

**School of Psychology  
Faculty of Health Sciences**

**Magical Thinking:  
How Important Is It in Explaining Obsessive-Compulsive  
Symptoms? A Transcultural Exploration of Magical Thinking and  
OCD in India and Australia**

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**This thesis is presented for the Degree of  
Doctor of Philosophy  
of  
Curtin University**

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## **Author's Declaration**

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

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

Human Ethics: The research presented and reported in this thesis was conducted in accordance with the National Health and Medical Research Council National Statement on Ethical Conduct in Human Research (2007) – updated 2018. The research study received ethics approval from the Curtin University Human Research Ethics Committee (HREC), Approval Number #HR22/2016.

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**Date: 14<sup>th</sup> March 2019**

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## **Statement of Contributors**

The candidate, Bristi Barkataki, was responsible for all aspects of the research presented in this thesis, including study design, data collection, data analysis, interpretation, and reporting of results. The following supervision team also contributed to the research design and some aspects of analysis, interpretation and writing/editing:

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\_\_\_\_\_ **Date: 14<sup>th</sup> March 2019**

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\_\_\_\_\_ **Date: 14<sup>th</sup> March 2019**

## Abstract

### **Background**

Empirical evidence suggests that several cognitive constructs are important in the development and maintenance of obsessive compulsive disorder (OCD). Some studies have found a unique relationship between magical thinking and obsessive-compulsive symptoms however this research has lagged behind that of other cognitive constructs such as responsibility and over-estimation of threat. The proposed research, therefore, aims to explore the cognitive construct of magical thinking and its relationship to obsessive-compulsive (OC) symptoms and OCD.

### **Objective**

The primary aim of this thesis was to comprehensively explore the cognitive construct of magical thinking and its contribution to obsessive-compulsive symptomatology. This was achieved through four separate studies outlined below:

1. A systematic review of existing research to determine the unique contribution of magical thinking in OCD (Study one).
2. A cross-cultural evaluation of the psychometric properties of the Illusory Beliefs Inventory (IBI) (Study Two).
3. A model testing study to determine the relative importance of magical thinking in explaining OC symptoms above and beyond the already established cognitive constructs in two culturally distinct samples (Study Three).
4. A qualitative study to explore and contextualise the lived experiences of magical thinking and its relationship to current obsessions and compulsions in a clinical sample (Study Four)

## Methods

A mixed-method approach was used across four interrelated studies to achieve the objectives.

*Study one:* Using a preregistered protocol with the International Prospective Register of systematic reviews (PROSPERO 2016: CRD42016037832) a systematic review of existing evidence was initiated to examine the unique contribution of magical thinking to OCD symptoms after controlling for other cognitive domains. Using PRISMA guidelines, both published and grey literature were systematically searched using the predefined MeSH terms in select databases for studies published until November 2017.

Studies *two* and *three* were quantitative studies conducted with community participants to empirically explore magical thinking and its association with OC symptoms from a transcultural perspective. To examine the impact of culture on magical thinking, this relationship was studied in two different cultures, namely, India (holistic-thinking, collectivistic culture) and Australia (analytic-thinking, individualistic culture). Community adult participants (18 years or above) were recruited from India ( $n = 627$ ) and Australia ( $n = 535$ ) via snowballing and convenience sampling. A cross-sectional correlational design was used to achieve the aims of this quantitative study using self-report measures.

*Study Two:* The aim of this study was to explore the cognitive construct of magical thinking as measured by the IBI with a transcultural perspective. It was hypothesised that there would be a different factor structure in the Indian and Australian samples due to cross-cultural differences regarding the acceptability and prevalence of superstitious thinking. As the IBI is a relatively new measure of magical thinking, exploring its factor structure was necessary to guide subsequent model testing in each sample.

*Study Three:* This was a model testing study extending on the factor structure established by *Study Two* with the following aims: (a) to test the unique as well as the relative contribution of magical thinking to cognitive vulnerability

for OC symptoms, (b) to investigate the unique predictive utility of magical thinking and its association with OC symptoms *viz-a-viz* the established cognitive constructs.

*Study Four:* Qualitative interviews were used to obtain the lived experiences of individuals diagnosed with OCD and who engage in magical thinking, and thus explore and contextualise the phenomenology of magical thinking and its relationship to current day obsessions and compulsions. Narratives were gathered from six participants seeking treatment for OCD (diagnosis as per DSM-5 criteria, APA, 2013) and identified as scoring high on magical thinking (IBI score > 60). Transcripts were analysed using Interpretative Phenomenological Analysis (IPA).

Ethics approval was obtained from the Curtin University Human Research Ethics Committee (HR22/2016). Written informed consent was obtained from all participants in this project.

## **Results**

*Study One:* Twenty-four studies met the inclusion criteria for the systematic review. Eighteen studies reported significant correlations between magical thinking and OC symptoms and six studies also found magical thinking to explain unique variance in OC symptoms when other relevant cognitive constructs were controlled. These findings lend support for further research to explore the role of magical thinking in relation to OCD.

*Study Two:* Preliminary analyses exploring measurement invariance did not support configurable invariance suggesting cross-cultural differences in the construct measured by the IBI. Factor analyses did not support the hierarchical three-factor structure of the original IBI. However, a consistent two-factor structure emerged across the samples while the solution differed with regards to the number of items in each sample. Therefore, two separate versions of the IBI were established in each sample and tested independently. IBI for the Australian sample consisted of 19 items (*Factor 1: Magical & thought-fusion beliefs (MTFB)*, 10 items; *Factor 2: Spirituality*, 9 items) whereas a shorter version of the

IBI was derived for the Indian sample with 12 items (*Factor 1: MTFB*, 8 items; *Factor 2: Spirituality*, 4 items). This study establishes the IBI as a reliable measure of magical thinking with good internal consistency and construct validity across the Indian and the Australian samples.

*Study Three:* This study found that cognitive vulnerability (indicated by all the existing constructs along with magical thinking) was a significant predictor of OC symptoms in both the Indian and the Australian sample. When tested alongside other constructs to test the predictive utility of these constructs in explaining OC symptoms, similar patterns emerged across both samples. *Threat* was the strongest contributor, although magical thinking added additional variance to the vulnerability to OC symptoms. With regard to the predictive utility of magical thinking in explaining OC symptoms, the *Magical and thought-fusion beliefs* subscale of the IBI was significantly associated with OC symptoms while the *Spirituality* subscale was not found to be a significant contributor. The strength of this association between *Magical and thought-fusion beliefs* and OC symptoms was comparable to the domain of *Perfectionism*.

*Study Four:* Four dominant themes emerged from the interviews namely, (1) Types of magical thinking, representing the conceptualisations of magical thinking by the participants; (2) Origin and triggers of magical thinking, indicating the socio-cultural influences of family, culture and life events in the development of these beliefs; (3) Functions of magical thinking, explaining the purpose served by magical thinking in the participant's lives; and, (4) Levels of insight, indicating the limited insight the participants had regarding the association of these beliefs in maintaining their OC symptoms. The phenomenological accounts provided by the six participants of this study, suggest distinct predisposing, precipitating, perpetuating and protective factors for the development and maintenance of magical thinking and its relationship with OCD cognitive vulnerability. The results from this qualitative accounts provided insights into how magical thinking may influence beliefs systems activated in times of threat and may coexist with rational thinking. The strong nature of these beliefs appeared to limit their insights into how these beliefs were contributing to their OCD.

## **Conclusion**

The four studies conducted in this thesis suggest that magical thinking is an important construct in understanding the development and maintenance of magical thinking in both Indian as well as the Australian sample. With regards to explaining vulnerability for OC symptoms, magical thinking emerged as a distinct cognitive construct that contributed uniquely to the cognitive vulnerability for OC symptoms. Additionally, when tested alongside other constructs, a significant direct association was found between the *Magical and thought-fusion beliefs (MTFB)* subscale of the IBI and OC symptoms, indicating its unique predictive utility in explaining OC symptoms. Fundamental cross-cultural differences were noted in the manifestation of magical thinking in each of the samples, expressed mainly in the domain of *Spirituality*. However, *Spirituality* in itself did not emerge as a unique significant factor in directly explaining OC symptoms in either of the samples. These empirical findings strengthen the case for magical thinking as a vulnerability factor for OCD symptoms. These insights may be important for case formulation and treatment planning for OCD symptoms.

**Keywords:** Magical thinking, Cognitive constructs, Obsessive-Compulsive Disorder

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## **List of Conference Presentations**

Barkataki, B. (2019, March). *What is Magical thinking? How important is it in Obsessive Compulsive Disorder (OCD)?*. Paper presented for 3MT competition at Mark Liveris Student Research Seminar, Curtin University, Western Australia.

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Barkataki, B. (June, 2017). *Magical thinking: How important is it in predicting obsessive-compulsive (O-C) symptoms*. Paper presented at The 9<sup>th</sup> International Congress of Cognitive Psychotherapy, Cluj-Napoca, Transylvania, ROMANIA.

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## **Research Award**

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## List of Abbreviations

|          |   |
|----------|---|
| ACT      | Acceptance and Commitment Therapy   |
| APA      | American Psychiatric Association  |
| CBT      | Cognitive Behaviour Therapy   |
| CCRQ     | Consolidated Criteria for Reporting Qualitative research                  |
| CFA      | Confirmatory Factor Analysis  |
| CFI      | Comparative fit index   |
| CRI      | Child Routines Inventory  |
| CY-BOCS  | Children's Yale-Brown Obsessive-Compulsive Symptoms                       |
| DOCS     | Dimensional Obsessive-Compulsive Scale                                    |
| DSM-5    | Diagnostic and Statistical Manual for Mental Disorders –<br>Fifth Edition |
| EFA      | Exploratory Factor Analysis   |
| ERP      | Exposure and Response Prevention  |
| GAD      | Generalised anxiety disorder  |
| HREC     | Human Research Ethics Committee   |
| I/C      | Importance and Need to Control thoughts                                   |
| IBI      | Illusory Beliefs Inventory  |
| IPA      | Interpretative Phenomenological Analysis                                  |
| LBBS     | Lucky Beliefs and Lucky Behaviour Scale                                   |
| <i>M</i> | Mean  |
| MAP      | Minimum Average Partial   |
| MCAR     | Missing Completely at Random  |

|            |   |
|------------|---|
| MIS        | Magical Ideation Scale  |
| MOCI       | Maudsley Obsessive-compulsive Inventory   |
| MTFB       | Magical & thought-fusion beliefs  |
| MTQ        | Magical Thinking Questionnaire  |
| NICE       | National Institute for Health and Care Excellence   |
| OBQ        | Obsessive Beliefs Questionnaire   |
| OBQ - TRIP | Obsessive Beliefs Questionnaire - Threat, Responsibility,<br>Intolerance of Uncertainty and Perfectionism |
| OC         | Obsessive-Compulsive  |
| OCCWG      | Obsessive-Compulsive Cognitions Working Group   |
| OCD        | Obsessive-compulsive disorder   |
| OCI-R      | Obsessive-Compulsive Inventory  |
| OFC        | Orbitofrontal-subcortical circuits  |
| P/U        | Perfectionism/ Intolerance of Uncertainty   |
| PAS        | Perceptual Aberration Scale   |
| PBS        | Paranormal Beliefs Scale  |
| PD         | Panic Disorder  |
| PFI        | Parsimonious fit index  |
| PI         | Padua Inventory   |
| PIOS       | Penn Inventory of Scrupulosity  |
| PRISMA     | Preferred Reporting Items for Systematic Reviews and<br>Meta-Analyses                                     |
| PROSPERO   | Prospective Register of systematic reviews  |
| R          | Inflated sense of personal responsibility for harm  |
| RAQ        | Responsibility Appraisal Questionnaire  |

|           |  |
|-----------|--|
| RMSEA     | Root Mean squared error of approximation         |
| ROII      | Revised Obsessive Intrusions Inventory           |
| SCAS      | Spence's Children's Anxiety Scale                |
| <i>SD</i> | Standard Deviation                               |
| SEM       | Structural Equation Modelling                    |
| SLOI-CV   | Short Leyton Obsessional Inventory-Child Version |
| SRMR      | Standardised Root Mean Square Residual           |
| SSRI      | Selective serotonin reuptake inhibitors          |
| T         | Overestimation of Threat                         |
| TAF       | Thought-action fusion                            |
| TAF-R     | Thought-Action Fusion Scale-Revised              |
| TAFS      | Thought-Action Fusion Scale                      |
| TLI       | Tucker-Lewis index                               |
| YBOCS     | Yale-Brown Obsessive Compulsive Scale            |

## **CHAPTER ONE: GENERAL INTRODUCTION**

## 1.1 Clinical Presentation of OCD

Obsessive Compulsive Disorder (OCD) is a distressing and time-consuming condition that interferes with occupational, educational and/or social functioning (American Psychiatric Association, [APA], 2013). Diagnostic features of OCD include recurrent distressing obsessions (e.g., fear of contamination, thoughts of harming others, preoccupation with symmetry and order) that are often associated with compulsions (e.g. repeated washing or checking, aligning objects, seeking reassurance) performed to reduce the discomfort experienced due to the intrusive thoughts.

OCD was separated from the anxiety disorders and re-classified into a separate section of the current edition of the Diagnostic and Statistical Manual for Mental Disorders – Fifth Edition (DSM-5) called “Obsessive-Compulsive and Related Disorders”. The *DSM-5* defines obsessions as “*persistent ideas, thoughts, impulses, or images that are experienced as intrusive and inappropriate and that cause marked anxiety or distress*” (APA, 2013, p.826). Obsessions consist of intrusive repetitive thoughts concerning contamination, orderliness, aggressive or sexual intrusions, religious preoccupations, and/or reassurance seeking. Compulsions are described as “*repetitive behaviours (e.g., hand washing, ordering, checking) or mental acts (e.g., praying, counting, repeating words silently) the goal of which is to prevent or reduce anxiety or distress, not to provide pleasure or gratification*” (APA, 2013 p.819). The type of obsessions and compulsions experienced by an individual can change over time (Evans, Leckman, Carter, Reznick, & et al., 1997; Taylor, 2002). Furthermore, levels of insight are variable in OCD, with research suggesting that degree of insight is best understood to occur on a continuum (Abramowitz, 1999; Bellino, Patria, Ziero, & Bogetto, 2005; Ravi Kishore, Samar, Janardhan Reddy, Chandrasekhar, & Thennarasu, 2004), and may be designated as “*with poor insight*” designated as a *DSM-5* diagnostic specifier of OCD.

Obsessive intrusions are also reported to exist on a continuum (Gibbs, 1996; Myers, Fisher, & Wells, 2008). Intrusions, as experienced by individuals with clinically significant obsessions, are also estimated to be present in 80 to 90 per cent of the general population and are similar in content (Rachman & de Silva,

1978; Salkovskis & Harrison, 1984). The key differences between obsessions experienced by non-clinical and those experienced by clinical populations are that for clinical populations the obsessions are more intense, more frequent and occur for an extended period of time (Rassin, Merckelbach, & Muris, 1999; Wroe, Salkovskis, & Richards, 2000).

### **1.1.1 Prevalence**

According to the DSM-5, the documented worldwide 12-month prevalence for OCD ranges between 1.1%-1.8% (APA, 2013). However, prevalence estimates vary across major studies based on epidemiological catchment areas and methodological differences ranging from population-based cross-sectional screening studies to relatively small clinical studies (Crino, Slade, & Andrews, 2005; Rintala, Chudal, Leppämäki, Leivonen, Hinkka-Yli-Salomäki, & Sourander, 2017). Epidemiological studies document lifetime prevalence rates of 2.3% in United States of America (Ruscio, Stein, Chiu, & Kessler, 2010), and 1-3% in Europe (Bebbington, 1998; Williams, Chapman, Simms, & Tellawi, 2017) whereas the Australian National Survey of Mental Health and Wellbeing in Australia found a lifetime prevalence of around 3.8% (McEvoy, Grove, & Slade, 2011). On the contrary, literature of prevalence statistics for OCD in India is sparse. The only official epidemiological data available for adult OCD in India dates back to 1993 that record a life-time prevalence of .6% for adult population (Khanna, Gururaj, & Sriram, 1993), while a relatively recent data available on adolescent OCD stated a point prevalence of .8% (Jaisoorya, Janardhan Reddy, Thennarasu, Beena, Beena, M., & Jose, 2015). Likewise, lifetime prevalence rates reported from Asian studies from Singapore is 3% (Subramaniam, Abdin, Vaingankar, & Chong, 2012), while relatively lower prevalence rates have been found for countries such as Iran with 1.8% (Mohammadi et al., 1994), Taiwan, and Korea with .4%, and 1.1% respectively (Weissman et al., 1994).

Previous epidemiological studies conducted in Europe, Africa and Asia report no difference in prevalence rates based on gender (Cilicilli, Telcioglu, Askin, Kaya, Bodur, Kucur, 2004; Juang & Liu, 2001), however, recent studies report higher incidence rates in females as compared to males (Abramowitz et al., 2009; APA, 2013; Lee, Cogle, & Telch, 2005; Purty, Nestadt, Samuels, & Viswanath,

2019). Furthermore, ethnocultural influences are known to have profound effects on OC symptom manifestation (Nedeljkovic, Moulding, Foroughi, Kyrios, & Doron, 2012; Williams et al., 2017). Thus, these worldwide variations found in the recorded prevalence statistics may be attributed to the influence of culture on OCD psychopathology (Medeiros et al., 2017). A further discussion on the impact of culture on OC symptom presentation will be discussed in Chapter 3 of this thesis.

### **1.1.2 Onset and Course**

OCD usually has an onset in late adolescence with a typical age range of 19-25 years (Abramowitz et al., 2009; APA, 2013; Lee, Coughle, & Telch, 2005; Steketee, 1993). The modal age of onset for females is recorded to be between 20-29 years while males record an earlier onset between 6-15 years (APA, 2000). Different symptomatic presentation has been reported for early-onset as opposed to late-onset OCD (Fontenelle, Mendlowicz, Marques, & Versiani, 2003; Rosario-Campos et al., 2001). For example, sexual obsessions are more common as a symptom manifestation for prepubertal OCD onset than a later onset OCD (Zohar, Pauls, Ratzoni, Apter, & et al., 1997).

OCD is a chronic and debilitating condition characterised by waxing and waning of symptoms over the course of the lifetime typically triggered by stressful life situations (Taylor, 2002). OCD has a typical presentation of gradual course while acute-onset OCD is commonly reported to develop in response to stressful life situations or traumatic events (de Silva & Marks, 2001; Sasson et al., 2005; Stavrakaki & Antochi, 2004). Obsessive-compulsive (OC) symptoms have been associated with hormonal changes such as premenstrual and menarche and with increased vulnerability to developing OC symptoms during pregnancy (Altemus, 2001; Williams & Koran, 1997). A history of depressive disorder, early-onset OCD, and poor response to treatment are all associated with a more chronic course and lower functioning (Steketee, Eisen, Dyck, Warshaw, & Rasmussen, 1999; Stewart et al., 2004).

### **1.1.3 Comorbidity and Differential Diagnosis**

OCD shares high comorbidity rates with other psychological disorders, including other anxiety disorders (Abramowitz & Foa, 1998; Black & Noyes, 1997; Foa & Kozak, 1986), mood disorders (Barlow, Allen, & Choate, 2004), some personality disorders such as obsessive-compulsive personality disorder (OCPD) and avoidant personality disorder (Gibbs & Oltmans, 1995), eating disorders (APA, 2013), and substance use/abuse (APA, 2013).

OCD is not diagnosed if thoughts or rituals are exclusively associated with another mental disorder, for example, specific phobia (i.e., excessive anxiety with feared object or situation) or Trichotillomania (i.e., hair-pulling disorder) (APA, 2013). OCD is differentiated from Psychotic disorders based on the insight of individuals to distinguish that the obsessions are irrational (APA, 2013). Although some individuals with OCD may present with some aberrant irrational beliefs and preoccupations similar to delusional thinking (such as, magical thinking), OCD is distinguished from Delusional or Schizotypal disorders when, they present with obsessions and compulsions, have insight that their irrational beliefs may not be reality, and do not qualify for a formal thought disorder (APA, 2013). Furthermore, there has been considerable debate regarding the nature and relationship between OCD and OCPD (Gibbs & Oltmans, 1995). Although the terminology ascribed to both these disorders is similar, the clinical presentation of symptoms varies significantly. While OCD is characterised by intrusive obsessions and repetitive compulsions, OCPD presents with a pervasive pattern of strict adherence to perfectionism, orderliness and control (APA, 2013). Additionally, while OCD is characterised by significant distress due to the nature of obsessions and/or compulsions and the inability to control them, individuals with OCPD are less likely to be distressed with their preoccupation with orderliness, perfectionism, and control (Phillips, Pinto, Eisen, Mancebo & Rasmussen, 2007).

### **1.1.4 Culture and manifestation of OC symptoms**

Culture can be defined as a socially transmitted knowledge shared by a group of individuals and are made up of values, attitudes and patterned ways of behaving (Sharma, 2014). OCD has had a cultural trajectory throughout history with the

earliest possible accounts available in the ancient Babylonian texts that report sufferers presenting with morbid fears and doubts related to lighted stoves, lamps, etc. (Williams et al, 2017). Embedded in the social context, culture plays a prominent role in the manifestation of OCD psychopathology and exerts its influence in an individual's belief systems (Medeiros et al., 2017). Cross-cultural literature highlights notable differences in OC symptom expression and manifestation with specific themes of obsessions (such as, religious themes, and superstitions), preoccupations (such as, cleanliness and morality), ritualistic behaviour (such as checking, cleaning, and reassurance seeking), and attitude towards treatment (Nedeljkovic, Moulding, Foroughi, Kyrios, & Doron, 2012; Williams, Chapman, Simms, & Tellawi, 2017; Williams & Steever, 2015).

Religious beliefs and the practices are not only an integral part of an individual's culture but also constitutes the core of a culture's belief system and socially acceptable interpretation of events (Mathur, 2012). Religious obsessions in OCD, often referred to as scrupulosity, takes the form of persistent fears and doubts about sin and punishment by God while compulsions revolve around reassurance-seeking about trivial religious concerns (Warshowsky, 2007). Cross-cultural literature emphasizes on the possible influence of religious obsessions with themes of cleanliness, purity, morality, and sexuality on OCD (Nicolini, Salin-Pascual, Cabrera, & Lanzagorta, 2017, Williams et al., 2017). For example, a transcultural study conducted by Okasha, Saad, Khalil, El Dawla, and Yehia (1994) found similarities in the content of both obsessions and compulsions in Islamic and Jewish samples that may be influenced by salient aspects of their religious teachings. Likewise, similarities in obsessive themes of purity and purification were found to be associated with cleanliness related OC symptoms in India and Nepal with Hindu participants (Okasha et al., 1994). A comprehensive review by Reddy, Jaideep, Khanna and Srinath (2005) indicated a high prevalence of contamination concerns and pathological doubt among Indian participants, suggestive of religious and cultural influences in OC symptoms manifestation. Converging evidence recognises the cross-cultural differences in OC symptom manifestation in relation to culture-related beliefs such as superstition, and other established cognitive constructs implicated in OCD (Nedeljkovic et al., 2017). A detailed account of the role of culture on OC symptoms will be discussed in the following chapters of this thesis.

Although, understanding the cultural context is pivotal in development and maintenance of OCD, yet very little is known about the degree to which these beliefs can influence OC symptoms. Studies 2 and 3 of this thesis will attempt to explore the relative contribution of cognitive beliefs in OCD from a transcultural perspective.

## **1.2 Aetiological Models of OCD**

Aetiological models of OCD comprise of biological and psychological theories regarding the pathogenesis and maintenance of OCD. These evidence-based models differ in terms of the theoretical framework and case formulation in understanding OCD.

### **1.2.1 Biological Models**

Evidence from clinical, neuroimaging, and pharmacological studies has informed neuropsychiatric conceptualisations of OCD (Stein, Goodman & Rauch, 2000). The biological model is comprised of the organic basis of the pathology of OCD and will be discussed under (2.1.1) Genetic (2.1.2) Neurochemical, and (2.1.3) Neuroanatomical models in OCD.

**1.2.1.1 Genetic Models.** Genetic models of OCD vulnerability have been explored using twin studies that show a greater concordance rate in OCD for monozygotic twins compared to dizygotic twins (Billiett, Richter, & Kennedy, 1998; Van Grooheest, Cath, Beekman & Boomsma, 2005). Genetic inheritance of OCD is reported to be higher for individuals with early-onset OCD when compared to late-onset OCD (Bellodi, Sciuto, Diaferia, Ronchi, & Smeraldi, 1992). Family studies that show consistency in the prevalence and manifestation of OCD symptoms in families with a history of OCD are also consistent with genetic heritability (Grisham, Anderson & Sachdev, 2008). However, there are several lines of evidence that are inconsistent with the genetic theory of OCD. For instance, there are numerous cases reported where there is no family history of OCD (Nestadt & Samuels, 1997; Samuels 2009). Additionally, genetic vulnerability is found to be higher in certain phenotypes of OCD such as tic-related cases (Samuels et al, 2007) and hoarding-related cases (Saxena, 2008), indicating that certain phenotypic expressions of OCD are more likely to be inherited than others (Middleton, 2011;

Swedo et al., 1992, 1989). The complexity of symptom manifestation, along with the influence of environmental factors in the causation of the disorder, meaning that the genetic model cannot fully account for vulnerability to the development of OCD (Bandelow et al., 2017; Billiett et al., 1998; Hettema, Neale, & Kendler, 2001, Purty et al., 2019).

**1.2.1.2 Neurochemical Imbalance Model.** The neurochemical imbalance model suggests that the development of OCD is caused by imbalances in neurotransmitters of the brain. The strongest evidence comes from pharmacological research on selective serotonin reuptake inhibitors (SSRIs) and the serotonergic hypothesis of OCD (Abramowitz, 2005; Gross, Sasson, Chopra, & Zohar, 1998). This hypothesis claims that under-activation of serotonin pathways, a neurotransmitter that regulates functions such as sleep, mood, and appetite, is responsible for the development of OCD (Gross et al., 1998). However, evidence to support the therapeutic efficacy of SSRIs in OCD treatment is contradictory (Pittenger & Bloch, 2014; Shafran, 2005). Limitations to the serotonergic hypothesis of OCD results from the lack of evidence for causality to explain the pathophysiology of OCD (Salkovskis, 1999; Stein, 2000). For instance, while some OCD patients report better prognosis with SSRI treatment, it fails to explain why some people respond better to atypical antipsychotics and benzodiazepines (Goodman, McDougle, & Price, 1992; Jenike & Rauch, 1994). In summary, serotonin dysfunction may not be the only underlying aetiology for OCD, and it does not explain the specific mechanism for the maintenance of OCD (Bandelow et al., 2017; Jenike & Rauch, 1994; Salkovskis, 1999).

**1.2.1.3 Neuro-anatomical Models.** Neuroanatomical models originate from correlational studies finding associations between OC symptoms dysfunctions in specific brain structures such as the caudate nucleus (Schwartz, 1999) and basal ganglia and/or striatum (Aigner et al., 2005; Hollander, 1997, 2005). However, with advances in neuroimaging techniques, other regions of the brain have since been implicated in the understanding of OCD. Neuroimaging literature emphasises the role of the orbitofrontal-subcortical circuits (OFC) in the causation of OCD. The OFC consists of direct and indirect pathways that help to initiate behavioural responses executed with less cognitive awareness (Saxena, 2008). OC symptoms are

hypothesised to result from the over-activation of the direct pathway of the OFC. This circuitry with the orbitofrontal cortex and the associated structures of the limbic system such as the anterior cingulate cortex and amygdala provides some neuroanatomical evidence to the pathogenesis of OCD, while the exact nature of these relationships are yet to be clearly understood (Graybiel & Rauch, 2000; Menzies et al, 2008). A recent meta-analysis by Amramovitch (2013) highlights that although poorer performance in neuropsychological domains was found to be related to OCD when compared to healthy controls, these differences were not found to be statistically significant. The review further suggests that although associations with frontostriatal pathophysiology and executive function impairments were implicated in OCD, these impairments are largely present in other psychiatric disorders such as schizophrenia, depression and bipolar disorder. Thus, there is little evidence that these impairments are exclusive to OCD endophenotypes and further research is warranted (Amramovitch, 2013, 2018).

## **1.2.2 Psychological models of OCD**

The first mention of the psychological aetiology of OCD can be found in the work of Freud who emphasised the contributory role of psychological defences and moralistic reasoning (Davison & Neale, 2001). Major developments in psychological theories of OCD have occurred since Freud's work, with the cognitive and behavioural models accumulating the most evidence.

**1.2.2.1 Psychodynamic Models.** The earliest conceptual framework for OCD dates back to the classical psychoanalytic accounts of Freud (1909/1913, 1955/ 1958, cited in Berle & Starcevic, 2005) who proposed OCD as a neurosis that results from defensive regression of the early Oedipal phase to the anal psychosexual phase of development. The consequent manifestation of the OC symptoms is ascribed to the conflictual functioning of the *id*, *ego*, and the *superego* in association with defensive forces of the psyche. For example, the contributory role of magical thinking in OCD was described as a result of defensive regression to the anal-sadistic phase and conceptually links to indecisiveness, doubting and moralistic reasoning (Ayouch, 2012; Berle & Starcevic, 2005; Gullestad, 2007; Nemiah, 1998; Ogden, 2010; Vikan & Clausen, 1993). Thus, neurotic anxiety is characterised by repression of the causal conflicts linked to the impulses of the *id*

(Davison & Neale, 2001). However, with the lack of empirical evidence and poor prognosis of OC symptoms with psychoanalytic/psychodynamic therapy, contemporary models of OCD do not stem from the central tenets of psychoanalytic theories (Abramowitz, 1997; Middleton, 2011; O’Leary, 2005, Steketee, 1993).

**1.2.2.2 Behavioural Models.** A paradigm shift occurred during the 1970s away from the focus on internal conflicts of the psyche to focus on observable behaviour. These models described obsessions as conditioned noxious stimuli (Rachman, 1971) that elicit anxiety via associations with prior experience of a traumatic event (Steketee, 1993). Early conditioning models postulated that acquisition of fear is based on classical conditioning and maintained by the principles of operant conditioning (Rachman & Hodgson, 1980; Teasdale, 1974). Based on this understanding, Mower (1960) developed a two-stage theory of avoidance learning that provided a behavioural foundation for the acquisition and maintenance of OCD via classical conditioning and operant conditioning respectively. According to this theory, first, an unconditioned stimulus that provokes anxiety is paired with a neutral, conditioned stimulus of the intrusive thoughts in a manner that whenever the intrusive thought occurs, the anxiety is triggered. In the second stage, the individual learns to avoid or neutralise the anxiety that triggers the intrusive thoughts. This negative reinforcement maintains compulsive rituals and prevents them from extinction (Rachman & Hodgson, 1980). However, the behavioural model was critiqued for the lack of empirical evidence to support the first stage of the acquisition of OC symptoms (O’Leary, 2005) and this led to the exploration of the cognitive components of OCD.

**1.2.2.3 Cognitive Models.** Among the various theoretical frameworks, the cognitive model is the leading explanatory model of OCD (Rachman, 1997; Salkovskis, 1985, 1999). There has been a growth in the various cognitive approaches to understanding OCD (Rachman, 1997; Salkovskis, 1985, 1999; Wells & Papageorgiou, 1998). These cognitive theories can be broadly categorised into two distinct models, namely the cognitive dysfunction /cognitive deficit model and the cognitive appraisal model (Middleton, 2011). The cognitive dysfunctional model proposes that OCD results from a general dysfunction in cognitive processing/ information processing deficit while the cognitive-appraisal model focusses on the

role of dysfunctional beliefs and assumptions in the development of OCD (O’Leary, 2005). Owing to the diversity of the existing range of cognitive models of OCD, a detailed description of all the existing cognitive models is beyond the scope of this thesis.

After a brief overview of cognitive deficit models, a more detailed account of the cognitive appraisal model is discussed in the section below as it forms the foundation of the studies conceptualised in this thesis.

**1.2.2.3.1 Cognitive Deficit Models.** Cognitive deficit theories emerge from the information processing hypothesis and have its dual roots in neuropsychology and experimental research. This model asserts that obsessions result from generalised and involuntary disturbances of information processing such as memory or reality monitoring impairments, and compulsive rituals develop secondary to these primary deficits (Salkovskis, Westbrook, Davis, Jevons, & et al., 1997). Empirical studies suggest the manifestation of pathological doubt, difficulty in making decisions and uncertainty in OCD to be associated with memory impairments in OCD (Amir & Kozak, 2002; Greisberg & McKay, 2003; Savage et al., 2000). However, there is only weak support for global memory impairments, and mistaken or faulty beliefs about one’s memory appear more pertinent in understanding OCD than actual cognitive deficits (Abramowitz, 2005). Studies also indicate that individuals with OCD present with deficits in executive functioning such as cognitive, sensory-motor, memory and affective functions (Clark, 2004; Reed, 1985; Schmidtke, Schorb, Winkelmann, & Hohagen, 1998). However, similar levels of impairments in executive functions are also recorded for Post-Traumatic Stress Disorder (Beckham, Crawford, & Feldman, 1998), Panic Disorder (Lucas, Telch, & Bigler, 1991); and Depression (Moritz et al., 2001) and are not specific to OCD. Therefore, the role of cognitive deficit specific to OCD offers limited understanding in the aetiology of the symptom development and maintenance of OCD and can only be speculative at this point.

**1.2.2.3.2 Cognitive-Appraisal Models.** Cognitive-appraisal models of OCD founded on Beck’s (1976) cognitive specificity hypothesis emphasises the role of dysfunctional beliefs or schemas in the pathogenesis of OCD (Rachman, 1997; Salkovskis, 1985, 1999). It claims that dysfunctional beliefs create emotional

disturbance based on the appraisal of an event and is influenced by life experiences (Salkovskis, Shafran, Rachman, & Freeston, 1999). For instance, previously dormant beliefs can be triggered by the occurrence of certain specific situations or events. These belief systems influence the way we cognitively appraise the situation, often fuelling misinterpretations leading to the significance of the intrusions. These intrusions are further inferred as threatening and cause anxiety and distress, which manifests itself in compulsive behaviour performed to alleviate this distress (Salkovskis et al., 1999). OC symptoms are maintained and strengthened by a momentary reduction in anxiety where individuals experience difficulty in separating the intrusive thought from the actual occurrence of the situation. According to cognitive-appraisal theorists, it is the interpretation and significance ascribed to the occurrence of intrusive thoughts or images that is key to the subsequent development of OCD (Rachman, 1993, 1997, 1998, 2002). Specifically, catastrophic interpretations of the perceived meaning of intrusions are proposed to result in distress and therefore rituals are used in an effort to reduce the distress (Obsessive Compulsive Cognitions Working Group, 1997; Salkovskis, 1985; Shafran, Thordarson, & Rachman, 1996; Wu & Carter, 2008). This model posits that the appraisals depend on the context, mood, and past experiences of the individual experiencing the appraisals (Taylor, 2002). Rachman (1997) stated five specific dimensions as fundamental components of misinterpretation of significance:

- (i) *Important*: The distressing and intrusive thought is perceived to be important and significant.
- (ii) *Ego-alien (dystonic)*: The thought is perceived to be alien to the individual and is perceived as a thought that is “unlike me”.
- (iii) *Personalised*: The thought belongs to me and is my own.
- (iv) *Potential consequences*: The presence of the thought is liable to potential consequences.
- (v) *Serious consequences*: The consequences attached to the thought are expected to be serious, threatening and unbearable/inexcusable.

For instance, intrusive thoughts become threatening only if the thought relates to a specific meaning important for an individual such as moral thoughts

(Rachman, 1997). The misinterpretation involves the assumption that the specific intrusive thought reveals certain key characteristics regarding the person's moral character (Clarke, 2002; Rachman, 1997). Thus, catastrophic significant interpretations will continue until the thoughts are appraised as not significant to the individual and the individual endeavours to reduce the sense of threat through avoidance or neutralisation. These strategies offer temporary relief until the individual is faced with the intrusive thought again and the cycle continues until the individual no longer appraises the thought as threatening (Rachman, 1998; Salkovoski, 1985).

The cognitive appraisal model recognises inflated responsibility (belief that one has focal responsibility for harm of others) and thought-action fusion (TAF; belief that occurrence of a thought is equivalent to performing the action) as central systems of belief in OCD specific cognitions (Clark, 2002; Rachman, 1993, 1997, 1998; Salkovoski, 1985, 1999). Inflated responsibility and TAF have the potential to increase the perceived catastrophic severity of the intrusive thought (Clark, 2002; Rachman, 1997, 2002, 2004; Rassin, Merckelbach, Muris & Spaan, 1999). Although there is theoretical and empirical evidence that suggests TAF and inflated responsibility are important constructs in OCD, there are insufficient findings to establish that the two constructs are specific to OCD. This model posits that clinical obsessions result from an appraisal that intrusive thought is significant via an inflated sense of responsibility. However, most research providing support for these two constructs as the central tenets of the cognitive appraisals in OCD is mostly based on cross-sectional student samples and/or clinical analogue samples with high psychopathology scores.

Over recent years, a diverse range of cognitive models has been developed with each emphasising the role of a specific dysfunction in OCD. The cognitive-appraisal model serves as the theoretical foundation for the studies conducted as a part of this doctoral thesis.

**1.2.2.4 Metacognitive Models.** Wells (2000) proposed a metacognitive model of OCD whereby intrusive thoughts are proposed to activate negative metacognitive beliefs concerning the dangerousness and significance of thoughts (Fisher, 2009). The metacognitive model of OCD further extends thought-fusion

to include thought–event fusion (the belief that having a thought can cause an event or means that an event has happened) and thought–object fusion (the belief that thoughts or feelings can be transferred into objects). In support of this model, Myer, Fisher and Wells (2009) using an undergraduate sample, reported that metacognitive beliefs accounted for unique variance in obsessive-compulsive symptoms over and above other cognitive beliefs namely threat, responsibility, perfectionism and worry. A similar study using a clinical sample of 57 OCD patients found significant differences in metacognitive beliefs between the OCD and non-clinical groups (Solem et al., 2010). This understanding of the metacognitive elements in OCD is not entirely new and has been an integral part of cognitive behavioural models that emphasise either acceptance-based strategies or change-focused strategies to deal with a dysfunctional thought (Dobson, 2013; Rees & Anderson, 2013). Myers and Wells (2013) tested the metacognitive model of OCD by experimentally manipulating metacognitive beliefs. Results provide support to the role of the metacognitive factors in the maintenance of OCD as the high obsessional group (experimental group) reported more intrusive thoughts about drinking and experienced more discomfort compared to the control group.

### **1.3 Cognitive Domains Specific to OCD**

The drive for new knowledge regarding the cognitive aspects of OCD led to the formation of the Obsessive Compulsive Cognitions Working Group (OCCWG), one of the largest groups of international researchers dedicated to the study of the cognitive constructs of OCD. The OCCWG (1997) elucidated the difference between various “levels” of cognition in cognitive models of OCD, viz. intrusions, appraisals, and assumptions.

(a) *Intrusions*: Unwanted and distressing thoughts, images, or impulses that are intrusive and are considered to be obsessions when at clinical severity.

(b) *Appraisals*: Misinterpretation and faulty appraisals regarding the significance and meaning of a particular event or situation.

(c) *Assumptions (beliefs)*: Enduring beliefs that are “*pan-situational rather than specific to a particular event*” (OCCWG, 1997, p. 670).

The OCCWG originally identified six key theoretically defined belief domains underpinning the development and maintenance of OCD, namely; i) Over-importance of thought, ii) Overestimation of threat, iii) Inflated Responsibility, iv) Lack of Control, v) Perfectionism, and vi) Intolerance of Uncertainty. Their findings led to the development of the first single measure of cognitive constructs in OCD that consisted of 87 items and were named the Obsessive Belief Questionnaire, or the OBQ-87 (Obsessive Compulsive Cognitions Working Group, 1997). Supplementary empirical research by the OCCWG (2005) included an evaluation of the OBQ-87 domains using exploratory factor analysis in clinical samples from the USA, Canada and Australia. The outcomes of this statistical analysis led to validation of a shorter 44-item version of the Obsessive Beliefs Questionnaire (OBQ-44) to measure these dysfunctional beliefs and it narrowed the cognitive domains to three predominant factors. The three key cognitive constructs outlined by the OCCWG (Obsessive Compulsive Cognitions Working Group, 1997, 2005) are outlined below. A detailed review of each of these belief domains and its contribution to OC symptoms are discussed in the following chapter (Chapter 2).

(i) *Importance/Control of thoughts* refers to unrealistic fears of the possible dangerous outcomes of the distressing negative thoughts, and the consequential necessity to control them. This domain combines beliefs related to the over importance and control of negative automatic thoughts in OCD. Example items of this domain from the OBQ-44 include “*If I have aggressive thoughts or impulses about my loved ones, this means I may secretly want to hurt them*”, and “*Having intrusive thoughts means I’m out of control*” (Moulding, Anglim, Nedeljkovic, Doron, Kyrios, & Ayalon, 2011).

Importance of thoughts refers to “*Beliefs indicating an exaggerated estimation of the probability or severity of harm*” (OCCWG, 1997, p 678) and consists of beliefs that the intrusive negative thoughts are exceptionally important to an extent that it reveals important information about the person. Rooted in these beliefs are Thought-action Fusion beliefs that reflect that these negative thoughts increase the possibility of them coming true in reality. Research suggests that the subjective significant meaning associated with these thoughts are a major precursor of obsessional thinking and weakening the strength of the ascribed meaning to the thought leads to a reduction of OC

symptoms (Freeston, Rheume & Ladouceur, 1996; Purdon & Clark, 2002; Salkovskis, 1985, 1989). Strong positive correlations are reported between the dysfunctional appraisals of over importance and control of thought (OCCWG, 2001, 2003). Control of thoughts refers to the “*overvaluation of the importance of exerting complete control over intrusive thoughts, images, and impulses, and the belief that this is both possible and desirable*” (OCCWG, 1997, p.678). Dimensions of these beliefs include hypervigilance and the importance of achieving complete mental control of intrusive thoughts to avoid harmful consequences (Purdon & Clark, 2002). Some research has found that control of thoughts is specifically associated with obsessions rather than worry or anxiety (Purdon & Clark, 2002) and is found to be higher in clinical populations (Freeston & Ladouceur, 1997; Ladouceur et al., 2000)

(ii) *Responsibility/Threat Estimation* refers to the perceived responsibility of bad events happening and overestimation of a possible threat with a need to prevent any possible harm to self and others. This domain combines beliefs related to threat to any noxious obsession and a sense of personal responsibility to prevent them. Example items of the OBQ-44 for this domain include “*In order to feel safe, I have to be as prepared as possible for anything that could go wrong*”, “*Even if harm is very unlikely, I should try to prevent it at any cost*”, “*In all kinds of daily situations, failing to prevent harm is just as bad as deliberately causing harm*” (Moulding et al., 2011).

Overestimation of threat refers to “*Beliefs indicating an exaggerated estimation of the probability or severity of harm*” (OCCWG, 1997, p.678). Earlier research focussed on the tendency for individuals with OCD to underestimate the capacity to cope with a potential threat (Carr, 1974; McFall & Wollersheim, 1979). More recent research has investigated overestimation of the likelihood of potential harm and possible dreadful consequences of the harmful event if it occurred (Freeston et al., 1996; Jones & Menzies, 1998; Krochmalik, Jones & Menzies, 2001; Salkovskis, 1985). In relation to threat estimation, responsibility beliefs also contribute to OCD pathology. For instance, if dysfunctional thought is appraised as more likely to occur, an inflated sense of personal responsibility is often activated that may further perpetuate the

obsessional thought (Thordarson & Shafran, 2002). Inflated responsibility beliefs have been defined as

*Belief that one is especially powerful in producing and preventing personally important negative outcomes. These outcomes are perceived as essential to prevent. They may be actual, that is, having consequences in the real world, and/or at a moral level. Such beliefs may pertain to responsibility for doing something to prevent or undo harm, and responsibility for errors of omission and commission (OCCWG, 1997, p.678).*

Literature suggests that overestimation of threat correlates with beliefs associated with an inflated sense of responsibility leading to threat estimation in the form of obsessions. These in turn precipitate heightened anxiety and the individual resorts to an avoidant coping response resulting in compulsive behaviour (Menzies et al., 2000).

(iii) *Perfectionism/Certainty* refers to a preoccupation with beliefs relating to certainty and correctness with intolerance of imperfection, where mistakes are considered to bring about serious consequences and marked inability to cope with unpredictable situations. Example items from the OBQ include “*If I’m not absolutely sure of something, I’m bound to make a mistake*”, “*It’s essential for me to consider all possible outcomes*” (OCCWG, 2001).

Perfectionism refers to “*Belief that (1) there is a perfect solution to every problem; (2) that doing something perfectly (mistake-free) is possible and necessary; and (3) that even minor mistakes have serious consequences*” (OCCWG, 1997, p 678). Perfectionism has been a defining feature of OCD research with higher scores on perfectionism reported to be associated with avoidance of mistakes and beliefs relating to personal failure (Antony, Purdon, Huta & Swinson, 1998; Ferrari, 1995; Frost & Steketee, 1997; Jones & Menzies, 1998; McFall & Wollersheim, 1979; Norman, Davies, Nicholson, Cortese & Malla, 1998; OCCWG, 1997; Steketee, Frost & Cohen, 1998). This preoccupation with the avoidance of mistakes overlaps with uncertainty

(OCCWG, 2001, 2003). The Intolerance for Uncertainty domain “*encompasses three types of beliefs: (a) beliefs about the necessity for being certain; (b) beliefs that one has a poor capacity to cope with unpredictable change; (c) beliefs about the difficulty of adequate functioning in inherently ambiguous situations.*” (OCCWG, 1997, p.678). Uncertainty beliefs consist of the hallmark trait of OC symptoms, namely “*doubting*” or “*folie du doute*” (Berrios, 1989; Ciarrocchi, 1995). Early research on uncertainty, doubt and OCD attribute it to memory deficit hypothesis. However, recent literature highlights “reduced confidence” in memory abilities to be the cause for doubt and uncertainty on OCD (Brown, Kosslyn, Breitler, Baer & Jenike, 1994; Constans et al., 1995; Dar, 2004; MacDonald, Anthony, MacLeod & Richter, 1997; McNally & Kohlberg, 1993). Research on uncertainty indicates that uncertainty beliefs are significantly higher in clinical OCD as well as GAD samples than controls, while it is unclear if levels of Intolerance of Uncertainty differ between OCD and GAD (Holaway, Heimberg & Coles, 2006).

The majority of empirical studies relevant to the importance/control of thoughts cognitive domain have explored the relationship between OC symptoms and TAF beliefs. Recent research posits an additional cognitive domain closely related to TAF, namely, magical thinking, which is proposed to be separable from importance/control of thoughts and provide unique predictive utility for OCD symptoms (Einstein & Menzies, 2004b). However, unlike the TAF belief domains, magical thinking is a broader construct that also encompasses beliefs relating to superstitions and various other forms of non-scientific belief such as paranormal beliefs, occult practices, and religiosity/spirituality that go beyond scientific explanation of the laws of causality (Amir et al., 2001; Einstein & Menzies, 2004b; Rees et al., 2010). Specific to OCD, magical thinking refers to a general cognitive tendency to ascribe specific meanings to intrusive thoughts that transcend the boundaries of a rational scientific explanation and have a heavy reliance on non-scientific explanations for the causation of an event (Bocci & Gordon, 2007; Einstein & Menzies, 2004b; Hutson, 2008, 2013; Rees et al., 2010; West & Willner, 2011; Yorulmaz et al., 2011). Although these belief domains offer a promising explanation in the understanding of the cognitive processes involved in OCD, high correlations found between them indicate that each domain may not be distinct from

each other and there could be potential overlaps (Clark, 2004, Middleton, 2011). However, the empirical basis of this construct is at a relatively nascent stage and limited research has explored the cultural and clinical significance of this construct in OCD. Exploration of the importance and relevance of this construct in OCD is the focus of this thesis. A detailed discussion of the position of magical thinking and its relationships with other cognitive vulnerability factors will be discussed in more detail in Chapter 2.

