross Tube Station in London. [*Please write the name of your best friend in the space provided below, as it will help you to fully imagine the scenario]*

Best Friend.....

You feel that the job would suit your best friend as it is very well paid, however they are not keen and you really have to persuade them to go to the interview. After much discussion your best friend says that they will be scared, as they will have to travel during rush hour, on the tube station. They remind you that Kings Cross is where the terrorists last attacked and killed numerous people. They tell you that they feel frightened about travelling on the tube station and have spent the entire night thinking of ways to keep themselves safe, if anything did happen.
You reassure them as you feel that they are always worrying about the worst possible scenario. You tell them that there is no chance that another terrorist attack would happen the day they travel to their job interview.
The next day, your best friend phones you from their mobile on the way to the interview, at 8.50am. You are also on a tube going to work and are 15 minutes away from Kings Cross Tube Station. Your phone starts to beep as it is loosing power. Your best friend tells you that they can see a rucksack on the tube station, approximately 10 metres away from them and that there is no-one stood with it. Your best friend suddenly shouts 'Oh my God!' you hear an almighty screeching sound and a lady screaming and then your mobile phone goes dead.....

Please list everything that you might try to do, or imagine, or say to yourself to put your mind at ease in such a situation. Then in the second column, please write the purpose of your actions (how it would help).

What I'd do, or imagine, or say to myself to put my mind at ease in such a situation	How I feel my actions could help .....
1. 2.	1. 2.

3.	3.
4.	4.
5.	5.

How anxious would this situation make you feel if it was happening right now?

0
(not at all anxious)

100
(very anxious)

How much do you feel that you could control or influence what happened in the situation?

0
(no control)

100
(lots of control)

DO NOT TURN THE PAGE OVER UNTIL INSTRUCTED TO DO SO

2. L.C.

Imagine that two of your best friends decide to go for a night out and intend to go to some pubs and a club. *[Please write the names of your best friends below, as it will help you to fully imagine the scenario]*

First Best Friend .....

Second Best Friend .....

You decide not to go as you are not feeling very well and tell them that you want to watch a movie at home instead.
At 2am one of your friends phones you in a drunken and distressed state. She tells you that she has lost her other friend and has no money and that she doesn't feel safe enough to walk home on her own. You were asleep when she phoned and still feel tired and want to stay in bed. You advise her that she will be fine to walk home on her own, as she has done it many times before. She tells you that she now feels reassured and glad that she phoned you as perhaps she was worrying about nothing. She then tells you that she will walk home and will phone you when she gets in.
When the phone goes again and you were nearly nodding off as it has been quite a while since her last call. Your best friend tells you that she and has noticed that a man has been following her for 10 minutes. She tells you that she has tried to lose him down some dark streets, but is now completely lost and very scared. She sounds terrified and you instantly feel guilty and sick. She tells you that she is worried what might happen and stresses again that the man is definitely following her.....suddenly the phone goes dead .....

Please list everything that you might try to do, or imagine, or say to yourself to put your mind at ease in such a situation. Then in the second column, please write the purpose of it (how it would help). Please continue over the next page.

What I'd do, or imagine, or say to myself to put my mind at ease in such a situation.....	How I feel my actions could help.....
1.	1.
2.	2.

3. 4. 5.	3.

How anxious would this situation make you feel if it was happening right now?

0
(not at all anxious)

100
(very anxious)

How much do you feel that you could control or influence what happened in the situation?

0
(no control)

100
(lots of control)

DO NOT TURN THE PAGE OVER UNTIL INSTRUCTED TO DO SO

3. H.C

Imagine that a young child in your family is walking with their relative down a busy street. *[Once you have a clear image of who they are and what their names are I want you to write their names in the space provided below as it will help you to fully imagine the scenario]*

Young Child .....

Relative.....

Now try to re-create this scene in your mind as vividly as you can.....As you see your relative, you are walking towards them, on the same side of the street. They don't see you at first, and your relative looks preoccupied. You find yourself starting to imagine that the relative could fail to notice if the child were to run off in front of her. You start thinking of how vulnerable she is, and how easily something bad could happen. As these thoughts go through your mind, you start to have the sense that the young child is actually going to run off. You spot some broken glass on the street in front of the young child. It would be so easy for her to fall into it. It feels as if something bad will happen unless you do something to stop it. Suddenly, the child looks up at you and waves and start to run, but she isn't looking where she is going, and the glass is just in front of her.

Please list everything that you might try to do, or imagine, or say to yourself to put your mind at ease in such a situation. Then in the second column, please write the purpose of it (how it would help). Please continue over the next page.

What I'd do, or imagine, or say to myself to put my mind at ease in such a situation.....	How I feel my actions could help.....
1.	1.
2.	2.
3.	3.

4.	4.
5.	5.

How anxious would this situation make you feel if it was happening right now?

0
(not at all anxious)

100
(very anxious)

How much do you feel that you could control or influence what happened in the situation?

0
(no control)

100
(lots of control)

DO NOT TURN THE PAGE OVER UNTIL INSTRUCTED TO DO SO

4. L.C

Imagine someone you love goes away on holiday for a week to Cyprus.
[Please write the names of someone you love below, as it will help you to fully imagine the scenario]

Someone you love. .....