## **1.4 Treatment**

Empirically supported treatment modalities for OCD comprise of both pharmacotherapy and evidence-based psychotherapy, with treatment response reported to be often slow and challenging with high relapse rates (Pallanti & Quercioli, 2006; Perugi et al., 1997; Phillips & Hollander, 2008; Saxena, 2011; Skapinakis et al., 2016; Van Ameringen et al., 2014). Only a few controlled studies suggest that a combined treatment approach with pharmacotherapy and Cognitive Behaviour Therapy (CBT) is superior to either treatment modality alone for OCD (Hembree et al., 2003; Foa et al., 1995).

### **1.4.1 Pharmacotherapy**

The earliest evidence-supported pharmacotherapy for OC symptoms was Clomipramine, a tricyclic antidepressant and a non-specific serotonin reuptake inhibitor (Fineberg, Shivakumaran, Roberts, & Gale, 2005; Husted & Shapira, 2004). Pharmacological literature on OCD highlights selective serotonin reuptake inhibitors (SSRI) such as Fluoxetine, Fluvoxamine, Paroxetine, Citalopram, Escitalopram and Sertraline as the pharmacological treatment of choice for OCD (Fineberg, Bullock, Montgomery, & Montgomery, 1992; Piccinelli, Pini, Bellantuono, & Wilkinson, 1995; Pittenger, & Bloch, 2014). While few studies indicate the SSRI Fluvoxamine to be more efficacious (Brown, Pampaloni, Reghunandan & Fineberg, 2012; Etain & Bonnet-Perrin, 2001; Stanley & Turner, 1995), literature does not provide enough support on whether fluvoxamine differs from other SSRIs with regards to effectiveness in treating OC symptoms (Geller, Biederman, Stewart, Mullin, Martin, Spencer & Faraone, 2003; Pittenger, & Bloch, 2014). A comprehensive review conducted by Pittenger, and Bloch (2014) suggests

that there is no evidence of the differential benefit among all the SSRIs and that the choice is dependent on multiple other considerations such as side effects, drug interaction and patient preference. Although SSRIs are considered to be the first line of treatment (along with CBT) for OCD in view of their more benign side-effects and safety profile, clomipramine continues to be prescribed for some cases (Pittenger, Kelmendi, Bloch, Krystal, & Coric, 2005).

### **1.4.2 Psychotherapy**

Cognitive Behaviour Therapy (CBT), predominantly exposure and response prevention (ERP), is the psychotherapeutic treatment of choice for OCD across all ages with large effect sizes consistently reported in meta-analyses (Baer & Minichiello, 1998; Foa, Steketee, Grayson, Turner, & Latimer, 1984; National Institute for Health and Care Excellence [NICE], 2005, 2013). Exposure and Response Prevention (ERP) is based on behavioural theory and results in a 60-70% improvement rate for symptom reduction (Clark, 2004; Jenike, 2001). ERP builds on the notion that habituation to the fearful stimuli reduces the performance of the compulsions. Although the effectiveness of ERP makes it the psychological treatment of choice, there is a high non-compliance rate with ERP due to the aversive nature of the intervention (Jones & Menzies, 1998a; Kircanski & Peris, 2015; Lee & Rees, 2011; Stanley & Turner, 1995).

Due to the high drop-out rate in ERP and the lack of theoretical support for the behavioural model underpinning it, researchers have turned to cognitive therapy approaches as an alternative approach to treatment (Eysenck, 1994; Wilson & Rachman, 1983). Cognitive therapy for OCD involves assisting the client to challenge common cognitive distortions (e.g., responsibility, over-estimation of threat) seen in this group of patients. This is combined with the use of behavioural experiments designed to directly challenge the distorted cognitions. There is some support for the effectiveness of cognitive therapy alone in treating OCD (Jones & Menzies, 1998; Macatee et al., 2016; Ponniah, et al., 2013; van Open, de Haan, van Balkom, Hoogduin, & van Dyck, 1995) although many head to head comparisons of cognitive therapy and ERP show no difference in outcomes (Belloch, Cabedo & Carrio, 2008; Ost, Havnen, Hansen & Kvale, 2015).

A further development in the exploration of cognitive approaches to treat OCD is the metacognitive approach, which turns away from efforts to modify distorted cognition and instead focuses on modifying unhelpful thinking processes proposed to maintain OCD (Wells, Myers, Simons & Fisher, 2017). This approach has been described as one of the third-wave cognitive-behavioural treatments along with Acceptance and Commitment Therapy (ACT) and mindfulness-based therapies, all of which focus on modifying a person's relationship to their thoughts (Ost et al., 2015). There is accumulating evidence for these approaches. For example, a significant reduction in obsessive-compulsive symptoms has been reported following 12 sessions of metacognitive therapy in two open trials (Fisher & Wells, 2005, 2008; Rees & Van Koesveld, 2008). Additionally, there is empirical support for the effectiveness of Exposure therapy for OCD from an Acceptance and Commitment Therapy (ACT) framework (Twohig et al., 2015). Within the broad classification of CBT, ACT promotes psychological flexibility by targeting six core processes to reach therapeutic goals, that is, acceptance, cognitive diffusion, awareness of the present moment, self as context, values, and committed action (Hayes, Levin, Plumb-Villardaga, Villatte, & Pistorello, 2013; Twohig, Morrison, & Bluett, 2014; Twohig, Woidneck, & Crosby, 2013). From an ACT perspective, incorporating exposure activities target interaction with the feared stimuli in novel and more functional ways via direct confrontation with the feared stimuli without engaging in the compulsive ritual so that the client can engage in the values that are more important to them (Arch, Eifert, Davies, Villardaga, Rose & Craske 2012; Twohig et al., 2014, 2015).

Approaches to ERP also continue to evolve. The Inhibitory learning model of ERP (Abramowitz & Arch, 2014; Jacoby & Abramowitz, 2015) de-emphasises fear habituation and aims to introduce an alternative, non-threatening association to the originally feared stimuli (Abramowitz & Arch, 2014; Arch & Abramowitz, 2014, 2015; Craske, Treanor, Conway, Zbozinek & Vervliet, 2014). Evidence supporting this model indicates improved relapse prevention as this model strives to develop new non-threatening associations to the feared stimuli that effectively compete with fear associations, unlike the rationale of the weakening of the fearful association in traditional ERP (Craske et al., 2012, 2014).

To summarise, a comprehensive multidimensional meta-analysis on pharmacological and psychotherapeutic intervention for OCD for studies published between 1980 to 2001 concluded that among the range of psychotherapeutic and pharmacological interventions, individual behaviour and cognitive therapies, clomipramine and other SSRIs are effective for OCD (Eddy, Dutra, Bradley, & Westen, 2004). Recent evidence-based recommendations as well as guidelines provided by The National Institute of Health and Excellence, ERP is indicated as the gold standard psychological treatment for OCD with greater success rates (Anderson & Rees, 2007; Macatee et al., 2016 ; NICE, 2013; Ponniah, Magiati, & Hollon, 2013; Volpato Cordioli et al., 2003;). Although cognitive theory provides the foundation for understanding dysfunctional beliefs in the development and maintenance of OCD, targeting cognitive distortions alone does not appear to be more efficacious compared to ERP alone (Macatee et al., 2016; Ponniah, et al., 2013). Conversely, few controlled studies comparing ERP and Cognitive Therapy suggests that Cognitive therapy is more effective when challenging prominent dysfunctional intrusive obsessions in OCD as opposed to overt compulsions (Belloch et al., 2008; Chambless & Hollon, 1998; Jones and Menzies, 1998; Whittal, Thordarson & McLean, 2005; Whittal, Woody, McLean, Rachman, Robichaud, 2010).

### **1.5 Chapter Summary**

The strong empirical foundation of the cognitive appraisal model has made it the dominant model in the conceptualisation of OCD in recent years (Frost, Novara & Rheaume, 2002; Purdon & Clark, 2002; Salkovskis, 1985, 1999; Rachman, 1993, 1997). Central tenets in the cognitive appraisal models emphasise the role of cognitive constructs in understanding cognitive vulnerability to OCD. Until recently, the belief domains identified by the OCCWG were considered pivotal in understanding the cognitive foundations of OCD. However, recent studies investigating the belief domains in OCD recognise that magical thinking may play an important role in understanding the disorder, although this research has lagged behind that of other cognitive constructs such as inflated responsibility. This issue will be discussed in more details in subsequent chapters of this thesis.

Based on the existing literature on the role of cognitions specific to OCD, there appears to be an overlap among the cognitive constructs specific to OCD. Less is known about the unique role of magical thinking to the cognitive vulnerability to OC symptoms. This forms the main research question of this doctoral thesis.

## **1.6 Thesis Overview**

This thesis, therefore, aims to comprehensively explore the cognitive construct of magical thinking and its contribution to OCD. A series of four studies investigate this relationship via a mixed-method research design with each study linking to the subsequent studies.

**Study 1:** The relationship between magical thinking and obsessive-compulsive symptoms: a systematic review.

This systematic review specifically examines the strength of association between magical thinking and obsessive-compulsive (OC) symptomatology. Using the PRISMA guidelines for reporting the flow of information retrieved using predefined MeSH terms in select databases, results of this review positions magical thinking and its contribution to OC symptoms alongside other cognitive constructs in OCD.

**Study 2:** Cross-cultural exploration of magical thinking in OCD using the Illusory Beliefs Inventory (IBI)

This study aims to explore the cognitive construct of magical thinking measured by the IBI with a transcultural perspective. Comparisons were drawn between Indian (holistic-thinking culture) and Australian (analytic-thinking culture) cultures (Hofstede, 2011; Markus & Kitayama, 2010; Varnum, Grossmann, Kitayama, & Nisbett, 2010; Zhu & Han, 2008). This study hypothesises that there will be cross-cultural differences in the understanding of the construct of magical thinking measured by the IBI.

**Study 3:** Does magical thinking uniquely contribute to Obsessive-Compulsive symptoms? A Model Testing Study in Australia and India

Extending on the factor structure established cross-culturally in the previous study, this is a model testing study that aims to comprehensively explore the construct of magical thinking in OCD in India and Australia. This study aims to answer the following questions; (a) Does Magical thinking provide a unique contribution to the latent cognitive vulnerability for OC symptoms, (b) Does magical thinking uniquely predict OC symptoms after accounting for the established cognitive constructs identified by the OCCWG?

**Study 4:** Lived experiences of magical thinking from people with OCD

This qualitative study using Interpretative Phenomenological Analysis (IPA) aims to explore and understand the phenomenon of magical thinking and its relationship to current obsessions and compulsions in a clinical population.

To date, (a) no systematic reviews have been conducted to understand strength of the relationship between magical thinking and OCD symptomatology, (b) no studies have been conducted in India to explore magical thinking in OCD and to examine the impact of culture on this relationship, (c) no studies have investigated magical thinking and its contribution to cognitive vulnerability of OC symptoms alongside the established belief domains implicated in OCD, and (d) no qualitative studies have been conducted to explore how magical thinking manifests in the clinical population. The present research has important implications for advancing the understanding of the cognitive beliefs and its role in the development and maintenance of OCD.

## CHAPTER TWO: THE RELATIONSHIP BETWEEN MAGICAL THINKING AND OBSESSIVE-COMPULSIVE SYMPTOMS: A SYSTEMATIC REVIEW.

### **Registered Protocol (see Appendix IX):**

Barkataki. B., Rees. C.S., McEvoy. P., Hasking. P. (2016) Magical Thinking: how important is it in predicting obsessive-compulsive symptomatology? A systematic review.

PROSPERO 2016 CRD42016037832 Available from:

[http://www.crd.york.ac.uk/PROSPERO/display\\_record.php?ID=CRD42016037832](http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42016037832)

### **Published Abstract (see Appendix XIII)**

Barkataki, B., Rees, C., McEvoy, P., Hasking, P. (2016). Magical thinking: How important is it in predicting obsessive-compulsive symptomatology? A systematic review. *Indian Journal of Social Psychiatry*, 32(4), 420. Abstract retrieved from

[http://iasp.org.in/oldsite/public\\_html/IJSP\\_Abstract\\_Oct-Dec%202016%20For%20CTP.pdf](http://iasp.org.in/oldsite/public_html/IJSP_Abstract_Oct-Dec%202016%20For%20CTP.pdf)

## **2.1 Chapter Linking Statement**

The previous chapter provided an overview of OCD and dominant psychological models and treatment approaches. As discussed, the cognitive model is the dominant psychological model of OCD. Whilst this model incorporates thought-action fusion, it does not include the broader cognitive schema of magical thinking. The purpose of this study (Study one) is to systematically review the existing literature to identify all published empirical studies that have investigated the relationship between magical thinking and OC symptoms. This review will provide information about the distinctions and possible overlaps between magical thinking and other cognitive constructs associated with OC symptoms, methodological approaches used to date, and the quality of evidence derived from these studies.

## 2.2 Introduction

As discussed in Chapter one, three key cognitive domains have been implicated in the development and maintenance of OCD namely; (1) importance/control of thoughts, (2) responsibility/threat estimation, and, (3) perfectionism/certainty (Obsessive Compulsive Cognitions Working Group, OCCWG, 1997). Recent research suggests that an additional cognitive domain, magical thinking, may provide unique predictive utility for OCD symptoms. The main aim of this paper is to systematically review the existing evidence that magical thinking (a) is associated with OCD symptoms, and (b) explains unique variance in OCD symptoms after controlling for other cognitive domains.

### 2.2.1 What is Magical Thinking?

The word magical originates from the Greek word *magos* (*fem. of magikos*) referring to a member of the learned and priestly class, with its Proto-Indo-European roots of Old Persian (*magh= to be able, have power*). In the middle ages, magical (Lat. *-magike*) was described as the “art of influencing or predicting events and producing marvels using hidden natural forces”, a legitimate practice to manipulate natural forces (magic, n.d.). Although unreasonable to the modern mind, a world without magic was inconceivable to ancient civilisations. Magical beliefs of wearing lucky charms and amulets, fear of curses, and evil spirits have been well-documented for the ancient civilisations in anthropological literature (Boyer, 1994, 2003; Jahoda, 1969; Seligman, 1948; Tambiah, 1990). Magical beliefs prevailed for centuries as a culturally acceptable tradition in all ancient societies like Egypt, India and Greece where diseases were known to be cured by magic. For instance, in ancient Egypt, *Heka* was the God of magic as well as medicine, and magical practitioners (*Sau*) specialised in treating unknown diseases operated out of *Per-Ankh* ("The House of Life"), a part of a temple where these magical practices were studied, documented, and discussed (Pinch, 2017). In ancient India, *Rigvidhana* (a magico-religious scripture for sorcery) described *Angirasa Brhaspati* (a mythical prophet), as the priestly adviser (*Purohita*) or magician of the gods. Through his communion with the Devine, he was known to perform magic that enabled the

medicinal plants to heal man from pain and misery (Norman, 1982). Likewise, in ancient Greece, *Oracles* (Devine Prophets) were inspired by the Gods to offer predictions, and ritualistic sacrifices were suggested for harm prevention (Subbotsky, 2004). Thus, in any given era, magical thinking was evident in situations that were beyond one's control and every civilisation operated it as the culturally accepted truth, often reinforced by religious or spiritual belief systems.

The European Renaissance led to a paradigm shift from magical thinking being considered as a universal phenomenon towards the current world of scientific and rational thinking (Lindeman & Svedholm, 2012). While the traditional societies endorsed spiritual powers to natural objects and elements, modern Western cultures recognised scientific laws to govern physical causality (Lindeman & Svedholm, 2012; Midelfort, 1991). Evidence suggests that beliefs in magic, witchcraft, astrology, palm reading, and all sorts of paranormal phenomena are still widespread among people living in cultural environments dominated by modern technologies (Bem & Honorton, 1994; Zusne, 1989, 2014). Magical thinking is acknowledged to coexist with rational reasoning and often emerges at times of uncertainty and has adaptive functions, such as providing a sense of hope and illusory control (Langer, 1975; Rozin, Markwith, & Nemeroff, 1992; Subbotsky, 2001, 2004, 2010; Zusne & Jones, 1989). For instance, walking under a ladder brings bad luck, unlucky 13, belief in Zodiac symbols, Feng Shui, praying to The Almighty when faced with life-threatening situations. In addition to functioning as a protective factor for problems of an emotional nature for the general population, empirical research identifies the overvalued dependence on magical thinking to be associated with psychiatric conditions such as psychoses, schizotypy and OCD (Bolton et al., 2002; Emmelkamp & Aardema, 1999; Lee et al., 2005; Muris & Merckelbach, 2003; Sobin et al., 2000; Tolin et al., 2001, 2003, 2008). Exploring the phenomenon of magical thinking and its relationship to OCD is the focus of this thesis.

Literature on magical thinking in OCD encompasses other similar concepts that describe a non-scientific phenomenon such as paranormal, supernatural and superstitious beliefs. Paranormality as a phenomenon is conceptualised as any occurrence that violates the science of nature (Paranormal, n.d.), while supernatural ascribes a religious nuance describing any phenomenon that was beyond the realm

of nature (Supernatural, n.d.). Superstitions (lat. *Superstitio*= standing over a thing in amazement or awe), are unsupported belief systems that have prevailed for years among people that contrast the progressive views of science (Vyse, 1997). Closely tied to magical beliefs are the concepts of religiosity, spirituality and scrupulosity. Studies indicate an interplay between religiosity, spirituality and scrupulosity in OC symptoms (Warshowsky, 2007). The term Religiosity reflects the various intrinsic and extrinsic aspects of organised religious doctrines, values and practices offered by a formal organised religion or cult (Agorastos et al., 2012; Sharma, 2009). Conversely, Spirituality is a complex, multi-dimensional construct independent of organised religion and is suggested to be a transcultural element of human beliefs and experiences (Agorastos et al., 2012). These spirituality beliefs provide autonomy and subjective meaning related to the Divine, self and the world (Sharma, 2009). In addition, Scrupulosity is defined as obsessive behaviour (related to doubts and sins) among religious individuals with an irresistible urge to perform excessive religious rituals (Warshowsky, 2007). Therefore, all the definitions commonly relate to unsupported beliefs of science that can be considered as categories under the broad umbrella of magical thinking and are not fundamentally different (Dag, 1999; Darwin, Neave, & Holmes, 2011; Hergovich, 2003; Lindeman & Svedholm, 2012; Peltzer, 2003; Roberts & Seager, 1999).

### **2.2.2 Magical thinking as a cognitive construct**

Magical thinking or magical ideation has been defined as: “*the erroneous belief that one’s thoughts, words, or actions will cause or prevent a specific outcome in some way that defies commonly understood laws of cause and effect*” (APA, 2000, p. 824). Empirical research has found magical thinking to be associated with a wide spectrum of psychiatric conditions such as psychoses, schizotypal traits (Dag, 1999; Eckblad & Chapman, 1983), trait anxiety and dissociative episodes (Wolfradt, 1997). In the context of OCD, magical thinking refers to a general cognitive tendency to ascribe specific meanings to intrusive thoughts that transcend the boundaries of a rational scientific explanation and have a heavy reliance on non-scientific explanations for the causation of an event (Bocci & Gordon, 2007; Einstein & Menzies, 2004b; Hutson, 2008; Rees, Draper, & Davis, 2010; West & Willner, 2011; Yorulmaz, Inozu, & Gultepe, 2011).

Magical thinking is considered a part of normal childhood cognitive development and was first described by Piaget who postulated that it constituted the stage of pre-operational thought and remains until the concrete operational period (Piaget, 1929). He described magical thinking as the “*process by which children believe they can modify reality through participation*” (p. 157). Although magical thinking is expected to decline with the development of logical reasoning as one progresses through the developmental stages, evidence suggests that magical thinking continues to operate throughout the lifespan regardless of cognitive maturity or educational attainment (Markovits & Vachon, 1989; Rozin, Millman, & Nemeroff, 1986; Subbotsky & Quinteros, 2002). For example, an adult can revert to magical thinking in order to manage uncontrollable threat and uncertainty with a need to retain illusory control (Simonds, Demetre & Read, 2009). Subotsky (2004) suggests magical thinking can offer a sense of hope at times of uncertainty. As such, it is possible to hold two conflicting beliefs concurrently, one more rational (e.g., “Death is final”), the other more intuitive and resistant to a logical argument (e.g., “The soul continues to exist though the body may die”) (Lindeman & Aarnio, 2007).

### **2.2.3 Magical thinking, over-importance of thought and thought-action fusion**

Magical thinking appears to be most closely aligned with the importance/need to control thoughts domain. Over-importance/control of thoughts refers to unrealistic fears of possible negative outcomes occurring due to intrusive thoughts and the need to control them (OCCWG, 1997, 2005). Rachman (1997) argued that the development of obsessions occurs when an individual holds the belief that thoughts are meaningful and important and may result in serious consequences if ignored. For example, an intrusive thought, such as a loved one being in a car accident, will cause distress if the thought is appraised as important and meaningful. Magical thinking adds an important dimension to such an example because, if in addition to the belief that thoughts are important, the person also believes that the accident can occur in ways that defy laws of cause and effect, it follows that distress will be heightened. Magical thinking is a broader construct than over-importance because it includes more than just the belief that thoughts are

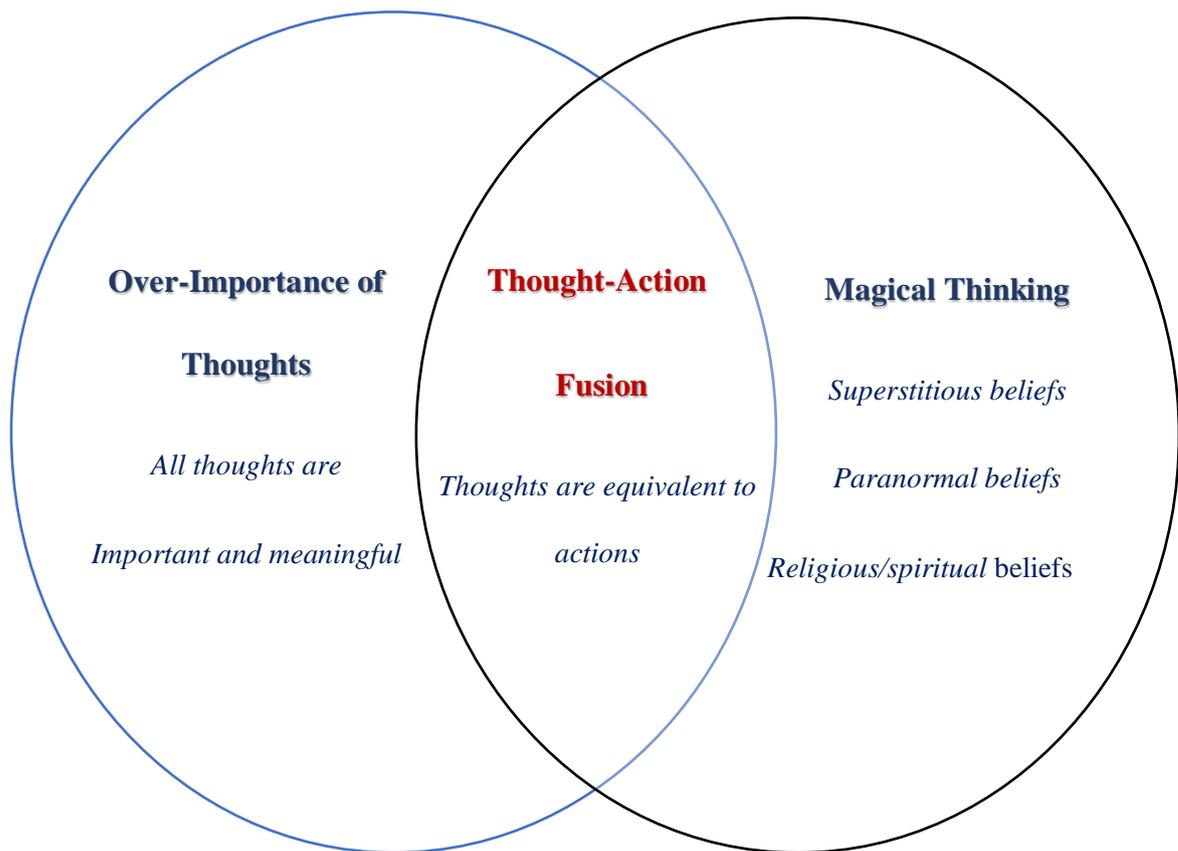
powerful/important. Magical thinking also includes belief in superstitions and various other forms of non-scientific belief such as paranormal beliefs, occult practices, and religiosity/spirituality that go beyond scientific explanation of the laws of causality (Amir, Freshman, Ramsey, Neary, & Brigidi, 2001; Einstein & Menzies, 2004b; Rees et al., 2010).

The OCCWG highlighted the important distinction between beliefs and appraisals stating that,

*According to cognitive theory, beliefs about responsibility, control and importance of thoughts, threat, uncertainty and perfectionism represent enduring trait-like conceptions about the role and function of unwanted distressing intrusive thoughts, images or impulses. Appraisals, on the other hand, are thought to reflect the immediate, situational cognitive processing of specific intrusions into consciousness” (OCCWG, 2003, p.875).*

One such appraisal that is considered a part of the over-importance of thoughts domain is thought-action fusion (TAF; Hezel & McNally, 2016). Related to these beliefs, thought-action fusion refers to the predisposition of treating thoughts and actions alike and concerns both the belief that thinking about an event increases the possibility of the occurrence of the event (TAF-Likelihood), and the belief that immoral thoughts are equivalent to immoral actions (TAF-Moral; Shafran, Thordarson & Rachman, 1996). TAF appears to exist on a continuum, with TAF severity being positively associated with severity of negative affect in both clinical and non-clinical populations (Abramowitz, Whiteside, Lynam, & Kalsy, 2003; Rees et al., 2010). Research has consistently found a relationship between obsessive-compulsive symptoms and thought-action fusion (Berle, 2006; Berle & Starcevic, 2005; Moulding & Kyrios, 2007; Myers, Fisher, & Wells, 2008; OCCWG, 1997, 2005). Although TAF is considered to play a key role in the development and maintenance of intrusive thoughts in OCD, TAF-Likelihood is reported to have a stronger relationship with OCD than TAF-Moral (Amir et al., 2001; Rassin, Merckelbach, Muris, & Schmidt, 2001; Rees et al., 2010; Yorulmaz, et al., 2011).

While it has been proposed that TAF is a specific misappraisal associated with beliefs about the over-importance of thoughts (Hezel & McNally, 2016), it has also been proposed that TAF occurs in the context of magical thinking. Einstein and Menzies (2004b) propose that thought-fusion beliefs are simply a sub-set of magical thinking. Yet, although magical thinking and TAF are significantly associated with each other (Einstein & Menzies, 2004a, 2004b), there is a substantial proportion of unshared variance among the two constructs (Rees et al., 2010). *Figure 1* presents a schematic diagram of the relationship between the constructs of magical thinking, over-importance of thoughts and thought-action fusion.



*Figure 1.* Schematic of the relationship between magical thinking, over-importance of thought, and thought-action fusion.

*Figure 1* is based on the conceptualisation of Obsessive Compulsive Cognitions Working Group (1997) that emphasise beliefs to be enduring trait-like constructs about the role and function of unwanted distressing intrusive thoughts, images, or impulses. In contrast, appraisals reflect the immediate, situational cognitive processing of specific intrusions into consciousness.

#### **2.2.4 Measures of Magical Thinking**

A range of measures have been used to assess the construct of magical thinking in OCD in adults such as the Magical Ideation Scale (MIS; Eckblad & Chapman, 1983), Paranormal Beliefs Scale (PBS; Tobacyk and Milford, 1983), and Illusory Beliefs Inventory (IBI; Kingdon, Egan and Rees, 2011). Eckblad and Chapman's (1983) Magical Ideation Scale (MIS) has been the most extensively used measure of magical thinking. This 30-item "true-false" scale encompasses a wide range of superstitious beliefs and magical phenomena, for example, beliefs in

telepathy or paranormal beliefs in reincarnation. However, the items in the MIS assess schizotypal symptoms including thought broadcasting, depersonalisation and thought-reading. Example items include- *“I have had the momentary feeling that I might not be human”*; *“I have occasionally had the feeling that TV or radio broadcaster knew what I was listening to”*; *“I have felt that there were messages for me in the way things were arranged, like in a store window”*. Therefore, the items in MIS may have questionable construct validity in assessing magical thinking in OCD since the scale was originally designed to measure the expression of magical thinking in schizotypy and not OCD.

The 25-item Paranormal Beliefs Scale (PBS) developed by Tobacyk and Milford (1983) and revised by Tobacyk (2004) assesses beliefs in paranormal phenomena like clairvoyance, precognitions, superstitions, spiritualism, traditional religious beliefs, and extra-terrestrial existence. Example items include *“Soul continues to exist though the body may die”*; *“Some individuals are able to levitate (lift) objects through mental forces”*; *“It is possible to communicate with the dead.”* Although this scale measures some aspects of magical thinking such as superstitions and religious beliefs, it does not include items related to thought-action fusion, which constitutes an important parameter of magical thinking in OCD.

The 24-item Illusory Belief Inventory (IBI; Kingdon et al., 2011) measures magical thinking specific to OCD. Validation studies conducted on the IBI report stable psychometric properties with good test-retest reliability ( $r = .94$ ), high internal consistency ( $\alpha = .92$ ), and good discriminant validity (Shihata, Egan, & Rees, 2014). The three subscales in the IBI assess magical beliefs (general magical and superstitious beliefs), spirituality (religious philosophies and belief in spiritual presence), and internal state-thought fusion (TAF, including appraisal of intuitive states and premonitions). Example items of each respective subscale include- *“Magical forces have impacted my life”*; *“I use prayers to ward off misfortune”*; *“If I think too much about something bad, it will happen”*. As such, the IBI is the only measure that comprehensively encompasses all the elements of magical thinking, namely, superstition, religiosity, magical beliefs, and TAF. However, the IBI is a relatively new measure that has not been widely used and its psychometric properties need to be tested in independent non-clinical and clinical samples.

Other scales have been used to measure related, discrete aspects of magical thinking. The Thought-Action Fusion Scale (TAFS; Shafran et al., 1996) assesses the thought-action fusion component of magical thinking, the Lucky Beliefs and Lucky Behaviour Scale (LBBS; Frost, Krause, McMahon, Peppe, Evans, McPhee, & Holden, 1993) to assesses a range of non-scientific beliefs and behaviour, the Superstitiousness Questionnaire (Zebb & Moore, 2003) measures the superstitiousness parameter of magical thinking, and the Penn Inventory of Scrupulosity (PIOS; Abramowitz et al., 2002) measures religiosity

However, the Magical Thinking Questionnaire (MTQ; Bolton et al., 2002), is the only inventory that was designed to specifically assess magical thinking in the paediatric population (age 5 to 17 years). This measure consists of 30-items with two subscales with 10 items each. The “*Thoughts*” subscale consists of items indicating TAF-Likelihood (e.g. “*Is it possible to move an object across a room just by thinking about it?*”). The “*Actions*” subscale consists of questions relating to possibilities for specific actions to cause a specific event (e.g., “*Is it possible to do really well at a test at school just by crossing your fingers?*”). The remaining 10 items test physical causal principles to assess responding biases. Respondents are required to answer with a “Yes”, “No” or a “Maybe” response and is scored. Although in a small sample ( $N = 17$ ) the MTQ is reported to provide good test-retest reliability ( $\alpha = .90$ ). However, there are no validation studies confirming the psychometric properties of the measure.

### **2.3 The current study**

The majority of research to date has examined TAF and OCD with far fewer studies examining the broader construct of magical thinking in OCD. Exploring the relationship between magical thinking and OCD has the potential for improving understanding of the development and maintenance of the disorder, and identifying an additional treatment target. The aim of this review is to systematically identify all published studies that have examined the relationship between obsessive-compulsive (OC) symptoms and magical thinking and to determine the strength of the relationship. The specific research questions are: 1) What is the strength of the association between magical thinking and OC symptoms? 2) Does magical thinking make a unique contribution to explaining OC symptomatology?

## 2.4 Method

### 2.4.1 Search strategy and selection criteria

A search strategy was registered with the International Prospective Register of systematic reviews (PROSPERO 2016: CRD42016037832; *see* APPENDIX IX). The systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (Moher, Liberati, TetzlaffJ, Altman, the PRISMA group, 2009). Electronic databases for published literature (Medline [Ovid], PsychArticles [Ovid], PsycINFO [Ovid], ProQuest, Science Direct, Taylor and Francis Online, Embase, Pubmed, Cochrane, CINAHL) and grey literature (espace, WorldCat, Trove, Grey Literature Report, Open Grey, Grey Net International) were systematically searched for studies published until November 2017, which examined magical thinking and Obsessive-Compulsive Symptoms. Search terms were customized to each database and included the following MeSH terms (*see* APPENDIX VIII);

“Magical thinking” Or “Magical Ideations or “Magical beliefs\*” AND “Obsessive-compulsive disorder\*” or “OCD” or Obsessions or Compulsions; “Obsessive-compulsive disorder\*” or “OCD” or Obsessions or Compulsions AND “superstition” or “religiosity” or “scrupulosity” or “paranormal” or “religious experiences” or “occult\*” or “spirit possession”; “thought-action fusion\*” or “inflated sense of responsibility” or “overestimation of threat” or “over importance of thought” or “control” or “perfectionism” or “uncertainty”.

All articles with the above-mentioned MeSH terms with its association to magical thinking and OCD appearing in either the abstract or the title were identified in the broad search. Boolean operators like AND, OR and truncation symbols were used to specify the search and to map any possible related term that might appear in the literature.

### 2.4.2 Inclusion and exclusion criteria

Studies were included if they met the following criteria: (1) Published or grey literature that aimed to examine relationships between magical thinking and obsessive-compulsive (OC) symptoms, regardless of age group studies; (2)

Published or grey literature that studied magical thinking in relation to the other existing cognitive constructs in association with OC symptoms. Studies were excluded if they (1) used qualitative designs or were case reports, expert opinions or consensus statements; (2) studied magical thinking in relation to other psychological conditions, for example, eating disorders, psychosis, personality disorders, hoarding disorder; (3) consisted of non-scientific literature such as newspaper reports and magazine articles. Uncertainties regarding study inclusion/exclusion were resolved via discussion between the authors.

### **2.4.3 Data extraction**

The database searches, study selection, title, and abstract review were undertaken by the first author (BB). To enhance rigour, 10% of all full texts were independently reviewed by a second author (CR), and an agreement was reached in all cases. Data were systematically extracted (see *Figure 2*) as per the PRISMA guidelines (Moher, Liberati, Tetzlaff, & Altman, D.G., [The PRISMA Group], 2009) and recorded in tables (see Table 1 and Table 2) to aid comparison and synthesis. Key variables included: study characteristics, sample characteristics, primary measure of magical thinking, other outcome and sample measures, country of origin, study design and data analysis, main findings and aspects of methodological quality.

### **2.4.4 Data synthesis**

Due to the significant heterogeneity of samples and measurements across the studies, a narrative synthesis was selected as the most appropriate analytical technique. The synthesis was conducted following the Guidance on the Conduct of Narrative Synthesis in Systematic Reviews (Popay, Roberts, Sowden, Petticrew, Arai, & Rodgers, 2006). Studies were grouped according to samples (clinical and non-clinical). Study quality was assessed using the QualSyst quality appraisal tools (Kmet, Lee, & Cook, 2004). According to the QualSyst checklist, each study was scored out of 1 with quality appraised as: limited (less than .50), adequate (.50-.70), good (.70-.80), or strong (greater than .80). Final quality scores, together with the information used in their calculation, are shown in Table 2.

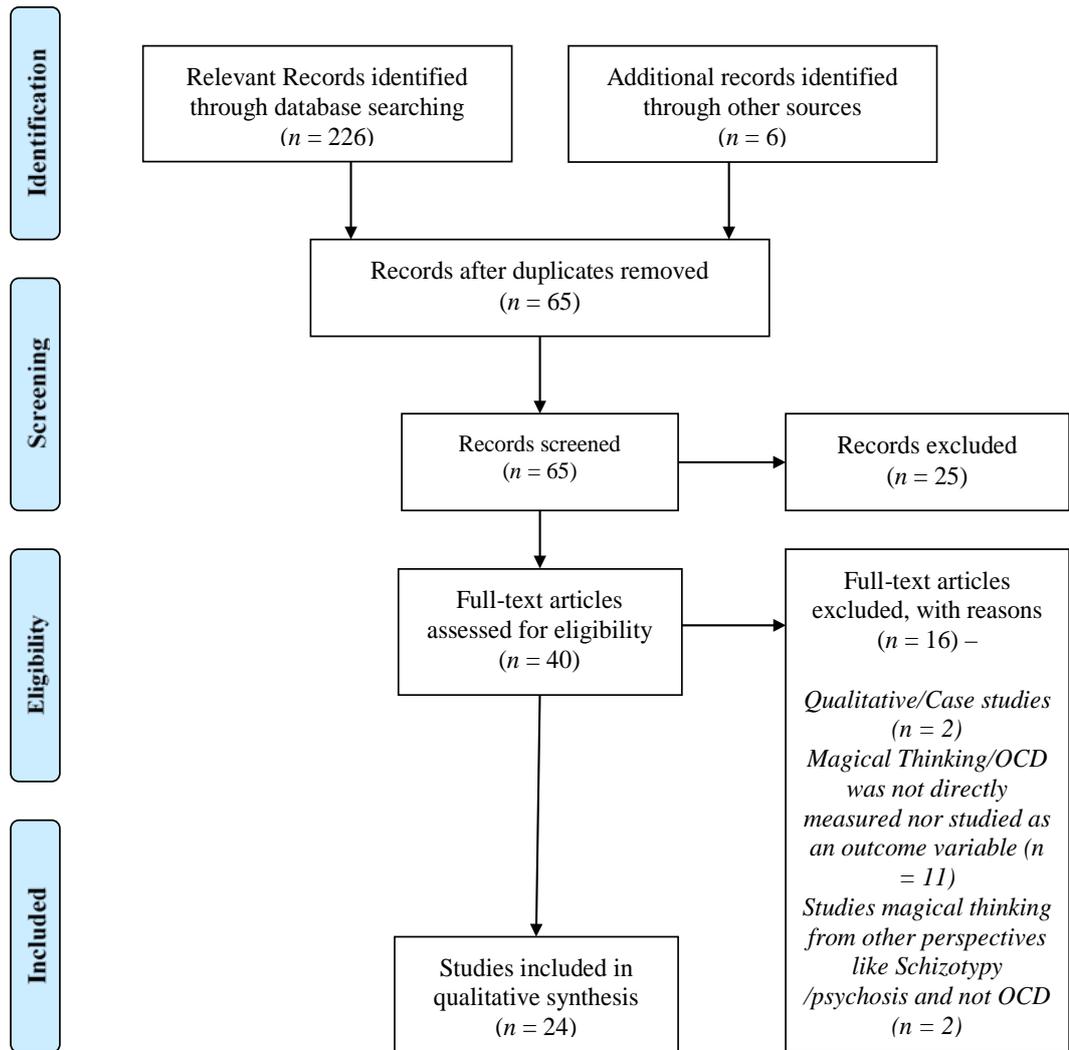


Figure 2. PRISMA Diagram for the systematic review process

## 2.5 Results

### 2.5.1 Results of the systematic search and overview of the included studies

The literature search yielded a total of 232 relevant articles (*Figure 2*). Removal of duplicates, and title and abstract screening, left 40 for full-text screening. Sixteen of these did not meet the eligibility criteria. The most common reason for exclusion was either because magical thinking /OCD was not studied as an outcome/predictor variable or magical thinking was studied from the perspective of psychosis/schizotypy and not specific to OCD. Twenty four studies were deemed eligible for inclusion in the narrative synthesis. All the included studies had a quality rating of  $>.60$ . Among the selected studies exploring the association between magical thinking and OCD, 83% ( $n = 20$ ) used an adult sample (above age 18) and 17% ( $n = 4$ ) were conducted with children (below age 18). Table 1 presents the four paediatric studies and 20 studies conducted with adults that have been included in the review.

Among the paediatric studies on magical thinking and OCD, only one study was conducted using a clinical sample who met the diagnosis for OCD and were seeking treatment while the remainder ( $n = 3$ ) were conducted with community samples of children and adolescents. All paediatric studies were cross-sectional, with one experimental study. The most commonly used measure to assess magical thinking was the Magical Thinking Questionnaire (MTQ; Bolton et al., 2002). Obsessive-compulsive symptoms were assessed using a variety of different measures. Results reported in the studies were typically descriptive statistics along with correlational analyses. The sample sizes of these studies were between 31 and 127 with the mean age of participants being 7.5 years. Among the four included studies, two were conducted in the United Kingdom (UK), one study was from the United States of America (USA) and the only clinical study was conducted in the Netherlands.

Among the literature on magical thinking and OCD in the adult population ( $n = 20$ ), the majority ( $n = 12$ ) were conducted with non-clinical participants, with approximately 67% ( $n = 8$ ) being student samples and approximately 33% community samples ( $n = 4$ ). Of the eight studies that were conducted using a

clinical population, 50% of these compared magical thinking scores between OCD patients and patients with other diagnoses such as panic disorder and generalized anxiety disorder. Most studies ( $n = 15$ ) were cross-sectional and, among those, there was only one cross-cultural study with a matched group design. The rest comprised of one experimental study and four case-control studies. The most commonly used measure of magical thinking was the MIS (Eckbald and Chapman, 1983). Some other measures used to measure magical thinking included the Paranormal Beliefs Scale (PBS; Tobacyk and Milford, 1983), Perceptual Aberration Scale (PAS; Chapman, Chapman, & Raulin, 1978), and Illusory Beliefs Inventory (IBI; Kingdon, Egan and Rees, 2011). Results were typically correlational. The sample sizes of these studies were between 34 and 1194 with the mean age of participants ranging from 18 to 42 years. The majority of the studies were conducted in Australia (35%,  $n = 7$ ) and the USA (25%,  $n = 5$ ), with one cross-cultural study using a matched group design comparing Ireland and Australia (Helgadottir, Menzies, & Einstein, 2012). Three studies explored the cultural impact of magical thinking and OCD in a Turkish population (Eremsoy & Inozu, 2016; Yorulmaz, 2016; Yorulmaz & Inozu, 2016). Other studies were conducted in Europe, namely, United Kingdom ( $n=2$ ), Germany ( $n = 1$ ) and Spain ( $n = 1$ ). All the studies selected were published from 1996 to 2017.

In this review, the findings regarding the relationship between magical thinking and OC symptoms have been summarised and discussed separately for paediatric (non-clinical and clinical) and adult (non-clinical and clinical) samples. The remainder of the results section summarises and synthesises the unique contribution of magical thinking to OC symptomatology. The strength of associations reported is as per Cohen's (1992) conventions.

**Table 1.***Characteristics of the study selected for the systematic review*

| Study ID   | Sample Characteristics |   |                         |                    | Country of Origin | Design          | Primary Measure of Magical Thinking              | Relevant Findings   |
|--|------------------------|---|-------------------------|--------------------|-------------------|-----------------|--|---|
|  | Size                   | Participants  | Clinical / Non-Clinical | Mean Age (in yrs.) |                   |                 |  |   |
| Evans, Milanak, Medeiros & Ross (2002)                 | 31                     | Children between 41 & 98 months                                     | Non-Clinical            | 7.54               | USA               | Experimental    | Hypothetical scenarios involving magical beliefs | MT positively correlated with OC symptom severity (CRI) ( $r = .43, p < .05$ ).   |
| Bolton, Dearsley, Madronal-Luque, & Baron-Cohen (2002) | 127                    | Children & Adolescents grouped into 6 age groups from 5 to 17 years | Non-Clinical            | -                  | UK                | Cross-sectional | MTQ  | MT positively correlated with OC symptom severity (SCAS) ( $r = .41, p < .001$ ). |

|                                      |     |                            |                  |     |             |                     |     |   |
|--------------------------------------|-----|----------------------------|------------------|-----|-------------|---------------------|-----|---|
| Simonds,<br>Demetre &<br>Read (2009) | 102 | Primary school<br>children | Non-<br>Clinical | 7.7 | UK          | Cross-<br>sectional | MTQ | MT positively<br>correlated with OC<br>symptom severity<br>(SLOI-CV) ( $r = .61, p < .001$ )            |
| Verhaak<br>& Haan<br>(2007)          | 39  | Paediatric<br>OCD patients | Clinical         | -   | Netherlands | Cross-<br>sectional | MTQ | Non-significant<br>association ( $r = .17, p > .05$ ) between MT &<br>OCD symptom severity<br>(CY-BOCS) |
| Einstein &<br>Menzies<br>(2004a)     | 86  | Undergraduate<br>Students  | Non-<br>Clinical | 22  | Australia   | Cross-sectional     | MIS | MT positively<br>correlated with OC<br>symptom severity<br>(MOCI, $r = .42$ ; PI, $r = .53$ ).          |

|                            |     |                        |              |       |     |                    |     |   |
|----------------------------|-----|------------------------|--------------|-------|-----|--------------------|-----|---|
| Bocci & Gordon (2007)      | 51  | Undergraduate Students | Non-Clinical | 20.7  | UK  | Experimental study | MIS | Neutralisers (PI) scored significantly higher in MT, $t(46) = 2.63, p > .05$ (two-tailed) than non-neutralisers |
| Warshowsky (2007)          | 50  | Undergraduate students | Non-Clinical | 19.6  | USA | Cross-sectional    | MIS | MT positively correlated with OC symptom severity (OCI) ( $r = .53, p < .001$ )                                 |
| Marino, Lunt & Negy (2008) | 714 | Undergraduate Students | Non-Clinical | 18.53 | USA | Cross-sectional    | MIS | MT positively correlated with OC symptom severity (PI) ( $r = 0.22, p < .01$ )                                  |

|  |     |                        |              |       |                 |  |     |  |
|--|-----|------------------------|--------------|-------|-----------------|--|-----|--|
| Rees, Draper & Davis (2010)            | 137 | Undergraduate Students | Non-Clinical | 27.1  | Australia       | Cross-sectional  | MIS | MT positively correlated with OC symptom severity (OCI-R) ( $r = 0.52, p < .01$ )  |
| Yorulmaz, Inozu & Gultepe (2011)       | 276 | Undergraduate Students | Non-Clinical | 21.44 | Turkey          | Cross-sectional  | PBS | Significant relationships between MT & total OCD scores (PI) ( $r = .17, p > .05$ ) after controlling for anxiety & depression |
| Helgadottir, Menzies & Einstein (2012) | 80  | Undergraduate Students | Non-Clinical | 22.6  | UK vs Australia | Cross-sectional, Cross-cultural (matched-group design) | MIS | MT significantly predicted OC symptom severity (PI) ( $\beta = .19, t(70) = 2.07, p < .05$ )                                   |

|                                       |      |                           |                  |       |           |                 |     |  |
|---------------------------------------|------|---------------------------|------------------|-------|-----------|-----------------|-----|--|
| Kingdon,<br>Egan & Rees<br>(2012)     | 1194 | Community<br>Participants | Non-<br>Clinical | 35.2  | Australia | Cross-sectional | IBI | MT positively<br>correlated with OC<br>symptom severity<br>(OCI-R) ( $r = 0.29, p < .01$ ).  |
| Goods, Rees,<br>Egan & Kane<br>(2014) | 201  | Community<br>Participants | Non-<br>Clinical | 34.94 | Australia | Cross-sectional | IBI | MT positively corelated<br>with OC symptom<br>severity ( $r = 0.30, p < .01$ ). MT accounted<br>for 4.3% of the unique<br>variance ( $\beta = .215, sr^2 = .209, p < .001$ ) in OC<br>symptoms (OCI-R) |

|                              |     |                           |                  |       |        |                 |     |  |
|------------------------------|-----|---------------------------|------------------|-------|--------|-----------------|-----|--|
| Spears<br>(2015)             | 246 | Undergraduate<br>students | Non-<br>Clinical | 19.5  | USA    | Cross-sectional | MIS | MT significant<br>predictor of<br>contamination subtype<br>of OC symptoms<br>(DOCS) ( $\beta = .26$ , $p < .001$ )   |
| Eremsoy &<br>Inozu<br>(2016) | 165 | Community<br>Participants | Non-<br>Clinical | 38.47 | Turkey | Cross-sectional | MIS | MT positively<br>correlated with OC<br>symptom severity ( $r = 0.42$ , $p < .01$ ). MT &<br>worry mediated the<br>relationship between<br>religiosity & OC<br>symptoms (OCI-R)<br>( $SE = .01$ , 95%, CI .01 -<br>.03) |

|                    |     |                    |                  |       |        |                 |               |   |
|--------------------|-----|--------------------|------------------|-------|--------|-----------------|---------------|---|
| Yorulmaz<br>(2016) | 496 | Community          | Non-<br>Clinical | 35.26 | Turkey | Cross-sectional | PBS-Revised   | MT positively correlated with OCD symptom severity ( $r = .23, p < .01$ ). MT contributed to 1% of the total variance in predicting OC symptoms (PI) ( $\beta = .09, t = 2.22, F(1, 471) = 4.94, p < .05$ ) |
| Thomas<br>(2000)   | 75  | OCD adult patients | Clinical         | 38.8  | USA    | Cross-sectional | Per-Mag Scale | MT positively correlated with OC symptom severity (MOCI) ( $r = .23, p < .05$ )   |

|  |     |              |          |       |           |                 |     |  |
|--|-----|--------------|----------|-------|-----------|-----------------|-----|--|
| Tolin,<br>Abramowitz,<br>Kozak, &<br>Foa<br>(2001) | 395 | OCD patients | Clinical | 35.75 | USA       | Case-control    | MIS | Patients with religious obsessions had significantly higher scores on MT than other categories of obsessions (YBOCS); $\chi^2(7) = 24.82, p < .01$ . |
| Einstein &<br>Menzies<br>(2004b)                   | 61  | OCD patients | Clinical | 33    | Australia | Cross-sectional | MIS | MT positively correlated with OC symptom severity [OCI-R, $r = .50, p < .001$ ; PI, $r = .69, p < .001$ ].   |

|  |     |  |                             |                        |           |              |     |  |
|--|-----|--|-----------------------------|------------------------|-----------|--------------|-----|--|
| Einstein & Menzies (2006)  | 71  | OCD-Checkers, OCD - Cleaners, Panic Disorder patients and controls | Clinical & Healthy controls | 38.3, 34.7, 40.4, 37.7 | Australia | Case-control | MIS | Participants diagnosed with OCD scored significantly higher on MT compared to those diagnosed with Panic disorder ( $f = 7.34, p < .009$ ) and healthy controls ( $f = 8.94, p < .004$ ).                        |
| Garcia-Montes, Perez-Alvarez, Balbuena, Perona Garcelan, & Cangas (2006) | 128 | Schizophrenia, OCD, other mental conditions and Healthy controls   | Clinical & Healthy controls | 21, 22, 16, 23, 26, 20 | Spain     | Case-control | MIS | Patients with schizophrenia had significantly higher MT scores than non-clinical controls [ $T(4, 90.27) = 7.62, p = 0.01$ ] but no significant difference between OCD patients and non-clinical controls on MT. |

|                           |    |                      |                             |                   |           |                 |     |   |
|---------------------------|----|----------------------|-----------------------------|-------------------|-----------|-----------------|-----|---|
| Einstein & Menzies (2008) | 34 | OCD patients         | Clinical                    | 38                | Australia | Cross-sectional | MIS | Pre-treatment MT negatively correlated with improvement in OC symptoms following CBT ( $r = -.52, p >.001$ )  |
| West & Willner (2011)     | 74 | OCD, GAD and Control | Clinical & Healthy controls | 36.5, 38.8, 42.79 | UK        | Case-control    | MIS | MT positively correlated with OC symptom severity (OCI-R) ( $r = .40, p < .05$ ). Patients with OCD had significantly higher scores on MT than controls ( $f(2,68) = 7.91, p < .01$ ) and higher but not significantly different from GAD patients. |

|                         |     |  |                             |      |         |                 |                   |  |
|-------------------------|-----|--|-----------------------------|------|---------|-----------------|-------------------|--|
| Agorastos et al. (2012) | 120 | OCD, AD, healthy controls & non-healthy controls | Clinical & Healthy controls | 36.8 | Germany | Cross-sectional | MIS, PBS- Revised | No significant difference between groups noted for MT scores ( $p = .96$ ) |
|-------------------------|-----|--|-----------------------------|------|---------|-----------------|-------------------|--|

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*Note:* UK, United Kingdom; USA, United States of America; CRI, Child Routines Inventory; MT, Magical Thinking, OC, Obsessive-compulsive; OCD, Obsessive Compulsive Disorder, AD, Anxiety Disorder; GAD, Generalised Anxiety Disorder; SLOI-CV, Short Leyton Obsessional Inventory-Child Version; SCAS, Spence's Children's Anxiety Scale; CY-BOCS, Children's Yale-Brown OC Symptom scale; YBOCS, Yale-Brown Obsessive Compulsive Symptom Scale; PI, Padua Inventory; OCI-R, Obsessive-Compulsive Inventory; MOCI, Maudsley Obsessive-compulsive Inventory; DOCS, Dimensional Obsessive-Compulsive Inventory, MIS, Magical Ideation Scale; PBS, Paranormal Beliefs Scale; Per-Mag, Perceptual Aberration Scales and Magical Ideation Scale

**Table 2.**  
*Quality Assessment of the Included Studies*

| Author<br>(Year)         | Question/Objective sufficiently described | Study Design Evident & Appropriate | Method of subject/comparison group selection or source of information/input variables described & appropriate | Subject (and comparison group, if applicable) characteristics sufficiently described | If interventional & random allocation was possible | If interventional & blinding of investigators was possible | If interventional and blinding of subjects was possible | Outcome & exposure measures well defined & robust to measurement | Sample size appropriate | Analytic methods described/justified & appropriate | Some estimate of variance is reported for the main results | Controlled for confounding | Results reported in sufficient detail | Conclusions supported by the results | Total Score |
|--------------------------|---|------------------------------------|---|--|--|--|---|--|-------------------------|--|--|----------------------------|---------------------------------------|--------------------------------------|-------------|
| Evans et.al<br>(2002)    | 2   | 1                                  | 1   | 2  | NA   | NA   | NA  | 2  | 1                       | 2  | 1  | 1                          | 2                                     | 2                                    | .77         |
| Bolton et al<br>(2002)   | 2   | 2                                  | 1   | 2  | NA   | NA   | NA  | 1  | 2                       | 1  | 2  | 0                          | 1                                     | 2                                    | .73         |
| Simonds et. al<br>(2009) | 2   | 2                                  | 1   | 2  | NA   | NA   | NA  | 2  | 2                       | 2  | 1  | 1                          | 2                                     | 2                                    | .86         |

|                                  |   |   |   |   |    |    |    |   |   |   |   |   |   |   |     |
|----------------------------------|---|---|---|---|----|----|----|---|---|---|---|---|---|---|-----|
| Verhaak & Haan (2007)            | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 1 | 2 | 2 | 2 | 2 | 2 | .95 |
| Einstein & Menzies (2004a)       | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 1 | 2 | 1 | 1 | 2 | 2 | .86 |
| Bocci & Gordon (2007)            | 1 | 2 | 1 | 2 | NA | NA | NA | 2 | 0 | 2 | 1 | 2 | 2 | 2 | .77 |
| Warshowsky (2007)                | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 0 | 2 | 2 | 2 | 2 | 2 | .90 |
| Marino, Lunt & Negy (2008)       | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1   |
| Rees, Draper & Davis (2010)      | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1   |
| Yorulmaz, Inozu & Gultepe (2011) | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1   |

|   |   |   |   |   |    |    |    |   |   |   |   |   |   |   |     |
|---|---|---|---|---|----|----|----|---|---|---|---|---|---|---|-----|
| Helgadottir,<br>Menzies &<br>Einstein<br>(2012) | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1   |
| Kingdon,<br>Egan& Rees<br>(2012)                | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1   |
| Goods, Rees,<br>Egan& Kane<br>(2014)            | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1   |
| Spears<br>(2015)                                | 2 | 2 | 1 | 2 | NA | NA | NA | 2 | 0 | 2 | 2 | 0 | 2 | 2 | .77 |
| Eremsoy &<br>Inozu<br>(2016)                    | 2 | 2 | 1 | 2 | NA | NA | NA | 1 | 1 | 1 | 2 | 0 | 1 | 2 | .68 |
| Yorulmaz<br>(2016)                              | 2 | 2 | 2 | 1 | NA | NA | NA | 2 | 2 | 2 | 2 | 2 | 2 | 2 | .95 |
| Thomas<br>(2000)                                | 2 | 2 | 2 | 1 | NA | NA | NA | 2 | 1 | 2 | 2 | 1 | 2 | 2 | .86 |
| Tolin,<br>Abramowitz,<br>Kozak & Foa<br>(2001)  | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 2 | 1 | 2 | 1 | 2 | 2 | .90 |

|                            |   |   |   |   |    |    |    |   |   |   |   |   |   |   |     |
|----------------------------|---|---|---|---|----|----|----|---|---|---|---|---|---|---|-----|
| Einstein & Menzies (2004b) | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1   |
| Einstein & Menzies (2006)  | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1   |
| Garcia-Montes et.al (2006) | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 2 | 2 | 2 | 0 | 2 | 2 | .90 |
| Einstein& Menzies (2008)   | 2 | 2 | 2 | 2 | NA | NA | NA | 2 | 1 | 2 | 2 | 2 | 2 | 2 | .95 |
| West & Willner (2011)      | 2 | 2 | 2 | 1 | NA | NA | NA | 1 | 1 | 2 | 2 | 1 | 2 | 2 | .82 |
| Agorastos et al.(2012)     | 2 | 1 | 2 | 2 | NA | NA | NA | 2 | 2 | 2 | 2 | 0 | 2 | 1 | .82 |

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*Note:* Quality Appraisal Score Indicators

Less than .50- Limited

0.50 to 0.70 -Adequate

0.70 to 0.80 -Good

Greater than 0.80 - Strong

### **2.5.2 Relationship between magical thinking and OC symptoms in nonclinical paediatric samples**

Three studies examined the relationship between magical thinking and OC symptom severity in a paediatric community sample. These studies reported correlations ranging from  $r = 0.41-0.61$ . Two of the studies (Bolton et al., 2002; Simonds et al., 2009) measured magical thinking using the Magical Thinking Questionnaire (MTQ; Bolton et al., 2002), with one study (Evans, Milanak, Medeiros, & Ross, 2002) assessing magical thinking via the use of hypothetical scenarios involving magical beliefs. Obsessive-compulsive symptoms were measured differently across each of the studies: the Short Leyton Obsessional Inventory-Child Version (SLOI-CV; Bamber, Tamplin, Park, Kyte & Goodyer, 2002), Spence's Children's Anxiety Scale (SCAS; Spence, 1998) and Child Routines Inventory (CRI; Sytsma, Kelley & Wymer, 2001).

### **2.5.3 Relationship between magical thinking and OC symptoms in clinical paediatric samples**

Only one study was identified that included children diagnosed with OCD. This study (Verhaak & Haan, 2007) included 39 paediatric OCD patients (aged 8 to 18 years) with a primary diagnosis of OCD as per DSM-IV-TR (APA, 2000). This study utilised the Magical Thinking Questionnaire (MTQ) to assess magical thinking and the Children's Yale-Brown OC Scale (CY-BOCS; Scahill, Riddle, McSwiggin-Hardin, Ort, King, Goodman, Cicchetti, & Leckman, 1997) to assess OCD symptom severity. In contrast to the findings with non-clinical participants, this study found a non-significant association ( $r = .17, p > .05$ ) between magical thinking and OCD severity.

### **2.5.4 Relationship between magical thinking and OC symptoms in non-clinical adult samples**

Twelve studies examined the relationship between magical thinking and OC symptoms in a non-clinical adult sample using a cross-sectional design. Convenience sampling was used to recruit participants for these studies, where

participants consisted of either undergraduate students ( $n = 8$ ) or community participants ( $n = 4$ ). Sample size varied from 50 to 1194 participants.

All of the 12 studies that investigated the relationship between magical thinking and obsessive-compulsive symptom severity found significant correlations ranging from  $r = 0.22$ - $0.53$ . These studies also found that magical thinking explained between 1.0% to 5.8% of unique variance in obsessive-compulsive symptoms. All of these studies employed cross-sectional, correlational designs except for the study by Bocci and Gordon (2007). This experimental study with 51 undergraduate students found that magical thinking distinguished participants who had high scores on neutralising obsessions compared to those with low neutralising scores. Eight of the 12 studies used the Magical Ideation Scale, two used the Illusory Beliefs Inventory and two used the Paranormal Beliefs Scale. In terms of measuring obsessive-compulsive symptoms, five studies used the Padua Inventory (PI; Sanavio, 1988), five used the Obsessive-Compulsive Inventory (OCI; Foa et al., 2002), one used the Maudsley Obsessive-compulsive Inventory (MOCI; Hodgson & Rachman, 1977), and one used the Dimensional Obsessive-Compulsive Inventory (DOCS; Abramowitz et al., 2010).

### **2.5.5 Relationship between magical thinking and OC symptoms in adult clinical samples**

Of the eight studies in this category, four explored the relationship between magical thinking and OCD and found correlations between  $r = 0.23$ - $0.50$ . A study by Tolin and colleagues (2001) compared magical thinking scores between categories of obsessions. They found magical thinking was significantly higher in OCD patients with religious obsessions compared to other categories of obsessions. Einstein and Menzies (2008) found that a higher level of magical thinking at pre-treatment was associated with poorer response to standard cognitive behavioural therapy.

Four studies employed between-groups comparisons to explore differences in magical thinking between patients with OCD and patients with other diagnoses. One study by Einstein and Menzies (2006) found that OCD patients had significantly higher scores on magical thinking compared to patients with panic

disorder. However, no significant differences were found in two of the other studies where scores on magical thinking were compared between OCD patients, patients with a mix of anxiety disorders (Agorastos et al., 2002) and patients with Generalised Anxiety Disorder (West & Willner, 2011). Half of the studies in this group found that magical thinking scores were significantly higher in OCD patients when compared to healthy controls with half not finding any significant differences

### **2.5.6 Unique contribution of magical thinking to OC symptoms**

The only study to examine the unique contribution of magical thinking in explaining obsessive-compulsive symptoms in a paediatric sample was conducted by Simonds et al. (2009), who found that magical thinking contributed little to the unique variance in OC symptoms beyond general trait anxiety ( $\beta = .19, p < .001$ ). It should be noted however that the measure of magical thinking used in this study, the Magical Thinking Questionnaire (MTQ), is not well-validated.

A few studies have investigated the unique contribution of magical thinking to OC symptoms in the adult population. Einstein and Menzies (2004a, 2004b) found significant correlations between obsessive-compulsive symptom severity and magical thinking, thought-action fusion (TAF) and superstition scores in both clinical and non-clinical samples. After controlling for magical thinking, the relationship between TAF, superstition and obsessive-compulsive symptoms was no longer significant. A study by Rees and colleagues (2010) found that magical thinking accounted for 5.8% of unique variance in obsessive-compulsive symptoms after controlling for TAF. Similarly, a study by Goods, Rees, Egan and Kane (2014) tested magical thinking alongside the construct of “*inferential confusion*”, a metacognitive construct related to OCD where one confuses between imagined possibilities with actual possibilities. After controlling for age and negative affect, inferential confusion accounted for 18.1% ( $\beta = .532, sr^2 = .426, p < .001$ ) of the unique variance in obsessive-compulsive symptoms, while magical thinking accounted for 4.3% ( $\beta = .215, sr^2 = .209, p < .001$ ) of unique variance.

Yorulmaz et al. (2011) utilised hierarchical regression to explore the unique contribution of magical thinking in explaining obsessive-compulsive symptoms among 276 undergraduate students. When entered into the model alongside other

relevant cognitive constructs (i.e., responsibility/threat, importance/control of thoughts) as well as general negative affect, magical thinking still accounted for significant variance in obsessive-compulsive symptoms ( $\beta = 0.17$ ,  $sr^2 = .03$ ,  $p < .05$ ). A more recent study by Yorulmaz (2016) with a community sample ( $N = 496$ ) found that after controlling for depression and anxiety, magical thinking explained a significant, albeit small 1% of the variance in obsessive-compulsive symptoms ( $\beta = .09$ ,  $t = 2.22$ ,  $F(1, 471) = 4.94$ ,  $p < .05$ ). In another recent study by Eremsoy and Inozu (2016) the relationship between religiosity and obsessive-compulsive symptoms was mediated by magical thinking ( $SE = .01$ , 95%, CI .01-.03).

The findings of Marino, Lunt, and Negy (2008) who tested a structural model that included responsibility, TAF, religiosity and magical thinking to explain obsessive-compulsive symptoms were in contrast to other studies. Using Structural Equation Modelling (SEM), this study examined the relationship between OC symptoms and TAF, by simultaneously testing its relationships with ethnic identity, responsibility, religiosity and magical thinking. Participants comprised of undergraduate psychology students ( $N = 714$ ) who completed an array of questionnaires that included Responsibility Appraisal Questionnaire (RAQ; Rachman, Thordarson, Shafran, & Woody, 1995), Thought-Action Fusion Scale-Revised (TAF-R; Shafran et al., 1996), Revised Obsessive Intrusions Inventory (ROII; Purdon & Clark, 1993), The Religious Life Inventory (RLI; Batson & Ventis, 1982), Padua Inventory (PI; Sanavio, 1988), Multigroup Ethnic Identity Measure-Revised (Roberts et al., 1999); and MIS (Eckblad & Chapman, 1983). Model results indicated ethnic identity was a significant predictor of religiosity, which in turn predicted TAF related beliefs and responsibility. Additionally, both TAF and OC symptoms predicted neutralisation whereas magical thinking was not a significant predictor for OC symptoms in this model. However, the final respecified model which did not account for magical thinking provided a mere parsimonious fit in this study [ $\chi^2(60) = 266.97$ , CFI = .90, RMSEA = .07, PFI = .66]<sup>1</sup>. The authors

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<sup>1</sup> Root Mean squared error of approximation (RMSEA), Comparative fit index (CFI), and the Parsimonious fit index (PFI).

concluded that since most of the constructs linked to TAF are often overlapping, more research is required to clarify these relations.

Overall, except the study by Marino et al. (2008), all other studies included in the review that explored the unique contribution of magical thinking in OC symptoms suggest that magical thinking is a unique predictor of OC symptoms when controlling for negative affect and other OCD specific cognitions such as TAF.

## **2.6 Discussion**

The aim of this review was to synthesise existing evidence regarding the relationship between magical thinking and OC symptoms. Only a small number of studies were identified that directly tested this relationship, the majority being conducted with adult samples. Only four studies were found that explored the relationship between magical thinking and OC symptoms in children. Although these studies mostly reported moderate associations, the majority utilised the Magical Thinking Questionnaire (Bolton et al., 2002), the only measure of magical thinking available for a paediatric population. However, the measure lacks validation studies to confirm and establish the internal consistency of the measure. Furthermore, the small sample size and insufficient power of the clinical study with 39 paediatric OCD cases (Verhaak & Haan, 2007) restricted the scope to assess the strength of this relationship between magical thinking and OC symptoms. As such, there is insufficient evidence to draw any firm conclusions strength of the relationship between magical thinking and OC symptoms in children.

Overall, the studies included in this review reported medium to large associations (Cohen, 1992) between magical thinking and OC symptoms among both clinical and non-clinical samples. Also, when other relevant variables such as TAF were controlled for in the analyses, magical thinking contributed unique variance in OC symptom severity. Only one study (Marino et al., 2008) comprehensively explored the contribution of magical thinking and its relationship to other similar constructs such as TAF, religiosity, and responsibility beliefs in OCD. In this study, magical thinking did not make a significant contribution to the model which could be attributed to the overlapping nature of the constructs tested in this study. For instance, in the same study, significant associations were found

between TAF, OC symptoms and neutralising. It could be possible that neutralising may be a form of magical thinking and accounts for some common variance between the overlapping variables. Despite this, the majority of evidence found in the included studies suggests that magical thinking is a cognitive construct important in understanding OC symptoms.

Studies that compared magical thinking scores between OCD samples, healthy controls, and those with other psychological disorders reported mixed results, with two studies finding significant differences in magical thinking scores between OCD patients and healthy controls (Einstein & Menzies, 2006; West & Willner, 2011), whereas two other studies found no differences (Agorastos et al., 2012; Garcia-Montes, Perez-Alvarez, Soto Balbuena, Perona Garcelan, & Cangas, 2006). Further mixed results were found in studies that compared magical thinking scores between OCD patients and patients with other anxiety disorders. Einstein and Menzies (2006) found magical thinking scores were significantly higher in a sample of OCD patients compared to those with panic disorder. However, Agorastos and colleagues (2012) and West and Willner (2011) found no differences in magical thinking between OCD patients and those with generalized anxiety disorder or mixed anxiety disorder diagnoses. All of these studies utilised the same measure of magical thinking (Magical Ideation Scale) but there were differences in how patients were diagnosed with OCD. Only one study (Agorastos et al., 2012) explicitly mentioned the use of a structured clinical interview to determine diagnoses. Einstein and Menzies (2006) study described the use of two clinical interviews to determine diagnosis according to DSM-IV criteria but it is unclear if they used a structured diagnostic interview. A structured diagnostic interview was not used in the study by West and Willner (2011). Given the importance of accurate diagnosis of a principal disorder, and the importance of controlling for comorbidities between OCD and other anxiety disorders, it is difficult to draw any firm conclusions regarding the above-mentioned findings.

There is evidence that elevated scores on magical thinking are associated with poorer response to standard treatment for OCD (Einstein & Menzies, 2008). This, along with the other findings of this review, proposes a unique association between magical thinking and OC symptoms, suggesting that further exploration of

this construct is necessary. More studies with larger samples are required to determine the relative importance of magical thinking compared with the existing cognitive constructs recognised by the OCCWG. Additionally, more studies are required with clinical samples utilising structured diagnostic interviews and presenting clear information regarding comorbid secondary diagnoses. Given that, the Magical Thinking Questionnaire (MTQ) is the only self-report measure of magical thinking in children, further work is required to establish construct validity to sufficiently support the validity claims of the instrument and advance our understanding of the role of magical thinking among children

A strength of this review is its rigorous methodology that systematically reviews all existing literature, both published and grey literature, across all age groups. However, there are some limitations of the review. First, the inclusion of a broad range of studies meant that there was considerable variation in sample characteristics and measures of magical thinking employed by the studies, which precluded meta-analysis. Second, most of the studies used cross-sectional designs, limiting the conclusions that can be drawn as to the nature and direction of the relationship between magical thinking and OC symptoms.

## **2.7 Conclusions**

There is a growing interest in the relationship between magical thinking and its unique contribution to OC symptoms, although research in this area is currently in a relatively nascent stage. This systematic review highlights the unique contribution of magical thinking in OCD and critically appraises this relationship. Based on the currently available evidence magical thinking could be a potential contributor in the pathogenesis and maintenance of OC symptoms over and above the existing constructs established by the OCCWG and needs more research attention. While existing evidence supports the importance of the association between magical thinking and OCD, most of the work has been conducted in non-clinical undergraduate samples. Additionally, since most of the research in magical thinking has been conducted in Western countries, it is important to explore whether it manifests any differently in Non-Western cultures. Hence, more work is warranted in understanding this relationship in the wider community and clinical samples, which could aid case formulations and treatment planning.

## CHAPTER THREE: A CROSS-CULTURAL EXPLORATION OF MAGICAL THINKING IN OCD USING THE ILLUSORY BELIEFS INVENTORY (IBI)

### 3.1 Chapter Linking Statement

The systematic review presented in the previous chapter confirmed that magical thinking is a construct of relevance to OCD with studies suggesting that; (1) it predicts unique variance in OC symptoms when controlling for other related cognitive constructs such as TAF, and inflated responsibility, and (2) the strength of association with OC symptoms remained significant after controlling for factors such as negative affect, anxiety or depression. However, due to the sparse literature available in this area, very little is known regarding the influence of culture on this construct.

The systematic review further highlighted the lack of a uniform measurement tool used in the literature to examine magical thinking and its association with OC symptoms. The validity of these measures is also questionable. These measurement issues may explain the variation observed in the reported strength of the association between magical thinking and OC symptoms. Efforts to advance understanding of the contribution of magical thinking in OCD has been hampered by existing self-report measures that fail to capture the full spectrum of magical thinking in OCD. The Illusory Beliefs Inventory (IBI) was developed as a comprehensive measure of magical thinking specific to OCD. Although the IBI was validated with an Australian community sample, it has never been tested cross-culturally. It is important that cross-cultural comparisons of the IBI are conducted to determine if the measure performs in a similar or different way as a function of culture.

Therefore, the aim of study two was to explore the factor structure of the IBI in an Indian and Australian sample and determine the psychometric properties of the measure across the two samples. This information will be used to better understand how the IBI performs cross-culturally and also to guide the model-testing in study three.

### 3.2 Introduction

Efforts to understand the importance of magical thinking in relation to the development and maintenance of OCD is largely dependent on the quality of existing self-report measures of the construct. The most extensively used measure to assess magical thinking is the Magical Ideation Scale (MIS; Eckblad & Chapman, 1983). However, the MIS was developed to assess magical thinking in psychosis and not OCD and thus the relevance of items to OCD is questionable. For example, items of MIS such as *“I have had the momentary feeling that I might not be human”*, *“I have occasionally had the feeling that TV or radio broadcaster knew what I was listening to”*, *“I have felt that there were messages for me in the way things were arranged, like in a store window”* are more akin to thoughts associated with psychosis than to OC symptoms. Unlike magical thinking as it presents in schizotypy, magical thinking in OCD is egodystonic in nature and accompanied by a greater insight into the irrationality of the magical beliefs (Kingdon, Egan & Rees, 2012).

The Illusory Beliefs Inventory (IBI; Kingdon et al., 2012) is the only measure that comprehensively encompasses all the elements of magical thinking specific to OCD, namely superstitious thinking, Thought-action Fusion (TAF), paranormal experiences, and religious beliefs (Kingdon et al., 2012). The items of the IBI were developed after generating an initial item pool specific to magical thinking in OCD after careful consultation with OCD experts, and the final version was developed after comprehensive factor analyses. Example items from IBI such as *“I sometimes perform special rituals for protection”*, *“Magical forces have impacted my life”*, *“Sometimes I get a feeling that something is going to happen, before it happens”* were developed specifically to measure OC symptoms in community and clinical OCD populations. The IBI was developed and validated with an Australian community sample and consists of 24 items comprised of three subscales: 1) Magical beliefs, 2) Spirituality and, 3) Internal States and Thought-Fusion (Kingdon et al., 2012). However, little is known about the influence of culture on this construct and how the IBI performs across cultures (Shihata, Egan & Rees, 2014). It is important that cross-cultural comparisons of the IBI are conducted to determine whether the measure performs in a similar or different way

in different cultures. The present study aims to address this gap by cross-culturally exploring magical thinking in OCD using the IBI.

### **3.2.1 Role of culture, magical thinking and OC symptoms**

Culture plays a prominent role in the content of OC symptoms and is closely related to religious and superstitious beliefs and practices (De Bilbao & Giannakopoulos, 2005; de Silva, 2006; Nedeljkovic, Moulding, Foroughi, Kyrios, & Doron, 2012). However, the literature on religious and superstitious beliefs and its association with OCD is equivocal. For example, there are no worldwide differences in the documented 12-month prevalence rates for OCD, although variations exist in prevalence estimates (Horwath, 2000). Furthermore, earlier studies with Christian participants found no association between religiosity and type of religion, while the intensity of religious beliefs was found to be associated with OC symptom severity (Steketee, 1993). Another study investigating the influence of religious beliefs on OCD found religious beliefs to be stronger cognitive predictors of OC symptoms in Catholic participants than in controls without strong religious inclinations (Sica, 2002; Sica, Novara, & Sanavio, 2002). Similar findings were reported in a study with protestant Christian participants where high religiosity was associated with a high degree of OC related cognitions and symptoms when compared to individuals with a moderate degree of religious beliefs and atheists (Abramowitz, 2004). In contrast, there were no significant differences reported between religiosity and OCD related cognitions in a Jewish sample when compared to panic disorder and healthy controls (Hermesh, Masser-Kavitzky, & Gross-Isseroff, 2003). Parallel studies conducted by different researchers in countries such as India, Nepal, Egypt and Saudi-Arabia with strong religious beliefs demonstrated the influential role of culture-specific beliefs and rituals on the presentation of OC symptoms. For example, preoccupation with themes of purity and purification in Hindu cultures, like India and Nepal, was related to the presentation of OC symptoms associated with cleanliness (Chaturvedi & Bhugra, 2007; Mahgoub & Abdel-Hafeiz, 1991; Okasha, Saad, Khalil, El Dawla, & Yehia, 1994; Sharma, 1968). Given that religious and superstitious beliefs are only two key underlying facets of magical thinking (Einstein & Menzies, 2004, 2006), more research is warranted to explore the cultural influence of magical thinking in OCD.

There are clear cultural differences not only in the extent of religious beliefs but also in other factors that are relevant to magical thinking. These include belief in superstition, occult practices, and spiritual experiences. In an experimental cross-cultural study by Subbotsky and Quinteros (2002) investigating the role of cultural factors on rational and magical thinking in Britain and Mexico, magical explanations of unusual phenomena were found to be more acceptable in rural Mexican participants than British participants. However, acceptance of magical explanations in both groups increased when they were introduced to high anxiety-provoking experimental conditions, which is when belief in non-scientific explanations of the event was endorsed by the participants (Subbotsky & Quinteros, 2002). Thus, the intricate relationship between magical thinking and culture is often intertwined. Yet, to date, very little research has been conducted in the context of culture and magical thinking in OCD. Studies conducted to date in Ireland, Australia (Helgadóttir et al., 2012), and Turkey (Eremsoy & Inozu, 2016; Yorulmaz, 2016; Yorulmaz, Inozu, & Gultepe, 2011) indicate that cultures like Ireland and Turkey with high paranormal and superstitious beliefs score highly also on magical thinking, supernatural beliefs, and OC symptoms. In order to advance understanding of magical thinking as it pertains to OCD, it is important to explore these variables cross-culturally to see if the relationship between magical thinking and OCD is universal.

### **3.2.2 Culture, social cognitions, and thinking styles**

Cross-cultural differences have been noted between Eastern and Western cultures with regards to making casual attributions and predictions that result from differences in social structure, social practices, perception and beliefs systems (Nisbett & Masuda, 2007). Cross-cultural studies show that individualistic cultures of the West tend to engage in an analytic thinking style with respect to the cognitive interpretation of events whilst collectivistic cultures of the East engage in holistic thinking styles (Markus & Kitayama, 2010; Varnum et al., 2010; Zhu & Han, 2008). Evidence suggests that individualistic cultures place greater importance in the concept of self as “*I*” that fosters an independent sense of self, as opposed to collectivistic cultures that explains the self as “*We*” that fosters an interdependent sense of self (De Mooij, 2010, 2011; Hofstede, 2011). For example, in the Indian

context, one tends to hold a higher perception of moral responsibility to help others whether or not one likes them, contrary to the American context where there appears to be more autonomy (Miller & Bersoff, 1998). Furthermore, individuals from analytic thinking cultures tend to be driven by logical explanations that focus on dispositions and overlooks situational causes, while holistic thinkers focus on both dispositions and situational causes when they search for causal explanations of events (Morga & John, 2007). Thus, it will be interesting to examine if these differences are also evident in the understanding of magical thinking and OCD.

The content of obsessions and compulsions reflects common beliefs within a culture (de Silva, 2006). People sharing the same culture are more likely to reflect similar preoccupations in their obsessions based on their shared history and socio-cultural factors. For example, obsessions related to HIV/AIDS or asbestos are found to be more prominent among contamination and cleaning symptoms within Western cultures (Nedeljkovic et al., 2012). Likewise, contamination and cleaning themes have been described in a Hindu clinical sample from India, congruent with the Hindu religious beliefs of purity, cleanliness and the presence of purification rituals in Hindu religious practices (Chaturvedi & Bhugra, 2007; Mahgoub & Abdel-Hafeiz, 1991; Okasha, Saad, Khalil, El Dawla, & Yehia, 1994; Sharma, 1968). Thus, it may be possible that culture may differentially influence the cognitive constructs implicated in OCD. On the premise that magical thinking may be culturally relative construct, it is important to explore cultural differences in magical thinking when considering its importance in OC symptoms.

Hofstede's Cultural Dimension Theory pioneered in 1980 is one of the significant models in cross-cultural research that identifies national differences in the concept of individualism-collectivism and how that influences social cognitions (Hofstede, 2011). To explore the cross-cultural differences in magical thinking related to OC symptoms, this study uses Hofstede's paradigm (Hofstede, 2011) of individualism-collectivism to understand cross-cultural differences in the cognitive manifestation of analytic-holistic thinking. Comparisons were drawn between India as a collectivistic culture with a holistic thinking style, and Australia, as an individualistic culture with an analytical thinking style. Appendix XV displays the contrasting scores between the Indian and Australian cultures through the lens of

Hofstede's 6-D model of cross-cultural comparison framework (Culture Compass™, n.d.).

### **3.2.3 Magical thinking and OC symptoms in the Australian context**

Literature in magical thinking and OCD indicates that there has been of growing interest in this area within the Australian context, as indicated by a substantial number of studies identified in the systematic review conducted with Australian participants (*see* Table 1). Evidence in the Australian context suggests magical thinking is a construct associated with OC symptoms where TAF and superstition were found to be derivatives of magical thinking (Einstein & Menzies, 2004a, 2004b, 2008; Goods et al., 2014; Rees et al., 2010). A study conducted with a clinical population by Einstein and Menzies (2004b) provides further support to these findings and indicates that magical thinking is strongly associated with OCD symptom severity. However, most studies conducted in the Australian context measure magical thinking via the Magical Ideation Scale (MIS, Eckblad & Chapman, 1983) and not the Illusory Beliefs Inventory (IBI; Kingdon et al., 2012). Although the IBI (Kingdon et al., 2012) was developed and validated in an Australian cohort, it is important to explore if similar associations between magical thinking and OC symptoms emerge when the IBI is used to study this relationship.

### **3.2.4 Magical thinking and OC symptoms in the Indian context**

India is believed to be a land of mystic heritage with a history of belief in rituals, spiritual experiences, supernatural/paranormal forces, and occult practices (Chakraborty & Bhattacharya, 1985; Kulhara, Avasthi, & Sharma, 2000; Prabhu, Raghuram, Verma, & Maridass, 1984; Srinivasan & Thara, 2001). A substantial number of Indian people suffering from severe mental health issues consult with occult practitioners as a first-line treatment instead of mental health professionals (Banerjee & Roy, 1998; Chadda, Agarwal, Singh, & Raheja, 2001; Kate, Grover, Kulhara, & Nehra, 2012; Srinivasan & Thara, 2001), which could be one reason for the low mental disorder prevalence rates recorded in India. However, these studies primarily focussed on understanding the existing attitude and presence of non-scientific beliefs towards mental illness in the Indian population, and not much is known about non-scientific beliefs specific to OCD. Thus, the majority of the OCD

statistics used in Indian studies rely heavily on western epidemiological data. Likewise, the Global Burden of Diseases (GBD) report formulated by the World Health Organization also works on presumed prevalence estimates for OCD in India (Ayuso-Mateos, 2006; Khanna et al., 1993; Reddy, Rao, & Khanna, 2010).

India was selected as a spiritually inclined culture for the cross-cultural comparison in this study to identify the cultural dependence of the relationship between magical thinking and OC symptoms as measured by the IBI. Given that spirituality is a separate domain in the original factor structure of the IBI, an advantage of using the IBI in a spirituality-oriented culture like India is that it may provide a way of assessing the relationship between magical thinking and OC symptoms separately from the influence of religious or spirituality related beliefs from a transcultural perspective.

### **3.3 Aim of the present study**

The central focus of the current study was to conduct a comprehensive cross-cultural exploration of magical thinking in OCD measured using the IBI. Comparisons were drawn between India (holistic-thinking culture) versus Australia (analytic-thinking culture) (Hofstede, 2011; Markus & Kitayama, 2010; Varnum et al., 2010; Zhu & Han, 2008). Second, this study also aimed to evaluate the psychometric properties of the IBI from a cross-cultural perspective. It was hypothesised that there will be cross-cultural differences in magical thinking in both cultures expressed by higher magical thinking scores and higher OC symptom scores in India compared to Australia. Additionally, it was expected that there would be differences in the interpretation of spirituality specific items in the Indian sample when matched with the Australian sample due to differences in cultural and religious beliefs. Furthermore, it was hypothesised that despite the cross-cultural differences in both the samples, the IBI would demonstrate stable psychometric properties in both samples with regards to reliability and construct validity.

## 3.4 Method

### 3.4.1 Research Design and Participants

A cross-sectional correlational design was used to achieve the aims of the study. Since obsessive intrusions exist on a continuum from normal/regular traits to severe symptoms (Gibbs, 1996; Myers, Fisher, & Wells, 2008) and intrusions experienced by individuals with clinically significant obsessions are also estimated to be present in 80-90 percent of the general population (Rachman & de Silva, 1978; Salkovskis & Harrison, 1984), community participants were purposively selected. Non-clinical community participants from India ( $n = 627$ ), and Australia ( $n = 535$ ) were recruited through snowballing and convenience sampling. Participants were required to be 18 years or above. The age of participants ranged from 18 years to 66 years [India=  $M (SD) = 29.74(6.04)$ ; Australia =  $M (SD) = 24.81 (9.96)$ ].

Based on the guidelines of recommended minimum sample size for model testing, a ratio of 10 observations per parameter was estimated for this study (Bentler & Chou, 1987; Kline, 1998). Thus, the a priori power analysis estimated that a minimum sample size of 290 participants per country was required. Among the total participants included in this study ( $N = 1162$ ), 70% of participants completed the survey online and 30% completed the paper and pencil version of the survey. The participants consist of 45.09% females, 54.48% males and 0.43% identified themselves as “Another gender”.

### 3.4.2 Measures

*Demographic Questionnaire*- a demographic questionnaire (see Appendix II) assessing age, gender, qualifications, nationality, and religious orientation was compiled and used to describe sample characteristics.

*Illusory Beliefs Inventory (IBI; Kingdon, Egan, & Rees, 2012)*

The IBI is a 24-item inventory assessing magical thinking specific to OCD. Factor analysis yielded three distinct domains of magical thinking; 1) Magical

Beliefs, 2) Spirituality and 3) Internal States and Thought-action Fusion. The domain of magical beliefs includes general beliefs related to the concepts of magic, superstition and the unknown, for example, “*Item 17: Most things that happen to us are the result of fate*”. The domain of spirituality covers the central beliefs in religion, higher powers, myths and miracles, for example, “*Item 18: I believe guardian angels or other spiritual forces protect me*”. The last domain is closely related to Thought-action Fusion (TAF) but also expands to statements indicative of intuitive thoughts and feelings, for example, “*Item 2: I have sometimes changed my plans because I had a bad feeling*”. The IBI is rated on a 5-point Likert scale from 1 (“Strongly Disagree”) to 5 (“Strongly Agree”) and the total score ranges from 24 to 120. The scales also offer high test-retest reliability ( $r = 0.94$ ;  $p < .001$ ), good discriminant validity (Shihata, Egan, & Rees, 2014) and excellent internal consistency of  $\alpha = 0.93$  (Kingdon et al., 2012).

#### *Obsessive Beliefs Questionnaire- 38 (OBQ-TRIP; Moulding et al., 2011b)*

OBQ-TRIP is a 38-item self-report measure derived from the Obsessive Belief Questionnaire-44 (OBQ-44) where TRIP stands for the four subscales namely *Threat, Responsibility, Intolerance of Uncertainty* and *Perfectionism*. This scale is subdivided into four categories of cognitive domains where responsibility and threat were classified as two different dimensions (Moulding et al., 2011a, 2011b). It measures the predominant beliefs related to responsibility, threat estimation, perfectionism /intolerance of uncertainty (IOU) and importance/control of thought. OBQ-TRIP is rated on a 7-point Likert scale from 1 (“Strongly Disagree”) – to 7 (“Strongly Agree”) and the total score ranges from 38 to 266. The scales provide an adequate internal consistency ( $\alpha = 0.80$  to  $0.90$ ) for all the mentioned factors as measured in a community sample (Moulding et al., 2010). In the current study, alpha for the total scale was .96 and the alpha for the subscales ranged from .80 to .91.

#### *Obsessive-Compulsive Inventory-Revised Version (OCI-R; Foa et al., 2002)*

OCI-R is an extensively used 18-item self-report inventory to measure symptoms of OCD. OCI-R is rated on a 5-point Likert scale from 0 (“Not at All”) – to 4 (“Extremely”) and the total score ranges from 0 to 72. Apart from a total score,

this measure provides specific scores for six subscales of OC symptoms namely washing, checking, ordering, hoarding, neutralizing and obsessing. This scale provides a satisfactory test-retest reliability ( $r = 0.70, p < .001$ ) and a high internal consistency ( $\alpha = .81$ ) for the full scale as well as the subscales (Hajcak, Huppert, Simons, & Foa, 2004). It is also stated to have excellent convergent and discriminant validity for a non-clinical sample (Abramowitz & Deacon, 2006). In this study, alpha for the total scale was .91 and ranged from .71 to .84 for the subscales, with the exception of hoarding subscale ( $\alpha = .63$ ).

### **3.4.3 Procedure**

Prior to recruitment, ethics approval was obtained from the Curtin University Human Research Ethics Committee (HR22/2016 – *see* Appendix I). Online participants were directed to an online questionnaire hosted by Qualtrics after providing informed consent (*see* Appendix IV). To ensure a wider reach to the community participants, paper and pencil surveys were made available to the community to enhance research participation from individuals without easy Internet access or computer skills. Participants completing the paper and pencil version were required to read and sign an Informed consent to participate in the study. The demographic questions were followed by the presentation of the three questionnaires (IBI, OBQ-TRIP, and OCI-R) in a random order to avoid response biases. Given the constitutional status of English as an “Associate” official language in India (Berns, 1995; Chaturvedi & Bhugra, 2007; Prabhu, 1987), no measures needed translating for the Indian participants. The completion time for the survey ranged from 15 to 30 minutes.

Recruitment was completed in two phases where initially participants were recruited online and in the later phase, a paper-pencil version of the survey was made available to include more participants in India to allow community participation where online accessibility was a limitation. Phase one recruitment was conducted online and the invitations to participate were distributed by an anonymous survey link via Qualtrics (<https://curtin.asia.qualtrics.com>) that was made available to the participants to ensure anonymity and confidentiality of responses. These anonymous links were circulated via social networking sites like Facebook ([www.facebook.com](http://www.facebook.com)) and LinkedIn ([www.linkedin.com](http://www.linkedin.com)), Facebook Psychology-related pages (such as International

OCD Foundation, International Adlerian FB Group, Hub 106E, PhD Survey Group, and Alliance of Psychology Graduates India Group) and emails to the personal contacts for snowballing the survey link. Survey links were also made available at Curtin Research participation Scheme (<https://curtin-rps.sona-systems.com>) for undergraduate university students of Curtin University who received study credits for completing the survey. The offline participants comprised of the consenting employees of “*The Cognition Group*” ([www.cognitiongroup.com](http://www.cognitiongroup.com)) a corporate office located in Gurgaon, India who were willing to volunteer in the research during their work break. All participation in the survey was voluntary and participants were not provided with any financial support for completing the survey.

#### **3.4.4 Planned Analyses:**

Statistical analyses were conducted in two phases- preliminary analyses with data cleaning and descriptive statistics in IBM SPSS Statistics Version 25.0 (IBM Corp. Released 2016. IBM SPSS Statistics for Windows) and exploration of the factor structure was completed in Mplus Version 8.0 (Muthén & Muthén, 1998-2017).

For the preliminary analyses, both the online data and the paper and pencil survey responses were entered into SPSS for Windows Version 25.0 (IBM Corp. Released 2016. IBM SPSS Statistics for Windows). This was done to screen for missing data (recorded as “-999”), all outliers, normality and to calculate internal reliability statistics in the dataset. Descriptive analyses were performed on the cleaned dataset as a whole ( $N = 1162$ , Australia  $n = 535$ , India  $n = 627$ ) to describe the sample characteristics. Planned analyses for cross-cultural comparisons included an examination of measurement invariance of the IBI with Mplus Version 8.0 (Muthén & Muthén, 1998-2017) across the two samples to evaluate if the measure performed differently across the two samples. Three forms of measurement invariance were tested, namely, configural (to assess if the factor structure is the same across the samples), metric (to examine if the factor loadings were similar across the samples), and scalar (to assess the equivalence in means across samples). Follow-up factor analyses were conducted to evaluate the hypothesised factor structure of the IBI and its psychometric properties across the two samples.

Following recommendations of Model fit indices by Hu and Bentler (1999), a combination of fit indices was used to evaluate the model fit. These included the  $\chi^2$  goodness of fit indices (GFI), absolute indices including the Root Mean Square Error of Approximation Root Mean Square Error of Approximation (RMSEA) with 90% interval (Steiger, 1990) and the Standardised Root Mean Square Residual (SRMR), and incremental indices including the Comparative Fit Indices (Bentler, 1990; Hooper, Coughlan, & Mullen, 2008) and the Tucker-Lewis index (TLI; Bentler, 1990). To interpret whether a given model provided a good fit to the data, Hu and Bentler's (1999) empirically derived cut-off values were used where (a) a non-significant  $\chi^2$  value indicated an acceptable fit; however since  $\chi^2$  is often sensitive to larger samples and rejects the model (Tabachnick & Fidell, 2013), this indicator was interpreted with caution, (b) RMSEA and SRMR close to 0.08 was indicative of an acceptable fit, while values closer to 0.06 and 0.05 indicated a close fit (Hu & Bentler, 1999; Marsh, Hau, & Wen, 2004), and (c) CFI and TLI values greater than .95 was considered an excellent fit while values greater than .90 and less than .95 was considered an acceptable model fit for a good fitting model (Hu & Bentler, 1999). Bivariate correlations were used to assess construct validity and test-retest reliability.

### 3.5 Results

Missing values analysis using Little's Missing Completely at Random (MCAR) test,  $\chi^2(176) = .000, p < .001$ , indicated that data was missing at random and no single variable had missing data exceeding 5%. Given that, further analyses were planned in Mplus Version 8.0 (Muthén & Muthén, 1998-2017), which deals with missing data using full information maximum likelihood, no imputation was considered necessary at this stage. The final data for the present study consisted of two samples for cross-cultural comparisons, namely Australia ( $n = 535$ ) and India ( $n = 627$ ). Thus, the present sample size met the aforementioned recommendation of the a priori analysis. Descriptive statistics for the study sample on the OCI-R and OBQ can be seen in Table 3.

**Table 3.**  
*Descriptive Statistics for measurement variables OCI-R and OBQ total scores for India (n = 627) and Australia (n = 535)*

| Scale          | Country   | M (SD)            | t (df)           | 95% Confidence Interval | d   |
|----------------|-----------|-------------------|------------------|-------------------------|-----|
| OCI-R Total    | India     | 23.84<br>(12.38)  | 11.06*<br>(1147) | 6.57 – 9.41             | .65 |
|                | Australia | 15.85<br>(11.99)  |                  |                         |     |
| OBQ-TRIP Total | India     | 139.54<br>(34.58) | 12.92*<br>(1138) | 23.34-31.68             | .77 |
|                | Australia | 112.03<br>(37.19) |                  |                         |     |

\*  $p < .001$  (2-tailed)

Note.  $p$ , Significance (2-tailed); Cohen's  $d$ , Effect size; M, Mean; SD, standard deviation; OCI-R, Obsessive Compulsive Inventory-Revised; OBQ-TRIP, Obsessive Beliefs Questionnaire (38 items)

### 3.5.1 Measurement invariance

Measurement invariance was explored for the IBI across the two samples, namely, Australia ( $n = 535$ ) and India ( $n = 627$ ), to assess if the same latent constructs were being measured across cultures. However, the model provided a poor fit suggesting that configural invariance was not supported [ $\chi^2$  (568) = 3598.20,  $p < .001$ , CFI = .66, TLI = .67, SRMR = .11, and RMSEA = .09 (90% CI, .09 to .11)]. Thus, the measure of magical thinking did not share the same structure across cultures.