Whilst they are in Cyprus, you have 2 vivid nightmares the first on a Monday night and the second on the Tuesday night. The nightmares involve the person you love deciding to hire a moped on Friday night. When they take the moped out, in your nightmare, they have an accident and the brakes fail to work. The moped skids for 4 seconds and then collides with 4 young girls who are walking down the street. In your nightmare your loved one sustains fatal injuries and dies. The image that you remember is of them is lying uncomfortably, in a pool of blood. Your loved one also injures one of the teenage girls and you remember the image of her being unconscious with lots of blood splattered on her clothing. You felt that the nightmare was very real and are left with a sense of dread and foreboding.
Your loved one has not taken their mobile phone to Cyprus and you cannot remember where they are staying. It is Friday morning and your nightmares indicated that the event was supposed to happen tonight.

Please list everything that you might try to do, or imagine, or say to yourself to put your mind at ease in such a situation. Then in the second column, please write the purpose of it (how it would help). Please continue over the next page.

What I'd do, or imagine, or say to myself to put my mind at ease in such a situation.....	How I feel my actions could help.....
1. 2. 3.	

4.	
5.	

How anxious would this situation make you feel if it was happening right now?

0
(not at all anxious)

100
(very anxious)

How much do you feel that you could control or influence what happened in the situation?

0
(no control)

100
(lots of control)

DO NOT TURN THE PAGE OVER UNTIL INSTRUCTED TO DO SO

5. H.C.

In the news, you hear that a prowler has been breaking in to houses through windows and physically and sexually attacking young women in your area. You visit your best female friend, who also lives in the area, for dinner and a movie one evening.
[Please write the names of your best female friends below, as it will help you to fully imagine the scenario]

Best Female Friend .....

As you drive home you realise that you left the bathroom window open in her house, when you went to the toilet. You begin to panic as she told you that she always keeps it closed as she thinks it would be easy for someone to get in through there and attack her at night. You start to worry as she may have gone to bed without checking and securing it, as she never opens it herself. You also remember her telling you that she worries that prowlers could easily get through her window, and could attack her. As she had had some wine that night you imagine that she went straight to bed, as she was quite drunk. The image of the open window keeps recurring in your mind and you think that if someone did break in she would not be able to defend herself, as she was so drunk.
When you reach home there is no reply when you try to phone her. You do have a spare key to her house, but it would take 45 minutes to drive back to her house.

Please list everything that you might try to do, or imagine, or say to yourself to put your mind at ease in such a situation. Then in the second column, please write the purpose of it (how it would help). Please continue over the next page.

What I'd do, or imagine, or say to myself to put my mind at ease in such a situation.....	How I feel my actions could help.....
1. 2. 3.	

4.	
5.	

How anxious would this situation make you feel if it was happening right now?

0
(not at all anxious)

100
(very anxious)

How much do you feel that you could control or influence what happened in the situation?

0
(no control)

100
(lots of control)

THIS IS THE END OF THE EXPERIMENT
PLEASE CAN YOU FILL IN THE QUESTIONNAIRES
THAT ARE ON THE TABLE INFRONT OF YOU
AND THEN YOU MAY LEAVE

THANK YOU VERY MUCH FOR TAKING PART

Appendix H Response booklet – Low control start

Appendix H Response Sheet

L.C. start

Date of Birth:.....

Gender:.....

Date:.....

Please listen carefully to the instructions and be careful not to turn more than one page over at a time, and do not turn over the pages until you are instructed to do so.

I would rate my current level of anxiety as:.....%

0
(not at all anxious)

100
(very anxious)

DO NOT TURN THE PAGE OVER UNTIL INSTRUCTED TO DO SO

Christmas Shopping

Imagine that you are going to London on the tube to do some Christmas shopping. You are aware that there are pick pockets hoping to steal wallets and purses and so you have taken the precaution to secure your money in your front right jean pocket. You have been careful to secure your money back into your front right jean pocket after every purchase. You have enjoyed your day in London and have some shopping bags with you. Whilst walking back to your train you over hear someone telling their friend that they have had their purse stolen from their bag. You feel anxious that the same thing could happen to you.

Please list everything that you might try to do, or imagine, or say to yourself to put your mind at ease in such a situation. Then in the second column, please write the purpose of it (how it would help).

What I'd do, or imagine, or say to myself to put my mind at ease in such a situation.....	How I feel my actions could help.....
1. I may feel the pocket of my jeans to check that my money was still there.	1. This would reassure me that my money was still there.
2. I may say to myself that I have been careful with my money and I know that no-one could get to it in my front, right hand side pocket.	2. This would stop me worrying about my money
3. I may not stand so close to people.	3. This would prevent anyone trying to steal money from me
4. I may keep saying to myself in my head that my money is safe and pickpockets won't target me	4. This would help me to think more positively.
5. I may look people directly in the face and attempt to appear confident in my gait	5. This may help me to appear more confident and may put thieves off targeting me.

DO NOT TURN THE PAGE OVER UNTIL INSTRUCTED TO DO SO

5. L.C.

In the news, you hear that a prowler has been breaking in to houses through windows and physically and sexually attacking young women in your area. You visit your best female friend, who also lives in the area, for dinner and a movie one evening.
[Please write the names of your best female friends below, as it will help you to fully imagine the scenario]

Best Female Friend .....