### 3.5.2 Exploratory Analyses

A Confirmatory Factor Analysis (CFA) was conducted using Mplus to confirm and assess the relative fit of the hierarchical three-factor structure of the IBI

found by Kingdon et al. (2012) in each of the two samples separately. However, the results indicated a poor fit in both the samples and did not meet any of the criteria for good fit specified by Hu and Bentler (1999). In the Australian sample, the CFA resulted in a poor fit,  $\chi^2(77) = 906.63$ , CFI = .82, TLI = .93, RMSEA = .14. Similarly, in the Indian sample, the CFA provided a poor fit to the data,  $\chi^2(99) = 1181.99$ , CFI = .57, TLI = .81, RMSEA = .13. This led to the decision to consider an exploratory analysis of the factor structure of the IBI in each sample separately to examine a potential alternative factor solution.

Following the best practice guidelines for Exploratory Factor Analysis (EFA; Costello, 2005) and to maintain consistency with previous research on IBI (Kingdon et al., 2012; Shihata et al., 2014), Principal Axis Factor Analysis with Oblique rotation (*Promax*) was used to analyse the 24 item IBI in the Australian and Indian samples separately. To determine the appropriate number of factors to be extracted, several statistical methods of estimation were used. First, Velicer's minimum average partial (MAP) test and Horn's parallel analysis (O'Connor, 2000) were primarily used to estimate the number of potential factors in the measure as it has demonstrated robust estimations in the construction of measurement instruments in the health literature (Coste, Fermanian, & Venot, 1995). In addition, the Eigenvalue greater than one criterion (Kaiser's criterion) and Scree Test were examined to ensure convergence of the extracted solution. Furthermore, the analytic strategy of first assessing item performance and then removing poorly functioning items to refine the scale for a better model fit was followed. Following the recommendations by Wu and Carter (2008), items with primary loadings <.4 or secondary loadings >.3 were omitted. Results of the factor structure of the IBI based on the analyses described is reported below for each country independently.

### **3.5.3 Exploratory Factor Analyses for the Australian Sample ( $n = 535$ )**

The MAP test, parallel analysis, and Scree plot indicated the presence of two factors in the Australian sample; unlike the three-factor structure as reported in the hierarchical model by Kingdon et al. (2012). Four Eigenvalues were greater than 1 (8.03, 2.75, 1.28, and 1.16). Consistent with previous literature, items were removed if primary loadings < .4 or secondary loadings > .3 (de Vaus, 2002; Kingdon et al., 2012; Moulding et al., 2010; Pallant, 2001). The suggested two-factor solution in

the Australian sample explained 44.9% of the total variance. The two-factor solution was examined and item 17 was the only item cross-loading and hence the analysis was re-run without item 17. The extracted solution after removing this item yielded further cross-loadings in four more items in the scale and hence, this time the tests were run after removing these cross-loading items, namely items 2, 10, 11 and 20. After removing all the cross-loading items in the two-factor solution, a 19 item IBI was retained that explained a total variance of 50.1%. Factor 1, labelled as Magical and Thought- Fusion beliefs (10 items), consisted of all the items related to magical beliefs and also included TAF related items under the same subscale. This factor explained 36.6% of the item variance. Factor 2, labelled Spirituality (9 items), contained all the items related to spirituality and the reversed worded rational beliefs items. This factor explained 13.4% of the variance. Subscale scores were computed for the two-factor solution. Cronbach's alpha suggested excellent internal consistency for both Factor 1 ( $\alpha = .86$ ) and Factor 2 ( $\alpha = .88$ ). Table 4 provides the rotated factor loadings for all the items retained in IBI-19.

**Table 4.***Rotated factor loadings for the extracted items of The Illusory Beliefs Inventory (IBI)-19 items in the Australian Sample.*

| <b>Illusory Beliefs Inventory (IBI) items</b>           | <b>Original subscale</b> | <b>Factor 1</b> | <b>Factor 2</b> |
|---|--------------------------|-----------------|-----------------|
| Reliability (Cronbach's Alpha)                          |                          | .86             | .88             |
| <i>Factor 1: Magical &amp; Thought fusion Beliefs</i>   |                          |                 |                 |
| I believe in magic                                      | Magical beliefs          | .60             | .16             |
| I sometimes perform special rituals for protection      | Magical beliefs          | .44             | .22             |
| If I think too much about something bad, it will happen | Internal States & TAF    | .81             | .06             |
| Magical forces have impacted on my life                 | Magical beliefs          | .63             | .16             |
| I do something special to prevent bad luck              | Magical beliefs          | .62             | .01             |

|   |                      |     |     |
|---|----------------------|-----|-----|
| Magic causes miracles to happen                     | Magical beliefs      | .64 | .07 |
| Good luck charms do not work (R)                    | Magical beliefs      | .36 | .02 |
| If I think too much about something, it will happen | Internal States& TAF | .77 | .05 |
| I avoid unlucky numbers                             | Magical beliefs      | .49 | .06 |
| You should never tempt fate                         | Magical beliefs      | .53 | .13 |
| <i>Factor 2: Spirituality</i>                       |                      |     |     |
| I use prayer to ward off misfortune                 | Spirituality         | .12 | .63 |
| The soul does not continue to exist after death (R) | Spirituality         | .07 | .73 |
|   | Spirituality         | .22 | .62 |

|  |              |     |     |
|--|--------------|-----|-----|
| It is just a matter of time until science can explain everything (R) |              |     |     |
| Life is nothing more than a series of random events (R)              | Spirituality | .14 | .57 |
| I believe guardian angels or other spiritual forces protect me       | Spirituality | .23 | .68 |
| Science is the key to understanding how things happen (R)            | Spirituality | .01 | .53 |
| There is an invisible force guiding us all                           | Spirituality | .34 | .56 |
| I do not believe in a spiritual presence (R)                         | Spirituality | .01 | .73 |
| I believe in a higher power or God                                   | Spirituality | .01 | .82 |

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*Note.* Values represent Geomin rotated loadings (rounded to two decimals); R, reversed scored items; TAF, Thought-action fusion.

### 3.5.4 Exploratory Factor Analyses for the Indian Sample ( $n = 627$ )

The MAP test indicated the presence of two factors while the parallel analysis and the Scree plot suggested a three-factor structure. Hence, both the two factor and the three-factor solutions were examined for the Indian sample. First, the two-factor solution as suggested by the MAP test was examined. The two-factor model explained a total variance of 32.62% and six eigenvalues were greater than 1 (5.44, 2.39, 1.41, 1.21, 1.15, and, 1.10). Based on the predecided criteria, items were removed if primary loadings  $< .4$  or secondary loadings  $> .3$  (de Vaus, 2002; Kingdon et al., 2012; Moulding et al., 2010; Pallant, 2001), no items were removed in the two-factor model. Factor 1, contained the majority of the items ( $n = 17$ ) and was named as *Magical Beliefs* as it reflected various aspects of non-scientific beliefs that do not conform to any logical explanation for the causality of events. This factor explained 22.66% of the variance. Factor 2, named *Scientific and Rational Beliefs* contained all the reversed worded items ( $n = 7$ ) and reflected scientific and rational beliefs. This factor explained 9.9% of the variance. Subscale scores were computed from this two-factor solution. Cronbach's alpha suggested that internal consistency was excellent for Factor 1 ( $\alpha = .86$ ) and was poor for Factor 2 ( $\alpha = .62$ ). Table 5 provides the rotated factor loadings for all the items of the IBI two factor model in the Indian sample. Conversely, this solution had certain limitations. First, the internal consistency of the second factor was poor. Second, the two factors extracted could be more of a method factor with positively worded items loading on one factor (*Magical & Thought-Fusion beliefs*) and reverse-scored items loading on another factor (Rational & Scientific beliefs). Follow-up examination of the three-factor solution as suggested by the parallel test and the scree plot was considered for further evaluation.

In the three-factor solution, four Eigenvalues were greater than 1 (4.40, 1.66, 1.30, and, 1.07). After careful inspection of the three-factor solution, and removing all the cross-loading items, namely items 2, 3, 10, 14, 17, 22, and, 23, the tests were run again and a shorter version of the IBI with 15 items was retained. The three-factor solution explained a total variance of 49.06% where the third factor alone contributed to 5.87% of the variance in the model. The three factors that emerged were labelled as Factor 1: *Magical & Thought-fusion beliefs* (8 items) that

contributed to 29.3% of the variance; Factor 2: Scientific beliefs (3 items) that contributed to 11.06% of the variance; and Factor 3: Spirituality (4 items) that contributed to 8.66% of the variance (*see* Table 6). Thus, from the 24 items of the original version of the IBI, 15 items were retained for the Indian sample with a limited number of items in factor 2 ( $n = 3$ ) and factor 3 ( $n = 4$ ) respectively. Subscale scores were computed from this three-factor solution and Table 6 provides the rotated factor loadings for all the items of IBI-15 for the three-factor model in the Indian sample. Cronbach's alpha suggested that internal consistency was excellent for Factor 1 ( $\alpha = .81$ ) and was good for Factor 3 ( $\alpha = .71$ ) while it was very poor for Factor 2 ( $\alpha = .55$ ). Given the poor internal consistency for Factor 2, this time the analyses were re-run after dropping all the three items of Factor 2.

The subsequent two-factor solution with 12 items of the IBI explained 47.5% of the total variance and was considered as the final solution as it had a relatively better fit statistically and conceptually. Factor 1: *Magical & Thought-fusion beliefs* (8 items) contributed to 36.66% of the variance, and, Factor 2: Spirituality (4 items) contributed to 10.83% of the variance. IBI-12 indicated excellent reliability and internal consistency for Factors 1 ( $\alpha = .81$ ) and Factor 2 ( $\alpha = .71$ ). Subscale scores were computed from the two-factor solution of IBI-12 and Table 7 provides the rotated factor loadings for all the items in the present sample. The two-factor structure with 12 items in the IBI was deemed most appropriate for the Indian sample.

Although the two factors comprised of different although overlapping items across the two samples, the content reflected *Magical and Thought-fusion Beliefs* (Factor 1) and *Spirituality* (Factor 2) in the Indian and Australian samples. The differences in items were considered to reflect genuine cultural differences rather than nuisance variance. Therefore, no further attempts to develop "equivalent" measures across the samples were considered.

**Table 5.***Rotated factor loadings for Principal Axis Factor Analysis of the Illusory Beliefs Inventory (IBI-24 items) in the Indian Sample*

| <b>Illusory Beliefs Inventory (IBI) items</b>                 | <b>Original subscale</b> | <b>Factor 1</b> | <b>Factor 2</b> |
|---|--------------------------|-----------------|-----------------|
| Reliability (Cronbach's alpha)                                |                          | .86             | .62             |
| <i>Factor 1: Magical Beliefs</i>                              |                          |                 |                 |
| I use prayer to ward off misfortune                           | Spirituality             | .46             | .13             |
| I have sometimes changed my plans because I had a bad feeling | Internal States& TF      | .40             | .08             |
| I believe in magic  | Magical beliefs          | .53             | .18             |
| I sometimes perform special rituals for protection            | Magical beliefs          | .61             | .07             |

|  |                     |     |       |
|--|---------------------|-----|-------|
| If I think too much about something bad, it will happen                        | Internal States& TF | .62 | .02   |
| Magical forces have impacted on my life  | Magical beliefs     | .58 | .09   |
| I do something special to prevent bad luck                                     | Magical beliefs     | .59 | .01   |
| Sometimes I get a feeling that something is going to happen, before it happens | Internal States& TF | .48 | .06   |
| Magic causes miracles to happen  | Magical beliefs     | .57 | <0.01 |
| If I think too much about something, it will happen                            | Internal States& TF | .58 | .08   |
| I avoid unlucky numbers  | Magical beliefs     | .49 | .08   |
|  | Magical beliefs     | .49 | .11   |

Most things that happen to us are the result of fate

Spirituality .53 .28

I believe guardian angels or other spiritual forces protect me

Internal  
States& TF .41 .07

My thoughts alone can alter reality

Spirituality .48 .18

There is an invisible force guiding us all

Magical  
beliefs .42 .08

You should never tempt fate

Spirituality .42 .31

I believe in a higher power or God

*Factor 2: Scientific and rational Beliefs*

Spirituality .10 .41

The soul does not continue to exist after death (R)

Spirituality .21 .54

|  |                 |     |     |
|--|-----------------|-----|-----|
| It is just a matter of time until science can explain everything (R) |                 |     |     |
|  | Magical beliefs | .09 | .41 |
| It is not possible to cast a magical spell (R)                       |                 |     |     |
|  | Spirituality    | .15 | .30 |
| Life is nothing more than a series of random events (R)              |                 |     |     |
|  | Magical beliefs | .07 | .31 |
| Good luck charms do not work (R)                                     |                 |     |     |
|  | Spirituality    | .07 | .47 |
| Science is the key to understanding how things happen (R)            |                 |     |     |
|  | Spirituality    | .05 | .61 |
| I do not believe in a spiritual presence (R)                         |                 |     |     |

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*Note.* Values represent Geomin rotated loadings (rounded to two decimals); R, reversed scored items; TF, Thought fusion

**Table 6.**

Rotated factor loadings for the extracted items of The Illusory Beliefs Inventory (IBI)-15 items in the Indian Sample

| <b>Illusory Beliefs Inventory (IBI) items</b>           | <b>Original subscale</b> | <b>Factor 1</b> | <b>Factor 2</b> | <b>Factor 3</b> |
|---|--------------------------|-----------------|-----------------|-----------------|
| Reliability (Cronbach's Alpha)                          |                          | .81             | .55             | .71             |
| <i>Factor 1: Magical &amp; Thought fusion Beliefs</i>   |                          |                 |                 |                 |
| I believe in magic                                      | Magical beliefs          | .53             | .09             | .14             |
| I sometimes perform special rituals for protection      | Magical beliefs          | .60             | .01             | .08             |
| If I think too much about something bad, it will happen | Internal States & TF     | .59             | .08             | .01             |
| Magical forces have impacted on my life                 | Magical beliefs          | .71             | .11             | .03             |
| I do something special to prevent bad luck              | Magical beliefs          | .63             | .04             | .01             |

|  |                     |     |     |     |
|--|---------------------|-----|-----|-----|
| Magic causes miracles to happen                                  | Magical beliefs     | .62 | .02 | .01 |
| If I think too much about something, it will happen              | Internal States& TF | .43 | .14 | .10 |
| I avoid unlucky numbers  | Magical beliefs     | .46 | .01 | .02 |
| <i>Factor 2: Scientific Beliefs</i>                              |                     |     |     |     |
| It is just a matter of time until science can explain everything | Spirituality        | .01 | .73 | .03 |
| Life is nothing more than a series of random events (R)          | Spirituality        | .02 | .32 | .03 |
| Science is the key to understanding how things happen (R)        | Spirituality        | .24 | .65 | .01 |

*Factor 3: Spirituality*

|  |              |     |     |     |
|--|--------------|-----|-----|-----|
| I use prayer to ward off misfortune                            | Spirituality | .16 | .05 | .41 |
| I believe guardian angels or other spiritual forces protect me | Spirituality | .20 | .03 | .51 |
| There is an invisible force guiding us all                     | Spirituality | .01 | .09 | .63 |
| I believe in a higher power or God                             | Spirituality | .07 | .01 | .74 |

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*Note.* Values represent Geomin rotated loadings (rounded to two decimals); R, reversed scored items; TF, Thought fusion

**Table 7.***Rotated factor loadings for the extracted items of The Illusory Beliefs Inventory (IBI)-12 items in the Indian sample*

| <b>Illusory Beliefs Inventory (IBI) items</b>           | <b>Original subscale</b> | <b>Factor 1</b> | <b>Factor 2</b> |
|---|--------------------------|-----------------|-----------------|
| Reliability (Cronbach's Alpha)                          |                          | .81             | .71             |
| <i>Factor 1: Magical &amp; Thought fusion Beliefs</i>   |                          |                 |                 |
| I believe in magic                                      | Magical beliefs          | .50             | .15             |
| I sometimes perform special rituals for protection      | Magical beliefs          | .62             | .06             |
| If I think too much about something bad, it will happen | Internal States & TF     | .62             | .01             |
| Magical forces have impacted on my life                 | Magical beliefs          | .70             | .03             |
| I do something special to prevent bad luck              | Magical beliefs          | .65             | .03             |

|  |                        |     |     |
|--|------------------------|-----|-----|
| Magic causes miracles to happen                                | Magical beliefs        | .61 | .01 |
|  | Internal States&<br>TF | .50 | .08 |
| If I think too much about something, it will happen            |                        |     |     |
| I avoid unlucky numbers  | Magical beliefs        | .50 | .01 |
| <i>Factor 2: Spirituality</i>                                  |                        |     |     |
|  | Spirituality           | .22 | .40 |
| I use prayer to ward off misfortune                            |                        |     |     |
|  | Spirituality           | .23 | .50 |
| I believe guardian angels or other spiritual forces protect me |                        |     |     |
|  | Spirituality           | .09 | .61 |
| There is an invisible force guiding us all                     |                        |     |     |
|  | Spirituality           | .03 | .74 |
| I believe in a higher power or God                             |                        |     |     |

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*Note.* Values represent Geomin rotated loadings (rounded to two decimals); TF, Thought- fusion.

### 3.5.5 Exploration of group differences with the Revised IBI:

In order to examine if there were significant differences between the Indian and the Australian sample with the revised versions of the IBI, independent sample *t*-test was repeated with a 95% confidence interval (CI) to explore the mean difference on the two new subscales of the IBI across the two samples. Given that different items were used, to ensure a common metric, “mean” ratings of *Magical thinking and Thought-fusion beliefs (MTFB)* and *Spirituality* (1 to 5 based on the Likert scale) were compared across each sample. For the *MTFB* subscale, India ( $M = 2.59, SD = .79$ ) scored significantly higher than the Australian sample ( $M = 2.22, SD = .75$ ),  $t(1160) = 8.03, p < .001, d = .47$ . Similarly, for the *Spirituality* Subscale, India ( $M = 3.41, SD = .85$ ) scored significantly higher than the Australian sample ( $M = 2.85, SD = .92$ ) samples;  $t(1160) = 10.63, p < .001, d = .63$ .

### 3.5.6 Construct validity

Bivariate correlations between the IBI, OCI-R and OBQ-TRIP were calculated to evaluate the construct validity of the IBI total and subscale scores across the two samples. The correlations between the IBI total scale and the subscales for the Indian and the Australian samples can be seen in Table 8. Evidence supportive of criterion-related concurrent validity was found as the IBI had a significant positive correlation with the OCI-R. Convergent validity was demonstrated with a significant positive correlation of the IBI with the OBQ-TRIP. Table 9 indicates the correlation matrix for the IBI and the two subscales with OBQ-TRIP total scores and subscale scores in both samples, and Table 10 indicates the correlation matrix for the IBI total scores and subscale scores in both samples with OCI-R total scores and subscale scores.

**Table 8.**

*Pearson's correlations between IBI total scores and the subscales in Australia (n=535) and India (n=627)*

|           | Country   | IBI   |          |          |
|-----------|-----------|-------|----------|----------|
|           |           | Total | Factor 1 | Factor 2 |
| IBI Total | Australia | -     | .85      | .88      |
|           | India     | -     | .94      | .78      |
| Factor 1  | Australia |       | -        | .50      |
|           | India     |       | -        | .52      |
| Factor 2  | Australia |       |          | -        |
|           | India     |       |          | -        |

\* $p < .01$  level (2-tailed)

*Note.* Factor 1 = Magical & Thought-Fusion Beliefs, Factor 2 = Spirituality.

**Table 9.***Pearson's correlations between IBI Australia (n=535) and India (n=627) and OBQ-TRIP total scores and the subscales*

|                   | Country   | IBI<br>Total | MTFB  | Spir  | OBQ-<br>TRIP | OBQ-TRIP subscales |       |       |       |
|-------------------|-----------|--------------|-------|-------|--------------|--------------------|-------|-------|-------|
|                   |           |              |       |       |              | T                  | R     | I/C   | P/IoU |
| IBI Total         | Australia |              | .85** | .88** | .31**        | .32**              | .22** | .36** | .21** |
|                   | India     | -            | .94** | .78** | .42**        | .43**              | .28** | .38** | .34** |
| MTFB              | Australia |              |       | .49** | .41**        | .41**              | .30** | .38** | .31** |
|                   | India     |              | -     | .52** | .40**        | .43**              | .25** | .40** | .31** |
| Spir              | Australia |              |       |       | .15**        | .14**              | .11*  | .26** | .06   |
|                   | India     |              |       | -     | .31**        | .29**              | .25** | .25** | .27** |
| OBQ-TRIP<br>Total | Australia |              |       |       |              | .88**              | .76** | .84** | .90** |
|                   | India     |              |       |       | -            | .88**              | .79** | .87** | .90** |
| T                 | Australia |              |       |       |              |                    | .65** | .66** | .72** |
|                   | India     |              |       |       |              | -                  | .63** | .74** | .70** |

|       |           |   |       |       |
|-------|-----------|---|-------|-------|
| R     | Australia |   | .55** | .60** |
|       | India     | - | .56** | .66** |
| I/C   | Australia |   |       | .65** |
|       | India     | - |       | .68** |
| P/IOU | Australia |   |       | -     |
|       | India     |   |       |       |

---

*Note.* IBI, Illusory Beliefs Inventory; MTFB = Magical & Thought Fusion Beliefs subscale of the IBI; Spir= Spirituality subscale of the IBI; OBQ-TRIP, Obsessive beliefs Questionnaire-38; T, Overestimation of threat; R, Responsibility; I/C, Importance and Control of thought; P/IOU, Perfectionism and Intolerance of Uncertainty. \*\* $p < .01$  level (2-tailed); \* $p < .05$  level (2-tailed)

**Table 10.***Pearson's correlations between IBI Australia (n=535) and India (n=627) and OCI-R total scores and the subscales*

|              | Country   | IBI   |      | OCI-R        |       | OCI-R subscales |     |     |     |     |     |
|--------------|-----------|-------|------|--------------|-------|-----------------|-----|-----|-----|-----|-----|
|              |           | Total | MTFB | Spirituality | Total | C               | H   | N   | Obs | O   | W   |
| IBI Total    |           |       |      |              |       |                 |     |     |     |     |     |
|              | Australia |       | .85  | .88          | .35   | .25             | .26 | .36 | .25 | .28 | .28 |
|              | India     | -     | .94  | .78          | .41   | .30             | .27 | .38 | .34 | .31 | .29 |
| MTFB         | Australia |       |      | .49          | .40   | .30             | .30 | .42 | .30 | .30 | .30 |
|              | India     |       | -    | .52          | .41   | .29             | .29 | .40 | .32 | .27 | .30 |
| Spirituality | Australia |       |      |              | .22   | .14             | .16 | .22 | .14 | .19 | .19 |
|              | India     |       |      | -            | .28   | .23             | .16 | .21 | .25 | .29 | .18 |
| OCI-R Total  | Australia |       |      |              |       | .77             | .72 | .78 | .82 | .78 | .76 |
|              | India     |       |      |              | -     | .80             | .72 | .79 | .81 | .73 | .78 |
| C            | Australia |       |      |              |       |                 | .46 | .55 | .70 | .47 | .58 |
|              | India     |       |      |              |       | -               | .55 | .58 | .66 | .49 | .58 |
| H            | Australia |       |      |              |       |                 |     | .50 | .54 | .47 | .36 |
|              | India     |       |      |              |       |                 | -   | .46 | .57 | .40 | .45 |



### 3.6 Discussion

This is the first study to the author's knowledge to validate the psychometric properties of the IBI with a cross-cultural perspective. Addressing this gap in the literature, the present study explored the cross-cultural reliability and validity of the IBI in Australia and India.

#### 3.6.1 Cross-cultural differences in magical thinking and OCD

Given that the IBI did not demonstrate configural invariance, there appear to be fundamental cross-cultural differences in the way the Indian and the Australian samples responded to at least some of the items. Although the factor themes of the IBI were similar across the two samples, each factor comprised of different items as well as different numbers of items measuring the same construct of magical thinking. Cross-cultural variances were also observed when average ratings were compared for the revised versions of the IBI across the two samples. Consistent with the magical thinking literature in OCD, where higher levels of magical thinking were reported in religious and superstitious cultures including Turkey (Eremsoy & Inozu, 2016; Yorulmaz, 2016; Yorulmaz, Inozu, & Gultepe, 2011) and Ireland (Helgadóttir et al., 2012). Although on average the Indian sample endorsed magical thinking items more strongly than the Australian sample, no direct comparison can be drawn since different versions of the IBI were derived for each sample. Cultural differences between the Indian and the Australian samples were also revealed with regards to OC symptoms, lending support to previous studies that highlight differences in OC symptom expressions in highly superstitious cultures (Chaturvedi & Bhugra, 2007; De Bilbao & Giannakopoulos, 2005; de Silva, 2006; Mahgoub & Abdel-Hafeiz, 1991; Nicolini, Salin-Pascau, & Lanzagorta, 2017; Jaisoorya et al., 2017; Okasha, Saad, Khalil, El Dawla, & Yehia, 1994; Sharma, 1968; Williams & Steever, 2015). Furthermore, the mean scores of the community participants of the Indian sample were higher than the standardised clinical cut-off scores of the OCI-R, emphasising cultural differences in the in normative range of these measures. These findings are analogous to previous cross-cultural studies that reported higher normative scores for the OCI-R for community participants from religious cultures (Nota et al., 2014; Williams, Davis, Thibodeau, & Bach, 2013).

### 3.6.2 Psychometric properties and the factor structure of the IBI

The EFAs revealed a two-factor solution instead of the three-factor structure proposed by Kingdon et al. (2012). Factor 1 was named *Magical and Thought-fusion beliefs* with 10 items in the Australian version and eight items in the Indian version of the IBI. In each of the samples, this factor comprised of most items assessing general magical beliefs and only a few items relating to TAF beliefs, which referred to a cognitive appraisal akin to intuitive states and superstitious beliefs. Factor 2, *Spirituality*, was a label retained from the original version proposed by Kingdon et al. (2012) as it was deemed appropriate for the extracted items. This factor denoted a central theme of religious beliefs, dogmas relating spiritual presence, and defiance of rational scientific explanations of events. The *Spirituality* factor consisted of nine items (four positively worded and five negatively worded items) in the Australian sample, mirroring the spirituality items in the original version of the IBI, which was also developed in an Australian sample. However, there were far fewer items in Factor 2, Spirituality, in the Indian sample. This factor in the Indian sample consisted of only four items where all the items related to “*fate*” dropped out in the final solution, reflecting a potential issue of cultural interpretation of the spirituality related items in the Indian sample. A tenable explanation could be that India is a historically religious/superstitious culture that may have a different interpretation of spirituality than western societies (Chaturvedi & Bhugra, 2007; De Bilbao & Giannakopoulos, 2005; de Silva, 2006), an area worth exploring through qualitative research. Thus, based on theory and the results of this study, a 19-item IBI was extracted for the Australian sample while a 12-item IBI was extracted for the Indian sample.

The two-factor solutions across both samples share some similarities with the psychometric properties of the original 24-item IBI (Kingdon et al., 2012; Shihata et al., 2014). Factor 1 of the new versions of the IBI encapsulates thought-fusion items and general magical belief items under one category, unlike the original version where both emerged as separate categories. The present study failed to distinguish between magical beliefs and thought-fusion beliefs as two distinct themes. A possible explanation could be that the present sample considered TAF as

a subset of general magical belief, consistent with previous literature (Abramowitz, Whiteside, Lynam, & Kalsy, 2003; Amir et al., 2001; Einstein & Menzies, 2004). Conversely, Factor 2 retained all the items of spirituality as in the original IBI in the Australian sample (Kingdon et al., 2012; Shihata et al., 2014), and a subset of items in the Indian sample.

The findings of the present study paralleled previous validation findings of the IBI conducted by Shihata et al. (2014), demonstrating reliable psychometric properties with good internal consistency. Consistent with the previous validation of the IBI conducted by Shihata et al. (2014), the present findings provide some evidence of the convergent and criterion validity of the IBI on the basis of significant correlations between the three IBI subscales and OCI-R, suggesting that magical thinking is associated with OC symptoms. A moderate correlation was found between IBI and OBQ-TRIP, providing further support for convergent validity.

### **3.6.3 Strengths and Limitations of the study**

A strength of this study is the use of a rigorous statistical approach to validate the measure. Also, this was the first study to use the IBI in an Indian sample and provide a transcultural insight on the psychometric properties of the measure. The current study, however, had a few limitations. Despite the large sample size, participants were obtained using convenience sampling and therefore recruitment may be biased based on underrepresentation or overrepresentation of the sample with regards to Internet access. This may limit the generalisability of results. Another limitation was that measures such as the TAF-scale (Shafran, Thordarson, & Rachman, 1996) were not included, limiting our understanding of relationships between magical thinking and TAF domains. Thus, future research should include such measures to further assess the construct validity of the IBI. It is also important for future research to examine the discriminant validity of the IBI, which was not examined in this study.

### 3.6.4 Implications

This study provides important theoretical implications and provides avenues for future research. This study provides evidence for the internal consistency of the IBI and its association with OC specific beliefs and symptoms from a cross-cultural perspective. These results may have potential implications in the assessment of this construct with individuals from diverse cultural backgrounds. For example, a culturally appropriate version of the IBI could be used as a screening tool for case formulations and to guide treatment to identify whether magical thinking may represent a valuable target for intervention. Future research should also evaluate the IBI in clinical samples with OCD across cultures so that norms for the different versions can be established. It would be interesting to explore whether IBI functions differently in other cultures or non-English speaking countries, an area worth investigating.

### 3.7 Conclusion

This study demonstrated that the IBI has stable psychometric properties across both samples, India and Australia, with good reliability and construct validity. The hierarchical three-factor structure proposed in the original scale by Kingdon et al. (2012) was not found, but rather a two-factor structure with similar themes was observed across both samples. The findings of the present study further indicate that the construct of magical thinking differs qualitatively across more or less superstitious cultures with respect to the domain of spirituality. Although there were some conceptual similarities with regards to the factor structure, separating *Spirituality* as a distinct factor from *Magical and Thought-fusion beliefs*, the items comprising each factor differed across the two samples. This understanding may be important in case formulations when considering cognitive vulnerability and planning culturally sensitive interventions for OCD.

## CHAPTER FOUR: DOES MAGICAL THINKING UNIQUELY CONTRIBUTE TO OBSESSIVE COMPULSIVE SYMPTOMS? A MODEL TESTING STUDY IN AUSTRALIA AND INDIA

### **4.1 Chapter Linking Statement**

The previous study validated the Illusory Beliefs Inventory (IBI) from a cross-cultural perspective in Australia (IBI -19 items) and India (IBI -12 items). This was a prerequisite for being able to conduct a comprehensive quantitative analysis for testing whether magical thinking uniquely contributes to the cognitive vulnerability for OC symptoms after controlling for established cognitive beliefs implicated in OCD. The findings of the previous study supported a two-factor structure with consistent themes across both samples instead of the three-factor model found in the original validation study by Kingdon et al. (2012). The following chapter is an extension of the previous study and therefore uses the derived two-factor structure of the IBI to further our understanding of magical thinking and its unique contribution in OC symptomatology from a transcultural perspective.

Therefore, the aim of this study is to use the factor structure of the IBI derived in the Indian and the Australian samples, to determine if magical thinking contributes additionally to the predictive utility of OC symptoms in each culture.

## 4.2 Introduction

### 4.2.1 Cognitive vulnerability and OCD:

The “*Triple Vulnerability Model*” by Barlow (2004) postulates that individuals with a pre-existing general diathesis for stress often develop specific vulnerabilities when faced with a challenging life event that contributes to the manifestation of OC symptoms (Barlow, 2004; Ormel et al., 2013). Evidence endorses that the perceived inability to cope or control threatening life experiences leads to a perceived apprehension of unpredictable negative events, heightens negative self-appraisals responsible for dysfunctional beliefs and provides a pathway for more anxiety through negatively valenced emotional states (Brown, Chorpita, & Barlow, 1998). Although, there is a marginal difference between obsessions and depressive ruminations that are mostly found to co-occur, negative cognitive/emotional states are acknowledged to play a significant role in the maintenance of OCD (Abramowitz, Whiteside, Lynam, & Kalsy, 2003; Goods, Rees, Egan, & Kane, 2014b). Regression analysis tested on both moderational and mediational models to test the effect of negative life events on generalised psychological vulnerability suggests that moderational models appeared to be stronger for adults and not for younger children and vice-versa (Brown et al., 1998). Thus, negative life events and potential general, as well as psychological vulnerability, intervenes the relationship between the rigid nature of the dysfunctional cognitive beliefs and OCD (Barlow, 1988; Jones & Menzies, 1998).

The existing literature on dysfunctional cognitive beliefs establishes three belief domains as key in the development and maintenance of OCD, namely *responsibility/threat*, *perfectionism/certainty*, and *importance/control of thoughts* (OCCWG (2005)). Contemporary theoretical and empirical literature suggests an additional cognitive domain, namely, magical thinking that is proposed to make a unique contribution to understanding OC symptoms and is separable from over-importance/control of thoughts (Amir, Freshman, Ramsey, Neary, & Brigidi, 2001; Bolton, Dearsley, Madronal-Luque, & Baron-Cohen, 2002; Einstein & Menzies, 2004a, 2004b, 2006; Rees, Draper, & Davis, 2010). Only one aspect of magical

thinking, *thought-action fusion* (TAF), which overlaps with the *importance/control of thoughts* domain (see *Figure 1*), whilst other more general aspects of magical thinking (e.g., superstitious thinking, paranormal beliefs) are not considered. Indeed, most items that make up this domain of the Obsessive Beliefs Questionnaire (OBQ-44; Myers, Fisher, & Wells, 2008) focus on general beliefs regarding the power and importance of thoughts. An example item is, “*Having a blasphemous thought is as sinful as committing a sacrilegious act.*” Although there is some evidence in the literature that magical thinking may play a role in vulnerability to OCD, it is not included in current conceptualisations of cognitive vulnerability to OCD. The current study attempts to extend the cognitive dysfunction model of OCD by exploring the unique contribution of magical thinking in OC symptoms above and beyond the existing constructs.

#### **4.2.2 Influence of culture on beliefs and OC symptoms**

Trans-cultural research has found evidence of a strong cultural influence on belief systems relating to the self, mental health, and coping behaviour in Eastern countries such as India, Nepal and Pakistan when compared to Western countries (Callaghan et al., 2005; Dhawan, Roseman, Naidu, Thapa, & Rettek, 1995; Sharma, 1968; Sheikh & Furnham, 2000; Srinivasan & Thara, 2001). Studies report that different religious orientations also confer different vulnerabilities in OCD (Siev & Cohen, 2007). However, it is currently unknown whether or not a superstitious culture characterised by a high level of magical thinking increases or reduces vulnerability to OCD. It is plausible that greater accommodation of magical thinking in a highly superstitious culture is protective against OCD, where traditional superstitious beliefs act as a socially acceptable neutralising force against the intrusive thought, enhancing tolerance and thereby reducing the vulnerability. Conversely, magical thinking in a culture with relatively low levels of superstitious beliefs may increase the risk of OCD. Alternatively, a highly superstitious culture may increase vulnerability to OCD symptoms whereas a culture with low levels of superstitious belief may be protective. Yet another alternative is that although a high superstitious culture may increase vulnerability to OC like obsessions and compulsions, the cultural acceptance of these beliefs and behaviours may result in less distress and disability (and therefore lower rates of OCD) than for individuals in

low superstitious culture. Therefore, it is important to explore magical thinking from a transcultural perspective by comparing a traditionally and spiritually inclined culture to a relatively low superstition culture. This study investigates this relationship between magical thinking and OCD symptoms in holistic-thinking, collectivistic culture (India) versus analytic-thinking, individualistic cultures (Australia) and investigates the strength of this relationship in understanding OC symptoms in each culture.

### **4.3 Aim of the present study**

The aim of the current study was to conduct a comprehensive transcultural exploration to determine the relative importance of magical thinking in explaining OC symptoms above and beyond the already established cognitive constructs. Based on the EFA results from the previous study, the first aim of the study was to conduct model testing in the Indian sample (holistic-thinking culture) and Australian samples (analytic-thinking culture) to explore whether magical thinking uniquely contributed to an underlying cognitive vulnerability to OC symptoms across the two samples. The second aim was to ascertain the strength of the association between magical thinking and OC symptoms after controlling for the other cognitive vulnerability factors. It was hypothesised that magical thinking would contribute to the cognitive vulnerability to OC symptoms alongside other constructs. Additionally, it was expected that magical thinking would explain a significant proportion of unique variance in OC symptoms in both samples.

## **4.4 Method**

### **4.4.1 Participants, Measures and Procedures**

The current study is an extension of the previous study described in Chapter Three of this thesis and uses the same participants, measures, and procedures. Based on the factor analyses in the previous chapter, IBI-19 is used for the Australian sample and IBI-12 is used for the Indian sample for the same dataset.

#### 4.4.2 Analytic strategy

The data from the previous study were used to evaluate the model fit of the hypothesised models using Structural Equation Modelling (SEM) in Mplus Version 8.0 (Muthén & Muthén, 1998-2017). SEM is a multivariate statistical technique that comprises testing both a measurement model and a structural model to analyse the structural relationships between latent variables (Byrne, 2012). The Mplus default of full information maximum likelihood was used to deal with missing data.

**Hypothesised models.** Two separate models were tested in each sample independently. In the first hypothesised model (*Figure 3*), a cognitive vulnerability factor was indicated by the four OBQ-TRIP subscales (Moulding et al., 2011) namely; *Overestimation of Threat (T)*, *Inflated sense of personal responsibility for harm (R)*, *Perfectionism/ Intolerance of Uncertainty (P/U)*, *Importance and Need to Control thoughts (I/C)*; and the two IBI subscales for the country-specific revised versions of the IBI (IBI-19 for Australia; IBI-12 for India) namely; *Magical and Thought Fusion Beliefs (MTFB)* and *Spirituality*. This measurement model specifies that each of these theoretical vulnerability factors is correlated with each other. The latent variable for OC symptoms was indicated by the six subscales of the OCI-R (Foa et al., 2002), namely; *Obsessing, Washing, Hoarding, Checking, Ordering, and Neutralising* respectively. The first SEM with general *cognitive vulnerability* predicting *OC symptoms* estimates the association between the common variance amongst the vulnerability factors and the *OC symptoms* latent variable but says nothing about each individual factor's unique predictive utility with respect to OC symptoms.

The second hypothesised model (*Figure 4*) was designed to estimate the unique predictive utility of each vulnerability factor, with the four OBQ-TRIP subscales and the IBI two subscales modelled as direct predictors of the OC symptoms latent variable. The proposed model has a total of 29 parameters, including direct and indirect pathways estimated for the *a priori* sample size calculation. A recommended ratio of 10 observations per parameter was exceeded in this study (Bentler & Chou, 1987; Kline, 1998).

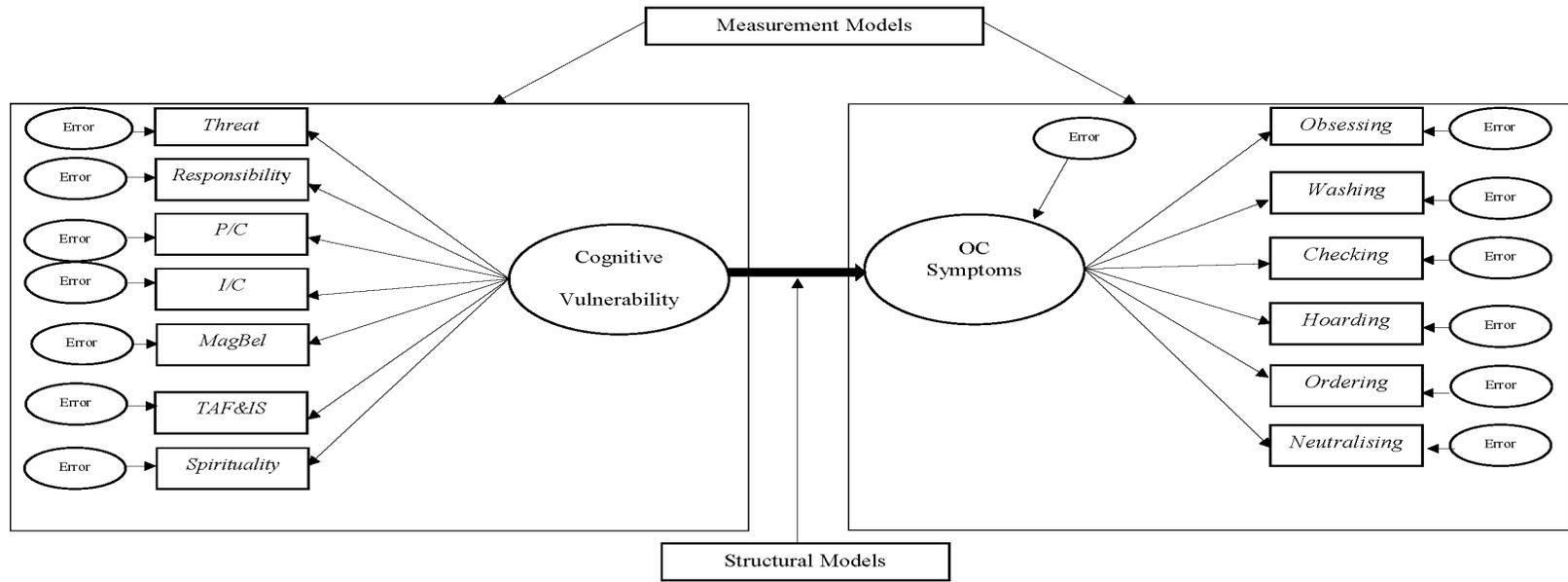
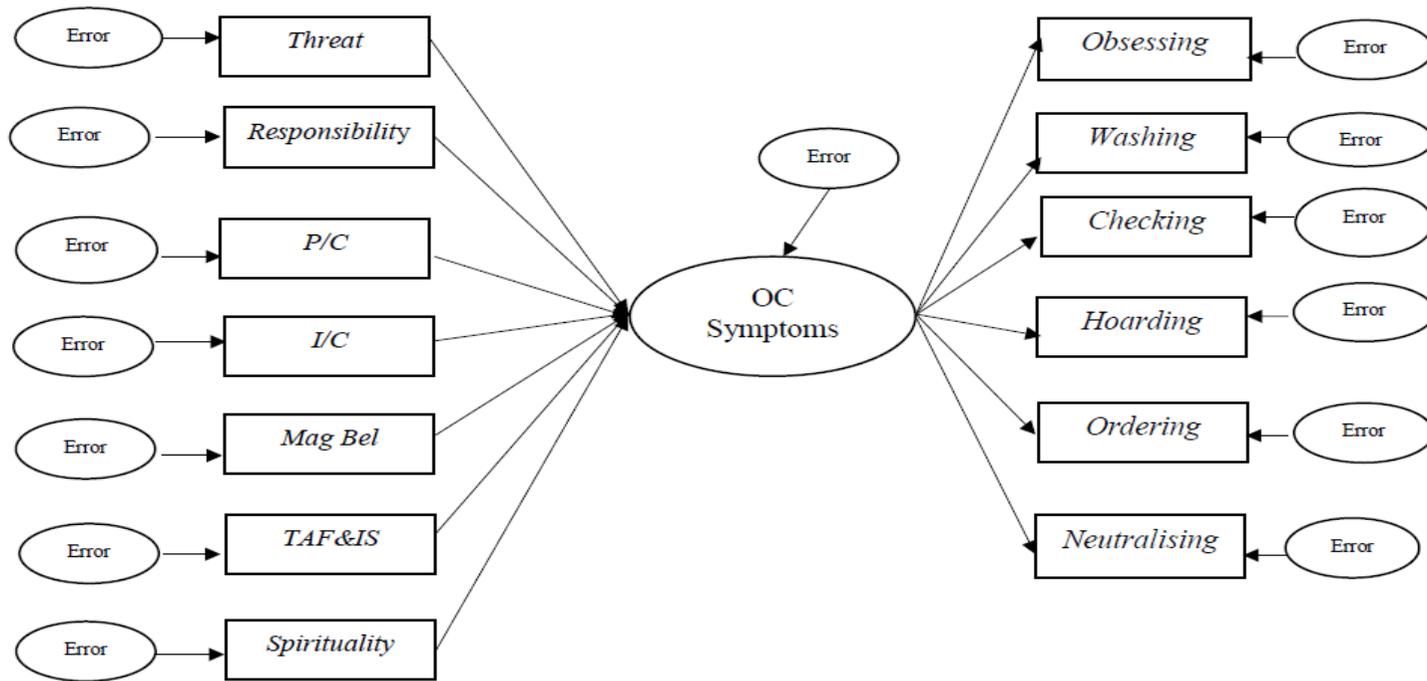


Figure 3. The hypothesised Structural Equation Model (demarcated into measurement and structural components) to see the contribution of magical thinking on cognitive vulnerability for OC symptoms. P/C = Perfectionism /Certainty; I/C = Importance/Control of thought; IS & TAF = Internal States and Thought-action Fusion; Mag bel = Magical Beliefs.



*Figure 4.* The hypothesised Structural Equation Model with all cognitive beliefs subscales directly predicting OC symptoms. P/C = Perfectionism /Certainty; I/C = Importance/Control of thought; IS & TAF = Internal States and Thought-action Fusion; Mag bel = Magical Beliefs

**Evaluating the data fit.** Data fit was evaluated in each sample separately for both the measurement and structural models with SEM using maximum likelihood estimation in Mplus 8.0 (Muthén & Muthén, 1998–2017). In the measurement models, Confirmatory Factor Analysis (CFA) was used to determine how strongly the subscales load on the latent variables (cognitive vulnerability and OC symptoms). The relationship between the latent variables comprises the structural model. To determine the model fit for the measurement and structural model in each sample, the same criteria for model fit were used as in Chapter 3 (*see* page 40). Standardised estimates were used to assess the strength of structural pathways.

## 4.5 Results

### 4.5.1 Model Testing-Australian sample

**Measurement Models.** Two independent CFAs were conducted in the Australian sample ( $n = 535$ ) to evaluate the two measurement models to be used in the final structural model. The measurement model for the latent *Cognitive Vulnerability* variable indicated a poor fit to the data,  $\chi^2(9) = 367.43$ ,  $p < .001$ , CFI = .88, TLI = .81, SRMR = .08, and RMSEA = .18 (90% CI [.16 to .21]). Inspection of the modification indices indicated a strong covariance between the IBI subscales, namely *Magical & Thought-fusion beliefs*, and *Spirituality*. Although two separate subscales, these subscales overlapped conceptually as they represent items from the same questionnaire used to assess the construct magical thinking and hence these two variables were freed to covary. This model provided a good fit to the data across most indices,  $\chi^2(8) = 43.77$ ,  $p < .001$ , CFI = .97, TLI = .95, SRMR = .03, and RMSEA = .091 (90% CI [.07 to .12]). However, the RMSEA was relatively high. Modification indices indicated covariance between the OBQ subscale of *Importance and control of thought* with *Spirituality* subscale of the IBI-19, which may be due to conceptual similarities between some items. For instance, items in the OBQ importance and control of thought subscale, such as “*If I don’t control my thoughts, I’ll be punished*”, “*Having a blasphemous thought is as sinful as committing a sacrilegious act,*” are conceptually similar to *Importance and control*

of thought and Spirituality related items in the IBI (e.g., “There is an invisible force guiding us all”, “I believe in a higher power or God”) with respect to the concepts of sins, punishment, and God. Freeing these scales to covary resulted in significant improvements in the model fit. The revised model revealed excellent fit to the data,  $\chi^2(7) = 20.87$ ,  $p < .001$ , CFI = .99, TLI = .98, SRMR = .02, and RMSEA = .06 (90% CI [.03 to .09]). The standardised loadings for all the subscales were significant (all  $ps < .001$ ) and ranged from .14 to .88. Cognitive vulnerability explained between 2% to 77% of the variance in the subscales.