As you drive home you realise that you left the bathroom window open in her house, when you went to the toilet. You begin to panic as she told you that she always keeps it closed, as she thinks it would be easy for someone to get in through there and attack her at night. You start to worry as she may have gone to bed without checking and securing it, as she never opens it herself. You also remember her telling you that she worries that prowlers could easily get through her window, and could attack her. As she had had some wine that night you imagine that she went straight to bed, as she was quite drunk. The image of the open window keeps recurring in your mind and you think that if someone did break in, she would not be able to defend herself, as she was so drunk.
On the way home your car stops and you realise that you have run out of petrol. You are 40 minutes from your friend house and from your house. You also realise that you left your mobile at your friends' house and so cannot call her to warn her.

Please list everything that you might try to do, or imagine, or say to yourself to put your mind at ease in such a situation. Then in the second column, please write the purpose of it (how it would help). Please continue over the next page.

What I'd do, or imagine, or say to myself to put my mind at ease in such a situation.....	How I feel my actions could help.....
1.	
2.	
3.	

4.	
5.	

How anxious would this situation make you feel if it was happening right now?

0
(not at all anxious)

100
(very anxious)

How much do you feel that you could control or influence what happened in the situation?

0
(no control)

100
(lots of control)

DO NOT TURN THE PAGE OVER UNTIL INSTRUCTED TO DO SO

4. H.C

Imagine someone you love goes away on holiday for a week to Cyprus.
[Please write the names of someone you love below, as it will help you to fully imagine the scenario]

Someone you love. .....

Whilst they are in Cyprus, you have 2 vivid nightmares, the first on a Monday night and the second on the Tuesday night. The nightmares involve the person you love deciding to hire a moped on Friday night. When they take the moped out, in your nightmare, they have an accident and the brakes fail to work. The moped skids for 4 seconds and then collides with 4 young girls who are walking down the street. In your nightmare, your loved one sustains fatal injuries and dies. The image that you remember is of them is lying uncomfortably, in a pool of blood. Your loved one also injures one of the teenage girls and you remember the image of her being unconscious with lots of blood splattered on her clothing. You felt that the nightmare was very real and are left with a sense of dread and foreboding.
Your loved one has taken their mobile phone to Cyprus, you try to phone and text them but there is no signal. It is Friday morning and your nightmares indicated that the event was supposed to happen tonight.

Please list everything that you might try to do, or imagine, or say to yourself to put your mind at ease in such a situation. Then in the second column, please write the purpose of it (how it would help). Please continue over the next page.

What I'd do, or imagine, or say to myself to put my mind at ease in such a situation.....	How I feel my actions could help.....
1.	
2.	
3.	

4.	
5.	

How anxious would this situation make you feel if it was happening right now?

0
(not at all anxious)

100
(very anxious)

How much do you feel that you could control or influence what happened in the situation?

0
(no control)

100
(lots of control)

DO NOT TURN THE PAGE OVER UNTIL INSTRUCTED TO DO SO

3. L.C

Imagine that a young child in your family is walking with their relative down a busy street. *[Once you have a clear image of who they are and what their names are I want you to write their names in the space provided below as it will help you to fully imagine the scenario]*

Young Child .....

Relative.....

Now try to re-create this scene in your mind as vividly as you can.....As you see your relative, you are walking on the other side of the street to them, and the traffic between you is heavy and loud. They don't see you at first, and your relative looks preoccupied. You find yourself starting to imagine that the relative could fail to notice if the child were to run off in front of her. You start thinking of how vulnerable she is, and how easily something bad could happen. As these thoughts go through your mind, you start to have the sense that the young child is actually going to run off. You spot some broken glass on the street, in front of the young child. It would be so easy for her to fall into it. It feels as if something bad will happen unless you do something to stop it. Suddenly, the child looks over at you and waves and starts to run, but she isn't looking where she is going, and the glass is just in front of her.

Please list everything that you might try to do, or imagine, or say to yourself to put your mind at ease in such a situation. Then in the second column, please write the purpose of it (how it would help). Please continue over the next page.

What I'd do, or imagine, or say to myself to put my mind at ease in such a situation.....	How I feel my actions could help.....
1.	
2.	
3.	

4.	
5.	

How anxious would this situation make you feel if it was happening right now?

0
(not at all anxious)

100
(very anxious)

How much do you feel that you could control or influence what happened in the situation?

0
(no control)

100
(lots of control)

DO NOT TURN THE PAGE OVER UNTIL INSTRUCTED TO DO SO

2. H.C.

Imagine that two of your best friends decide to go for a night out and intend to go to some pubs and a club. *[Please write the names of your best friends below, as it will help you to fully imagine the scenario]*

First Best Friend .....

Second Best Friend .....

You decide not to go, as you are not feeling very well, and you tell them that you want to watch a movie at home instead.
At 2am one of your friends phones you in a drunken and distressed state. She tells you that she has lost her other friend and has no money and doesn't feel safe enough to walk home on her own. You were asleep when she phoned and still feel tired and want to stay in bed. You advise her that she will be fine to walk home on her own, as she has done it many times before. She tells you that she now feels reassured and glad that she phoned you, as perhaps she was worrying about nothing. She tells you that she will walk home will phone you when she gets in.
When the phone goes again you were nearly nodding off as it has been quite a while since her last call. Your best friend tells you that she and has noticed that a man has been following her for 10 minutes. She tells you that she has tried to lose him down some dark streets, but is now completely lost and very scared. She tells you that the last street name that she remembers was 'Fisherman Street', but that she has no idea where that was and that there is no one around. She sounds terrified and you instantly feel guilty and sick. She tells you that she is worried what might happen and stresses again that the man is definitely following her.....suddenly the phone goes dead .....

Please list everything that you might try to do, or imagine, or say to yourself to put your mind at ease in such a situation. Then in the second column, please write the purpose of it (how it would help). Please continue over the next page.

What I'd do, or imagine, or say to myself to put my mind at ease in such a situation.....	How I feel my actions could help.....
1. 2.	

3.	
4.	
5.	

How anxious would this situation make you feel if it was happening right now?

0
(not at all anxious)

100
(very anxious)

How much do you feel that you could control or influence what happened in the situation?

0
(no control)

100
(lots of control)

DO NOT TURN THE PAGE OVER UNTIL INSTRUCTED TO DO SO

1. L.C.

Imagine that you have heard from a relative that there is a fantastic job being advertised in West London. Your best friend is desperate for a job and it sounds to be just what they are looking for and you recommend that they apply for it. The job would require your friend to travel through Kings Cross Tube Station in London. [*Please write the name of your best friend in the space provided below, as it will help you to fully imagine the scenario]*

Best Friend.....

You feel that the job would suit your best friend as it is very well paid however they are not keen and you really have to persuade them to go to the interview. After much discussion your best friend says that they will be scared, as they will have to travel during rush hour on the tube station. They remind you that Kings Cross is where the terrorists last attacked and killed numerous people. They tell you that they feel frightened about travelling on the tube station and have spent the entire night thinking of ways to keep themselves safe, if anything did happen.
You reassure them as you feel that they are always worrying about the worst possible scenario. You tell them that there is no chance that another terrorist attack would happen the day they travel to their job interview.
The next day, your best friend phones you at home, from their mobile on the way to the interview, at 8.50am. Your best friend tells you that they can see a rucksack on the Kings Cross tube station, approximately 10 metres away from them and that there is no-one stood with it. Your best friend suddenly shouts 'Oh my God!' you hear an almighty screeching sound and a lady screaming and then your home telephone goes dead.....

Please list everything that you might try to do, or imagine, or say to yourself to put your mind at ease in such a situation. Then in the second column, please write the purpose of it (how it would help). Please continue over the next page.

What I'd do, or imagine, or say to myself to put my mind at ease in such a situation.....	How I feel my actions could help.....
1. 2.	

3.	
4.	
5.	

How anxious would this situation make you feel if it was happening right now?

0
(not at all anxious)

100
(very anxious)

How much do you feel that you could control or influence what happened in the situation?

0
(no control)

100
(lots of control)

THIS IS THE END OF THE EXPERIMENT
PLEASE CAN YOU FILL IN THE QUESTIONNAIRES
THAT ARE ON THE TABLE INFRONT OF YOU
AND THEN YOU MAY LEAVE

THANK YOU VERY MUCH FOR TAKING PART

Appendix I Five scenarios high and low control

Appendix I Five scenarios, both high and low control

Scenario 1 (high threat control)
Imagine that you have heard from a relative that there is a fantastic job being advertised in West London. Your best friend is desperate for a job and it sounds to be just what they are looking for and you recommend that they apply for it. The job would require your friend to travel through Kings Cross Tube Station in London. [*Please write the name of your best friend in the space provided below, as it will help you to fully imagine the scenario]*

Best Friend.....

You feel that the job would suit your best friend as it is very well paid, however they are not keen and you really have to persuade them to go to the interview. After much discussion your best friend says that they will be scared, as they will have to travel during rush hour, on the tube station. They remind you that Kings Cross is where the terrorists last attacked and killed numerous people. They tell you that they feel frightened about travelling on the tube station and have spent the entire night thinking of ways to keep themselves safe, if anything did happen.
You reassure them as you feel that they are always worrying about the worst possible scenario. You tell them that there is no chance that another terrorist attack would happen the day they travel to their job interview.
The next day, your best friend phones you from their mobile on the way to the interview, at 8.50am. You are also on a tube going to work and are 15 minutes away from Kings Cross Tube Station. Your phone starts to beep as it is loosing power. Your best friend tells you that they can see a rucksack on the tube station, approximately 10 metres away from them and that there is no-one stood with it. Your best friend suddenly shouts 'Oh my God!' you hear an almighty screeching sound and a lady screaming and then your mobile phone goes dead.....

Scenario 1 (low threat control)
Imagine that you have heard from a relative that there is a fantastic job being advertised in West London. Your best friend is desperate for a job and it sounds to be just what they are looking for and you recommend that they apply for it. The job would require your friend to travel through Kings Cross Tube Station in London. [*Please write the name of your best friend in the space provided below, as it will help you to fully imagine the scenario]*

Best Friend.....

You feel that the job would suit your best friend as it is very well paid however they are not keen and you really have to persuade them to go to the interview. After much discussion your best friend says that they will be scared, as they will have to travel during rush hour on the tube station. They remind you that Kings Cross is where the terrorists last attacked and killed numerous people. They tell you that they feel frightened about travelling on the tube station and

have spent the entire night thinking of ways to keep themselves safe, if anything did happen.
You reassure them as you feel that they are always worrying about the worst possible scenario. You tell them that there is no chance that another terrorist attack would happen the day they travel to their job interview.
The next day, your best friend phones you at home, from their mobile on the way to the interview, at 8.50am. Your best friend tells you that they can see a rucksack on the Kings Cross tube station, approximately 10 metres away from them and that there is no-one stood with it. Your best friend suddenly shouts 'Oh my God!' you hear an almighty screeching sound and a lady screaming and then your home telephone goes dead.....