Inspection of the fit statistics for the measurement model with *OC symptoms* as a latent variable revealed a marginal fit to the data,  $\chi^2(9) = 119.92$ ,  $p < .001$ , CFI = .93, TLI = .90, SRMR = .04, and RMSEA = .15 (90% CI [.12 to .17]). The modification indices indicated strong covariance between *checking* and *obsessions*, *washing and hoarding*, and *obsessions* and *hoarding*, which were deemed theoretically defensible. A model when these subscales were freed to covary provided an excellent fit to the data,  $\chi^2(6) = 15.67$ ,  $p < .001$ , CFI = .99, TLI = .98, SRMR = .01, and RMSEA = .05 (90% CI [.02 to .09]). The standardised factor loadings were statistically significant (all  $ps < .001$ ) and strong, ranging from .64 to .80. The *OC symptoms* latent variable explained between 41% and 63% of the variance in the observed variables.

The 95% confidence intervals indicated that the IBI *Spirituality* score loaded most weakly on the *cognitive vulnerability* latent factor, followed by the IBI *Magical & Thought-Fusion Beliefs* subscale. OBQ *Responsibility* subscale score loaded more weakly than OBQ *Threat*, OBQ *Perfectionism/Uncertainty*, and *Importance/Control of thought* on the *cognitive vulnerability* latent factor, but there were no other differences between subscales loadings. In OC symptoms subscales, *hoarding* and *obsessing subscales* loaded more weakly on *OC symptoms* latent factor than *washing*, *neutralising*, *checking* and *ordering* subscales, but there were no other differences between subscales loadings. Table 11 reports the standardised parameter estimates of the observed variables on the latent variables.

**Table 11.**

*Measurement Model with Standardised parameter estimates of the observed variables on Cognitive Vulnerability and OC symptoms in the Australian sample*

| Latent variables                    | $\beta$ ( 95% CI) | S.E |
|-------------------------------------|-------------------|-----|
| Cognitive Vulnerability             |                   |     |
| OBQ Threat                          | .88 (.85 - .91)   | .01 |
| OBQ Responsibility                  | .72 (.67 - .77)   | .02 |
| OBQ Importance/Control of Thought   | .77 (.73 -.81)    | .02 |
| OBQ Perfectionism/Uncertainty       | .82 (.79 -.86)    | .02 |
| IBI Magical& Thought-Fusion Beliefs | .44 (.36 -.51)    | .04 |
| IBI Spirituality                    | .14 (.05 -.23)    | .05 |
| OC Symptoms                         |                   |     |
| Checking                            | .72 (.67 -.76)    | .03 |
| Hoarding                            | .64 (.57 -.70)    | .03 |
| Neutralizing                        | .76 (.71 -.80)    | .02 |
| Obsessing                           | .68 (.62 -.73)    | .03 |
| Ordering                            | .71 (.66 -.76)    | .03 |
| Washing                             | .80 (.75 -.84)    | .02 |

\*  $p > .001$

**Structured Equation Modelling (SEM) in Australia.** In the structural model (*Figure 5*), cognitive vulnerability was found to be a strong predictor of OC symptoms ( $\beta = .70$ ,  $SE = .03$ ,  $p < .001$ , (95% CI [.65 - .76]) and provided a good model fit,  $\chi^2(48) = 218.91$ , CFI = .95, TLI = .93, SRMR = .05, RMSEA = .08 (90% CI: .07 - .09). In the structural model, *OC symptoms* accounted for 50% of the total variance in the model ( $\beta = .50$ ,  $SE = .04$ ,  $p < .001$ ). The factor loadings were all statistically significant (all  $ps < .001$ , see *Figure 5*) and ranged from .16 to .90, where *Threat* was the largest predictor of cognitive vulnerability for OC symptoms ( $\beta = .90$ , 95% CI: .88 - .93), followed by *Perfectionism* ( $\beta = .81$ , 95% CI: .77 - .85), *Importance/Control of thought* ( $\beta = .76$ , 95% CI: .72- .80) , *Responsibility* ( $\beta = .70$ , 95% CI: .65 - .75), *Magical and thought-fusion beliefs* ( $\beta = .46$ , 95% CI: .40- .53),

while *Spirituality* ( $\beta = .16$ , 95% CI: .10 - .25) contributed to the least amount of variance in the model.

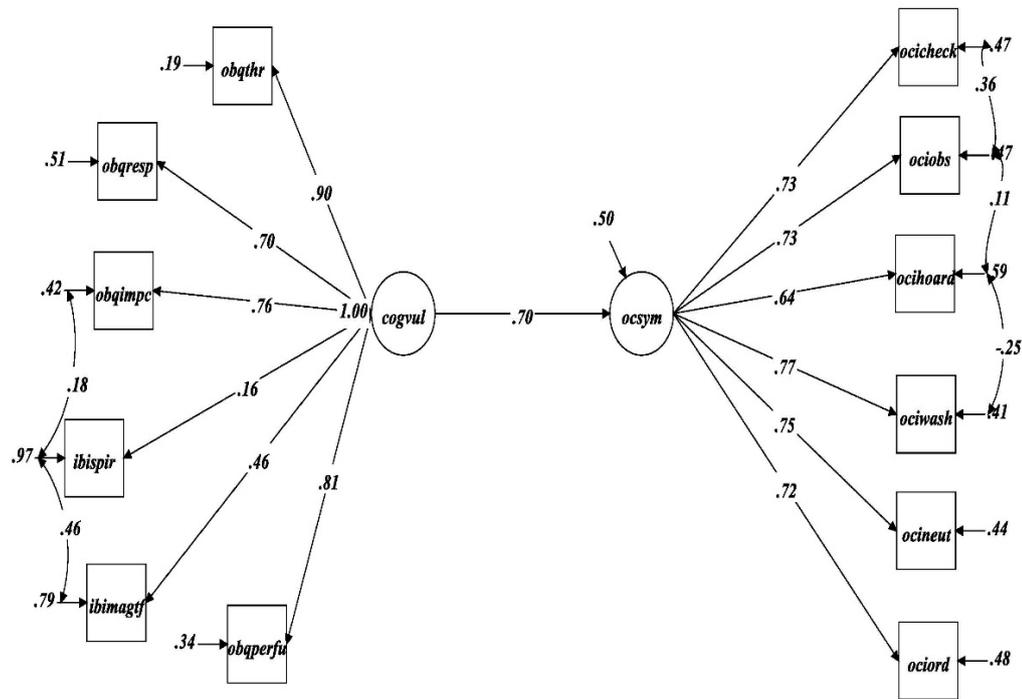


Figure 5. The full SEM with Cognitive vulnerability on OC Symptoms in the Australian sample with standardised factor loadings and residual variances. In this model, *cogvul* = Cognitive Vulnerability; *obqthr* = Threat subscale of OBQ-38; *obqresp* = Responsibility subscale of OBQ-38; *obqimpc* = Importance/Control of thought subscale of OBQ-38; *obqperfu* = Perfectionism/Certainty subscale of the OBQ-38; *ibispir* = Spirituality subscale of IBI-19; *ibimagf* = Magical and thought-fusion belief subscale of the IBI-19; *ocicheck* = Checking subscale of the OCI-R; *ociobs* = Obsession subscale of the OCI-R; *ocihoard* = Hoarding subscale of the OCI-R; *ociwash* = Washing subscale of the OCI-R; *ovineut* = Neutralising subscale of the OCI-R; *ociord* = Ordering subscale of the OCI-R

The second SEM (Figure 6), with all cognitive vulnerability subscales predicting *OC symptoms*, provided an adequate fit to the data,  $\chi^2(36) = 114.66$ , CFI = .94, TLI = .91, SRMR = .03, RMSEA = .07 [90% CI: .06 - .09]). Several areas of model strain were identified. First, the *importance and control of thought* subscale of the OBQ and the *Spirituality* subscale of the IBI were not significant in this model. Second, modification indices indicated strong covariance between *threat* and

*magical and thought fusion beliefs*. This association may be theoretically defensible given that *threat* being the largest contributor in OC symptom (OCCWG, 1998, 2005), development of magical beliefs could be associated with the perception of threat. Third, there was a significant negative association between *responsibility* and *OC symptoms*, rather than the hypothesised positive association. A revised model was run after removing the non-significant predictors, allowing *magical and thought fusion beliefs* and *threat* to covary to account for some common variance, and *threat* and *responsibility* were also freed to covary based on the previous literature (OCCWG, 1998, 2005). This model demonstrated a poor fit,  $\chi^2(29) = 446.68$ , CFI = .76, TLI = .68, SRMR = .15, RMSEA = .16 [90% CI: .15 - .18]. Inspection of the modification indices (MIs) suggested strong covariance between *Threat* and *Perfectionism* subscale. Given that, these subscales overlapped conceptually as they represent items from the same questionnaire used to assess the construct of obsessive beliefs, this time the model was run after allowing *Threat* and *Perfectionism* to covary. The results of this structural model provided a good fit,  $\chi^2(26) = 92.32$ , CFI = .96, TLI = .94, SRMR = .03, RMSEA = .07 [90% CI: .05- .08]. In the structural model, OC symptoms accounted for 50% of the total variance in the model ( $\beta = .50$ ,  $SE = .04$ ,  $p < .001$ ). The factor loadings were all statistically significant (all  $ps < .001$ ) and ranged from .11 to .61, where *Threat* was the largest predictor of OC symptoms ( $\beta = .61$ , 95% CI: .52 - .71), followed by *Magical and thought-fusion beliefs* ( $\beta = .18$ , 95% CI: .11 - .26), while *Responsibility* ( $\beta = .11$ , 95% CI: .02- .21) and *Perfectionism* ( $\beta = .11$ , 95% CI: .02 - .21) contributed to the least amount of variance in the model. However, similar to the previous model, there was a significant negative association between *Responsibility* and *OC symptoms*, rather than the hypothesised positive association.

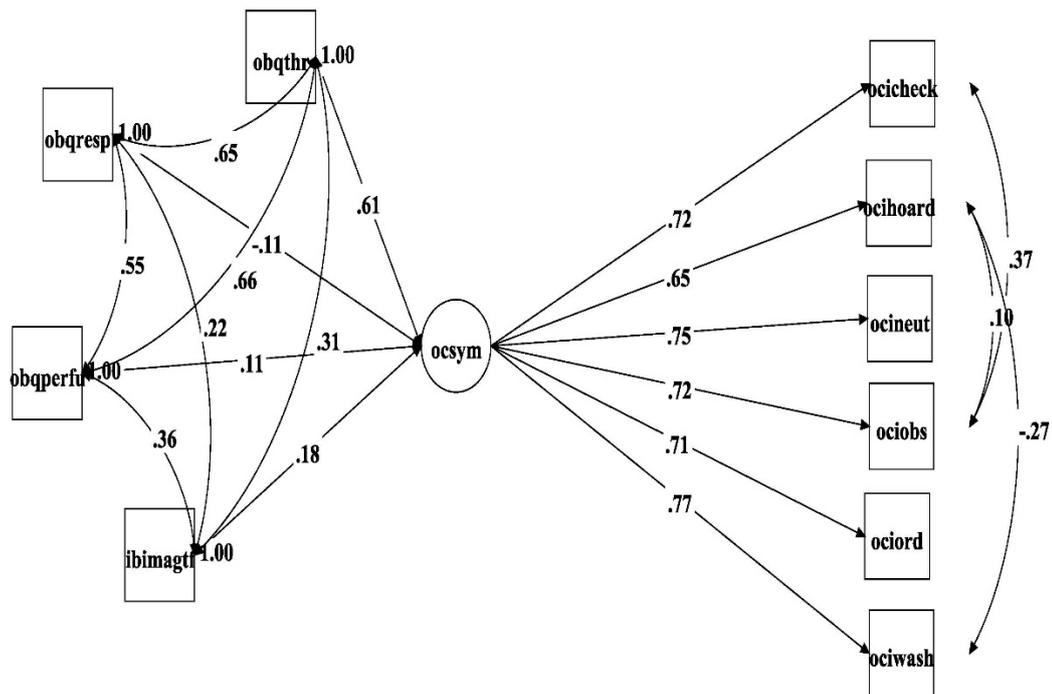


Figure 6. All cognitive beliefs directly predicting OC symptoms in the Australian sample with only the significant standardised loadings and error variances. In this model, *obqthr* = Threat subscale of OBQ-38; *obqresp* = Responsibility subscale of OBQ-38; *ibimagt* = Magical and thought-fusion belief subscale of the IBI-19; *obqperf* = Perfectionism/Certainty subscale of the OBQ-38; *ocicheck* = Checking subscale of the OCI-R; *ociobs* = Obsession subscale of the OCI-R; *ocihoard* = Hoarding subscale of the OCI-R; *ociwash* = Washing subscale of the OCI-R; *ocineut* = Neutralising subscale of the OCI-R; *ociord* = Ordering subscale of the OCI-R

To investigate whether the negative association between responsibility and OC symptoms was a function of problematic residual error variance, this time the model was run without threat as a predictor and the results indicated a positive relationship between responsibility and OC symptoms, consistent with the theory (OCCWG, 2005). Thus, the negative association proved to be more of a statistical artefact rather than a real negative relationship.

#### 4.5.2 Model testing –Indian sample

**Measurement Models.** Two independent CFAs were conducted in the Indian sample ( $n = 627$ ) to evaluate the two measurement models to be used in the final structural model. The measurement model with *Cognitive Vulnerability* as a latent variable indicated a marginal fit to the data,  $\chi^2 (9) = 192.75, p < .001$ , CFI = .90, TLI = .82, SRMR = .07, RMSEA = .18 (90% CI [.16 - .20]). Inspection of the modification indices revealed a strong covariance between the IBI-12 subscales, namely *Magical thinking and thought-fusion beliefs* and *Spirituality*. These subscales overlapped conceptually as they represent items from the same questionnaire used to assess the construct magical thinking. This covariance may represent common method variance and hence these two variables were freed to covary. This model provided a good fit to the data,  $\chi^2 (8) = 60.17, p < .001$ , CFI = .97, TLI = .94, SRMR = .03, and RMSEA = .10 (90% CI [.08 - .13]). However, the RMSEA was still elevated and modification indices indicated strong covariance between the OBQ subscales *Perfectionism* and *Intolerance of Uncertainty* with *Responsibility*, which may be due to similarly worded items. An example of item content overlap is “*For me, making a mistake is as bad as failing completely*” from the *Perfectionism* and *Intolerance of Uncertainty* subscale, and “*To me, failing to prevent disaster is as bad as causing it*” from the *Responsibility* subscale. Both items implicate a sense of failure. Freeing the covariance between these factors improved model fit, such that the indices were excellent  $\chi^2 (7) = 30.96, p < .001$ , CFI = .99, TLI = .97, SRMR = .02, and RMSEA = .07 (90% CI [.05 - .10]). The standardised loadings for all the subscales were significant (all  $ps < .001$ ) and ranged from .32 to .89. Cognitive vulnerability explained between 10% and 79% of the variance in the observed variables.

Inspection of the fit statistics for the measurement model with OC symptoms as a latent variable revealed an excellent fit with no modification indices above 10 and excellent fit to the data,  $\chi^2 (9) = 29.03, p < .001$ , CFI = .99, TLI = .99, SRMR = .02, RMSEA = .06 (90% CI [.04 to .08]). Thus, no modifications were made to this model. The standardised factor loadings were statistically significant (all  $ps < .001$ ) and strong, ranging from .63 to .81. OC symptoms explained between 40% and 62% of the variance in the subscales. Table 12 illustrates the standardised parameter

estimates of the observed variables on the latent variables. The standardised factor loadings were statistically significant (all  $ps < .001$ ) and strong, ranging from .32 to .89. The *OC symptoms* latent variable explained between 40% and 62% of the variance in the observed variables.

The 95% confidence intervals indicated that the IBI *Spirituality* score loaded most weakly on the *cognitive vulnerability* latent factor, followed by the IBI *Magical & Thought-Fusion Beliefs* subscale. OBQ *Responsibility* subscale score loaded more weakly than OBQ *Threat*, OBQ *Perfectionism/Uncertainty*, and *Importance/Control of thought*, on the *cognitive vulnerability* latent factor, but there were no other differences between subscales loadings. In OC symptoms subscales, *ordering*, and *hoarding* loaded more weakly on *OC symptoms* latent factor than *washing*, *neutralising*, *obsessing*, and *checking* subscales, but there were no other differences between subscales loadings. Table 13 reports the standardised parameter estimates of the observed variables on the latent variables.

**Table 12.**

*Measurement Model with Standardized parameter estimates of the observed variables on Cognitive Vulnerability and OC symptoms in the Indian sample*

| Latent variables                    | $\beta$ ( 95% CI) | S.E |
|-------------------------------------|-------------------|-----|
| Cognitive Vulnerability             |                   |     |
| OBQ Threat                          | .89 (.86 -.92)    | .01 |
| OBQ Responsibility                  | .69 (.64 -.74)    | .02 |
| OBQ Importance/Control of Thought   | .84 (.80 -.87)    | .02 |
| OBQ Perfectionism/Uncertainty       | .79 (.75 -.83)    | .02 |
| IBI Magical& Thought-Fusion Beliefs | .45 (.39 -.52)    | .04 |
| IBI Spirituality                    | .32 (.25- .40)    | .04 |
| OC-Symptoms                         |                   |     |
| Checking                            | .81 (.78 -.85)    | .02 |
| Hoarding                            | .67 (.62 -.72)    | .03 |
| Neutralizing                        | .73 (.69 -.78)    | .02 |
| Obsessing                           | .79 (.75 -.83)    | .02 |
| Ordering                            | .63 (.58 -.68)    | .03 |
| Washing                             | .71 (.67 -.77)    | .02 |

\*  $p > .001$

**Structured Equation Modelling (SEM) in India.** Examination of the structural model in the Indian sample revealed an acceptable fit to the data,  $\chi^2$  (51) = 208.76, CFI = .95, TLI = .94, SRMR = .04, RMSEA = .07 (90% CI [.06 - .08]). Based on the inspection of the modification indices, *Responsibility* and *Threat* were freed to covary, as it was deemed theoretically defensible. Although the revised SEM results did not indicate a considerable change in the model fit results, except for the incremental fit indices, the current model (*Figure 7*) demonstrated an excellent fit to the data,  $\chi^2$  (50) = 190.93, CFI = .96, TLI = .95, SRMR = .04, RMSEA = .07 (90% CI [.06 - .07]). In this structural model, *cognitive vulnerability* was a strong predictor of *OC symptoms* ( $\beta = .69$ , SE = .03,  $p < .001$ , 95% CI: .65 - .76), and OC symptoms accounted for 52% of the total variance in the model. The

factor loadings were all statistically significant (all  $ps < .001$ , see Figure 7) and ranged from .33 to .88, where *Threat* was the largest predictor of cognitive vulnerability for OC symptoms ( $\beta = .88$ , 95% CI: .85 - .91), followed by *Importance/Control of thought* ( $\beta = .85$ , 95% CI: .81- .88), *Perfectionism* ( $\beta = .79$ , 95% CI: .75 - .83), *Responsibility* ( $\beta = .63$ , 95% CI: .57 - .68), *Magical and thought-fusion beliefs* ( $\beta = .47$ , 95% CI: .41- .54), while *Spirituality* ( $\beta = .33$ , 95% CI: .26 - .41) contributed a relatively small but significant proportion of variance in the model. Thus, the Indian sample revealed a relatively higher amount of variance with respect to the *Spirituality* subscale when compared to the Australian sample.

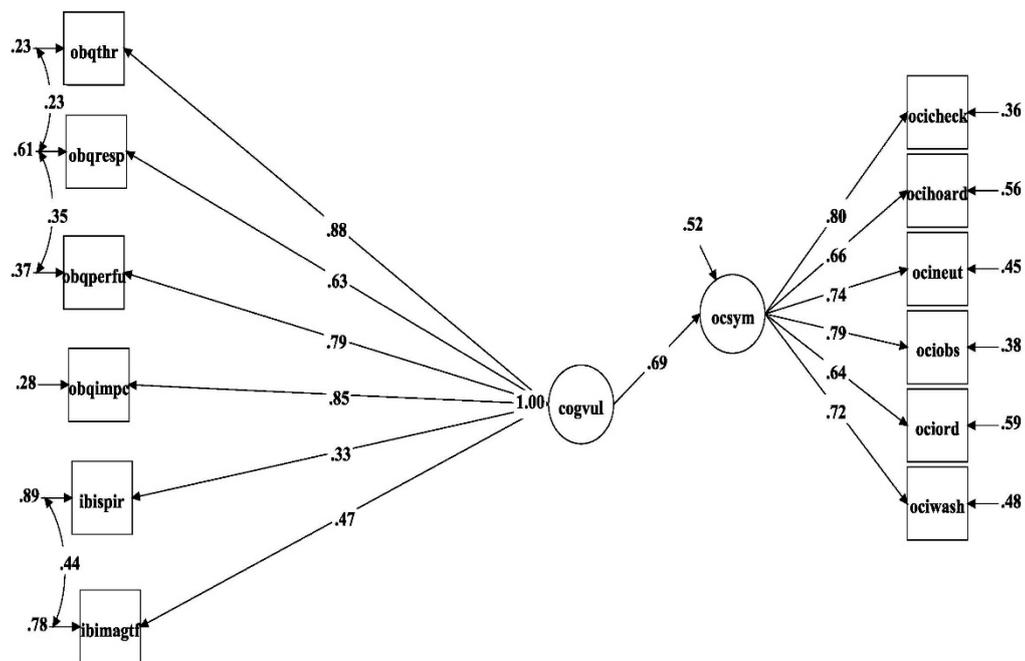


Figure 7. The full SEM with Cognitive vulnerability on OC Symptoms in the Indian sample with standardised factor loadings and residual variances. In this model, *cogvul* = Cognitive Vulnerability; *obqthr* = Threat subscale of OBQ-38; *obqresp* = Responsibility subscale of OBQ-38; *obqperf* = Perfectionism/Certainty subscale of the OBQ-38; *obqimpc* = Importance/Control of thought subscale of OBQ-38; *ibispir* = Spirituality subscale of IBI-12; *ibimagt* = Magical and thought-fusion belief subscale of the IBI-12; *ocicheck* = Checking subscale of the OCI-R; *ociobs* = Obsession subscale of the OCI-R; *ocihoard* = Hoarding subscale of the OCI-R; *ociwash* = Washing subscale of the OCI-R; *ocineut* = Neutralising subscale of the OCI-R; *ociord* = Ordering subscale of the OCI-R

The second SEM, with all cognitive vulnerability subscales predicting *OC symptoms*, provided a good fit to the data,  $\chi^2(39) = 147.80$ , CFI = .94, TLI = .93, SRMR = .03, RMSEA = .07 [90% CI: .06 - .08]. All the subscales of the OBQ, and *Magical & thought-fusion beliefs* subscale of the IBI were significant predictors in this model. Additionally, there was a significant negative association between responsibility and OC symptoms, which is opposite to the hypothesised positive association. Inspection of the modification indices did not indicate any additional theoretically defensible revisions for improving the model fit. The model was re-run after dropping the non-significant *Spirituality* subscale from the model (*Figure 8*), which demonstrated a slight improvement in the incremental fit indices and displayed an overall good fit to the model,  $\chi^2(34) = 129.98$ , CFI = .95, TLI = .93, SRMR = .03, RMSEA = .07 [90% CI: .06 - .08]. In this structural model, *OC symptoms* accounted for 68% of the total variance in in the model ( $\beta = .68$ ,  $SE = .03$ ,  $p < .001$ ). The factor loadings were all statistically significant (all  $ps < .001$ ) and ranged from .13 to .32. Although all the predictors were weak, *Threat* was the largest predictor of OC symptoms ( $\beta = .32$ , 95% CI: .20-.43). The three predictors, *Importance and control of thought* ( $\beta = .21$ , 95% CI: .11 - .32), *Perfectionism* ( $\beta = .20$ , 95% CI: .10-.30), and *Magical & thought-fusion beliefs* ( $\beta = .18$ , 95% CI: .10 - .25) shared similar variance in explaining OC symptoms, while responsibility contributed to the least amount of variance in the model ( $\beta = .13$ , 95% CI: .21 - .04). Responsibility continued to indicate a significant negative association between *Responsibility* and *OC symptoms*, rather than the hypothesised positive association.

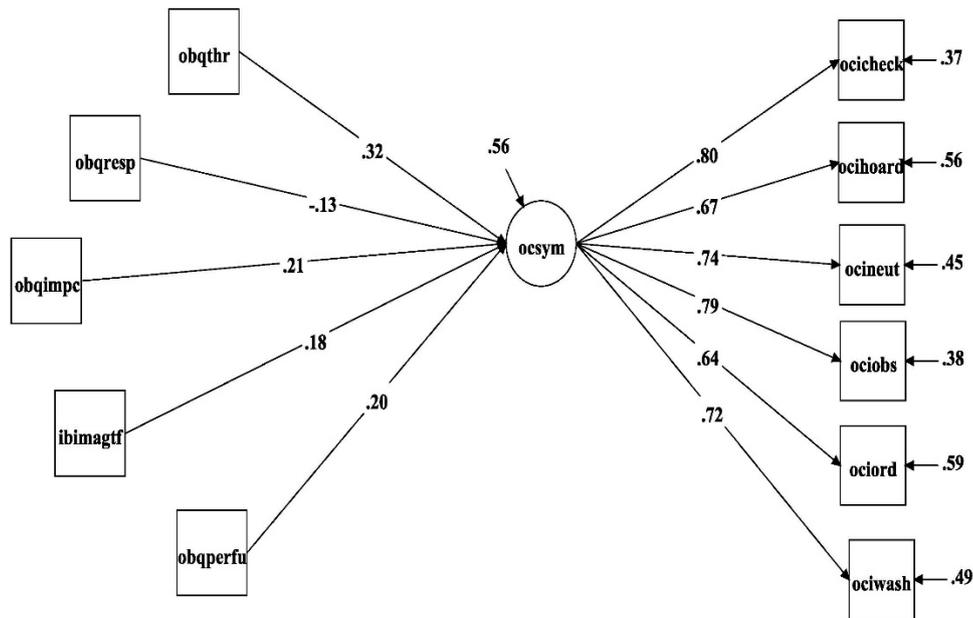


Figure 8. All cognitive beliefs directly predicting OC symptoms in the Indian sample with standardised loadings and error variances. In this model, *obqthr* = Threat subscale of OBQ-38; *obqresp* = Responsibility subscale of OBQ-38; *obqperf* = Perfectionism/Certainty subscale of the OBQ-38; *obqimpc* = Importance/Control of thought subscale of OBQ-38; *imimagbel* = Magical and thought-fusion belief subscale of the IBI-12; *ocicheck* = Checking subscale of the OCI-R; *ociobs* = Obsession subscale of the OCI-R; *ocihoard* = Hoarding subscale of the OCI-R; *ociwash* = Washing subscale of the OCI-R; *ovineut* = Neutralising subscale of the OCI-R; *ociord* = Ordering subscale of the OCI-R

To investigate whether the negative association was a function of residual error variance after removing responsibility, this time the model was run without threat as a predictor and the results indicated a positive but non-significant relationship between responsibility and OC symptoms in this model. Thus, the negative association proved to be more of a statistical artefact rather than a real negative relationship, consistent with the theory and findings with the Australian sample.

## 4.6 Discussion

This study was the first to extensively examine the relative contribution of magical thinking with each of the cognitive constructs theorised to be important in the development and exacerbation of OCD psychopathology. This study aimed to investigate (a) if magical thinking is a unique contributor to the cognitive vulnerability in OC symptoms after accounting for other established constructs, and (b) if magical thinking adds any unique predictive utility in explaining OC symptomatology.

In the current study, cognitive vulnerability was strongly and significantly associated with OC symptoms across cultures, extending support to the conceptualisations that dysfunctional beliefs contribute to the vulnerability for OC symptoms. These results lend support to a large body of research indicating that cognitive vulnerabilities are associated with the development and maintenance of OCD, and expand on the transcultural evidence on cognitive beliefs in OCD literature (Barlow, 2004; Callaghan et al., 2005; Chaturvedi & Bhugra, 2007; Freeston, Rheume, & Ladouceur, 1996; Frost & Steketee, 2002; Ingram & Luxton, 2005; Magee, Harden, & Teachman, 2012; Rheume, Ladouceur, Freeston, & Letarte, 1995). The findings support the first hypothesis that magical thinking would be uniquely associated with cognitive vulnerability to OC symptoms. Both the subscales of the IBI contributed uniquely and significantly to cognitive vulnerability for OC symptoms in the Indian as well as the Australian sample. Among the magical thinking subscales, cognitive vulnerability explained a larger proportion of variance in *Magical & thought-fusion subscale* scores than *Spirituality* subscale scores in each sample. It is interesting to note that cognitive vulnerability explained a larger proportion of variance in *Spirituality* in the Indian sample compared to the Australian sample, suggesting the potential influence of culture on the degree to which religious beliefs confer vulnerability to OCD symptoms (De Bilbao & Giannakopoulos, 2005). Specifically, this finding suggests that individuals with higher levels of cognitive vulnerability are likely to have higher levels of these dysfunctional beliefs, and that this relationship is stronger in the Indian sample than the Australian sample. However, overall the strengths of these relationships are relatively weak. The findings from this study are important they suggest that

magical thinking may be an additional cognitive construct explaining cognitive vulnerability to OC symptoms and these vulnerabilities may differ in holistic-thinking, collectivistic cultures as opposed to more analytic-thinking, individualistic cultures. Understanding how these mechanisms uniquely contribute to the cognitive vulnerability to OCD has the potential to inform interventions with OCD, especially when working with individuals from diverse cultural backgrounds. Among all the cognitive constructs, overestimation of threat emerged as the strongest predictor of cognitive vulnerability for OC symptoms followed by responsibility beliefs across both cultures. Although the cross-sectional associations found in this study cannot speak to causality, these findings are consistent with previous literature suggesting danger expectancies strongly contribute to vulnerability to OC symptomatology (Moulding, Kyrios, & Doron, 2007; Ramezani, Rahimi, & Mohammadi, 2016; Sookman & Pinard, 2002).

With regards to predictive utility, as hypothesised *Magical & thought-fusion beliefs* significantly and uniquely contributed to the prediction of OC symptoms in the Indian sample as well as the Australian sample over and above the OBQ beliefs. Although *Spirituality* contributed to cognitive vulnerability, and therefore shared variance with the other cognitive vulnerability constructs (represented by the latent factor), this subscale was not a significant predictor for OC symptoms after taking into account the other factors in either culture. The strengths of association between magical thinking and OC symptoms in both samples were significant and comparable to other cognitive constructs. In the Australian sample, the unique variance contributed by *Magical and thought-fusion beliefs* (3%) to *OC symptoms* was greater than that of *Perfectionism* (1%) and *Responsibility* (1%). Also, in the Indian sample, *Magical & thought-fusion beliefs* (3%) shared similar unique variance to *Importance and control of thought* (4%), and *Perfectionism* (4%), in explaining *OC symptoms*. Consistent with previous research, this study highlights that *importance and control of thought* is a distinct construct from magical thinking (Amir, Freshman, Ramsey, Neary, & Brigidi, 2001; Bolton, Dearsley, Madronal-Luque, & Baron-Cohen, 2002; Einstein & Menzies, 2004a, 2004b, 2006; Rees et al., 2010). Furthermore, *Threat* emerged as the most powerful predictor for OC symptoms, consistent with previous research (Sookman & Pinard, 2002).

There were a few differences noted in the final models for India and Australia. First, unlike the Indian sample, the prediction model in the Australian sample offers evidence that importance and control of thought was not a significant contributor to OC symptoms, contrary to previous research conducted with Australian non-clinical participants (Einstein & Menzies, 2004a, 2004b). Second, the prediction model in both samples provides support to the theory that responsibility is best understood with threat accounting for the common variance based on the three-factor model of the OBQ namely *responsibility/threat*, *perfectionism/certainty*, and *importance/control of thoughts* (Obsessive Compulsive Cognitions Working Group, 2005). This suggests that *Responsibility* shares overlapping variance with *Threat* wherein *Threat* explains a far greater proportion of variance and the residual variance does not significantly contribute to OC symptoms without the threat subscale. It is plausible that *Responsibility* beliefs contribute differently to varied culture, suggesting a direction for future research.

Theory and evidence highlight the important role of several cognitive beliefs implicated in the pathogenesis of OCD (Freeston, Rheaume, & Ladouceur, 1996; Frost & Steketee, 2002; Purdon & Clark, 2002; Rachman, 1997; Salkovskis, 1985, 1999). The present study specifies the unique contribution of magical thinking to OC symptoms alongside the other established beliefs. It further highlights the strengths of each association in explaining OC symptomatology. These findings suggest that magical thinking is a core and a distinct cognitive vulnerability factor for OC symptoms and needs more attention.

#### **4.6.1 Strengths and Limitations**

Strength of this study includes the large sample size, and the comprehensive investigative strategy using a transcultural perspective between individualistic (analytic-thinking) cultures like Australia and a more collectivistic (holistic-thinking) culture like India. The current findings should be interpreted with the following limitations in mind, which also offer avenues for future research. First, this study uses a cross-sectional design, which precludes any causal inferences. Whether OC symptoms increase vulnerability to magical thinking or the relationships are reciprocal, still needs to be investigated. Given that the study sample is non-clinical, future research in this area is also warranted in the clinical

population to explore if there is any difference in the nature of these relationships. Consistent with previous literature in this area, we relied solely on self-report data, so future research with multi-method approaches (e.g., clinical interviews; Hong, 2013) will be beneficial to provide a more comprehensive understanding of the construct. Third, although IBI measured the same constructs indicated by the same subscales across the Indian and the Australian sample, both samples used different versions of the IBI with different items. This limited our scope for extensive cross-cultural comparisons with a multi-group analysis.

#### **4.6.2 Theoretical Implications**

The current study makes an important contribution to the OCD literature. This study examines a relatively less-researched construct of magical thinking with the already established cognitive constructs implicated in OCD. This knowledge extends our understanding of magical thinking and its contribution in explaining cognitive vulnerability for OC symptoms. This study provides initial evidence that the current cognitive models could be extended to include magical thinking as a cognitive vulnerability to OC symptoms and further research in this area is warranted. This study further highlights the strength of these associations directly with OC symptoms to extend the understanding of how much each construct uniquely contributes to OC symptomology. Although spirituality was not a significant predictor of OC symptoms in this study, it is important to note that if the samples were large enough for all of the vulnerability factors to be modelled as individual *latent* variables (using subscale items as indicators and thereby removing measurement error from the predictors), the relationship between spirituality and OC symptoms may have been stronger and statistically significant in the predictive model. Future research with larger samples is required to test this possibility. However, across all models, it was clear that spirituality was indeed the weakest of the vulnerability factors (SEM 1) and predictors (SEM 2).

#### **4.7 Conclusion**

Data collected from this study suggest that magical thinking is a unique and significant contributor to a cognitive vulnerability in OC symptoms above and beyond the established cognitive domains. Although the *Spirituality* subscale of

magical thinking emerged as a non-significant predictor of OC symptoms directly, the strength of association between *Magical and thought-fusion beliefs* subscales of the IBI and OC symptoms were significant and of a similar magnitude to the much-researched domains of *Perfectionism, Responsibility and Importance/Control* of thought subscales of the OBQ. This study positions magical thinking to play a distinctive role in OC symptomatology over and above the other constructs across cultures.

## CHAPTER FIVE: LIVED EXPERIENCES OF MAGICAL THINKING FROM PEOPLE WITH OCD

### **5.1 Chapter Linking Statement**

The previous study comprehensively explored the contribution of magical thinking in accounting for obsessive-compulsive symptoms in addition to other key cognitive vulnerability factors identified by the OCCWG in a non-clinical community transcultural sample. The findings of the quantitative studies position magical thinking as a unique and significant cognitive vulnerability factor for OC symptoms in both Indian and Australian samples. With regards to directly contributing to OC symptoms, the magical and thought-fusion beliefs subscale of the IBI emerged as a significant predictor of OC symptoms while spirituality was found to be a non-significant predictor for OC symptoms across both samples. This qualitative study builds on the findings of the previous studies by exploring the phenomenology of magical thinking from people with lived experiences of OCD and their perspectives on the role magical thinking plays in maintaining OC symptoms. No previous study used a qualitative approach to contextualise this phenomenon in a clinical sample. Compared to a nomothetic approach of the quantitative findings, this study adopts an idiographic approach to focus on the lived experiences of magical thinking in people with OCD.

## 5.2 Introduction

The preceding studies of this thesis provide quantitative evidence with non-clinical samples, that magical thinking is a cognitive construct of relevance in explaining OC symptoms. In these studies, magical thinking was assessed using a self-report measure. Whilst these quantitative studies provide important information about the unique relationship between magical thinking and OC symptoms, they do not provide contextual information. For example, under what circumstances do people engage in magical thinking? What types of magical thinking are used? This type of in-depth information could inform potential clinical interventions that focus on modifying unhelpful magical thinking in OCD.

There is evidence that cognitive therapy is effective in treating OCD (NICE, 2013). Current approaches focus on modifying inflated responsibility beliefs and include behavioural experiments designed to challenge thought-fusion beliefs. Existing cognitive interventions do not include direct modification of magical thinking as a treatment goal. Only one study has focused on challenging unhelpful magical thinking in OCD with two participants with OCD (Einstein & Menzies, 2008). Each participant received a six-week cognitive therapy programme that consisted of eight tasks focussing on magical thinking with cognitive restructuring exercises. This study found clinically significant improvement in OC symptoms in both study participants when general magical thinking was targeted. Based on the previous findings of this thesis that magical thinking explains unique variance in OC symptoms, it makes sense to gather further information about the nature of magical thinking in OCD samples.

Given that OC symptoms are understood to occur on a continuum (Gibbs, 1996), the preceding studies of this thesis utilised non-clinical samples to explore the relationship between variables. In the limited literature that explores OCD and magical thinking, the vast majority of studies have indeed been conducted with non-clinical samples with only a few conducted with clinical samples (Berenbaum, Boden, & Baker, 2009; Bocci & Gordon, 2007; Einstein & Menzies, 2004; Helgadóttir, Menzies, & Einstein, 2012; Rees, Draper, & Davis, 2010). However, to the author's knowledge, there have been no qualitative studies investigating magical thinking in a clinical sample.

### 5.3 Aim

The aim of this study was to explore and contextualise the phenomenology of magical thinking and its relationship to current obsessions and compulsions in a clinical population via in-depth face-to-face qualitative interviews. A qualitative phenomenological approach was adopted to gather rich data on magical thinking from an idiographic viewpoint of people diagnosed with OCD and engaging in magical thinking. Since research in this area was mostly quantitative and there were no qualitative studies targeting a purposive sample of individuals with elevated levels of magical thinking and a diagnosis of OCD, an idiographic approach was considered suitable for this study.

### 5.4 Research design

The Interpretative Phenomenological Analysis (IPA) framework described by Smith and Osborn (2003) was used to rigorously explore participants' lived experiences of magical thinking. Semi-structured interviews (*see* Appendix III) were used to facilitate an inductive approach to data collection and analysis where the interviewee could take a lead and be engaged in the interview process.

#### 5.4.1 Participants

Six adult participants with OCD were recruited for this study. Half of the sample was recruited from the Curtin Psychology Clinic with the other half being recruited via Curtin University Radio. To be eligible for the study participants needed to score a minimum of 60.14\* on the Illusory Beliefs Inventory (IBI, Kingdon et al., 2012). The study sample comprised of four women and two men, with ages ranging from 19 to 70 years ( $M = 50.33$ ,  $SD = 21.41$ ). Since IPA does not follow the notion of saturation, six participants were considered sufficient for an in-depth exploration of the phenomenon under study to maintain idiographic focus on the individual's lived experiences using this methodology (Brocki & Wearden, 2006; Smith, 2004; Turpin et al., 1997). All participants were receiving regular ( $N = 4$ ) or intermittent ( $N = 2$ ) treatment from a psychologist or a psychiatrist for managing their OCD. Although not a part of the inclusion /exclusion criteria for this study, all participants reported a history of psychiatric illness in the family. Eleven

individuals expressed interest in the study, with two excluded at the screening stage due to low scores on the IBI (clinical cut-off range for IBI total score  $> 60.14^2$ ) and two did not have a formal diagnosis of OCD (based on the history provided by the prospective participant). One potential participant was not included in the study since he was considered high risk and was deemed not appropriate for the scope of this research. Table 13 summarises the key demographic characteristics of the included participants.

All participants were locally born residents living in Australia for all their life and identified themselves as Australians. With respect to ethnic diversity among the participants. P1's father had a Malaysian ethnic background, however, she was not aware if she had any family living in Malaysia. P3 has an Irish family background but has never visited Ireland since his entire family, including his great grandparents' generation, lived in Australia. P4 had a Dutch background and still visits family in Holland. P2, P5 and P6 have reported having no known family roots outside Australia.

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<sup>2</sup> *The elevated scores on the IBI is based on the guidelines of clinical change index (Jacobson & Truax, 1991) where total score of higher than 60.14 ( $> 2SD$  from the mean) has been considered significant for the clinical sample (Kingdom et al., 2012)*

**Table 13.***Participant Characteristics of the study sample*

| ID | Gender | Age<br>(years) | Education     | Employment          | OCD Treatment Status        | Recruitment source       |
|----|--------|----------------|---------------|---------------------|-----------------------------|--------------------------|
| P1 | Female | 39             | Undergraduate | Unemployed          | Currently on Treatment      | Curtin Psychology Clinic |
| P2 | Female | 38             | High School   | Unemployed          | Currently on Treatment      | Curtin Psychology Clinic |
| P3 | Male   | 19             | Undergraduate | Student (Commerce)  | Currently on Treatment      | Curtin Psychology Clinic |
| P4 | Female | 71             | Postgraduate  | Theosophical writer | Intermittent Treatment      | Radio                    |
| P5 | Female | 70             | Postgraduate  | Retired             | Completed full-term therapy | Radio                    |
| P6 | Male   | 65             | Undergraduate | Musician            | Currently on Treatment      | Radio                    |

*Note:* All participants were locally born residents with families living in Australia for more than two generations.

### 5.4.2 Procedure

Ethics approval for this study was provided by the Curtin University Human Research Ethics Committee (HR 22/2016) and recruitment occurred between January 2018 and April 2018. Recruitment was completed in two ways. First, the Clinical Psychology masters students on placement at the Curtin Psychology Clinic provided the Information sheet (see Appendix VI) to their clients seeking treatment for OCD and obtained permission for the doctoral researcher to contact them via telephone. The potential participants were contacted by the doctoral researcher for clarification and screening. Second, to ensure a wider reach to the community, the study was promoted via Curtin Radio 100 FM from February 2018 to April 2018 with a short broadcast script provided and approved by the researcher (See Appendix VII) that was played twice a day. Interested participants contacted the PhD researcher for further information. All potential participants who agreed with the information provided were screened for the diagnostic criteria of OCD as per DSM-5 and for magical thinking measured by the IBI.

Participants who met the diagnostic criteria for OCD assessed by the researcher or the placement students at the clinic (as per Mini International Neuropsychiatric Interview for OCD; MINI for DSM-5; Sheehan et al. 1998) and who had elevated levels of magical thinking (IBI, Kingdon et al., 2012, total score > 60.14) were invited for a face-to-face interview at Curtin University Psychology Clinic. All participants provided written consent to participate and to be audio-recorded (*see* Appendix V for Consent form template). No participants dropped out or withdrew from the study.

The semi-structured interview questions were guided on the principles of content sensitivity of IPA (Pietkiewicz & Smith, 2014; Smith, Flowers & Larkin, 2009) and were developed based on a review of the magical thinking literature and discussion with the research team with their clinical and research expertise. One-on-one individual face-to-face interviews conducted by the doctoral researcher followed a discovery-oriented exploratory approach (Barker, Pistrang, & Elliot, 2002) where probes were used for clarification to understand the narratives of the participants lived experiences in context. For standardisation purposes, the

following uniform example of magical thinking was provided to every participant at the beginning of the interview.

*“We often hold some unique beliefs which transcend rational or scientific explanation for the causation of a event. An example of such magical thinking could be to touch wood or could be the idea that seeing a certain object, or having a certain thought or feeling is a sign that something bad is going to happen, such as seeing the number 8 and believing that is a sign that your loved one will have a bad accident.”*

Example questions included: *I would like to understand your experience regarding the last time you engaged in magical thinking and what it meant to you? ; Can you recall a recent time you engaged in magical thinking to avoid a negative consequence? ; Does anybody else in your family believe in magical experiences?; How does magical thinking help you manage your OCD?* The full semi-structured interview schedule is presented in Appendix III.

Interviews were audio-recorded with an Olympus digital recorder and lasted from 45 mins to 2 hours per interview. All the recorded interviews were transcribed together verbatim for analysis after recruitment was terminated.

### **5.4.3 Analysis**

The transcribed interviews were recorded in Microsoft word documents and were manually analysed by the researcher to enable close reading of each transcript to explore the essence of the narratives shared by each participant. The process of double hermeneutics was chosen in analysing the data, that is, both the participant’s perspective (emic) and the researcher’s perspective (etic) was construed and reported from a cognitive paradigm (Biggerstaff & Thompson, 2008; Smith, Flowers, & Osborn, 1997). Qualitative data analysis was conducted to explore, review and generate specific themes from the transcribed data based on the guidelines for IPA’s cyclic process of analysis so that the final write-up directly reflects the original transcripts. Stage-wise representation of the analysis of the transcribed data was used (Pietkiewicz & Smith, 2014; Smith, 2015) - Stage 1: Multiple reading and making notes from the transcripts; Stage 2: Transforming

notes and comments into emerging themes; Stage 3: Clustering themes and seeking similarities and differences; Stage 4: Summarising the themes into a master list; Stage 5: Writing up the IPA study. The final reporting of the analysed data is augmented with extracts from the interviews and followed by analytical comments from a theoretical standpoint.

#### **5.4.5 Trustworthiness**

The guidelines for qualitative research documented in Consolidated Criteria for Reporting Qualitative research was used to ensure validity or trustworthiness of the findings (CCRQ; Tong, Sainsbury, & Craig, 2007). Based on the guide for using IPA in psychology research (Smith, 2012), the analyses were audited at each stage (transcriptions, different stages of coding, word-trees, quotes, emerging themes, clustering and reporting) by another researcher in the supervisory team (CR) for internal consistency of findings. Reflective notes were maintained by the researcher after every interview to ensure a thoughtful understanding of the phenomenon. The summarised findings were discussed with all the members of the research team prior to incorporating it into the concluding analysis. The expertise of the supervisory team with their record of publication in qualitative research as well as clinical expertise as practitioners in the field of the study confirms the interpretative validity of the reported findings while maintaining the subjectivity of each narrative in this study.

#### **5.4.6 Interviewer Characteristics:**

The researcher (BB) is a person of Indian origin, a female doctoral researcher at Curtin University, Western Australia. She worked as a Clinical psychologist in India for eight years prior to her doctoral research and is currently registered with the Psychology Board of Australia as a Provisional Psychologist. With regards to the interviews, her clinical skills facilitated the inquisitive inquiry with a supportive non-judgemental approach. One of the incidental discoveries during the interview was the participants' openness to the interviewer based on her appearance indicating her Indian cultural background and history of magical belief in India, even though the interviewer never explicitly shared her ethnicity or cultural

beliefs. This was described by the participants positively in terms of relatedness to the interview questions.

## **5.5 Results**

All participants (represented by their unique ID) were able to reflect on their beliefs and provided a detailed description of magical thinking as they experience it. The narratives provided by the participants not only described magical thinking in relation to their OCD but also it is varying origins and functionality that these beliefs served in their lives. Interpretative phenomenological analysis of the transcripts revealed four overarching domains with several themes associated with each domain. A summary of the interpretative themes is presented in Table 14 below.

**Table 14.**

*Table indicating the Domains and themes of the Phenomenological Analysis*

| Domains                                     | Themes   |
|---|--|
| 1. Types of Magical thinking                | 1.1 Superstitions & numbers                      |
|   | 1.2 Metaphysical conceptualisations              |
|   | 1.3 Power of objects and thoughts-fusion beliefs |
| 2. Origins and triggers of Magical thinking | 2.1 Influence of family -a learnt behaviour      |
|   | 2.2 Cultural influences                          |
|   | 2.3. Stressful life events                       |
| 3. Functions of magical thinking            | 2.1 “Healthier” coping                           |
|   | 2.2. Reframing magical thinking as spirituality  |
| 4. Levels of insight                        | 3.2 Role of religion                             |
|   | 3.3 Limited insight into OCD                     |

## **Domain 1: Types of Magical thinking**

This domain captures the various types of magical thinking engaged in by the participants. Each of the three predominant themes is described below along with how the participants rationalised this thinking.