Scenario 2 (high threat control)
Imagine that two of your best friends decide to go for a night out and intend to go to some pubs and a club. *[Please write the names of your best friends below, as it will help you to fully imagine the scenario]*

First Best Friend .....

Second Best Friend .....

You decide not to go, as you are not feeling very well, and you tell them that you want to watch a movie at home instead.
At 2am one of your friends phones you in a drunken and distressed state. She tells you that she has lost her other friend and has no money and doesn't feel safe enough to walk home on her own. You were asleep when she phoned and still feel tired and want to stay in bed. You advise her that she will be fine to walk home on her own, as she has done it many times before. She tells you that she now feels reassured and glad that she phoned you, as perhaps she was worrying about nothing. She tells you that she will walk home will phone you when she gets in.
When the phone goes again you were nearly nodding off as it has been quite a while since her last call. Your best friend tells you that she and has noticed that a man has been following her for 10 minutes. She tells you that she has tried to lose him down some dark streets, but is now completely lost and very scared. She tells you that the last street name that she remembers was 'Fisherman Street', but that she has no idea where that was and that there is no one around. She sounds terrified and you instantly feel guilty and sick. She tells you that she is worried what might happen and stresses again that the man is definitely following her.....suddenly the phone goes dead .....

Scenario 2 (Low threat control)
Imagine that two of your best friends decide to go for a night out and intend to go to some pubs and a club. *[Please write the names of your best friends below, as it will help you to fully imagine the scenario]*

First Best Friend .....

Second Best Friend .....

You decide not to go as you are not feeling very well and tell them that you want to watch a movie at home instead.
At 2am one of your friends phones you in a drunken and distressed state. She tells you that she has lost her other friend and has no money and that she doesn't feel safe enough to walk home on her own. You were asleep when she phoned and still feel tired and want to stay in bed. You advise her that she will be fine to walk home on her own, as she has done it many times before. She tells you that she now feels reassured and glad that she phoned you as perhaps she was worrying about nothing. She then tells you that she will walk home and will phone you when she gets in.
When the phone goes again and you were nearly nodding off as it has been quite a while since her last call. Your best friend tells you that she and has noticed that a man has been following her for 10 minutes. She tells you that she has tried to lose him down some dark streets, but is now completely lost and very scared. She sounds terrified and you instantly feel guilty and sick. She tells you that she is worried what might happen and stresses again that the man is definitely following her.....suddenly the phone goes dead .....

Scenario 3 (High threat control)
Imagine that a young child in your family is walking with their relative down a busy street. *[Once you have a clear image of who they are and what their names are I want you to write their names in the space provided below as it will help you to fully imagine the scenario]*

Young Child .....

Relative.....

Now try to re-create this scene in your mind as vividly as you can.....As you see your relative, you are walking towards them, on the same side of the street. They don't see you at first, and your relative looks preoccupied. You find yourself starting to imagine that the relative could fail to notice if the child were to run off in front of her. You start thinking of how vulnerable she is, and how easily something bad could happen. As these thoughts go through your mind, you start to have the sense that the young child is actually going to run off. You spot some broken glass on the street in front of the young child. It would be so easy for her to fall into it. It feels as if something bad will happen unless you do something to stop it. Suddenly, the child looks up at you and waves and start to run, but she isn't looking where she is going, and the glass is just in front of her.

Scenario 3 (Low threat control)
Imagine that a young child in your family is walking with their relative down a busy street. *[Once you have a clear image of who they are and what their names are I want you to write their names in the space provided below as it will help you to fully imagine the scenario]*

Young Child .....

Relative.....

Now try to re-create this scene in your mind as vividly as you can.....As you see your relative, you are walking on the other side of the street to them, and the traffic between you is heavy and loud. They don't see you at first, and your relative looks preoccupied. You find yourself starting to imagine that the relative could fail to notice if the child were to run off in front of her. You start thinking of how vulnerable she is, and how easily something bad could happen. As these thoughts go through your mind, you start to have the sense that the young child is actually going to run off. You spot some broken glass on the street, in front of the young child. It would be so easy for her to fall into it. It feels as if something bad will happen unless you do something to stop it. Suddenly, the child looks over at you and waves and starts to run, but she isn't looking where she is going, and the glass is just in front of her.

Scenario 4 (High threat control)
Imagine someone you love goes away on holiday for a week to Cyprus.
[Please write the names of someone you love below, as it will help you to fully imagine the scenario]

Someone you love. .....

Whilst they are in Cyprus, you have 2 vivid nightmares, the first on a Monday night and the second on the Tuesday night. The nightmares involve the person you love deciding to hire a moped on Friday night. When they take the moped out, in your nightmare, they have an accident and the brakes fail to work. The moped skids for 4 seconds and then collides with 4 young girls who are walking down the street. In your nightmare, your loved one sustains fatal injuries and dies. The image that you remember is of them is lying uncomfortably, in a pool of blood. Your loved one also injures one of the teenage girls and you remember the image of her being unconscious with lots of blood splattered on her clothing. You felt that the nightmare was very real and are left with a sense of dread and foreboding.
Your loved one has taken their mobile phone to Cyprus, you try to phone and text them but there is no signal. It is Friday morning and your nightmares indicated that the event was supposed to happen tonight.