*Theme 1.1: Superstitions & numbers.* In this category, magical thinking was described by participants as superstitious beliefs that have been held over generations as a source of explanation for unknown phenomena. Participants appeared to validate these beliefs by referring to the mystical beliefs and superstitions of traditional cultures.

*P6: “If I’m doing magic and I want to achieve an outcome, then the number is four, and the reason for that is the four principles of magic, well magical thinking. I mean actual magic I expect from the Egyptians, correlate to the four points of the pyramid, the base of the pyramid. And the first one is to know, if you’re going to do something, you have to know what it is you’re going to do, so that’s where the clairvoyance comes in, and you have a look and you see, this is not right. Something has to be corrected here. Then the second part which comes in is, you have to say “Okay, do I dare to do it?” in other words, if I take this upon myself, there will be consequences for me and am I prepared to wear the consequences because if you’re not, don’t do it.”*

This participant describes himself as a “voracious reader” and unequivocally believed in the number four. In the interview, he explicitly describes the basis of his beliefs as being linked to ancient traditions and structures such as the Egyptian pyramids and considers that each of these magical beliefs has consequences. The strength of his magical beliefs were so strong that he even shared that he was convinced to participate in this interview since he was invited to Building number 404, where the Psychology clinic is located at the University (“*Yeah, soon as I saw that, I thought ‘Here we go.’*”). With regards to validating his beliefs to the interviewer, he elaborated further to relate more to the interviewer and support his claims with ancient Indian traditions.

*P6: “You probably know a lot of this from Hindu philosophy.....The 22<sup>nd</sup>, the 22 was the number of a grandmaster in the western tradition like a guru in the Indian tradition. The number four is the number of magic because that’s the four elements of the earth, air, fire, water. Number eight comes up as a sign of infinity, the first sign on the top of the head.”*

Another superstitious belief involving numbers was shared by P1 who had a chronological focus. She believed that all the bad events that happened in her life always came in threes.

*P1: “The threes..... So the whole thing come in threes – bad things come in threes”*

*P1: “Oh, thank god that’s three, that’s over and done with. I don’t have to worry about it now”*

P1 attributes the number three to have magical abilities and explains further how she knows that if something bad happens twice, like she has a fall and hurts herself, and a few days later her appointment that gets cancelled, she gets anxious that the third bad event is going to happen sometime and she struggles with this anxiety until it finally happens. Believing in magical thinking via superstitious beliefs although stressful, was positioned as a powerful force guiding life decisions.

*Theme 1.2: Metaphysical conceptualisations.* The second major type of magical thinking described by participants involved interpreting the occurrence of day to day events as signs and premonitions. As described below, two of the participants clearly recall examples of this type of thinking.

*P5: “.....in fact I believe that my new little dog is containing my mother’s soul at the moment..... Because my mother and I had some karma together and it just hit me like a ton of bricks one day and I feel that after I got her because it’s unusual how I got her, “My goodness, this is mum.” So I have to look after her and be kind to her, because I wasn’t as kind as I could have been to my mother. I believe in magic.”*

P5's account explicitly stating "I believe in magic" describes the high value of these beliefs in her life. The notion that sense of communications travelling via channels such as objects, dreams and external events was also described extensively by P4 and P5 in their interviews.

*P4: "...we often reincarnate in groups and you maybe father, you maybe daughter, you maybe uncle, you maybe friend, and my soul group is mainly left in Holland... Well, I think it is managed by, let's say, the angelic forces.... So, yeah, with this dreams kind of pointing... I was connected to that spiritual connection... And I found out I was channelling, kind of thing."*

*P5: "I had a dream years before Heath Ledger died... ... I had this dream that I was in apartments somewhere like in New York with a metal staircase going down the escape stairs, and I dreamt somebody came from above down the stairs. So above to me is like coming from heaven or whatever with a symbol, came down to my room and sat on the side of my bed and I had the sense of somebody being there and as I've turned I saw that he had a face like the Joker, About two years later, he died while he was making that movie with the Joker, he was the Joker."*

*P4: "This is not logical. ...The other day I woke up, and I had an aunt who died recently, and she was very religious, almost to the point of not being able to do anything and that's another story. There're reasons for that. And this aunt spoke to me in kind of like a dream thing"*

*P5: "I believe that we're all channels and the channel that the story, whatever it is comes to us whether we recognise it or not is another thing."*

The participants who engaged in these conceptualisations took the support of philosophies like ontology and theology to support their vague conceptualisation of their non-scientific causality of events. Participants further supported their magical belief systems to be similar to the probable existence of a non-singular reality of metaphysics (e.g., theories relating to the nature of an alternate reality, a possible relationship with mind and matter, and possibility with actuality) which cannot empirically be tested. Although participants recognised that it may not have

connections to real-life events, they justified their beliefs to be possible until it is proved by science.

*Theme 1.3 Power of objects or thoughts to cause actions.* This theme is akin to the dominant thought-fusion beliefs of OCD. Four of the six participants gave clear indications that they believed objects or thoughts could influence reality. These participants believed that certain random thoughts could influence their reality and tailored their explanations to an imagined link between thoughts and objects.

*P1: "Panadol didn't work..... Like with music, the headaches, the first time it would've been, probably a fluke but the more I do it and the more I put importance in it and the more that was the only way that I could actually get rid of my headaches. I could – Panadol, still to this day doesn't work very well."*

This participant considered music to have magical powers to cure headaches, a concept similar to magic used as a cure for diseases in ancient civilisations. To emphasise the magical properties of music was a real cure for her headaches, she explains that she had tested it on many occasions by using Panadol for pain relief. As per her narrative, Panadol never worked while music always helped, although she accepts that it is her subjective experience and may not be true for everyone.

*P4: "I do believe – and you may not be with me on it, my OCD came on after I had the flu injection, truly....."*

*P5: "I had a car when my husband was removed from the house..... The first two months, two heads went off, so they had to be fixed. After the three months, another head went on, and it suddenly occurred to me, this is my head that I have to fix, not the car's..... To me, it was telling me that this is about you and the way you hang on to things"*

*P3: "one that bugged me was I'd do something out socially or something, nothing bad, but I'd be worried as a bad person. So minor little issues, like again stopping up in the work, saying something I didn't like, not in public, if I didn't take the right thing would mean I'm a bad person."*

The participants appeared to be externalising the causality of their thoughts by giving power to the thoughts and/or the events or objects. While the accounts of P4 and P5 indicated the beliefs similar to thought-object fusion while P3's account of thinking of something would make him a bad person could be linked to thought-event fusion beliefs.

## **Domain 2: Origins and Triggers of Magical thinking:**

This cluster of themes highlights how the participants believed that their magical thinking developed and the sorts of situations that tend to trigger magical thinking.

*Theme 2.1: Influence of family, a learnt behaviour.* All participants in the study expressed the influence of modelling on these beliefs from either the family, their close confidants or important mentors in their lives who also engaged in magical thinking.

*P6: "Well, my father was what we call in Australia a bush mystic. Yeah, as in bush, the bush, and mystic ... .. his powers were absolutely astronomical. I swear it must be where I get mine from. He was a clairvoyant title, which is great and he passed it unto me and now I am a clairvoyant.... where you can see energy patterns and things like that. So I've got the ability to read minds, the ability to being able to influence events which I have done"*

*P3: "Not really, except for the fact I observed myself at the touch word thing or I would think like my mum, she would say about – my mum has a problem with 13, but if you listen to the amount of things that had happen, like her dad died 13 days before his next birthday, my grandmother died 13 days before my mum's 22<sup>nd</sup> birthday, her brother died 13 days after his birthday, and actually I was thinking about the day dad died, that was 13 days before my brothers birthday, I don't blame my mum for thinking that way."*

*P2: "Well, we've been brought up with god but you don't have to be religious or follow a religion to believe in god. I mean, we believe that pretty much – doesn't matter who you pray to you – whatever – doesn't matter what religion you were in"*

*P5: “My mother was very religious.....my mother was like me I think. I don’t know that she was so much into magical thinking, but she believed in a lot of things that affected us.”*

All the four participants quoted above had a parent who engaged in such non-scientific beliefs and their narratives account for how observing it since childhood impacted their belief systems. When narrating these events, the participants seemed to engage in a confirmation bias as they tried to support it with favouring facts to uphold these beliefs. For instance, calculating the 13th-day difference between a death and a birthday by P3’s Irish mother and P3, himself, linking his dad’s death to 13 days before his brother’s birthday clearly states the influence of such vicarious learning.

*P1: “Oh, that’s all been learnt..... Yeah, 100%...All been learnt from every single person around me. ....Society. Your parents might say something ‘Oh, don’t say that’ or “Don’t pull a face. So it’s come from every single person saying that to you and I think, with somebody with OCD, you might actually click on to that a lot more than what somebody else will say.”*

P1’s narrative clearly describes the learnt nature of these beliefs influenced by family and society, conditioning her to such beliefs and how people with OCD could be more susceptible to it.

*Theme 2.2 Cultural influences.* This theme captures the influence of culture in the development of magical thinking among the participants. Australia is a multicultural continent and has a vast history of migration. All participants in the study had exposure either directly or indirectly to varied ethnocultural diversity which may have influenced the genesis of magical conceptualisations. This is evidenced by the narratives of the participants when asked what they perceived as the role of culture in developing magical thinking

*P3: “My mum’s side is Irish. They’re anxious but they’re just anxious, a lot of highly-functioning people, with a level of anxiety.... ...probably cultures that are longer developed ....So in Australia where you got a mixture of cultures, you can’t really say you’re Australian and, therefore, you’re likely to have this. But if you*

*look at the Irish culture where there's a very strong – they were scientifically-advanced but culturally, that's why they were very advanced in the literally tradition, so there was a lot of stories, a lot of like the bad folklores. The only good families alerting member of when there's death, when you hear the Banshi scream, then you'd know that someone is going to die..... again if you're believing at something that's not evidence for – it sets the brain up in such a way that you're more likely to believe in something else that there's no evidence for. And again you look at the Irish culture that is quite a strong religious tradition there. So perhaps culture does have an influence.”*

*P1: “So I think culture has a big part of where – because like the aboriginal culture, for example, they've got the all the drought and things, that was by a big frog that drank a cup of water. So culture has the biggest influence on us..... my father is Malaysian....although I have never left Australia”*

Although P2 had no relation to India, she expressed a lot of relatedness to the Indian concept of Spirituality and mentioned that it was a part of the formative years as her family followed a spiritual guru from India.

*P2: “spiritual teacher that we believe in came – lives in India that teaches – he's not alive anymore but he teaches human values and – in India so that's – and we've been following his teachings ever since I was a little child so I've been brought up”*

*Theme 2.3 Stressful life events.* This theme highlights a crucial aspect related to the emergence of magical thinking among individuals with OCD who participated in the study. It was interesting to discover how each of them started to engage more in magical thinking after a stressful life event.

*P4: “....and because I was going through a lot of – how could I say – a lot of domestic issues – my husband was drinking and I was having a lot of problems. It kind of helped me through this period”*

*P1: “I was this close to killing myself. And after I found music obviously and..... I think that's probably one of the biggest things, like music's my placebo. Magical – religion might be somebody else's placebo.*

*P5: “I did a lot of crying through the years that my husband and I were breaking up and the things that were going wrong when he was threatening my life all of the time. And I remember letting go on one occasion .....and started to move into a different way of being for myself”*

Participants seemed to believe that magical thinking was in some way an anchor that saved them at critical life events bringing in a sense of purpose when there was none and enabled them to accept themselves better.

### **Domain 3: Functions of magical thinking**

This cluster of themes illustrates the purpose magical thinking provides to this sample of individuals with OCD. It was interesting to note that social acceptability of these types of beliefs by aligning it to traditional philosophies, allowed the participants to perceive these beliefs as helpful and functional. Practising these beliefs for their intrusive thoughts helped to cope with the distress by displacing responsibility since these rituals and practices were often validated by social and cultural norms. Non-judgemental acceptance by their intrusive thoughts by the society appeared to provide validation among the study participants and hence they did not associate it as one of their OCD rituals. Participants also affiliated these beliefs to an arbitrary and subjective sense of spirituality that enabled them to gain illusory control. However, the meaning and significance attributed to concepts of spirituality and meditation were subject to personal interpretive qualities of the participants that helped them deal with their current life stresses.

*Theme 3.1 Reframing magical thinking as ‘Spirituality’.* Highly valued spiritual beliefs emerged as an overarching theme in the interviews, almost like a tool to make their magical thinking related to their OCD more socially acceptable.

*P2: “my spiritual belief is that I believe if God purifies the food, puts love into it, then I’m not gonna – it’s gonna – that love is gonna go into me and I’m not gonna be – or the anger from me couldn’t have gone into that food. I actually believe that as a truth. That’s my general truth. That’s not a mental – that’s just my general beliefs. My spiritual beliefs that if someone cooks angry, the anger goes*

*into the food it can make you sick because that anger or that emotion's gone to that food"*

This participant narrative described how praying in a specific manner would help her in purifying the food so that she does not get sick and strongly believes in this as her truth. The inflexibility of these thoughts makes her dread that if she does not pray in "a specific manner" then she may get sick, may need to be hospitalised and may even die. However, she links it more to her spiritual beliefs than to her OCD.

*P4: "I believe my spirituality helps.....in being able to have a little more insight into reality and that reality is not just one way. There are far more layers of reality."*

P4's language corroborates how participants reframed spirituality by their subjective interpretations to validate their pre-existing beliefs in relation to OCD. Over importance given to the notion of spirituality to gain acceptance was also evident from the participant's reaction to the interviewer, myself, assuming that being an Indian, I must be highly spiritual and a magical thinker to understand the theories shared.

*P1:" Someone – with your Indian culture, you got something completely different and something exotic which you are even – which people from the outside look on and go "That was so beautiful. I love the way that works. I love that culture."*

*P4: "Where are you from?....You might be quite spiritual as well... consider yourself lucky. You're Indian, with the Hindu and the Buddhism, they are a lot gentle ..."*

*Theme 3.2 "Healthier" coping.* Regardless of the kind of magical thinking, the participants were engaging in, magical thinking was perceived as a protective mechanism helping them to gain a sense of control in their lives. All participants explained that the social acceptance of these beliefs help them feel less distressed and hence they do not link it with OCD. Furthermore, none of the participants linked it be a part of OCD since its "*healthier*" given that society confirms these

beliefs. When asked whether they perceive magical thinking to be helpful in regards to their OCD or whether it could make them more vulnerable to the rituals, all the participants believed it to be a healthy coping strategy that protects them from their intrusive thoughts.

*P1: “Yeah, the benefits, of course, is there are definitely worst thing that I could be addicted to, there are worst thing that could overtake my life. It’s just music.”*

*P6: “But if it’s not avoidance and its acceptance, well then it’s positive OCD”*

In the narrative below, P4 attributed her experience of meditation to empower her to give control of her distressing thoughts. Contrary to the meditative practice of acceptance of thought and self, based on the eastern meditative traditions, her coping appeared more similar to thought control strategies (for example, thought suppression) documented in OCD literature.

*P4: “I think through meditation you move through the layers of realisation of who you are and why you’re here.....But if you really meditate and then go through the layers, you realise that you can be anyone you want to be and where do you want to be, what do you ..... Well if I have a thought and if that thought doesn’t coincide where I want to be or what I want to do, I stop the thought, and I think, ‘No, I don’t want to do that.’”*

P5 describes that the validation of these beliefs with philosophical traditions not only protects her in her OCD but also enables her to destigmatise mental illness.

*P5: “In a way it protects us because it gives me another explanation for why I am the way I am, that I’m not mentally ill.”*

Participants expressed that their magical beliefs help them cope with their OCD better. Unlike the OCD rituals, magical thinking protects them from the distress and stigma, since it is not similar to the socially unacceptable distressing rituals of their OCD. Conversely, the participants did not tend to have awareness of how it may be a maintaining factor for their ritualistic behaviour of OCD.

#### **Domain 4: Levels of Insight**

This final domain covers the contradictory levels of insight in the areas of understanding the demarcation between religion and spirituality on one hand, while on the other having a limited level of awareness into the extent of their magical thinking in maintaining OCD. Although all the participants were well-educated and lived in rational and scientific environments, they still reflected a duality in the levels of insight pertaining to magical thinking. This duality was reflected in their ability to intellectually distinguish the concept of “religion” from “spirituality” however when it came to OCD, they lacked the ability to intellectually rationalise how magical thinking could be feeding their current obsessions and compulsions. This duality has been further explained in the themes discussed below.

*Theme 4.1 Role of religion.* This theme highlights the ability of the participants to be able to identify and separate religion from spirituality.

*P6: “Well, I’d say religiosity is more doctrine-based, dogma, and spirituality is more as direct communication...directly with the ultimate.”*

*P5: “Religion is a manmade thing. Organised religion is a manmade thing. Spirituality is something entirely different.”*

*P4: “Well, I don’t like religiosity or religion because that kind of puts a certain doctrine in there. I believe in the broader aspects of religion and those are the basic principles, as in the basic principles of – we are here for a learning experience, and it is by our actions and our thoughts that we determine a certain life. And I do believe in reincarnation.”*

*P2: “I don’t follow a religion. I don’t believe in religion. We believe this is more to do with the – I suppose it could be related to Hinduism a lot but it’s not really a religion as such it’s more to do with – it’s just to do with a spiritual teacher who teaches human values like love, not violence – all that sort of stuff. And I’ve been brought up with that as a kid so I believe – and it’s my spiritual beliefs.”*

As can be seen from the narratives, although these participants engaged in high levels of magical thinking and valued non-scientific claims via their subjective conceptualisation of spirituality, they did not tend to believe in an organised institution of religion and made a clear demarcation between the two concepts.

*Theme 4.2 Limited Insight into OCD.* The central focus of this theme is the fact that the participants although presented with very intellectual debates about the diverse concepts discussed during the interview, they demonstrated very limited awareness with regards to their subjective beliefs of spirituality, which indeed mirrored more of the magical beliefs nurturing their OCD.

*P2: "It's not healthy to pray that way.... Well, realistically it's better to not have the ritual at all ... I don't know where that comes from the magical thinking anyway.... how that some things we do in our lives or what we believe and think can actually be helpful – that there are helpful things we do in our lives that I do the compulsions to help me feel safe so I don't get sick or anything like that. But I'm not saying it's all helpful because as – there's unhelpful things about it and there's helpful things about it so the reason you do it, you wouldn't be doing it if it wasn't helpful to you. So it just helps you feel more safe but it doesn't help with the anxiety part of it. So it helps you feel safe doing it, 'causes a lot of anxiety but after you've done it, you feel safe. If that makes any sense."*

P2 in this section of the discussion talks about how her specific ritualistic way of praying makes her feel safe as it is connected to God and purifies food so that she does not get sick. Although she compares her magical beliefs to her compulsions at some point, she fails to connect the two to rationalise that her magical beliefs of praying in a specific ritualistic manner are further contributing to her OCD vulnerability.

*P4: "I see a lot of mystical countries like India. There're a lot of truths out there but there're a lot of superstitions out there as well and you've got to be able to separate the two..... The Indian culture sets you up with a rich immense jewellery box of knowledge. It's just you got to sought out the stones from the jewellery, the real from the gold. I think the most – what you do have, you've been believing in reincarnation now for a long time but there are certain belief systems too which are*

*very detrimental to society there and those are the ones that you've got to figure out for yourself, that they have been put there by certain people who want to have the power. .... I mean some people have had fantastic privileges and they have gone ever so high with their insight and with their spirituality, and there was those people who are living on the rubbish debts and who are so superstitious and who have had no – I mean we got to take care of our basic needs first .... so education is the answer.”*

As can be seen in the above narrative the participant positions a rational debate about the drawbacks of superstitious countries like India using metaphors like “immense jewellery box” to establish the wealth of knowledge and focussing on education to deal with superstitions. However, the same participant (as can be seen below) fails to use rationalisation when she talked about her magical thinking although she is aware that there is no evidence of her beliefs to influence causality.

*P4: “I do believe I've got great insight ..... But I have done a lot of study, a lot of research, a lot of reading ..... because I didn't believe one word of it initially, how all this magic supposed to happen..... have experienced a lot of things and the experience brings a reality forward. There are other dimensions and other worlds that we don't normally see, and they may have an influence or not, depending on where you are, what you're doing..... I put it in to spirituality and a certain amount of experience and then I put the OCD into stress, anxiety and a possible genetic disharmony, vulnerability.”*

These beliefs were so strongly held by the participants that it could almost appear delusional except that they had the insight into the fact that these beliefs are not reality and are subjective experiences instead, unlike the psychotic spectrum.

*P5: “A god or a goddess may guide me but I'm still totally responsible for what I do. So I'm not schizophrenic, I think that's the term for it.”*

P5 here typifies the magical thinking literature in OCD where she has the clear insight of the clear distinction between the magical beliefs and reality and explicitly separates it from a psychotic type of thinking although is strongly guided by these beliefs.

*P1: "It's made me who I am and I accept that ..... So the religion and all the magical thoughts, I suppose, they're helping me with – build the kind of same highways that somebody else – are normal. So it's more of a way to explain and, I suppose, to help to at least focus me to get to a point where it's like, Okay, no, there is no reason for why it's happening but – yeah, but here's something to help you,"*

*P6: "So there's no definitive cause and effect – no. There is a cause and effect, a constant cause and effect, but the amount of that, the depth of that will vary. You take concepts for magical thinking, the will and the imagination. And so what you do is you fill the will up to a very powerful force, then you focus through the imagination and the image here is if the sun shining on the earth and it has a certain power. The sun shining through a magnifying glass can build a fire. It intensifies its power enormously and that is the image of magical thinking."*

As can be seen from the above narratives, although the participants had the cognitive capacity to understand and rationalise that these beliefs logically had no cause and effect relationship, they perceived it as their subjective reality. These beliefs were very strongly held despite no scientific evidence. These beliefs emerged at times of distress and provided the participants with a sense of relief in stressful situations.

## **5.6 Discussion**

This in-depth exploration of magical thinking among a sample of participants with OCD was aimed at providing an insight into the phenomenology of magical thinking and its functions in maintaining obsessions and compulsions. Consistent with the existing quantitative literature, the participants in this sample endorsed a variety of different types of magical thinking such as superstitions, beliefs in paranormal phenomena, supernatural and thought-fusion beliefs (Einstein & Menzies, 2004; Darwin, Neave, & Holmes, 2011; Lindeman & Svedholm, 2012; Rees, et al., 2010; Roberts & Seager, 1999; Subbotsky, 2004, 2010). Thus, the lived experiences of magical thinking described by the study participants is consistent with the description of magical thinking in the OCD literature derived from non-clinical participants. Despite the variability in magical thinking expressed by the participants, the conceptualisation of magical thinking by these participants also

paralleled the items of the IBI (Kingdon et al, 2012) with beliefs in magical forces, guardian angels, unlucky numbers and TAF related beliefs. The narratives of all the six participants in the study, tend to support the larger contention that these beliefs influence reality in unknown ways beyond scientific understanding (Rozin, Markwith, & Nemeroff, 1992; Subbotsky, 2001, 2004, 2010). Although all the participants were educated and raised in Australia, their subjective sense of spirituality or spiritual belief systems were supported by ancient traditional philosophies and their subjective interpretations of it. This view supplements the literature of the widespread popularity of non-scientific beliefs even in technologically advanced environments (Bem & Honorton, 1994; Lindeman & Svedholm, 2012).

The six participants in this study described distinct predisposing, precipitating and perpetuating factors in regards to magical thinking and their OCD. With a likely genetic vulnerability to anxiety (as evidenced from the reported history of diagnosed psychiatric conditions in the family) and raised in an environment where they were exposed to magical beliefs since childhood (e.g., the “*Irish*” mother, the “*bush mystic*” father, the Indian spiritual “*guru*” of the family), all participants recognised the influence of modelling magical thinking in the family in the development of their own magical beliefs. It is likely that these participants developed the magical thinking schemas over time that emerged as a learnt behaviour at some points in their lives.

In terms of precipitants, participants noted that their magical beliefs were triggered by specific stressful life events causing heightened emotional distress (e.g., domestic problems, divorce, identity issues during adolescence) where magical thinking tended to provide a sense of hope and control at the time of crisis. There was some evidence of confirmation bias among participants. For instance, P3’s narrative with the number 13 and the evidence of bad events happening with a 13 days gap, P1’s example of pain relief with music and P4s account and providing the “*write-up*” as evidence regarding the flu injection causing OCD and providing evidence how that could be the truth were suggestive of confirmation bias among the study participants.

In terms of perpetuating factors, all participants indicated that their magical beliefs protected them or helped them in various ways. For example, P2 praying in a specific way to cleanse food helped her to not get a major illness. In this sense, magical thinking was highly valued by the participants as an important way to have control over threat and uncertainty.

The themes obtained from the current interviews are largely consistent with the stress-vulnerability model (Agius & Goh, 2010). Based on this model, it can be hypothesised that an individual with a vulnerability to OCD and who is conditioned vicariously to magical thinking through culture and family may be predisposed to develop magical thinking schemas. For individuals with a vulnerability to OCD, these schemas (learnt from family and other socio-cultural influences) may activate during heightened anxiety situations as a coping mechanism for their intrusive thoughts, providing a sense of illusory control. The societal acceptability of these beliefs serves to legitimise and maintain them, thereby limiting insight and maintaining their OCD symptoms

An important finding from the interviews was that all participants appeared to have very limited insight regarding the connection between strongly held magical beliefs and their OCD. In most cases, the participants described highly valuing their sense of spirituality and tended to identify magical thinking as part of their overarching spirituality. This view of magical thinking, which they term as “spirituality” is so strongly held that it limits their insight into understanding how it is inextricably contributing to their OCD. Along with valuing their spirituality, participants also described how much they rely on magical thinking to manage stressful times in their life. Together these findings suggest that therapeutically it may be a challenge to reduce magical thinking among individuals with OCD and high levels of magical thinking. These findings suggest that interventions need to focus initially on increasing the client’s awareness of how magical beliefs may perpetuate OCD. Providing clients with clear case conceptualisations would be useful in this regard.

In summary, this study has provided much-needed information about how and why individuals with OCD engage in magical thinking. The findings suggest strong ethnocultural influences in the genesis of magical thinking among the study

participants. Importantly, Australia being a multi-cultural country with a strong a history of migration from both east and west, offers an environment for meta-cultural awareness. This was demonstrated in the narratives of the participants with their subjective interpretation of spirituality in dealing with their OCD *vis-a-vis* religious beliefs. These findings are akin to the literature which states that magical thinking and rationality can both coexist within an individual and emerges at times of uncertainty and provides a sense of hope and false control (Langer, 1975; Rozin, Markwith, & Nemeroff, 1992; Subbotsky, 2001, 2004, 2010; Zusne & Jones, 1982). The functional mechanisms presented by the study participants as a way of coping via magical thinking and validating it to spirituality appeared as a way of gaining acceptance for their behaviour, providing a sense of control.

### **5.6.1 Strengths and Limitations**

This study provides a rare qualitative account of the lived experiences of magical thinking in people diagnosed with OCD. These narratives provide the much-needed baseline in contextualising magical thinking in OCD and generates preliminary insights into how these beliefs contribute to obsessions and compulsions. The findings of the present study need cautious interpretation in the view of the following limitations. First, these narratives were obtained from only a single detailed interview to gather their lived experiences of OCD with magical thinking. Collecting data over time with other alternative methods alongside individual interviews such as participant diaries and focus groups may provide more detailed information about their lived experiences. This may be a way forward for future research. Second, since this study utilised an in-depth approach with limited participants in Australia, a detailed examination of the influence of culture and adaptation was not sought in this study. Future studies examining such associations could investigate the role of acculturation (adaptation to the new culture) and enculturation (retaining the sense of belonging to their native culture) and its influence in maintaining magical thinking in OCD.

### **5.6.2 Implications**

The current study has important clinical implications. The findings of this study suggest that magical thinking provides individuals with OCD with a sense of

control that they believe is a healthy way of coping. It was evident from the interviews that the participants had poor insight as to the unhelpful nature of magical thinking in relation to their OCD. Furthermore, the rituals completed in the light of magical thinking are supported by cultural belief systems, which could pose a challenge in working with clients to develop appropriate insight via cognitive disputation. Understanding the clients' cultural belief system that maintains magical thinking and advancing therapy with cultural empathy would facilitate in developing insight for a better prognosis in therapy. For example, since these beliefs are very strongly held and are supported by cultural beliefs, clients may not be willing to dispute it. Therapy could address this by understanding the client's magical beliefs with the use of daily diaries and then using motivational interviewing techniques to guide this disputation process. Last, since insight is what separates magical thinking in OCD from delusional type thinking in psychosis, the assessments of the patient's associated level of insight may be beneficial when working with magical beliefs in OCD. This could be done in the initial assessment with measures such as Brown Assessment of Belief Scale (Eisen, Phillips, Baer, Beer, Atala, & Rasmussen, 1998), Overvalued ideation scale (Neziroglu, McKay, Yaryura-Tobias, Stevens, & Todaro, 1999) or Nepean Beliefs Scale (Brakoulias, Starcevic, Milicevic, Hannan, Viswasam, & Brown, 2018) to assess the characteristics of beliefs and differentially identify OCD related aberrant beliefs from overvalued ideation and delusional thinking of Psychosis.

## **5.7 Conclusion**

This study provides the first known qualitative account of the phenomenology of magical thinking from people with lived experiences in OCD. The study findings indicate that the development of magical thinking is influenced by vicarious learning through culture and family. Stressful life situations appear to trigger magnification of such beliefs among vulnerable individuals perpetuated by social acceptability to gain illusory control over intrusive thoughts. This understanding may inform researchers and clinicians to target insight development for a better therapeutic prognosis in OCD clients with magical thinking.

## CHAPTER SIX: GENERAL DISCUSSION

## 6.1 Introduction

Dysfunctional beliefs are proposed to be crucial in the pathogenesis of OCD. The literature emphasises three such beliefs to be associated with the development and maintenance of OCD namely; (1) responsibility/threat, (2) perfectionism/certainty, and, (3) over-importance/control of thoughts (Obsessive Compulsive Cognitions Working Group, OCCWG, 1997). An additional belief domain in OCD that has largely been overlooked is magical thinking. Magical thinking is a complex widespread belief system that has prevailed from the very beginning of human culture. Globally, the practice of magical thinking in varying degrees prevails in young and old alike and plays a significant role in both mundane and important life decisions. It is quite common to hear of people who avoid walking under ladders, or wear a lucky shirt for an important event or a game, touch wood in the hope of things working out well, or for an athlete to do rituals before an important game. Ethnographic studies propose magical thinking to have emerged as an adaptive function activated in times of danger to relieve anxiety and enable coping (Markle, 2010). Psychological literature over the last two decades indicates a growing interest in the potential contribution of magical thinking to OCD (Amir et al., 2001; Bocci & Gordon, 2007; Bolton, Dearsley, Madronal-Luque, & Baron-Cohen, 2002; Einstein & Menzies, 2004b; Hutson, 2008; Rees et al., 2010; West & Willner, 2011; Yorulmaz, Inozu, & Gultepe, 2011, Yorulmas, 2016). Magical thinking in OCD has been defined as a defiance of culturally accepted laws of cause and effect (Einstein & Menzies, 2004; Rees et al., 2010), an incorrect foundation of causality (Parris, Kuhn, Mizon, Benattayallah, & Hodgson, 2009), pre-causal description of a phenomenon (Subbotsky, 2004), causality that defies basic scientific principles (Peltzer, 2003), and an irrational linking of thoughts and actual events that cannot be supported by physical laws or culturally acceptable reasoning (Bocci & Gordon, 2007). However, research in this area is still in its infancy.

Being raised in a cultural environment filled with magical beliefs and working in an evidence-based domain of mental health research stirred my interest in studying this area from a cross-cultural perspective. Like OCD, magical thinking may be construed as a dimensional construct that exists on a continuum. On one

end, magical thinking is viewed as an evolutionary concept endorsed by cultural and religious beliefs for effective coping, while on the other end it is viewed as a dysfunction associated with OCD. This thesis advances the literature in understanding magical thinking and its potential contribution to OCD. A series of four studies comprise this PhD that comprehensively explored this relationship with a mixed-method research design. Each study was designed in a manner to guide the subsequent studies to address the existing gap in the literature and to gather a comprehensive understanding of the study topic. Study one was a systematic review of literature that enabled better insight into the existing literature on magical thinking in OCD and highlighted a lack of uniformity in measuring the construct. To address variations on how magical thinking in OCD has been measured across literature, the subsequent two studies used the Illusory Beliefs Inventory (IBI; Kingdon et al., 2012) developed specifically to assess magical thinking in OCD instead of the widely used Magical Ideation Scale (MIS; Ekblund & Chapman, 1983) that was developed to assess magical ideation in Schizotypy (Einstein & Menzies, 2004; Kingdon et al. 2012; Shihata, et al, 2014). Studies two and three were conducted with community participants and empirically explored magical thinking and its association to OC symptoms in a transcultural perspective between India and Australia. The fourth study consisted of qualitative interviews to discover the lived experiences of individuals diagnosed with OCD and who engage in magical thinking.

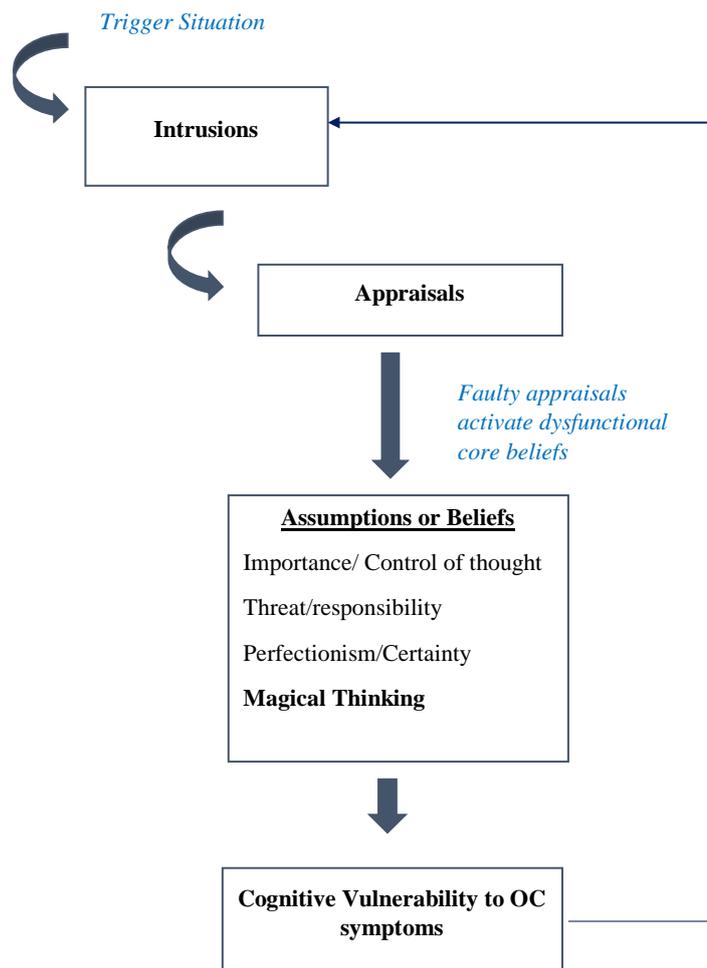
Therefore, this research had the following specific aims addressed in the four studies:

1. Systematically review the unique contribution of magical thinking in OCD and determine the strength of this association (Study one).
2. A cross-cultural exploration of magical thinking in OCD measured using the IBI and evaluation of the psychometric properties of the IBI with a cross-cultural perspective (Study Two).
3. Transcultural exploration to determine the relative importance and strength of magical thinking in explaining OC symptoms above and beyond the already established cognitive constructs (Study Three).

4. Explore and contextualise the lived experiences of magical thinking and its relationship to current obsessions and compulsions in a clinical population (Study Four)

## **6.2 Overview of the studies and the main findings**

The first study of this thesis was a rigorously conducted systematic review of the literature concerning the relationship between OC symptoms and magical thinking. Due to the variability of the samples used in the literature as well as non-uniform tools used to assess magical thinking, the prospect of conducting a meta-analysis was precluded for this study. Although there was some variability in the findings of the included studies, most reported significant relationships between magical thinking and OC symptoms. The strength of the relationship between magical thinking and OC symptoms was found to be small to moderate (Cohen, 1998) in the included studies. The results of this review positions magical thinking as an important construct relevant to understanding OC symptoms and worthy of further research attention. A major conclusion emerging from this review is that magical thinking is a construct that may explain additional vulnerability in the genesis of OCD beyond the OCCWG constructs (Bocci & Gordon, 2007; Einstein & Menzies, 2004a, 2004b; Hutson, 2008; Rees et al., 2010; West & Willner, 2011; Yorulmaz, et al., 2011, Yorulmas, 2016). *Figure 9* provides a visual depiction of this conclusion. The findings of this review also highlighted the conflicting evidence regarding the influence of culture on this relationship. Furthermore, very little research was documented to understand this phenomenon in the clinical context. This study was of pivotal importance in understanding the gaps in the existing literature and further paved the way for the subsequent studies in this thesis.

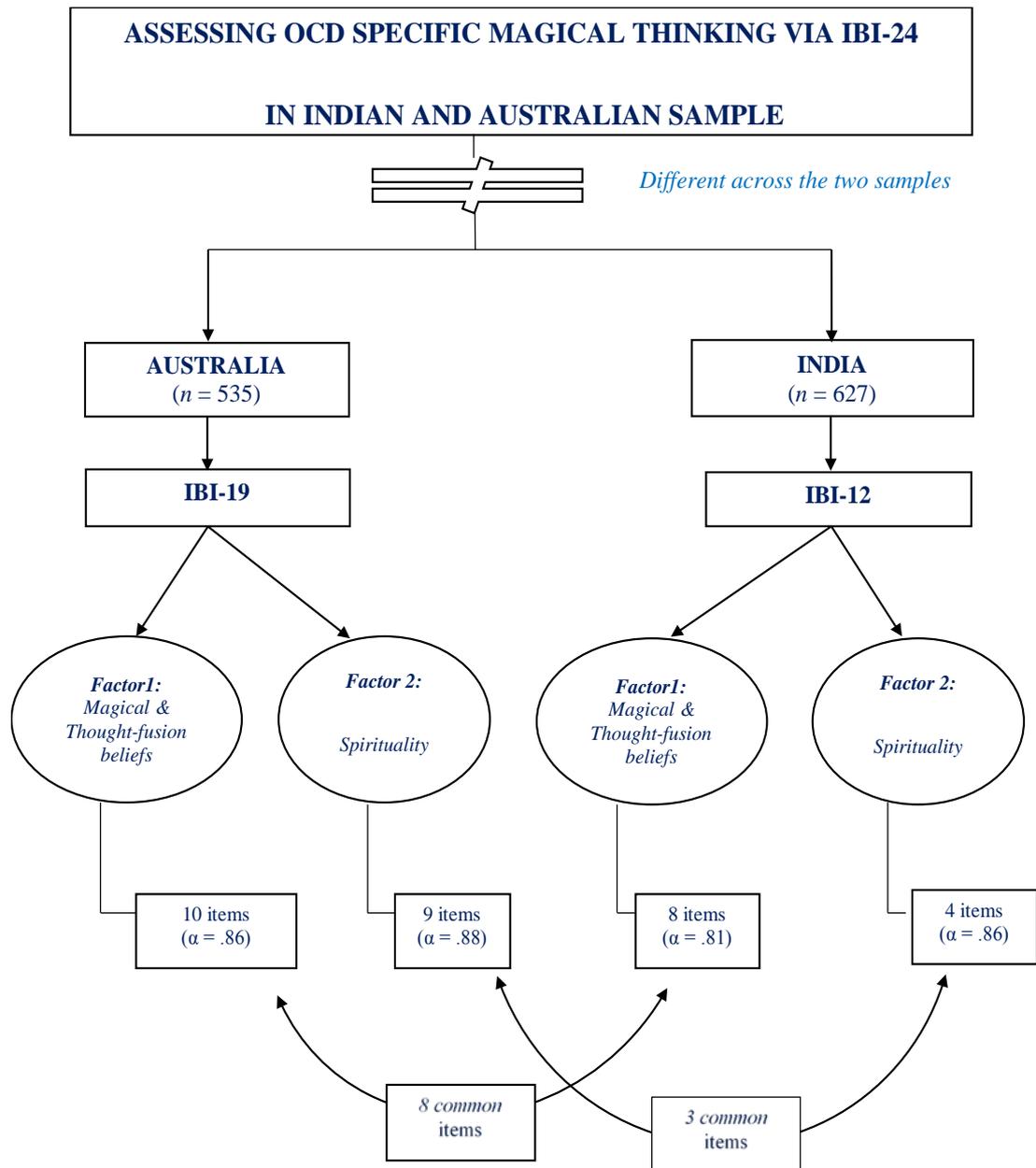


*Figure 9.* Grounded in the Cognitive model for OCD, positioning magical thinking and its association to OCD alongside the established OCCWG constructs based on the levels of cognitions (i.e., intrusions, appraisals and assumptions) framework postulated by the OCCWG (1997). This visualisation is based on the systematic review of study one.

Study two was a quantitative study designed and initiated to address the gap highlighted in the systematic review regarding the use of non-uniform tools used to assess magical thinking. Therefore, this study and the subsequent studies in this thesis used the IBI (Kingdon et al., 2012) that was developed specifically to measure magical thinking in OCD. Since OCD is known to exist on a continuum (Gibbs, 1996; Myers et al., 2008) and magical thinking traits are common in varying degrees in most individuals (Markle, 2010), this study was conducted with non-

clinical community participants to assess magical thinking and its association with OC symptoms. To explore the cross-cultural differences in the manifestation of this construct, samples were drawn from Australia (analytic-thinking culture of the west) and compared to India (holistic-thinking culture of the east). Given that the IBI was validated in an Australian sample, the cross-cultural element of this study also tested the performance of the IBI in a different culture. This was examined by testing measurement invariance to assess if the measure performed differently across the two samples. A detailed factor analyses was further conducted to evaluate the factor structure and the psychometric properties of the IBI in the studied samples. The findings of this study were in line with the previous validation study conducted by Shihata et al. (2014) demonstrating excellent reliability, good internal consistency and robust correlations with other measures. However, the findings did not support the hierarchical three-factor structure of the original IBI suggested by Kingdon et al. (2012). Instead, a consistent two-factor structure was observed across both samples. *Factor 1: Magical and thought-fusion beliefs (MTFB)* encapsulated all general magical beliefs, and TAF related appraisals akin to intrusive thoughts and superstitious beliefs. *Factor 2: Spirituality*, a label retained from the original IBI, included items with the central theme of religious beliefs and dogmas pertaining to a spiritual presence. When examined cross-culturally, the lack of configural variance of the IBI across the Indian and the Australian samples indicated that there were fundamental differences in magical thinking across the two cultures. This was highlighted in the differences in the number of items that were derived in the new versions of the IBI in each sample, despite a consistent two-factor structure across the samples. IBI for the Australian sample consisted of 19 items (*Factor 1: MTFB*, 10 items; *Factor 2: Spirituality*, 9 items) whereas a shorter version of the IBI was derived for the Indian sample with 12 items (*Factor 1: MTFB*, 8 items; *Factor 2: Spirituality*, 4 items). Cultural differences were noted in the expression of *Magical and thought fusion beliefs* as well as the *Spirituality* related beliefs, which is reflected by the inclusion of different items across both the Australian and Indian samples, there were eight common items in the *MTFB* subscale and only three common items in the *Spirituality* subscale of the IBI. *Figure 10* represents cross-cultural differences in OCD specific magical thinking measured by the IBI based on the findings of study two. Cross-cultural differences were found with respect to the higher magical thinking scores by the Indian sample in comparison to the Australian

sample. These differences were pronounced with respect to the *Spirituality* domain of the IBI with a far fewer number of items in the Indian version of the IBI. This may indicate the potential issue of cultural interpretation of spirituality in historically superstitious cultures like India, a defensible justification also supported by cross-cultural research on the western versus the eastern notion of spirituality (Chaturvedi & Bhugra, 2007; De Bilbao & Giannakopoulos, 2005; de Silva, 2006). Historically religious preoccupations are believed to have served as a psychological anchor for Indian minds amidst stressful times (Sharma & Mehratra, 2012). Besides, religious ideas and beliefs are the key components and central theme for cross-cultural differences in OC symptoms manifestation (Nedeljkovic et al., 2012, Williams et al., 2017). Thus, the key difference in the Spirituality related domain with different items of the IBI in the Indian and the Australian sample provide valuable insights into the differences in the belief systems of each culture. Hence, based on statistical findings and theoretical support, the IBI-19 for Australia and the IBI-12 for India were considered for further analyses in the following model testing study (Study three). These findings are consistent with previous OCD related magical thinking research conducted in superstitious cultures like Ireland, Mexico and Turkey (Eremsoy & Inozu, 2016; Helgadóttir, et al., 2012; Subbotsky & Quinteros, 2002; Yorulmaz, 2016; Yorulmaz, et al., 2011) that indicated higher scores on magical thinking.



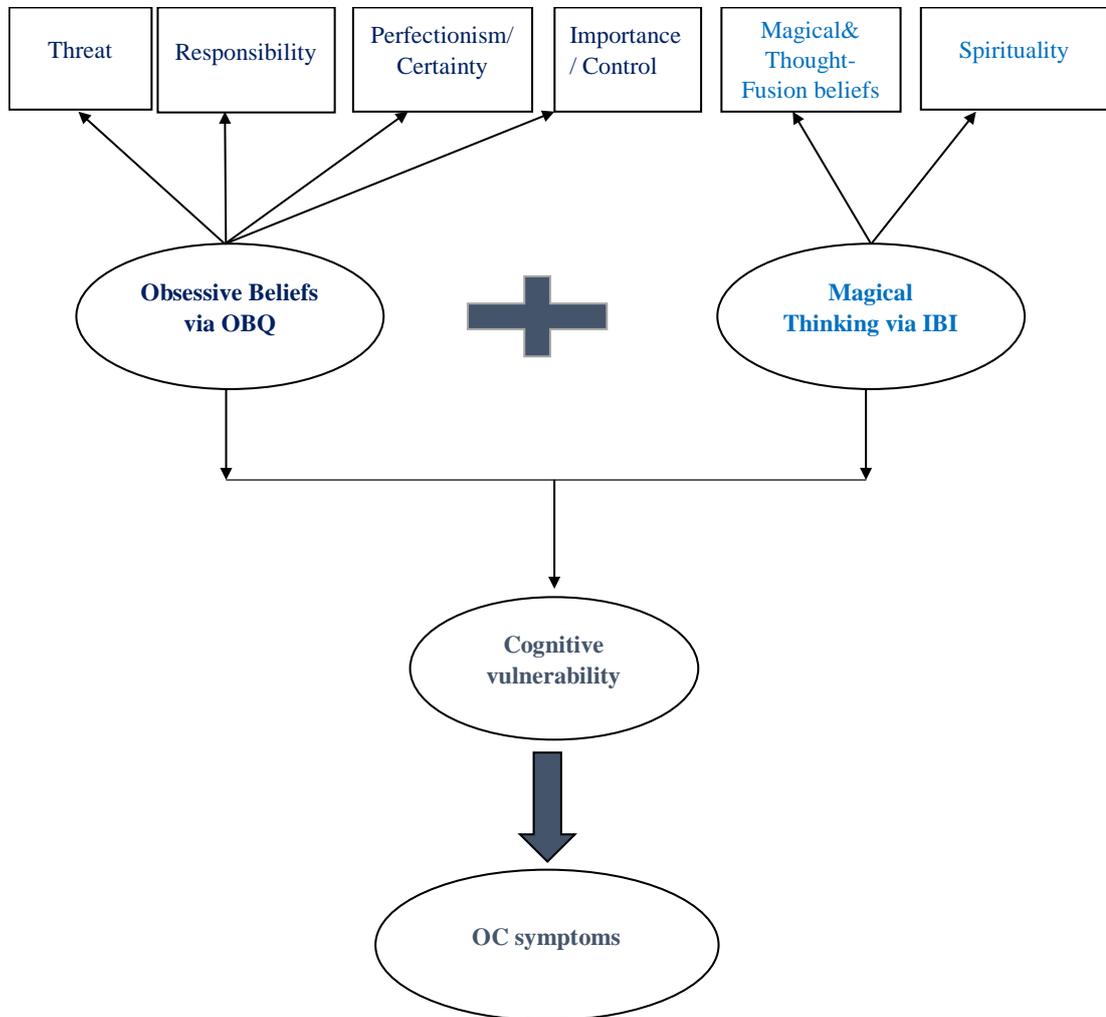
*Figure 10.* Diagrammatic representation of the cross-cultural differences in magical thinking based on the findings of study two.