Scenario 4 (Low threat control)
Imagine someone you love goes away on holiday for a week to Cyprus.
[Please write the names of someone you love below, as it will help you to fully imagine the scenario]

Someone you love. .....

Whilst they are in Cyprus, you have 2 vivid nightmares the first on a Monday night and the second on the Tuesday night. The nightmares involve the person you love deciding to hire a moped on Friday night. When they take the moped out, in your nightmare, they have an accident and the brakes fail to work. The moped skids for 4 seconds and then collides with 4 young girls who are walking down the street. In your nightmare your loved one sustains fatal injuries and dies. The image that you remember is of them is lying uncomfortably, in a pool of blood. Your loved one also injures one of the teenage girls and you remember the image of her being unconscious with lots of blood splattered on her clothing. You felt that the nightmare was very real and are left with a sense of dread and foreboding.
Your loved one has not taken their mobile phone to Cyprus and you cannot remember where they are staying. It is Friday morning and your nightmares indicated that the event was supposed to happen tonight.

Scenario 5 (High threat control)
In the news, you hear that a prowler has been breaking in to houses through windows and physically and sexually attacking young women in your area. You visit your best female friend, who also lives in the area, for dinner and a movie one evening.
[Please write the names of your best female friends below, as it will help you to fully imagine the scenario]

Best Female Friend .....

As you drive home you realise that you left the bathroom window open in her house, when you went to the toilet. You begin to panic as she told you that she always keeps it closed as she thinks it would be easy for someone to get in through there and attack her at night. You start to worry as she may have gone to bed without checking and securing it, as she never opens it herself. You also remember her telling you that she worries that prowlers could easily get through her window, and could attack her. As she had had some wine that night you imagine that she went straight to bed, as she was quite drunk. The image of the open window keeps recurring in your mind and you think that if someone did break in she would not be able to defend herself, as she was so drunk.
When you reach home there is no reply when you try to phone her. You do have a spare key to her house, but it would take 45 minutes to drive back to her house.

Scenario 5 (Low threat control)
In the news, you hear that a prowler has been breaking in to houses through windows and physically and sexually attacking young women in your area. You visit your best female friend, who also lives in the area, for dinner and a movie one evening.
[Please write the names of your best female friends below, as it will help you to fully imagine the scenario]

Best Female Friend .....

As you drive home you realise that you left the bathroom window open in her house, when you went to the toilet. You begin to panic as she told you that she always keeps it closed, as she thinks it would be easy for someone to get in through there and attack her at night. You start to worry as she may have gone to bed without checking and securing it, as she never opens it herself. You also remember her telling you that she worries that prowlers could easily get through her window, and could attack her. As she had had some wine that night you imagine that she went straight to bed, as she was quite drunk. The image of the open window keeps recurring in your mind and you think that if someone did break in, she would not be able to defend herself, as she was so drunk.

On the way home your car stops and you realise that you have run out of petrol. You are 40 minutes from your friend house and from your house. You also realise that you left your mobile at your friends' house and so cannot call her to warn her.

Appendix J Bar charts of frequency of actions used by participants

Appendix J: Bar charts of strategies used in response to the 5 scenarios

Figure 7: Bar chart of strategies used in response to Scenario 1, high and low control

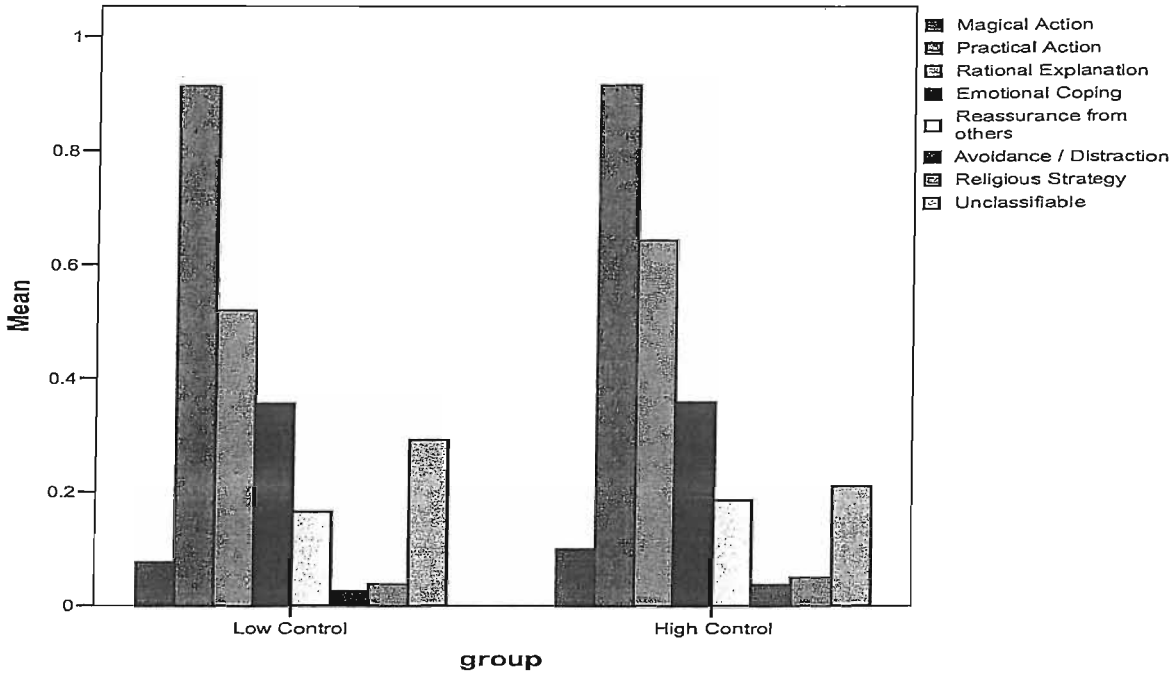


Figure 8: Bar chart of strategies used in response to Scenario 2, high and low control