Study three extended the findings of the previous study and used the same dataset to further test a directional hypothesis. The central aim of this study was to conduct a comprehensive trans-cultural analysis to examine the unique as well as the relative contribution of magical thinking alongside the cognitive constructs implicated in OCD. Based on the derived factor analyses of study two, two separate

models were hypothesised and tested in each sample independently where IBI-19 was used for the Australian sample and IBI-12 was used for the Indian sample.

The first model tested the unique and relative contribution of magical thinking (measured by the revised IBI specific to each country) alongside the cognitive beliefs associated with OCD (measured by the OBQ-TRIP; Moulding et al., 2014) to evaluate the cognitive vulnerability for OC symptoms. The results of this study indicated cognitive vulnerability to be a strong and significant predictor of OC symptoms in both samples alongside the existing constructs in OCD (*see Fig. 11*). These findings extend support to the large body of literature on the contributory role of dysfunctional beliefs in the pathogenesis of OCD (Barlow, 2004; Callaghan et al., 2005; Chaturvedi & Bhugra, 2007; Freeston et al., 1996; Frost & Steketee, 2002; Purdon, 2001; Rachman, 1997; Salkovskis, 1985, 1999). In this model, *Magical and thought-fusion beliefs* and *Spirituality* subscale control of thought, contributed uniquely to this vulnerability, adding additional variance to the cognitive vulnerability of OC symptoms alongside other cognitive constructs namely, *Threat*, *Importance/Control of thought*, *Responsibility* and *Perfectionism*. Among the subscale of the IBI, *Magical and thought-fusion beliefs* subscale of the IBI had a stronger association to cognitive vulnerability in both samples compared to the *Spirituality* subscale. However, the proportion of variance explained by *Spirituality* was larger in the Indian sample compared to the Australian sample, suggesting the potential influence of culture and spiritual beliefs in conferring these vulnerabilities. As expected, *Threat* was the strongest contributor to cognitive vulnerability among the other constructs followed by *responsibility* related beliefs across both cultures. These findings are aligned to existing literature finding perceived threat to be the strongest contributor of vulnerability to OC symptoms (Moulding, et al., 2007; Ramezani, et al., 2016; Sookman & Pinard, 2002). This study is important as it provides preliminary transcultural evidence on how magical thinking may add an additional dimension to understanding OC symptoms and how these vulnerabilities may differ across cultures based on the domain of spirituality. This understanding may be helpful for clinicians to gather further insights when working with clients with diverse cultural backgrounds. *Figure 11* provides a diagrammatic representation of the findings of the Cognitive Vulnerability Model for OC symptoms indicating the unique contribution of magical thinking to

vulnerability for OCD beyond the established obsessive beliefs recognised in OCD literature across both samples. The unique significant contribution of both the subscales of the IBI to cognitive vulnerability for OC symptoms was found in the Indian as well as the Australian sample.



*Figure 11.* Generic Model of Cognitive Vulnerability for OC symptoms indicating the unique contribution of magical thinking to vulnerability for OCD beyond the established obsessive beliefs recognised in OCD based on findings of Study 3.

The second model examined if magical thinking adds any unique predictive utility in explaining OC symptomatology. Magical thinking denoted by the IBI subscales emerged as a distinct construct from the other existing cognitive constructs in OCD across both samples, consistent with recent literature (Amir et al., 2001; Bolton et al., 2002; Einstein & Menzies, 2004a, 2004b, 2006; Rees et al., 2010). Furthermore, significant and unique associations were found between

*Magical and thought-fusion beliefs* subscale of the IBI and OC symptoms cross-culturally, indicating the unique predictive utility of this construct in explaining OC symptoms. The strength of these associations was of similar magnitude to the other cognitive domains of *Perfectionism, Responsibility and Importance/control of thought*, which has received considerable research attention. This positions *Magical and thought-fusion beliefs* as warranting more research. Conversely, although *Spirituality* was correlated with vulnerability to OC symptoms in the previous model, it was not a significant predictor for OC symptoms in either culture. A tenable explanation may be that spirituality related beliefs are often culturally and socially validated belief systems. Engaging in such beliefs endorsed by society may not produce the level of distress caused by OC symptoms, and hence they have no predictive utility for the OC symptoms in the tested model. However, this finding was contrary to some previous research which has found that suggests religiosity is a strong predictor in OC symptoms (Amramowitz, 2004; Sica, 2002; Sica, Novara, & Sanavio, 2002). Consistent with previous literature (Moulding, et al., 2007; Ramezani, et al., 2016; Sookman & Pinard, 2002), *Threat* emerged as the strongest predictor of OC symptoms in both the samples. Furthermore, there was an overlap observed with regards to the domain of *threat* and *responsibility*, consistent with the factor structure reported OCCWG and other studies (Gwilliam et al., 2004; Myers & Wells, 2005; OCCWG, 2005; Tolin, Woods, et al., 2003), suggesting that there is no heightened sense of responsibility if there is no threat perceived. It may be inferred that humans by nature are inherently vigilant to threatening situations and seek ways to ensure safety. In the light of OCD, it is possible that this safety behaviour performed mitigates the perceived levels of threat and alleviates the sense of personal responsibility associated with OC symptoms. Findings from these quantitative studies (studies two and three) are also consistent with the findings of the systematic review discussed in study one (chapter two) regarding the potential contribution of magical thinking in OC symptoms. These insights are pertinent in the context of the recent debate about the relative role of magical thinking in OCD literature (Bocci & Gordon, 2007; Einstein & Menzies, 2004a, 2004b; Hutson, 2008; Rees et al., 2010; West & Willner, 2011; Yorulmaz, et al., 2011, Yorulmas, 2016).

Study four was the last study of the series. This study entailed an empirical exploration of magical thinking by interviewing people with a formal diagnosis of OCD and high scores on magical thinking (IBI score >60; Kingdon et al., 2012). As mentioned in the systematic review (study 1), there is paucity of research on magical thinking based on a clinical sample as most of the research is skewed with non-clinical data (Berenbaum, Boden, & Baker, 2009; Bocci & Gordon, 2007; Helgadóttir, et al., 2012; Rees et al., 2010). This study, therefore, advances the research on magical thinking in OCD by contextualizing the phenomenology of magical thinking and its association to the presenting obsessions and compulsions in a clinical population.

Study four provides rich novel data on the lived experiences of magical thinking by people living with OCD to facilitate our understanding of how this construct is manifested in the clinical sample. Based on the narratives of the six participants of the study analysed using Interpretative Phenomenological Analyses (IPA; Smith and Osborn, 2003), it is possible to position magical thinking within existing cognitive models of OCD (Rachman, 1997; Salkovskis, 1985, 1999). *Figure 12* provides an example of how magical thinking could be incorporated into the cognitive model. This model proposes the underlying principle that predisposes a person with OCD to develop magical thinking and the possible mechanisms that maintain such beliefs. The cognitive model being the dominant theory in OCD, the findings of this study conceptualises the role of magical thinking in OCD as per the Four *P*'s of case conceptualisation used in CBT, namely, predisposing, precipitating, perpetuating, and protective factors (Persons & Tompkins, 2007). According to the proposed model based on the study findings, early life experiences with magical thinking (learned vicariously via family or culture) may play a crucial role as a predisposing factor for someone with generic vulnerability for OCD. These core magical beliefs may then be activated as precipitants among vulnerable individuals when faced with critical life events to facilitate coping and providing a sense of illusory control. Perpetuating factors such as ethnocultural influences compounded by protective factors such as attention and reasoning biases perhaps further strengthen these beliefs and maintain OC symptoms. Thus the societal acceptability of these beliefs serves as a maintaining factor, limiting insight into their OCD symptoms. Thus, creating a vicious self-perpetuating cycle is established. These

findings extend and complement the work of Einstein and Menzies (2008) that suggested magical beliefs to be a poor prognostic factor for OCD leading to poor treatment outcomes. This conceptualisation may inform clinicians working with OCD to assess the presence of magical thinking in their clients and subsequently target insight development for a better prognosis in therapy.

Preliminary evidence provided by study four provides support to the magical thinking literature regarding the perceived adaptive mechanisms of magical thinking in OCD, reinforced by systemic influences to gain a sense of illusory control (Langer, 1975; Rozin, et al., 1992; Subbotsky, 2001, 2004, 2010; Zusne & Jones, 1982). This can be supported by existing literature suggesting that this need for control may be more specific to OCD given that OCD patients record higher desire for control and lower sense of control when compared to other anxiety groups and non-clinical controls (Moulding, Doron, Kyrios, & Nedeljkovic, 2008; Moulding, & Kyrios, 2007). The results from the qualitative accounts provided insights into how magical thinking may influence beliefs systems activated in times of threat and may coexist with rational thinking (Bem & Honorton, 1994; Lindeman & Svedholm, 2012). Despite having the cognitive capacity to separate religion from spirituality, the participants did not tend to have awareness regarding the perceived adaptive functions magical thinking was providing to their OCD. This duality was also observed in the way participants described magical thinking. The perspectives provided by the participants bordered on a fine demarcation from delusional thinking, except that all the participants were very aware of the subjective nature of their beliefs which may not be the reality as it cannot be scientifically tested. The strong nature of their magical thinking (often described as “*My Spiritual beliefs*” by the study participants), limited their insight into their inextricable association to OCD. The arbitrary conceptualisation of the term *Spirituality* by the study participants (to describe their magical thinking) and their defensible association with ancient philosophies of the east describe the ethnocultural influences on magical thinking in today’s world of rational reasoning (Bem & Honorton, 1994; Lindeman & Svedholm, 2012; Midelfort, 1991; Subbotsky, 2001, 2004, 2010). Importantly, despite the variability in the presentation of magical thinking, magical thinking as expressed and defined by the study participants was consistent with the literature and was perceived to capture a wide range of non-scientific beliefs such as the

superstitions, paranormal phenomenon, supernatural and thought-fusion beliefs  
(Einstein & Menzies, 2004; Darwin, et al., 2011; Lindeman & Svedholm, 2012; Rees  
et al., 2010; Roberts & Seager, 1999; Subbotsky, 2004, 2010).

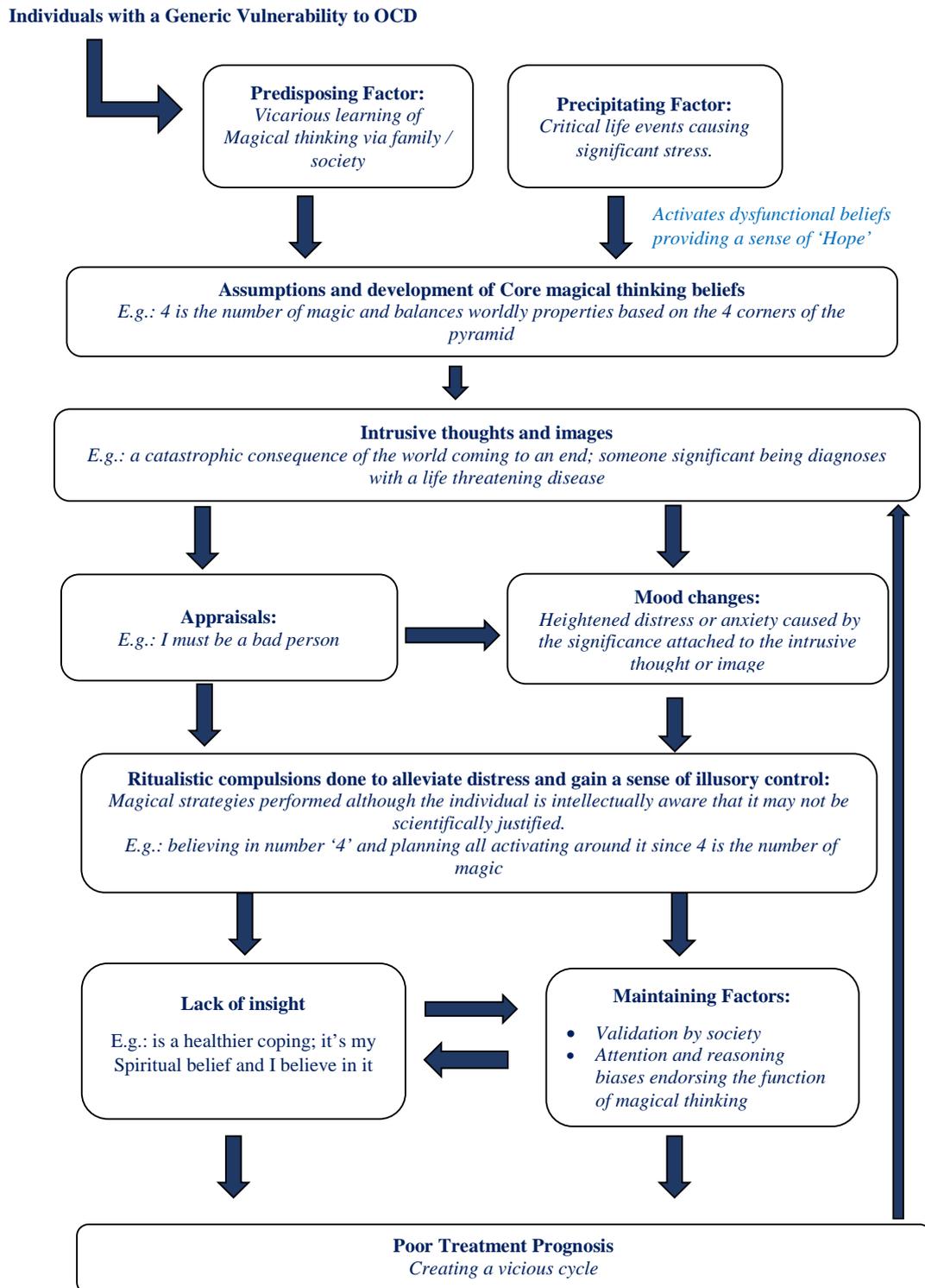


Figure 12. Proposed Cognitive Model for understanding magical thinking and its contribution to the pathogenesis of OCD grounded on the established Cognitive Theory of OCD.

### 6.3 Significance of the study findings:

This was the first study to comprehensively examine the contribution of magical thinking in OCD alongside other established constructs and furthers literature in this area. The findings of this thesis are significant for the following reasons. First, the primary strength of this research was that it was systematically developed to address the gaps in the literature using existing theories to generate hypotheses that were then empirically tested. Second, this study series clarifies the relationship between magical thinking and OCD by exploring the unique and relative importance of magical thinking when considered alongside other key cognitive constructs. No study to date has tested the correlation between magical thinking and the key cognitive domains measured by the OBQ. The systematic review positions magical thinking as an important construct in the development and maintenance of OCD beyond the existing constructs. The findings of the quantitative studies provided further support to the review findings by empirically establishing the unique contribution that magical thinking offers over and above the existing construct. Third, this research provides important cross-cultural information regarding the relationship between magical thinking and OC symptoms. Cross-cultural differences in magical thinking were revealed in the way the construct manifested in each sample and these distinctions were particularly pronounced in the domain of *Spirituality*. Fourth, the research addresses the existing gap in the literature regarding the use of non-specific tools to measure OC specific magical thinking, by using the Illusory Belief Inventory (IBI), a measure specifically developed to assess magical thinking in both community and clinical population (Kingdon, et al., 2012). Fifth, the qualitative interviews used in study four provided detailed information about the phenomenon of magical thinking in individuals with OCD. The clinical study offered rich qualitative accounts of magical thinking in individuals living with OCD and guided the development of a cognitive vulnerability model that explains the underlying mechanisms for the development and maintenance of magical thinking in OCD. Finally, the robust sample sizes in the quantitative studies, and the comprehensive mixed-methods analytic approach (e.g., factor analyses, structural equation modelling, qualitative interviews) and the transcultural perspective were novel.

## 6.4 Implications

### 6.4.1 Clinical Implications

The study findings have important clinical implications with regards to assessment, case formulations and intervention approaches to OCD. The robust and significant associations reported in the quantitative studies of this thesis highlight the potential value of explicitly incorporating magical thinking into treatment protocols in clinical practice. As demonstrated by this study, dysfunctional beliefs, including that of magical thinking, appear to play a unique contributory role in the aetiology and maintenance of OCD. Although the studies in this thesis were cross-sectional, caution should be exercised in making inferences. Future longitudinal, experimental, and intervention studies will be important to build the case for the causality of the associations found in this study. Assessment of this construct to evaluate the presence of magical thinking could be an important element for targeting this construct in therapy. Evidence suggests that individuals with high magical thinking and OCD respond poorly to standard CBT for OCD (Basoglu, Kasvikis, & Marks, 1988; Einstein et al., 2011). The IBI (Kingdon et al., 2012) may be incorporated into clinical assessments by practising clinicians when working with cognitive dysfunctions in OCD. For instance, the IBI (Kingdon et al., 2012) could be used within an assessment battery along with the OBQ Scale (OCCWG, 2005) to identify cognitive beliefs as a pre-post measure in therapy.

Initial studies suggest that OCD clients can achieve good outcomes when general magical thinking is targeted in cognitive therapy (Einstein, Menzies, St Clare, Drobny, & Helgadottir, 2011). Targeting these beliefs directly with OCD clients who engage in magical thinking may assist in better treatment outcomes which otherwise may pose as a poor prognostic factor. Thus, targeting a reduction in magical thinking that may be maintaining the OC symptoms could lead to a reduction in OC symptoms leading to better recovery rates. Moreover, case formulation could be enhanced by exploring this construct among individuals with OCD to understand the perceived adaptive mechanisms for better treatment planning. Grounded on the principles of cognitive therapy, the proposed vulnerability model for magical thinking may guide clinicians in case formulations for evaluating the magical thinking mechanisms in OCD such as core beliefs,

appraisals and their maintaining factors. It may also be beneficial to determine the comparative efficacy of cognitive interventions for magical thinking compared to other cognitive treatments using the IBI as an outcome measure. Furthermore, since perfectionism and general magical beliefs accounted for similar amount of variance in Study Four (Chapter Five), cognitive therapy targeting magical thinking could be trialled in a similar way that cognitive therapy for perfectionism in OCD (Frost et al., 2002) with directly challenging the dysfunctional thinking and use of behavioural experiments. Treatment protocols targeting these biases towards the magical beliefs may be advantageous in reduction of the intensity of such beliefs and subsequent reduction of OC symptoms in clients who engage in magical beliefs. Although this construct needs more research especially in the clinical and therapeutic context, it is worth assessing this dimension to target it independently when working with cognitive vulnerability factors since it is likely to contribute to the severity and prognosis of OC symptoms.

The current study also indicates potential clinical implications while working with clients from culturally diverse backgrounds. Evidence suggests that the therapist's openness and sensitivity to the cultural orientations of the client facilitate a better therapeutic relationship (Burkard & Knox, 2004; Wang et al., 2003). As magical thinking is a socio-cultural construct, these insights could guide clinicians to be open to exploring magical beliefs among their clients and to target these beliefs in a culturally sensitive way. The mere knowledge of the cultural viewpoints of these beliefs may facilitate cultural competence among the treating clinicians and help in exercising caution in challenging such culturally sensitive belief systems in therapy. Given that magical thinking appears to be a culture-specific construct (as indicated by Studies 2 and 3), the IBI needs to be validated in more cultures so that culture-specific versions of the IBI could be used when working with clients from diverse cultural backgrounds. A culturally appropriate version of the IBI could be used as a screening tool for case formulations and to guide treatment to identify whether magical thinking may represent a valuable target for intervention.

Cognitive Behaviour Therapy (CBT), primarily exposure and response prevention (ERP) is the psychotherapeutic treatment of choice for OCD (NICE,

2013). While studies indicate that the addition of cognitive component to behavioural therapy does not appear to result in greater reduction in symptoms compared to ERP alone (Baer & Minichiello, 1998; Foa, Steketee, Grayson, Turner, & Latimer, 1984; Rees et al, 2010); several controlled studies comparing ERP and Cognitive Therapy suggests that Cognitive Therapy is more efficacious when challenging prominent dysfunctional intrusive obsessions in OCD as opposed to overt compulsions (Belloch, Cabedo & Carrio, 2008; Chambless & Hollon, 1998; Jones and Menzies, 1998; Whittal, Thordarson & McLean, 2005; Whittal, Woody, McLean, Rachman, Robichaud, 2010). One possible explanation may be that there are some beliefs that may not be adequately challenged via cognitive disputation, and magical thinking may be one such domain. Cognitive disputation aimed at challenging irrational cause and effect relationships may pose a challenge as the client may not think of probabilities (e.g., the extent to which something is likely to happen or be the case) but instead will think in terms of magical possibilities (e.g., a thing that may happen or be the case) that cannot be tested. For example, P5's magical belief that *"My dog has my mother's soul"*, or *"I believe in magic"* or P4's account of *"dreams are channels to carry message of death and dying"*, may be difficult to challenge. Attention biases may further strengthen these beliefs posing a vicious cycle. Thus, in clinical work when someone with magical thinking is presented with a perceived threat, they may be thinking in terms of magical possibilities rather than probabilities, which may pose as a barrier for standard cognitive disputation. Hence, it is suggested that the clinical approach needs to be different to not only target specifically "what they think" but also the "way they think" to elicit patterns in the obsessive nature of their beliefs. For instance, it may be possible to challenge each specific negative thought about possibilities. However, this may not generalise to future thoughts related to their magical beliefs. Thus, challenging the style of thinking (i.e., magical thinking) would enable clients to identify and challenge problematic thoughts in the future.

The focus on unhelpful processes in thinking as opposed to working on challenging the content of thoughts is the basis of therapies such as Acceptance and Commitment Therapy (ACT; Twohig et al., 2015), metacognitive therapy (Fisher & Wells, 2008) and mindfulness-based therapies (Hershfield & Corboy, 2013). For instance, it may be helpful to increase metacognitive awareness to enable the client

to explore the helpful versus unhelpful nature of magical thinking in relation to their OC symptoms based on a continuum. This could help decrease the strength of their unhelpful negative and positive beliefs about magical thinking, and increase more helpful metacognitive beliefs and adaptive coping behaviours (e.g., with P4's account that "*I think it is managed by, let's say, the angelic forces*" metacognitive awareness may benefit in facilitating more effective coping "*I can have this magical thought but don't have to leave things up to chance*"). Similarly, clients with beliefs in meditation practices may be introduced to mindfulness-based CBT to enable them to develop skills to accept their magical thinking as a "thought" and not react to it via mindfulness practice (e.g., "*I have this magical thought, it is there and I accept it as my thought while I do not need to get distressed or react to it*"). Positive beliefs about magical thinking were expressed by participants in Study 4, including the belief that magical thinking is helpful for protecting them against distress and stigma attached to OCD (e.g., P1's narrative "*Yeah, the benefits, of course, is there are definitely worst thing that I could be addicted to, there are worst thing that could overtake my life. It's just music.*" Or P6's narrative "*But if it's not avoidance and its acceptance, well then it's positive OCD*"), ACT protocol for OCD may be used to develop *psychological flexibility* in such clients without direct confrontation of these thoughts (Arch, Eifert, Davies, Vilardaga, Rose & Craske 2012; Twohig et al., 2014, 2015). Therefore, when considered in relation to magical thinking and OCD, it may be beneficial for therapy to focus on increasing client awareness of their magical thinking and its role in maintaining OCD.

#### **6.4.2 Theoretical implications**

The novel findings of this research advance literature on dysfunctional beliefs in OCD by empirically establishing magical thinking to be an important construct in explaining OC symptoms. The current study makes an important contribution to the OCD literature with regards to the understanding of cognitive constructs and vulnerability in OCD. Dysfunctional cognitions are known to be implicated in the development and maintenance of OCD (OCCWG, 2001, 2005, 2008; Taylor & Jang, 2011). Findings of this research extend the evidence for magical thinking as a new dimension in explaining OC symptoms beyond the existing constructs. Therefore, these findings may be incorporated into the cognitive

dysfunction theory (Rachman, 1997; Salkovskis, 1985, 1989, 1993; Salkovskis, Shafran, Rachman, & Freeston, 1999) explaining vulnerabilities for OC symptoms. The strength of the association of magical thinking to OC symptoms in the quantitative study was equivalent to the much-researched construct of perfectionism across both samples, whereas literature on magical thinking has been largely overlooked. The findings of this study provide important evidence to endorse magical thinking as an important construct in OCD that needs research focus.

This is the first study that explores the contribution of magical thinking in OCD in the Indian sample. Given that, the existing cross-cultural evidence in this study area comes from Ireland, Turkey, Great Britain, Mexico and Australia (Erimsoy & Inozu, 2016; Helgadóttir, et al., 2012; Subbotsky & Quinteros, 2002; Yorulmaz, 2016; Yorulmaz, et al., 2011), the data from the current study contributes novel cultural evidence to the body of magical thinking research in OCD. Previous studies exploring the contributory role of magical thinking in OCD with a transcultural perspective provide conflicting evidence regarding culture-specific differences in magical thinking associated with OCD. While some studies examining this relationship between magical thinking emphasise the possible influence of culture in this relationship (Helgadottir et al., 2012; Yurolmas et al., 2011), contradictory evidence suggests that this relationship is free of any cultural influences (Erimsoy & Inozu, 2016; Yurolmas et al., 2011; Yurolmas, 2016). However, transcultural insights from this study provide preliminary evidence on how the manifestation of this construct explicitly differs in the domain of *Spirituality* (measured by the IBI; Kingdon et al., 2012). It is likely that this clarity was not evident in the previous literature since most existing research in this area has used the Magical Ideation Scale (MIS; Eckblad & Chapman, 1983), which does not have a domain specific to *Spirituality*. In addition to having a separate spirituality subscale, the IBI assesses magical thinking specific to OCD (Kingdon et al., 2012) and therefore captures the egodystonic nature of magical thinking as presented in OCD, unlike the more egodystonic magical thinking associated with schizotypy as assessed by the MIS (Eckblad & Chapman, 1983). This knowledge opens new research possibilities to evaluate the cultural differences in more countries using the IBI, such as examining how magical thinking is expressed in

other traditional (holistic-thinking) cultures when compared to advanced (analytic-thinking) cultures.

According to cognitive theorists, it is the interpretation and significance ascribed to the occurrence of intrusive thoughts or images that is key to the subsequent development of OCD (Rachman, 1997; Salkovskis, 1985, 1999). Specifically, catastrophic interpretations of the perceived meaning of intrusions are proposed to result in distress and therefore rituals are used in an effort to reduce the distress (OCCWG, 1997; Salkovskis, 1985; Shafran et al., 1996; Wu & Carter, 2008). Grounded in the dominant cognitive model for OCD, this study proposes a cognitive vulnerability model for the development and maintenance of magical thinking in OCD. Although preliminary and speculative at this stage, this hypothesised model (*Figure 12*) offers a preliminary framework for understanding magical thinking in the clinical context. This model was offered as an initial hypothesis about the contribution of magical thinking to OCD symptoms, and as an exploratory guide for researchers and clinicians working in this area.

### **6.5 Limitations and directions for future research:**

The studies presented in this thesis should be interpreted cautiously with several important limitations in mind. These limitations provide directions for future research.

First, the quantitative studies in this thesis used cross-sectional data with analogue (non-clinical) samples to draw inferences on the contributory role of magical thinking in OC symptoms. Given that OC traits are known to exist on a continuum, there has been a strong reliance on non-clinical cohorts within the literature on cognitive vulnerabilities for OC symptoms, which may limit generalisability of results to clinical samples. Future research in this area should focus on gathering evidence from clinical samples to ensure the findings generalise to the population who are most likely to seek interventions for their symptoms. Longitudinal studies should be conducted to determine whether magical thinking confers an additional risk of developing clinically significant OC traits. Likewise, longitudinal studies are required that follow young children with high magical

thinking scores to identify the risk factors, vulnerability factors, and protective factors related to magical thinking and OCD.

Second, given that the mainstay of cognitive theory and dysfunctional beliefs is specificity, it is important to cross-validate the role of magical thinking with other related psychiatric conditions. For example, future research could explore the mechanisms of magical thinking across disorders such as Generalised Anxiety Disorder (GAD) and Panic Disorder (PD). Additionally, there may be considerable overlap between the cognitive dysfunctions of threat and responsibility as measured by the OBQ-38 (Moulding et al., 2011) that requires further investigation. Literature states that magical thinking emerges at times of uncertainty to serve a perceived adaptive function to gain a sense of illusory control (Langer, 1975; Rozin, et al., 1992; Subbotsky, 2001, 2004, 2010; Zusne & Jones, 1982). It would be informative to experimentally investigate the interaction between magical thinking and uncertainty to see if magical thinking is more strongly associated with a higher need for control and OC symptoms is uncertain compared to certain contexts.

Third, since the quantitative study findings are mostly correlational, the direction of causality cannot be established. It is important to further investigate the nature of the relationship between magical thinking and OC symptoms in longitudinal studies to determine whether the relationship is unidimensional or reciprocal over time. Fourth, the results of this thesis suggest that magical thinking (measured by the IBI) is a culturally diverse construct. This issue raises the challenge of comparing these constructs despite differences in measure items across cultures. Any differences could, therefore, be a consequence of different items and/or genuine cultural differences. Depending on the purpose of using the IBI, researchers interested in cross-cultural differences need to choose between using (a) the same measure of magical thinking that may obscure genuine cultural differences in the expression of the construct or (b) using measures that were developed within each cultural group that may differ in item content. Both options have limitations that must be carefully considered when drawing conclusions about cross-cultural differences. The aim of this thesis was to identify cross-cultural differences in the *expression* of magical thinking, rather than to develop an equivalent version across cultures. The consequence of developing different versions is that the norms

reported in this thesis are culture-specific, and therefore future research will need to establish separate clinical norms in Australian and Indian samples specifically using the version developed in each of these samples. Future research could identify common items across cultures for more direct comparisons, whilst acknowledging that the items may not comprehensively assess the construct within each culture.

Fifth, the factor analyses across the Indian and the Australian sample indicated magical beliefs and TAF related beliefs as a single factor. More research is warranted to the clarity the demarcation, should one exist, between general magical beliefs and its boundaries with TAF related beliefs. It is unclear whether the theoretical distinction between these constructs translates into unique contributions vulnerability to OC symptoms. Studies in this thesis were unable to empirically distinguish between these factors, which may suggest that TAF is one form of magical thinking and that these constructs tend to co-occur.

The current study used self-report measures, a common practice in mental health literature. However, one limitation of self-report measures is the susceptibility to social desirability biases in reporting of symptoms, which may limit generalisability of study findings (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Behavioural measures of magical thinking and OC symptoms in further research would be informative to corroborate self-report. It would be useful if future research improved upon the aforementioned limitations with an emphasis on replication across diverse ethnicities to provide more validity to the study findings.

## **6.6 Conclusions**

There is growing evidence in the last decades regarding the potential contribution of magical thinking in explaining OC symptoms. The studies presented in this thesis illustrated novel empirical evidence to establish magical beliefs as a unique and significant predictor in explaining OC symptoms. This study positions magical thinking as a distinct construct above and beyond more established cognitive vulnerability factors for OC symptoms. When compared to the existing cognitive constructs, *Threat* was most strongly associated with OC symptoms. However, magical thinking contributed to additional unique variance in explaining OC symptoms. The studies presented in this thesis provided evidence of the cross-

cultural differences across the study samples from India (holistic-thinking culture) and Australia (analytic-thinking culture). These differences were prominent with respect to the *Spirituality* domain, which may confer differential risk across cultures that are high or low in magical thinking.

The phenomenological accounts of the clinical study indicate that the development of magical thinking is influenced by vicarious learning through culture and family. Stressful life events tend to magnify these beliefs among vulnerable individuals and are maintained by ethnocultural validation, limiting the level of insight into their OCD. Magical thinking appears to serve as a socially acceptable coping mechanism to deal with distressing thoughts, providing a perceived sense of illusory control. The paradoxical nature of these beliefs suggests that one engages in magical possibilities versus probabilities for causality of an event, posing a challenge in working with clients to develop appropriate insight via cognitive disputation.

To conclude, magical thinking is a unique and important construct implicated in the pathogenesis of OCD. It adds a new facet to the existing cognitive dysfunction model of OCD and warrants research attention, for both theoretical and clinical advancement.

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## APPENDIX I. Ethics Approval Form

### MEMORANDUM



|         |  |
|---------|--|
| To:     | A/Prof Clare Rees<br>School of Psychology and Speech Pathology |
| CC:     | Bristi Barkataki   |
| From    | Professor Peter O'Leary, Chair HREC                            |
| Subject | Ethics approval<br>Approval number: HR22/2016                  |
| Date    | 17-Feb-16  |

Office of Research and  
Development  
Human Research Ethics Office

TELEPHONE 9266 2784  
FACSIMILE 9266 3793  
EMAIL hrec@curtin.edu.au

Thank you for your application submitted to the Human Research Ethics Office for the project: 6521  
Magical Thinking: How important is it in explaining Obsessive-Compulsive Symptoms?

Your application was reviewed by Human Research Ethics Committee at Curtin University at their meeting  
on the 2/02/2016

Thankyou for providing the additional information requested by the Human Research Ethics Committee. The  
information you provided was satisfactory and your proposal is now approved.

Please note the following conditions of approval:

1. Approval is granted for a period of four years from 18-Feb-16 to 18-Feb-20
2. Research must be conducted as stated in the approved protocol.
3. Any amendments to the approved protocol must be approved by the Ethics Office.
4. An annual progress report must be submitted to the Ethics Office annually, on the anniversary of approval.
5. All adverse events must be reported to the Ethics Office.
6. A completion report must be submitted to the Ethics Office on completion of the project.
7. Data must be stored in accordance with WAUSDA and Curtin University policy.
8. The Ethics Office may conduct a randomly identified audit of a proportion of research projects approved by the HREC.

Should you have any queries about the consideration of your project please contact the Ethics Support Officer for your faculty, or the Ethics Office at hrec@curtin.edu.au or on 9266 2784. All human research ethics forms and guidelines are available on the ethics website.

Yours sincerely,

Professor Peter O'Leary  
Chair, Human Research Ethics Committee

**APPENDIX II. Questionnaire for the Quantitative studies**

## Informed Consent

|                         |                                 |
|-------------------------|---------------------------------|
| HREC Project Number:    | HR 22/2016                      |
| Project Title:          | Thinking, Beliefs and Behaviour |
| Principal Investigator: | A/Prof Clare S Rees             |
| Co-investigator         | A/Prof Peter McEvoy             |
| Co-investigator         | A/Prof Penelope Hasking         |
| Student researcher:     | Bristi Barkataki                |
| Version Number:         | 1.1                             |
| Version Date:           | 10/Feb/2016                     |

## Introduction

We invite you to participate in an exploratory study that aims to understand the different types of thinking and beliefs that impact different forms of behaviour in the community. Therefore, we are looking for healthy volunteers from the community to participate in an online survey which constitutes a part of my PhD project.

*This Consent Form has two parts:*

- Participant Information Sheet (to provide information about the study with you)
- Certificate of Consent (to sign in if you choose to participate)

**PART 1: Participant Information Sheet***Research details and the researcher*

This project is conducted by Bristi Barkataki, a doctoral researcher enrolled in the School of Psychology and Speech Pathology, Faculty of Health Sciences at Curtin University, WA. The aim of this study is to improve our understanding of how some types of beliefs relate to mood and behaviour, such as beliefs about how responsible we are for negative events that might occur from time to time. This information can then guide interventions designed to modify unhelpful beliefs and improve mood.

The results of this research project will be used by the researcher to obtain a Doctor of Philosophy (PhD) at Curtin University and is funded by the University. This research constitutes a part of the PhD project with an objective to collect information to understand the types of thinking and beliefs that impact different forms of behaviour in the community.

*Procedures*

If you choose to participate in this study, you will be guided to an online survey with an online consent via Qualtrics followed by a short survey which will take approximate 10 mins to complete. The survey includes questions relating to general details like age, gender, nationality, etc. and will proceed to statements regarding thoughts, beliefs and behaviour that help you adapt in dealing with day-to-day situations.

*Risks/Discomforts*

There are no foreseeable risks from this research project. However, if you, at all, feel emotionally uneasy while taking the survey, please do not hesitate to contact us and we will assist you with it or even guide you through the process of seeking professional advice in your country of residence, if needed. Furthermore, you may also call the following helpline numbers to receive immediate confidential psychological assistance by contacting Lifeline on 13 11 14, Samaritans on 13 52 47 and Men's Line Australia on 1300 789 978 for Australia and contacting the 24-hour Helpline on 1860 266 2345 from India.

*Participation & Benefits*

There will be no costs to you and you will not be paid for participating in this project. Your participation in this study will thus be entirely voluntary and there is no direct monetary compensation provided for participation in the research apart from furthering knowledge in the field by sharing your valuable life experiences.

If you are a student enrolled in School of Psychology and Speech Pathology, at Curtin University and you have registered for this study on SONA website, you will be awarded credit points if you complete the survey. After completing the survey, you will be asked to provide your Student ID and email address. This information will not be linked to your responses that you provide in the survey.

You have a choice not to participate or withdraw your participation at any time during the process.

*Confidentiality*

All information provided by you will be kept confidential and data will only be reported in an aggregate format (by reporting only combined results) for the purpose of research reporting. The results of this research may be presented at conferences or published in professional journals. You will not be identified in any results that are published or presented. The study will strictly adhere to the guidelines of the Australian Code for the Responsible Conduct of Research (NHMRC) whereby, anonymity of participant's name/identification will be ensured for participant's safety and the recorded data will only be accessible by the principle investigator, co-investigators and the student researcher listed in the study. The electronic data collected will be stored the HIPPA-compliant, Qualtrics-secure database until it has been deleted by the principal investigator for a period of 7 years after completion of the study or publication of data.

#### *Further Queries*

For any further clarification/questions you may contact me at [bristi.barkataki@postgrad.curtin.edu.au](mailto:bristi.barkataki@postgrad.curtin.edu.au) , or if you wish to speak to someone else other than the researcher, you may write to my supervisors, Associate Professor Clare S Rees at [c.rees@curtin.edu.au](mailto:c.rees@curtin.edu.au) or Associate Professor Peter McEvoy at [peter.mcevoy@curtin.edu.au](mailto:peter.mcevoy@curtin.edu.au)

#### *Ethics:*

Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number HR 22/2016). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email [hrec@curtin.edu.au](mailto:hrec@curtin.edu.au)

#### PART 2: Consent Certificate

I have read the foregoing participant information sheet. I believe I understand the purpose, extent and possible risks of my involvement in this project. I am aware that I have the choice to withdraw from the study at any-time during the process, if I change my mind. I consent voluntarily to be a participant in this study. I understand that this project has been approved by Curtin University Human Research Ethics Committee and will be carried out in line with the National Statement on Ethical Conduct in Human Research (2007) – updated March 2014.

- I AGREE  
 I DISAGREE

#### Sociodemographics

How old are you?

What is your gender?

- Male  
 Female  
 Another gender

Please indicate your marital status:

 ▼

Religious Affiliation

- Buddhism  
 Christianity  
 Hinduism  
 Islam  
 No Religion  
 Others

On a scale of 0 to 10 , how religious would you rate yourself



Please indicate the highest level of education completed.

- High School or equivalent
- Undergraduate Degree
- Postgraduate Degree
- Professional Degree (MD, JD, etc.)
- Other

Occupation

Country of Birth

Self

Father

Mother

Current country of residence

How long have you lived in the present country

- Less than 3 months
- Less than a year
- Less than 2 years
- More than 2 years
- More than 5 years

I am a Citizen / Permanent Resident of

- India
- Australia
- Others

OCI-R

The following statements refer to experiences that many people have in their everyday lives. Pick the option that best describes HOW MUCH that experience has DISTRESSED or BOTHERED you during the PAST MONTH.

|  |            |          |            |       |           |
|--|------------|----------|------------|-------|-----------|
|  | Not at all | A little | Moderately | A lot | Extremely |
|--|------------|----------|------------|-------|-----------|

|   |                       |                       |                       |                       |                       |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| I have saved up so many things that they get in the way   | <input type="radio"/> |
| I check things more often than necessary  | <input type="radio"/> |
| I get upset if objects are not arranged properly  | <input type="radio"/> |
| I feel compelled to count while I am doing things   | <input type="radio"/> |
| I find it difficult to touch an object when I know it has been touched by strangers or certain people | <input type="radio"/> |
| I find it difficult to control my own thoughts  | <input type="radio"/> |
| I collect things I don't need   | <input type="radio"/> |
| I repeatedly check doors, windows, drawers, etc.  | <input type="radio"/> |
| I get upset if others change the way I have arranged things   | <input type="radio"/> |
| I feel I have to repeat certain numbers   | <input type="radio"/> |
| I sometimes have to wash or clean myself simply because I feel contaminated                           | <input type="radio"/> |
| I am upset by unpleasant thoughts that come into my mind against my will                              | <input type="radio"/> |
| I avoid throwing things away because I am afraid I might need them later                              | <input type="radio"/> |
| I repeatedly check gas and water taps and light switches after turning them off                       | <input type="radio"/> |
| I need things to be arranged in a particular order  | <input type="radio"/> |
| I feel that there are good and bad numbers  | <input type="radio"/> |
| I wash my hands more often and longer than necessary  | <input type="radio"/> |
| I frequently get nasty thoughts and have difficulty in getting rid of them                            | <input type="radio"/> |

**IBI**

Please read each statement carefully and pick the option which indicates how much the statement describes you.

Describe yourself as you generally are now, not as you wish to be in the future. There are no 'right' or 'wrong' answers, so click on the circle that most closely reflects you on each statement.

If you are not sure how to answer then the decision should be based on your most typical reaction or feeling in the given situation.

|  | Strongly Disagree     | Disagree              | Undecided             | Agree                 | Strongly Agree        |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| I use prayer to ward off misfortune                              | <input type="radio"/> |
| I have sometimes changed my plans because I had a bad feeling    | <input type="radio"/> |
| The soul does not continue to exist after death                  | <input type="radio"/> |
| I believe in magic   | <input type="radio"/> |
| I sometimes perform special rituals for protection               | <input type="radio"/> |
| If I think too much about something bad, it will happen          | <input type="radio"/> |
| Magical forces have impacted on my life                          | <input type="radio"/> |
| It is just a matter of time until science can explain everything | <input type="radio"/> |
| I do something special to prevent bad luck                       | <input type="radio"/> |

|  | Strongly Disagree     | Disagree              | Undecided             | Agree                 | Strongly Agree        |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Sometimes I get a feeling that something is going to happen, before it happens | <input type="radio"/> |
| It is not possible to cast a magical spell                                     | <input type="radio"/> |
| Magic causes miracles to happen  | <input type="radio"/> |
| Life is nothing more than a series of random events                            | <input type="radio"/> |
| Good luck charms do not work   | <input type="radio"/> |
| If I think too much about something, it will happen                            | <input type="radio"/> |
| I avoid unlucky numbers  | <input type="radio"/> |
| Most things that happen to us are the result of fate                           | <input type="radio"/> |
| I believe guardian angels or other spiritual forces protect me                 | <input type="radio"/> |
| Science is the key to understanding how things happen                          | <input type="radio"/> |
| My thoughts alone can alter reality  | <input type="radio"/> |
| There is an invisible force guiding us all                                     | <input type="radio"/> |
| You should never tempt fate  | <input type="radio"/> |
| I do not believe in a spiritual presence                                       | <input type="radio"/> |
| I believe in a higher power or God   | <input type="radio"/> |

**OBQ-TRIP**

Please read each statement carefully and pick the option which indicates how much the statement describes you.

Describe yourself as you generally are now, not as you wish to be in the future. There are no 'right' or 'wrong' answers, so click on the circle that most closely reflects you on each statement.

If you are not sure how to answer then the decision should be based on your most typical reaction or feeling in the given situation.

|  | Disagree very much    | Disagree              | Somewhat disagree     | Neither agree nor disagree | Somewhat agree        | Agree                 | Agree very much       |
|--|-----------------------|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|-----------------------|
| I often think things around me are unsafe  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I'm not absolutely sure of something, I'm bound to make a mistake                                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Things should be perfect according to my own standards   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| In order to be a worthwhile person, I must be perfect at everything I do                                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Even if harm is very unlikely, I should try to prevent it at any cost                                      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| For me, having bad urges is as bad as actually carrying them out   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I don't act when I foresee danger, then I am to blame for consequences                                  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I can't do something perfectly, I shouldn't do it at all  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Even minor mistakes mean a job is not complete   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I have aggressive thoughts or impulses about my loved ones, this means I may secretly want to hurt them | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| In all kinds of daily situations, failing to prevent harm is just as bad as deliberately causing harm      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Avoiding serious problems (for example, illness or accidents) requires constant effort on my part          | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

|  | Disagree very much    | Disagree              | Somewhat disagree     | Neither agree nor disagree | Somewhat agree        | Agree                 | Agree vey much        |
|--|-----------------------|-----------------------|-----------------------|----------------------------|-----------------------|-----------------------|-----------------------|
| For me, not preventing harm is as bad as causing harm  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I should be upset if I make a mistake  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I should make sure others are protected from negative consequences of my decisions or actions        | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| For me, things are not right if they are not perfect   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Having nasty thoughts means I am a terrible person   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I do not take extra precautions, I am more likely than others to have or cause a serious disaster | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| In order to feel safe, I have to be as prepared as possible for anything that could go wrong         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I should not have bizarre or disgusting thoughts   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| For me, making a mistake is as bad as failing completely   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| It is essential for everything to be clear cut, even in minor matters                                | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Having a blasphemous thought is a sinful as committing a sacrilegious act                            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I am more likely than other people to accidentally cause harm to myself or to others                 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Having bad thoughts means I am weird or abnormal   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I must be the best at things that are important to me  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Having an unwanted sexual thought or image means I really want to do it                              | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Even when I am careful, I often think bad things will happen   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Having intrusive thoughts means I'm out of control   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Harmful events will happen unless I am very careful  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I must keep working until it's done exactly right  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Having violent thoughts means I will lose control and become violent                                 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| To me, failing to prevent disaster is as bad as causing it   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I don't do a job perfectly, people won't respect me   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Even ordinary experiences in my life are full of risk  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Having a bad thought is morally no different than doing a bad deed                                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| No matter what I do, it won't be good enough   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| If I don't control my thoughts, I'll be punished   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/>      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| <b>End of Survey</b>   |                       |                       |                       |                            |                       |                       |                       |

### **APPENDIX III. Semi-structured Interview probe framework used for the qualitative study**

#### Study 4: Qualitative study using Interpretative Phenomenological Analysis

*‘Magical thinking refers to all those beliefs that don’t follow laws of science/ or rationality  
An example of magical thinking would be the idea that seeing a certain object, or having a certain thought or feeling is a sign that something bad is going to happen, such as seeing the number 8 and believing that is a sign that your loved one will have a bad accident.’  
Or “ If I think of a bad event happening to my loved one, something bad might happen to him/her”*

*1. What sort of obsessions/compulsion do you engage in?*

*2.1. Can you recall a recent time you engaged in magical thinking to avoid a negative consequence?*

*2.1.1. (situation/trigger/what were the thoughts/how strongly did you believe them/are you able to tell yourself that the beliefs are not supported by logic/fact?)*

*3.1. What are the most common situations or triggers that lead you to engage in magical thinking?*

*4.1. What according to you influences the development of your magical thinking?*

*4.1.1. Does anybody else in your family believe in magical experiences/superstitious thinking?*

*4.1. What are your thoughts about the influence of Culture in magical thinking?*

*5.1. What influence do you think magical thinking has on OCD symptoms?*

*5.1.1 Do you see any other problems or benefits to your magical thinking?”*

## APPENDIX IV: Consent form for Quantitative Studies



School of Psychology and Speech Pathology  
Faculty of Health Sciences, Curtin University, WA  
CRICOS Provider Code 00301J

### CONSENT FORM

|                               |                                 |
|-------------------------------|---------------------------------|
| <b>Project title</b>          | Thinking, Beliefs and Behaviour |
| <b>Principal investigator</b> | A/Prof Clare S Rees             |
| <b>Co-investigator</b>        | A/Prof Peter McEvoy             |
| <b>Co-investigator</b>        | A/Prof Penelope Hasking         |
| <b>Student Researcher</b>     | Bristi Barkataki                |

#### Introduction

*This Consent Form has two parts:*

- **Participant Information Sheet (to provide information about the study with you)**
- **Certificate of Consent (to sign in if you choose to participate)**

#### **PART 1: Participant Information Sheet**

My name is Bristi Barkataki and I am a doctoral researcher enrolled with School of Psychology and Speech Pathology, Faculty of Health Sciences at Curtin University, WA. This research constitutes a part of my PhD work with an objective to collect information to understand the types of thinking and beliefs that impact different forms of behaviour in the community.