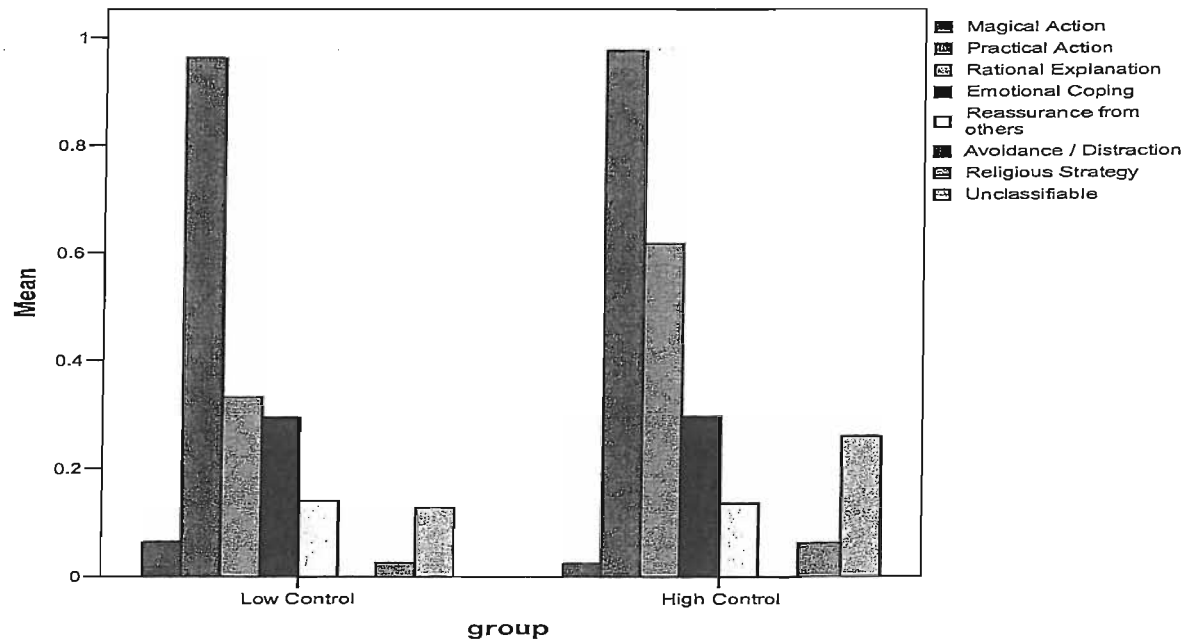


Figure 9: Bar chart of strategies used in response to Scenario 3, high and Low control

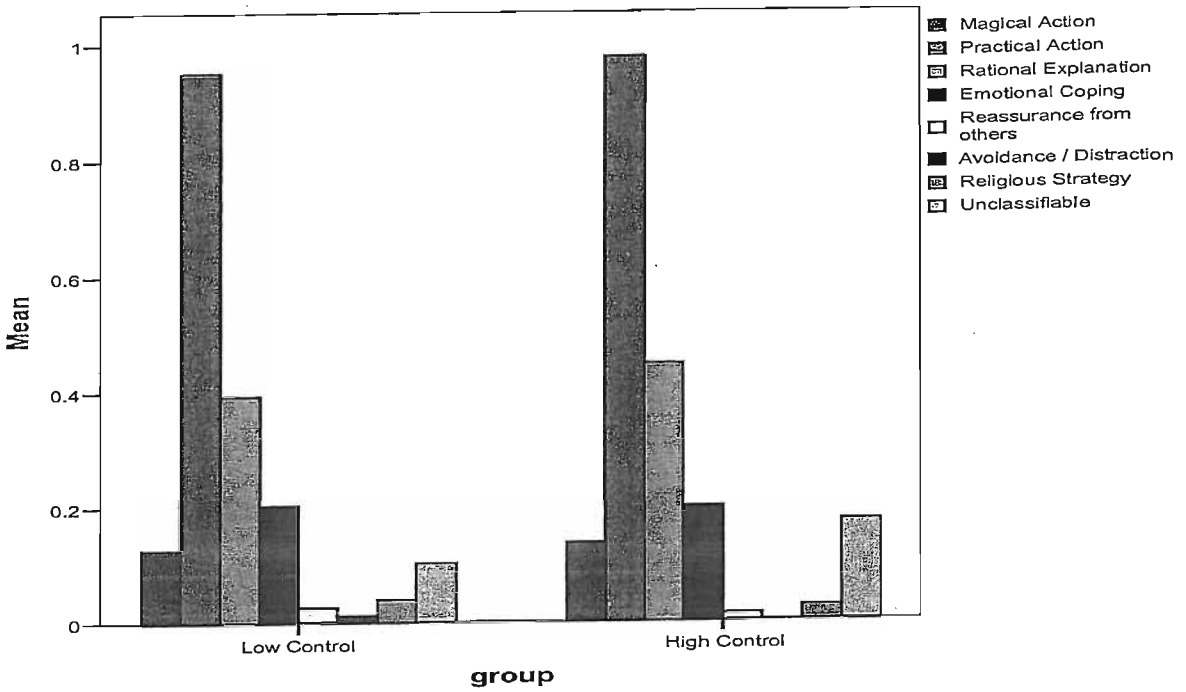
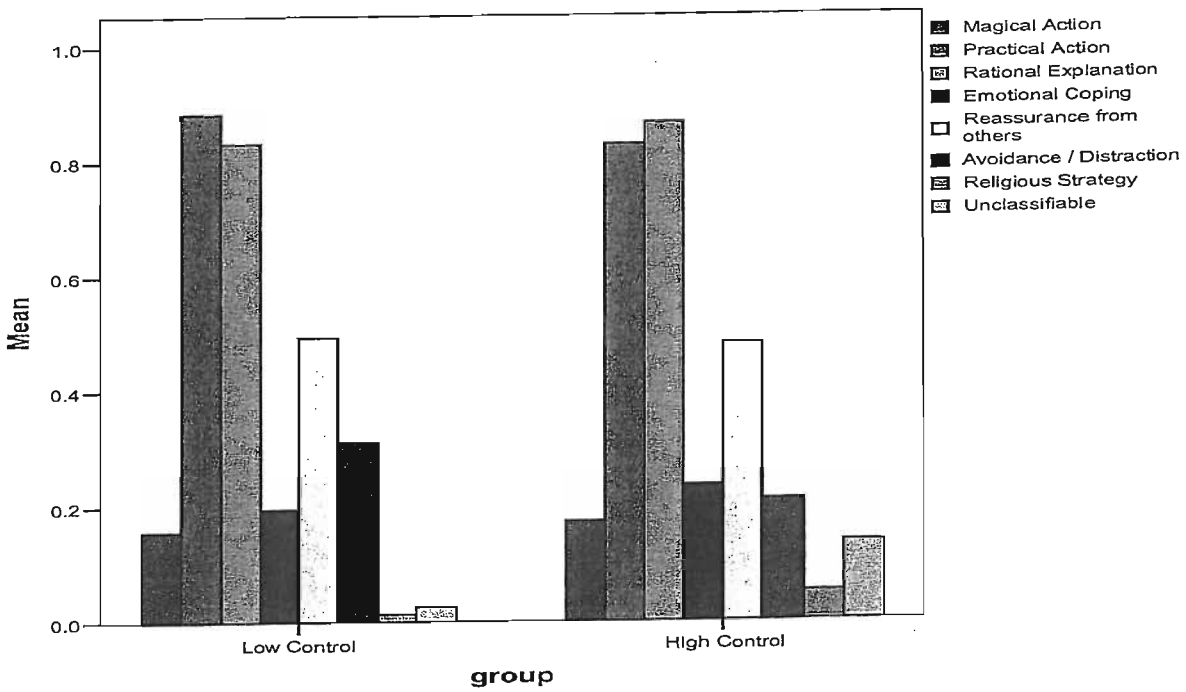


Figure 10: Bar chart of strategies used in response to Scenario 4, high and low control



Appendix K Debriefing statement

Appendix K Debriefing Statement

This project is concerned with the relationship between magical thinking and perceived threat in obsessive-compulsive disorder (OCD). Magical thinking refers to beliefs that defy culturally acceptable laws of causality. The experiment that you have just taken part in is designed to induce a form of magical thinking that is concerned with decreasing the perceived likelihood of an event happening due to thinking it. It is believed that this is one of the cognitive distortions that is present in OCD that gives rise to anxiety symptoms.

This study is concerned with the following hypotheses:

1. More participants will use magical actions in the low control scenarios, than in the high control scenarios.
2. Scenario threat was predicted to interact with psychological variables so that in the low control scenarios: participants who use magical actions will be those with higher MIS scores, higher PI-R scores and higher external LoC scores, and in the high control scenarios: there will be no significant difference in MIS scores, PI-R scores and LoC scores between participants who use magical actions and participants who do not use magical actions.

This study is interested in the strategies that individuals use to make themselves feel better and to 'undo' a perceived increase in the likelihood of an event occurring as a consequence of the experiment.

It is estimated that 80-90% of the population have unwanted intrusive thoughts and some of these thoughts may be similar to the thoughts that were generated in this experiment. Often, when people have these thoughts, they think that these thoughts are wrong and that the things that they were thinking increase the probability that they will happen. These thoughts are perfectly normal and have no influence on events.

If you feel at all distressed following this experiment, or would like to speak to me about any aspect of it then please contact me by email (ckb103@soton.ac.uk)

Thank you for participating in this experiment.

Charlotte Keeling (Clinical Psychologist in training)

University of Southampton

School of Psychology

University of Southampton
Highfield Southampton
SO17 1BJ United Kingdom

Tel +44 (0)23 8059 5000
Fax +44 (0)23 8059 4597

10 March 2006

Charlotte Keeling
School of Psychology
University of Southampton
Highfield
Southampton SO17 1BJ

Dear Charlotte,

Re: **Is magical thinking a function of perceived threat?**

I am writing to confirm that the above titled ethics application was approved by the School of Psychology Ethics Committee on 14 October 2005.

Should you require any further information, please do not hesitate in contacting me on 023 8059 3995.

Please quote approval reference number CLIN/03/94.

Yours sincerely,

Kathryn Smith
Secretary to the Ethics Committee