#### ***Procedures***

If you choose to participate in this study, you will be guided to an online survey which will take approximate 10 mins to complete. The survey includes questions relating to general details like age, gender, nationality, etc. and will proceed to statements regarding thoughts, beliefs and behaviour that help you adapt in dealing with day-to-day situations.

#### ***Risks/Discomforts***

We do not expect any potential risk/ harm for any participant involved in this study. However, if you, at all, feel emotionally uneasy while taking the survey, please do not hesitate to contact us and we will assist you with it or even guide you through the process of seeking professional advice in your country of residence, if needed. Furthermore, you may also call the following helpline numbers to receive immediate confidential psychological assistance by contacting

Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number XX/XXXX). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email [hrec@curtin.edu.au](mailto:hrec@curtin.edu.au).

Informed Consent Form\_Study2&3\_25th Nov'15\_Version 1.1\_BB

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Lifeline on 13 11 14, Samaritans on 13 52 47 and Men's Line Australia on 1300 789 978 for Australia and contacting the 24-hour Helpline on 1860 266 2345 from India.

### ***Participation & Benefits***

Your participation in this study will be entirely voluntary and there is no direct monetary compensation provided for participation in the research apart from furthering knowledge in the field by sharing your valuable life experiences. Hence, you do have a choice not to participate or withdraw your participation at any time during the process.

If you are a student enrolled in School of Psychology and Speech Pathology, at Curtin University and you have registered for this study on SONA website, you will be awarded 3 credit points if you complete the survey. After completing the survey, you will be asked to provide your Student ID and email address. This information will not be linked to your responses that you provide in the survey.

### ***Confidentiality***

All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results) for the purpose of research publication. The study will strictly adhere to the guidelines of the Australian Code for the Responsible Conduct of Research (NHMRC) whereby, anonymity of participant's name/identification will be ensured for participant's safety and the recorded data will only be accessible by the principle investigator, co-investigators and the student researcher listed in the study. The electronic data collected will be stored the HIPPA-compliant, Qualtrics-secure database until it has been deleted by the principal investigator for a period of 7 years after completion of the study or publication of data.

### ***Further Queries***

For any further clarification/questions you may contact me at [bristi.barkataki@postgraduate.curtin.edu.au](mailto:bristi.barkataki@postgraduate.curtin.edu.au), or if you wish to speak to someone else other than the researcher, you may write to my supervisors, Associate Professor Clare S Rees at [c.rees@curtin.edu.au](mailto:c.rees@curtin.edu.au) or Associate Professor Peter McEvoy at [peter.mcevoy@curtin.edu.au](mailto:peter.mcevoy@curtin.edu.au)

Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number XX/XXXX). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email [hrec@curtin.edu.au](mailto:hrec@curtin.edu.au).

**PART 2: Consent Certificate**

I have read, understood and printed a copy of the foregoing participant information sheet. I am also aware that I have the choice to withdraw from the study at any-time during the process, if I change my mind. I consent voluntarily to be a participant in this study.

Yes

No

Date : [Click here to enter text.](#)

Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number XX/XXXX). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email [hrec@curtin.edu.au](mailto:hrec@curtin.edu.au).

Informed Consent Form\_Study2&3\_25th Nov'15\_Version 1.1\_BB

3

**APPENDIX V: Consent form for Qualitative study**

## INFORMED CONSENT FORM

|                               |   |
|-------------------------------|---|
| <b>Project title</b>          | Exploring the Role of Magical Thinking in OCD |
| <b>Principal investigator</b> | Prof Clare S Rees                             |
| <b>Co-investigator</b>        | Prof Peter McEvoy                             |
| <b>Student Researcher</b>     | Bristi Barkataki                              |

### Introduction

We invite you to participate in an exploratory study that involves understanding the concept of Magical thinking and Obsessive-Compulsive Disorder (OCD) which constitutes a part of my PhD project. This study attempts to collect information about the view and meaning of magical thinking related to OCD

*This Informed Consent Form has two parts:*

- **Information Sheet (to provide information about the study with you)**
- **Certificate of Consent (to sign in if you choose to participate)**

### PART 1: Information Sheet

#### *Research details and the researcher*

My name is Bristi Barkataki and I am a doctoral researcher enrolled in the School of Psychology and Speech Pathology, Faculty of Health Sciences at Curtin University, WA. A part of my PhD project involves the exploration of the meaning of Magical Thinking and its role in obsessions and compulsions. In this exploratory study, I am interested in understanding the concept of magical thinking from your perspective based on your lived experiences of magical thinking and how it influences your present day functioning.

#### *Procedures*

Participation into the study is done in two phases. The first phase involves a telephone interview where I will brief you about the study and ask you to complete a questionnaire about magical thinking. The purpose of this phone interview is to determine if magical thinking is relevant to your experience of OCD. If so, you will be invited to take part in the second phase of the study which is a face-to-face in-depth interview. In this interview, I will be asking you about your experiences of magical thinking and its possible influence in your behaviour as you perceive it. This interview will take about an hour and will be held in Curtin Psychology Clinic situated in Curtin University, Bentley Campus at a time that is most convenient to you. The interviews will be audio recorded for transcription and analysis.

Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number HR22/2016). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email [hrec@curtin.edu.au](mailto:hrec@curtin.edu.au).

***Risks/Discomforts***

We do not expect any potential risk/ harm for any participant involved in this study. However, if you, at all, feel emotionally uneasy while talking about your experiences, please do not hesitate to inform us and we will assist you with it and even guide you through the process of seeking professional advice, if needed. Furthermore, you may also call the following Help-line numbers to receive immediate confidential psychological assistance by contacting Lifeline on 13 11 14, Samaritans on 13 52 47 and Men's Line Australia on 1300 789 978.

***Participation & Benefits***

Your participation in this study will be entirely voluntary and there is no direct financial benefit provided for participation in the research apart from furthering knowledge in the field by sharing your valuable life experiences. You will receive a \$20 Coles gift voucher as a compensation for you time to be a part of the study.

You have a choice not to participate or withdraw your participation at any time during the process. This choice will not have any bearing on your access to services that you wish to receive from the Curtin Psychology Clinic.

***Confidentiality***

All information provided by you will be kept confidential and data reporting will strictly adhere to the guidelines of the Australian Code for the Responsible Conduct of Research (NHMRC) whereby, anonymity of your name/identification will be ensured for your safety. The recorded data will also be given codes in order to conceal the individual specific information and no one other than the principal investigator, co-investigator and the researcher listed below will have access to them. The data collected (in the form of electronic recordings as well as consent forms and field notes) will be stored in a secure database until it has been deleted by the principal investigator as per the national ethics guidelines for a period of 7 years after completion of the study or publication of data and will be deleted securely thereafter.

***Further Queries***

For any further clarification/questions you may contact me at [bristi.barkataki@postgraduate.curtin.edu.au](mailto:bristi.barkataki@postgraduate.curtin.edu.au), or if you wish to speak to someone else other than the researcher, you may write to my supervisors, Associate Professor Clare S Rees at [c.rees@curtin.edu.au](mailto:c.rees@curtin.edu.au) or Associate Professor Peter McEvoy at [peter.mcevoy@curtin.edu.au](mailto:peter.mcevoy@curtin.edu.au)

Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number HR22/2016). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email [hrec@curtin.edu.au](mailto:hrec@curtin.edu.au).

**PART 2: Consent Certificate**

I have read the foregoing information sheet which has been verbally explained to me as well. I had the opportunity to ask questions which was satisfactorily answered with possible clarifications. I am aware that I have the choice to withdraw from the study at any-time during the process, if I change my mind. I consent voluntarily to be a participant in this study.

Name of Participant [Click here to enter text.](#)

Signature \_\_\_\_\_

Date \_\_\_\_\_ dd/mm/yyyy

Name of the Researcher [Click here to enter text.](#)

Signature \_\_\_\_\_

Date \_\_\_\_\_ dd/mm/yyyy

Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number HR22/2016). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email [hrec@curtin.edu.au](mailto:hrec@curtin.edu.au).

**APPENDIX VI: Information sheet for participants in the qualitative study  
given by the placement students to the prospective participants**



## CONSENT FORM

|                               |                                 |
|-------------------------------|---------------------------------|
| <b>Project title</b>          | Thinking, Beliefs and Behaviour |
| <b>Principal investigator</b> | A/Prof Clare S Rees             |
| <b>Co-investigator</b>        | A/Prof Peter McEvoy             |
| <b>Co-investigator</b>        | A/Prof Penelope Hasking         |
| <b>Student Researcher</b>     | Bristi Barkataki                |

### Introduction

*This Consent Form has two parts:*

- **Participant Information Sheet (to provide information about the study with you)**
- **Certificate of Consent (to sign in if you choose to participate)**

### PART 1: Participant Information Sheet

My name is Bristi Barkataki and I am a doctoral researcher enrolled with School of Psychology and Speech Pathology, Faculty of Health Sciences at Curtin University, WA. This research constitutes a part of my PhD work with an objective to collect information to understand the types of thinking and beliefs that impact different forms of behaviour in the community.

### *Procedures*

If you choose to participate in this study, you will be guided to an online survey which will take approximate 10 mins to complete. The survey includes questions relating to general details like age, gender, nationality, etc. and will proceed to statements regarding thoughts, beliefs and behaviour that help you adapt in dealing with day-to-day situations.

### *Risks/Discomforts*

We do not expect any potential risk/ harm for any participant involved in this study. However, if you, at all, feel emotionally uneasy while taking the survey, please do not hesitate to contact us and we will assist you with it or even guide you through the process of seeking professional advice in your country of residence, if needed. Furthermore, you may also call the following helpline numbers to receive immediate confidential psychological assistance by contacting

Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number XX/XXXX). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email [hrec@curtin.edu.au](mailto:hrec@curtin.edu.au).

Lifeline on 13 11 14, Samaritans on 13 52 47 and Men's Line Australia on 1300 789 978 for Australia and contacting the 24-hour Helpline on 1860 266 2345 from India.

### ***Participation & Benefits***

Your participation in this study will be entirely voluntary and there is no direct monetary compensation provided for participation in the research apart from furthering knowledge in the field by sharing your valuable life experiences. Hence, you do have a choice not to participate or withdraw your participation at any time during the process.

If you are a student enrolled in School of Psychology and Speech Pathology, at Curtin University and you have registered for this study on SONA website, you will be awarded 3 credit points if you complete the survey. After completing the survey, you will be asked to provide your Student ID and email address. This information will not be linked to your responses that you provide in the survey.

### ***Confidentiality***

All data obtained from participants will be kept confidential and will only be reported in an aggregate format (by reporting only combined results) for the purpose of research publication. The study will strictly adhere to the guidelines of the Australian Code for the Responsible Conduct of Research (NHMRC) whereby, anonymity of participant's name/identification will be ensured for participant's safety and the recorded data will only be accessible by the principle investigator, co-investigators and the student researcher listed in the study. The electronic data collected will be stored the HIPPA-compliant, Qualtrics-secure database until it has been deleted by the principal investigator for a period of 7 years after completion of the study or publication of data.

### ***Further Queries***

For any further clarification/questions you may contact me at [bristi.barkataki@postgraduate.curtin.edu.au](mailto:bristi.barkataki@postgraduate.curtin.edu.au), or if you wish to speak to someone else other than the researcher, you may write to my supervisors, Associate Professor Clare S Rees at [c.rees@curtin.edu.au](mailto:c.rees@curtin.edu.au) or Associate Professor Peter McEvoy at [peter.mcevoy@curtin.edu.au](mailto:peter.mcevoy@curtin.edu.au)

Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number XX/XXXX). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email [hrec@curtin.edu.au](mailto:hrec@curtin.edu.au).

**APPENDIX VII: Radio transcript for advertisement played in Curtin Radio  
(109 FM)**

**RADIO ANNOUNCEMENT TEMPLATE\_STUDY 4**

You are invited to participate in an exploratory study that involves the concept of Magical thinking in Obsessive-Compulsive Disorder (OCD). This is as a part of a PhD project in the School of Psychology and Speech Pathology at Curtin University, WA and explores the meaning of magical thinking related to OCD . You will receive a \$20 Coles gift voucher as a compensation for you time to be a part of the study.

For more details contact Bristi at 0406140408

**RADIO RECRUITMENT TEMPLATE\_VERSION 1.0\_BB**

**APPENDIX VIII: Search Criteria for the systematic review**



**Edit Search**

Search Name: Bristl Pscyinfo 16.3.16

Comment:

| Set | Search Statement   | Annotate | Insert | Edit | Delete |
|-----|--|----------|--------|------|--------|
| 1.  | magical thinking/  |          |        |      |        |
| 2.  | ("magical ideation" or "magical belief") mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]   |          |        |      |        |
| 3.  | 1 or 2   |          |        |      |        |
| 4.  | superstitions/ or irrational beliefs/ or parapsychological phenomena/ or religious beliefs/  |          |        |      |        |
| 5.  | religiosity/ or religious beliefs/ or spirituality/  |          |        |      |        |
| 6.  | scrupulosity mp.   |          |        |      |        |
| 7.  | paranormal mp.   |          |        |      |        |
| 8.  | exp Religious Experiences/   |          |        |      |        |
| 9.  | occultism/ or spirit possession/   |          |        |      |        |
| 10. | 4 or 5 or 6 or 7 or 8 or 9   |          |        |      |        |
| 11. | ("thought action fusion" or TAF) mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]   |          |        |      |        |
| 12. | ("inflated sense of responsibility" or "overestimation of threat" or "overimportance of thought" or control or Perfectionism or uncertainty) mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] |          |        |      |        |
| 13. | perfectionism/ or compulsions/   |          |        |      |        |
| 14. | 11 or 12 or 13   |          |        |      |        |
| 15. | uncertainty/ or doubt/   |          |        |      |        |
| 16. | 14 or 15   |          |        |      |        |
| 17. | obsessive compulsive disorder/ or compulsions/ or obsessions/  |          |        |      |        |
| 18. | ("obsessive compulsive disorder" or OCD) mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]   |          |        |      |        |
| 19. | 17 or 18   |          |        |      |        |
| 20. | 3 and 19   |          |        |      |        |
| 21. | "magical thinking" mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]   |          |        |      |        |
| 22. | 3 or 21  |          |        |      |        |
| 23. | 19 and 22  |          |        |      |        |
| 24. | 16 and 23  |          |        |      |        |
| 25. | 10 or 22   |          |        |      |        |
| 26. | 19 and 25  |          |        |      |        |
| 27. | 10 or 16   |          |        |      |        |
| 28. | 19 and 22 and 27   |          |        |      |        |
| 29. | 23 or 24 or 26 or 28   |          |        |      |        |

**APPENDIX IX: PROSPERO registered Protocol for the Systematic Review**

**Magical Thinking: how important is it in predicting obsessive-compulsive symptomatology?  
A systematic review**

*Bristi Barkataki, Clare S Rees, Peter McEvoy, Penelope Hasking*

*This version was published on 15 April 2016 and is not the current version.*

**Citation**

Bristi Barkataki, Clare S Rees, Peter McEvoy, Penelope Hasking. Magical Thinking: how important is it in predicting obsessive-compulsive symptomatology? A systematic review. PROSPERO 2016 CRD42016037832 Available from: [http://www.crd.york.ac.uk/PROSPERO/display\\_record.php?ID=CRD42016037832](http://www.crd.york.ac.uk/PROSPERO/display_record.php?ID=CRD42016037832)

**Review question**

What is the strength of association between magical thinking and obsessive compulsive (O-C) symptomatology?

**Searches**

Type of data: Both published and unpublished data; All in English relating to the research question  
Database:

For Grey Literature- espace, worldCat, Trove, Grey Literature Report, Open Grey, Grey Net International  
For Published Literature: MEDLINE (Ovid), PsychArticles (Ovid), PsycINFO (Ovid), ProQuest, Science Direct, Taylor and Francis Online, Embase, Pubmed, Cochrane, CINAHL

Study will follow the PRISMA guidelines reporting the flow of information and no start date restriction would be applied to the searches strategies using the below mentioned Mesh Terms and would include literature until June, 2016.

Limits:

Language: English only

Age: 18 and above (Adult population)

Mesh Terms:

"Magical thinking" Or "Magical Ideations or "Magical beliefs"

"Obsessive compulsive disorder" or "OCD" or Obsessions or Compulsions

"superstition" or "religiosity" or "scrupulosity" or "paranormal" or "religious experiences" or "occult" or "spirit possession"

"thought action fusion" or "inflated sense of responsibility" or "overestimation of threat" or "over-importance of thought" or "control" or "perfectionism" or "uncertainty"

Boolean operators to be used:

AND for specifying the search

OR to broaden the search terms or map possible related terms in literature

" " for specific phrases

\* (truncation) for alternative endings

**Types of study to be included**

This systematic review will consider studies that include magical thinking specifically as a cognitive construct in relation to O-C symptoms in both clinical and non-clinical samples. All quantitative studies and case reports focussing on magical thinking in OCD; excludes magazines and newspaper reports/articles

**Condition or domain being studied**

We are interested in studies reporting the unique contribution of magical thinking in relation to obsessive compulsive (O-C) symptomatology

**Participants/population**

Inclusion criteria:

- Participants age 18 and above
- Magical thinking research in Obsessive Compulsive Disorder
- Cognitive constructs studied in association with OC symptoms, for example, superstition, religiosity, paranormal beliefs, thought-action fusion (TAF)

• Magical thinking studies in relation to the already existing belief domains in OCD. For example, the Obsessive Compulsive Cognitions Working Group (OCCWG) belief domains of overestimation of threat, over importance of thought, perfectionism, control and responsibility

Exclusion Criteria:

- Magical thinking studied in association to any other condition, for example Eating disorders, Psychosis, Personality disorders.
- Magical thinking in children/ adolescence
- Magical thinking in association with hoarding

### Intervention(s), exposure(s)

The review will focus on the following phenomenon of interest;

- Methodology used to measure magical thinking in OCD
- Cross-sectional association of magical thinking in OCD

### Comparator(s)/control

There are no controls in this review. The review will investigate the construct of magical thinking and its distinct association to O-C symptomatology in relation to the other closely related cognitive constructs in OCD literature.

### Context

Magical Thinking has been defined as "the erroneous belief that one's thoughts, words, or actions will cause or prevent a specific outcome in some way that defies commonly understood laws of cause and effect" (APA, 2013, p. 824). The majority of research in the area of Obsessive Compulsive Disorder (OCD) has been largely confined to the study of thought-action fusion. Thought-Action Fusion (TAF) is a cognitive distortion that is closely related to magical thinking but is more specific in nature. TAF refers to the predisposition of treating thoughts and actions alike (Rees, Draper, & Davis, 2010) and is divided into two types; TAF-Likelihood and TAF-Moral, where TAF-Likelihood refers to the belief that thinking about an event increases the possibility of the occurrence of the event and TAF-Moral is the belief that immoral thoughts are equivalent to immoral actions (Shafran et al., 1996). Although TAF has received considerable research attention, it is different from the more general construct of magical thinking.

In contrast to TAF, magical thinking refers to a more general cognitive style whereby individuals tend to ascribe specific meanings to intrusive thoughts that transcend the boundaries of a rational scientific explanation and heavily relies on non-scientific explanations for the causation of an event (Bocci & Gordon, 2007; Einstein & Menzies, 2004; Hutson, 2008; Rees et al., 2010; West & Willner, 2011; Yorulmaz, Inozu, & Gultepe, 2011).

Research on magical thinking is still at a relatively early stage. This review would enable us to position magical thinking and its association with O-C symptomatology in relation to the other associated cognitive domains related to OCD in order to determine the importance of magical thinking in explaining O-C symptomatology.

References:

- American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders.(DSM-5®).
- Bocci, L., & Gordon, P. K. (2007). Does magical thinking produce neutralising behaviour? An experimental investigation. *Behav Res Ther*, 45(8), 1823-1833.
- Einstein, D. A., & Menzies, R. G. (2004). The presence of magical thinking in obsessive compulsive disorder. *Behav Res Ther*, 42(5), 539-549.
- Hutson, M. (2008). Magical thinking. *Psychology Today*, 41(2), 88-95.
- Rees, C. S., Draper, M., & Davis, M. C. (2010). The relationship between magical thinking, thought-action fusion and obsessive-compulsive symptoms. *International Journal of Cognitive Therapy*, 3(3), 304-311.
- Shafran, R., Thordarson, D. S., & Rachman, S. (1996). Thought-action fusion in obsessive compulsive disorder. *J Anxiety Disord*, 10(5), 379-391.
- West, B., & Willner, P. (2011). Magical thinking in obsessive-compulsive disorder and generalized anxiety disorder. *Behav Cogn Psychother*, 39(04), 399-411.
- Yorulmaz, O., Inozu, M., & Gultepe, B. (2011). The role of magical thinking in Obsessive-Compulsive Disorder symptoms and cognitions in an analogue sample. *J Behav Ther Exp Psychiatry*, 42(2), 198-203.

### Main outcome(s)

This review aims to gain insight into the strength of association between magical thinking and O-C symptomatology and position the construct of magical thinking with the other existing cognitive constructs

identified in the literature.

**Additional outcome(s)**

None

**Data extraction (selection and coding)**

Studies retrieved from the predetermined search strategy and additional sources would be screened independently by two review authors to ascertain that it meets the inclusion and exclusion criteria. Any discrepancy and disagreement regarding the included studies would be resolved by discussion with all the co-authors.

A standardized predetermined search criteria will be used to extract data based on relevance, methodology. Missing data will be requested from the respective authors.

**Risk of bias (quality) assessment**

Risk of bias assessment will be conducted using the Cochrane Risk of Bias Assessment Tool to avoid any form of systematic error/bias and to maintain transparency in the review process.

**Strategy for data synthesis**

A narrative synthesis will be provided from the selected studies focusing on the methodological approaches and cross-sectional data from the findings. However, we anticipate limited scope for any formal statistical analysis or meta-analysis.

**Analysis of subgroups or subsets**

None planned for this review.

**Contact details for further information**

Ms Barkataki  
bristi.barkataki@postgrad.curtin.edu.au

**Organisational affiliation of the review**

Curtin University, WA  
[www.curtin.edu.au](http://www.curtin.edu.au)

**Review team members and their organisational affiliations**

Ms Bristi Barkataki. Curtin University, WA  
Prof Clare S Rees. Curtin University, WA  
Prof Peter McEvoy. Curtin University, WA  
A/Prof Penelope Hasking. Curtin University, WA

**Anticipated or actual start date**

01 April 2016

**Anticipated completion date**

30 June 2016

**Funding sources/sponsors**

Funded by Faculty of Health Sciences; Curtin University, WA

**Conflicts of interest**

None known

**Language**

English

**Country**

Australia

**Stage of review**

Review\_Ongoing

**PROSPERO**  
International prospective register of systematic reviews

**Subject index terms status**

Subject indexing assigned by CRD

**Subject index terms**

Humans; Mental Disorders; Nervous System Diseases

**Date of registration in PROSPERO**

15 April 2016

**Date of publication of this version**

15 April 2016

**Details of any existing review of the same topic by the same authors**

**Stage of review at time of this submission**

| <b>Stage</b>  | <b>Started</b> | <b>Completed</b> |
|---|----------------|------------------|
| Preliminary searches  | Yes            | Yes              |
| Piloting of the study selection process                         | Yes            | No               |
| Formal screening of search results against eligibility criteria | No             | No               |
| Data extraction   | No             | No               |
| Risk of bias (quality) assessment                               | No             | No               |
| Data analysis   | No             | No               |

**Versions**

15 April 2016

19 August 2016

PROSPERO

This information has been provided by the named contact for this review. CRD has accepted this information in good faith and registered the review in PROSPERO. CRD bears no responsibility or liability for the content of this registration record, any associated files or external websites.

## APPENDIX X: Telephone Consent Form



School of Psychology and Speech Pathology  
Faculty of Health Sciences, Curtin University, WA  
CRICOS Provider Code 00301J

### Consent Certificate

I, [Click here to enter text.](#), give permission to Bristi Barkataki (PhD candidate at School of Psychology & speech Pathology, Faculty of Health Sciences, Curtin University, WA), to contact me to explain about her research titled "Exploring the Role of Magical Thinking in OCD."

Signature \_\_\_\_\_

Date \_\_\_\_\_ dd/mm/yyyy

Curtin University Human Research Ethics Committee (HREC) has approved this study (HREC number HR22/2016). Should you wish to discuss the study with someone not directly involved, in particular, any matters concerning the conduct of the study or your rights as a participant, or you wish to make a confidential complaint, you may contact the Ethics Officer on (08) 9266 9223 or the Manager, Research Integrity on (08) 9266 7093 or email [hrec@curtin.edu.au](mailto:hrec@curtin.edu.au).

## **APPENDIX XI: Data Management Plan**

## Research Data Management Plan

### Magical Thinking: How important is it in explaining Obsessive-Compulsive Symptoms?

|                                |                  |
|--------------------------------|------------------|
| Supervisor                     | Clare Rees       |
| Data Management Plan Edited by | Bristi Barkataki |
| Modified Date                  | 12/01/2016       |
| Data Management Plan ID        | REES0C-HS01275   |
| Faculty                        | Health Sciences  |

#### 1 Research Project Details

##### 1.1 Research project title

Magical Thinking: How important is it in explaining Obsessive-Compulsive Symptoms?

##### 1.2 Research project summary

Empirical evidence emphasizes the importance of several different cognitive constructs in the development and maintenance of obsessive-compulsive disorder (OCD). Some studies have found a unique relationship between magical thinking and OCD however, this research has lagged behind that of other cognitive constructs such as responsibility and over-estimation of threat. The proposed research, therefore, aims to explore the cognitive construct of magical thinking and its relationship to obsessive-compulsive (O-C) symptoms and OCD. A series of 4 studies will be conducted to investigate this relationship via a mixed method research design. The study series will begin (Study 1) with a scoping review of the literature to produce a concept map to describe the status of evidence regarding the relationship between magical thinking and OCD. The following two studies will be quantitative, based on online surveys via Qualtrics using community participants. These two studies will examine the contribution of magical thinking as a cognitive vulnerability for O-C symptoms. Specifically, study 2 will test a model where magical thinking and other previously identified cognitive constructs are tested to predict O-C symptoms. Study 3 will extend this work by investigating the model in a cross-cultural context. The cross-cultural comparison will be drawn between India (a high superstition driven culture) and Australia (a low superstition culture/ a more logic driven culture) to further explore the role of culture in magical thinking and OCD. Structural Equation Modelling (SEM) will be used to analyse the surveyed data using MPlus. The last study in the series (Study 4) will be a qualitative study using Interpretative Phenomenological Analysis (IPA) to explore and understand the phenomenon of magical thinking and its relationship to current obsessions and compulsions in a clinical population. Participants for this study will be recruited from the Curtin Psychology Clinic after a telephonic screening. Individuals meeting the diagnosis of OCD with elevated scores on magical thinking will be invited for an in-depth face-to-face qualitative interview. Informed consent will be obtained for all the studies. Results will be discussed in the light of the existing theoretical framework with recommended directions for further research.

The study is significant for the following reasons. First, this study will help to clarify the relationship between magical thinking and OCD by exploring the relative importance of magical thinking when considered alongside other key cognitive constructs. No study to date has tested the interaction between magical thinking and the key cognitive domains identified by the OBQ. Second, this research will provide important cross-cultural information regarding the relationship between magical thinking and O-C symptoms. Third, the study is expected to address the gap in the existing literature by using the Illusory Belief Inventory (IBI) that measures magical thinking specific in OCD as opposed to the Magical Ideation Scale (MIS) that was originally developed to measure magical ideation in schizotypy. Fourth, although the literature indicates that a potential relationship between magical thinking and OCD exists in non-clinical populations, little is known about how magical thinking manifests in OCD in a clinical population. Studies conducted to date have been exclusively quantitative in design and mostly with non-clinical participants. Qualitative interviews proposed in the present study will help to contextualise the phenomenon of magical thinking in OCD; providing much-needed information of the unique role of magical thinking and its relationship to obsessions and compulsions. Finally, in the clinical settings, this study could serve as a guide in clinical case formulation and intervention planning in a multicultural society like Australia as it looks at magical thinking in OCD from a cross cultural perspective.

##### 1.3 Keywords

Magical thinking, Cognitive constructs, Obsessive Compulsive Disorder

#### 2 Research Project Data Details

## 2.1 Research project data summary

Qualitative data comprises the numeric scores obtained from the measures used to test the study variables along with some sociodemographic variables for study 2 and 3. All the measures would be made available online via Qualtrics for studies 2 and 3. Qualitative data for study 4 will consist of transcriptions of the audio recorded interviews. Data gathered for all the studies will be stored in R-Drive. Quantitative data will be analyzed using MPlus software and the qualitative data will be analyzed using the guidelines for Interpretative Phenomenological Analysis

## 2.2 Confidentiality or privacy considerations

Ethics for Human Research will be sought from Curtin Human Research Committee. All participants of the study would be required to sign an informed consent (debriefing the study details with statements ensuring confidentiality and privacy considerations, before they participate in the study. The study proposed will be in line with the stated guidelines of Australian Code for the Responsible Conduct of Research (NHMRC), whereby anonymity of participant's name/identification will be ensured for participant's safety. Soft copy of the gathered data will be stored securely with the School of Psychology and Speech Pathology at Curtin University for a minimum of 7 years from the date of degree completion or publication of the data (whichever date is the latter) which will be deleted by the School after the completion of the stated time period.

## 2.3 Data organisation and structure

The raw data will take the form of scores online for the quantitative studies (Study 2&3) and transcripts for the qualitative study (Study 4). Collated data will be organized using Microsoft Word and Excel spreadsheets. Mplus would be used to store and evaluate the proposed model.

Naming convention: Study name/date/version\_ author initials

# 3 Research Project Data Storage, Retention and Dissemination Details

## 3.1 Storage arrangements

Computerized data for studies 2&3 will be stored on an encrypted networked drive administered by Curtin University Information Technology Services (CITS) and password-protected with access granted only to the named researchers on the current ethics application. Paper-based consent forms for study 4 will be kept in a lockable filing cabinet in the lockable office of the researcher at Curtin University's Bentley campus Health Sciences Research Hun (Building 101) which will be kept locked when the data are not in use. The data will be stored in this way until the data are written up for publication and, thereafter, for 7 years in accordance with the University guidelines.

## 3.2 Estimated data storage volume

The data files will take up very little drive space.

The paper forms will need a small archive storage cabinet.

## 3.3 Safeguarding measures

Paper-based consent forms for study 4 will be kept in a lockable filing cabinet in the lockable office of the researcher at Curtin University's Bentley campus Health Sciences Research Hun (Building 101) which will be kept locked when the data are not in use.

Computerized data for studies 2&3 will be stored on an encrypted networked drive administered by Curtin University Information Technology Services (CITS) and password-protected with access granted only to the named researchers on the current ethics application.

Besides the data being stored in the R-Drive, it will be regularly backed up onto computer/laptop provided to the researcher at Curtin University's Bentley campus Health Sciences Research Hun (Building 101).

## 3.4 Retention requirements

7 years (All other research with outcomes that are classed as Minor)

### 3.5 Collaboration

N/A

### 3.6 Data dissemination

This research is proposed to be a PhD by publication with an aim to publish in high impact peer reviewed journals supported by a PhD exegesis. Data is proposed to be disseminated in 5 proposed publications to different peer-reviewed journals with details mentioned below;

Publication 1: Mapping the Cognitive Construct of Magical Thinking in OCD - A Scoping Review; PLOS ONE, an open access journal with Impact Factor 3.234

Publication 2: Psychometric Evaluation of IBI in an Indian Sample; Journal of Applied Psychology – American Psychological Association with Impact Factor 4.799

Publication 3: Importance of magical thinking in the prediction of O-C symptoms – A model Testing study; Behaviour Research and Therapy – ELSEVIER with Impact Factor of 3.395

Publication 4: A cross-cultural comparison of manifestation of magical thinking in O-C symptoms between India and Australia; Behavior Therapy – ELSEVIER with Impact Factor of 3.694

Publication 5: Exploring the phenomenon of magical thinking in OCD in a clinical population; International Journal of Clinical and Health Psychology – ELSEVIER with Impact Factor of 2.850

### 3.7 Embargo period

N/A

## **APPENDIX XII: Helpline line number for paper and pencil community participants in India**

Page 1 of 3

### **HELPLINE NUMBERS IN INDIA:**

**24 Hours Mental Health Helpline**  
1860 266 2345

**Vandrevala Foundation Helpline (24x7)**  
1 860 266 2345

**iCall**  
+91 22 2556 3291 (Monday to Saturday, 10 a.m. to 10 p.m.)

**Samaritans Mumbai**  
+91 22 3247 3267 / 022 6565 3267 / 022 6464 3267 (Monday to Sunday, 3 p.m. to 9 p.m.)

**Aasra (24x7)**  
+91 22 2754 6669

**YUVA Helpline**  
10580 (7.30 am to 7.00 pm on all working days)

**SAATH: Mental health Helpline by Manas Foundation**  
01141708517 (10 a.m. to 5 p.m.)

**APPENDIX XIII: Published abstract**



being more common in women whereas substance use disorder in men.1) Recent Indian study found lower QOL scores in depression than obsessive compulsive disorders, both the disorders showing significant improvement in QOL on treatment over six months. Anxiety disorders negatively impact many functional areas (marital, occupational, financial, personal, social etc.) that may contribute to poor QOL. 2) In alcohol dependent patients, improvement in QOL was noted with complete abstinence and regular follow up visits with family members.3) Presence of personality traits such as avoidant, schizotypal, paranoid and schizoid are negative determinants of QOL. Some of the longitudinal studies have shown that CMD untreated may also show remission without any subsequent intervention. However, early identification, ensuring compliance of medication, treating comorbid physical disorders, non-pharmacological approaches like cognitive therapy, stress management, enhancing social supports and Yoga may be some of the approaches for improving quality of life in CMD. Keeping in view the scarcity of available data, there is a need to conduct more longitudinal follow up studies on quality of life in common mental disorders in the community setting all over the globe. Common mental disorders (CMD) includes Depression, anxiety and substance abuse disorders (DSMIV). Often the aspect of quality of life aspect in the overall management of these less severe clinical conditions goes unrecognized.

**Key words:** Common mental disorders, QOL, Prevalence

#### SESSION 17

##### Psychosocial Aspects of Adolescent and Young Adult Wrist and Forearm Cutters: A Case Series

Oberoi RK, Sharma RC

Kothi No. 658, Phase IV, Mohali, Punjab, India. E-mail: rko.medico@gmail.com

**Background:** The objective of this case series was to study the demographic profile of patients indulging in Non-Suicidal Self Injurious Behaviour (NSSI), factors leading to and reinforcing the behaviour, the personality profile of the patients and association with family history of psychiatric illness.

**Methods:** This report describes six cases of NSSI reporting to the out-patient department of the department of Psychiatry over a period of 2 years. The cases were assessed for their socio-demographic profile, nature and frequency of NSSI acts, present and past history of psychiatric illness, family history of psychiatric illness. After eight weeks of suitable pharmacotherapy and supportive psychotherapy, cases were followed up again. Factors influencing the initiation and persistence of NSSI were also analysed.

**Results:** Six female patients in the age group of 13 to 20 years were studied. Two cases were diagnosed as Conduct disorder, two as Adjustment Disorder, one as Schizophrenia, one as Emotionally Unstable Personality Disorder. In three cases, association with pathological internet use was seen. A precipitating life event was found in every case. In two cases peer influence whereas in one case, internet influence led to NSSI behaviour. All cases reported feeling relief after the act, two had additional motives of seeking attention and manipulating environment.

**Conclusion:** In only one case diagnosed as schizophrenia having persistent psychotic conditions and inadequate family support, NSSI acts were seen to recur during follow up period which had even progressed to suicidal ideation. Rest all cases showed significant improvement in NSSI at 8 weeks.

**Key words:** NSSI, Pathological internet use, Peer influence

##### Does Religiosity Influence Medication Compliance Among Patients with Depression?

Dua D, Grover S, Avasthi A

264, IInd Floor, Sector 15 A, Chandigarh, India. E-mail: devakshi.dua@gmail.com

**Background:** To study the association of medication compliance with religiosity among patients with depression.

**Methods:** 96 patients with depression, currently in clinical remission were evaluated on Brief Adherence Rating Scale (BARS), Duke Religiosity Scale, and Hamilton Depression Rating scale (HDRS).

**Results:** One-fifth of the subjects missed their medications for more than 7 days (N=20; 20.8%) in the previous month and similar percentage of patients consumed less than 75% (N=21; 21.9%) of their prescribed medications. The mean number of tablets prescribed to the patients was 2.07 (SD 0.95) and the mean percentage of medications consumed by the patients was 80.81% (SD - 12.81). In terms of religiosity as assessed on DUREL, majority of the patients were visiting religious places either a few times a month (N=45; 46.9%) or a few times a year (N=36; 37.5%). One-third of the patients indulged in private religious or spiritual activities 2 or more times a week (N=37; 38.7%) or once a week (N=32; 33.3%). On DUREL, mean religious attendance domain score was 3.41 (SD 0.95), private religious activities score was 3.21 (SD -1.03) and intrinsic religiosity score was 10.31 (SD 1.77). Positive correlation was found between Intrinsic Religiosity and percentage of doses taken (Pearson coefficient 0.201; p=0.04). Other domains of religiosity did not correlate with medication compliance.

**Conclusion:** Intrinsic religiosity has positive influence on medication compliance. However, religious practices like religious attendance and private religious activities do not influence medication compliance among patients with depression.

##### Magical Thinking: How Important is it in Predicting Obsessive-Compulsive Symptomatology? A Systematic Review

Barkataki B, Rees CS, McEvoy P, Hasking P

Curtin University, Kent Street, Bentley, WA, Perth, Australia. E-mail: bristi.barkataki@postgrad.curtin.edu.au

**Background:** Obsessive Compulsive Disorder (OCD) is a chronic condition with a lifetime prevalence of 2-3% worldwide. The dominant explanatory model of OCD is the cognitive model. A number of dysfunctional beliefs have been proposed as salient in the development and maintenance of OCD. One belief domain that has been largely overlooked is magical thinking. Magical thinking is a general cognitive style whereby individuals tend to ascribe specific meanings to events and thoughts that transcend the boundaries of accepted rational scientific explanations. The majority of research in the area has been largely confined to the study of thought-action fusion (TAF), a closely related but different construct. In order to determine the relevance and importance of magical thinking in OCD, a systematic review was conducted to specifically examine the strength of association between magical thinking and obsessive-compulsive (O-C) symptomatology.

**Methods:** A search of both published and unpublished literature was undertaken using Medline, Psych INFO, ProQuest, Science Direct, Taylor and Francis Online, Embase, PubMed, Cochrane, for published literature and world Cat, Trove, Grey Literature Report, Open Grey, for grey literature. The review follows the PRISMA guidelines for reporting the flow of information retrieved using predefined mesh terms.

**Results and Conclusions:** The majority of empirical studies examining magical thinking have been conducted with non-clinical samples. These studies have found support for a significant relationship between O-C symptoms and magical thinking. In some studies, magical thinking explained additional variance in O-C symptoms above that explained by other cognitive constructs such as thought-action fusion and inflated responsibility. The results of this review suggest that magical thinking is relevant to understanding O-C symptoms. However, more studies are required that seek to determine the relative importance of magical thinking in OCD when compared against other cognitive constructs. Studies of magical thinking with OCD patients are also required.

**Key words:** Magical Thinking, OCD, Magical Ideation/Beliefs

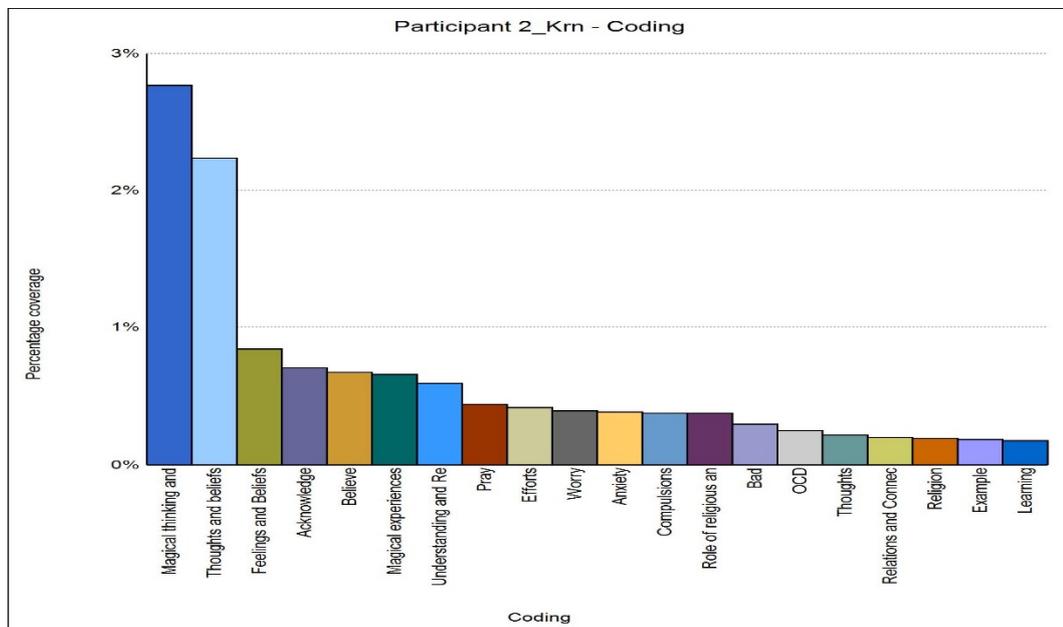
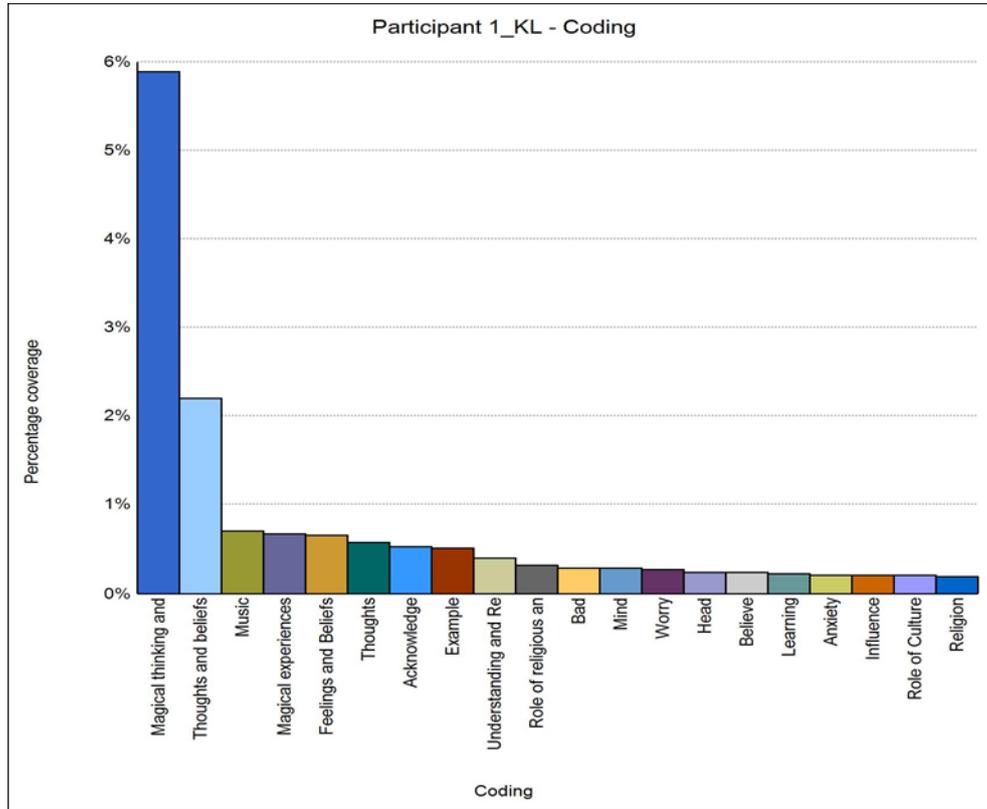
##### Mental and Behavioral Disorders of Internally Displaced Persons: Psychopathological Features

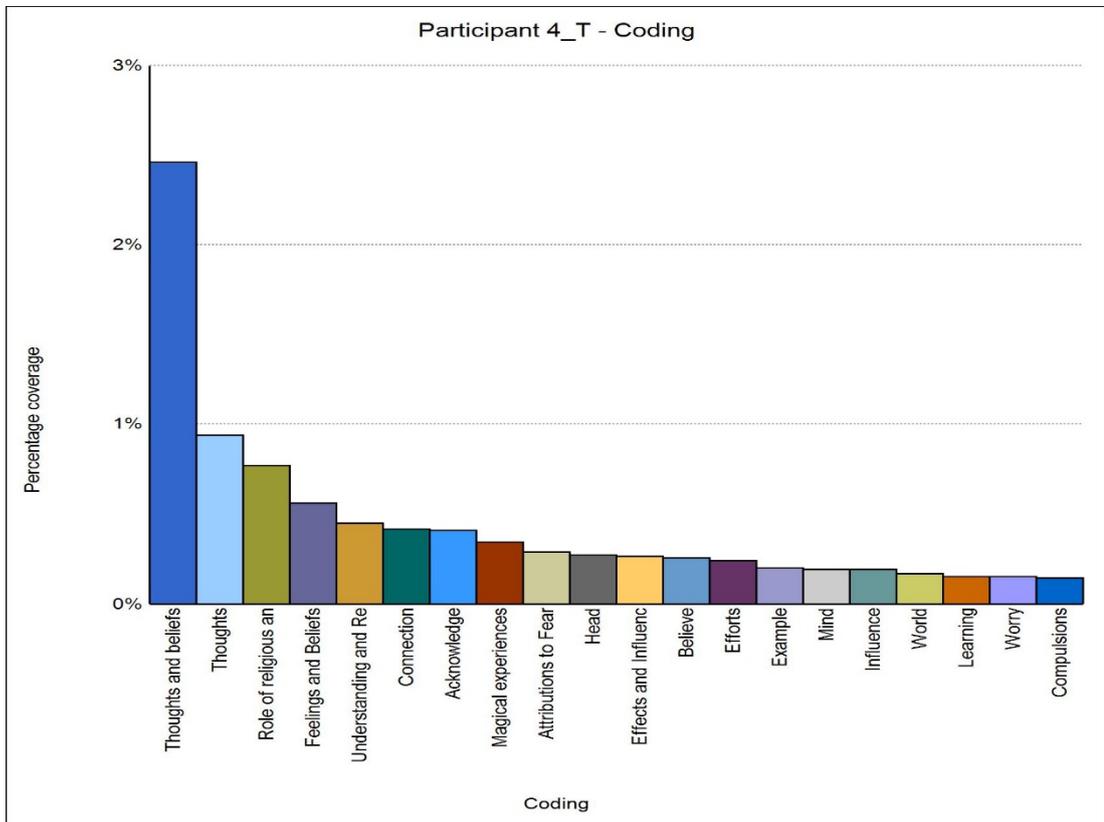
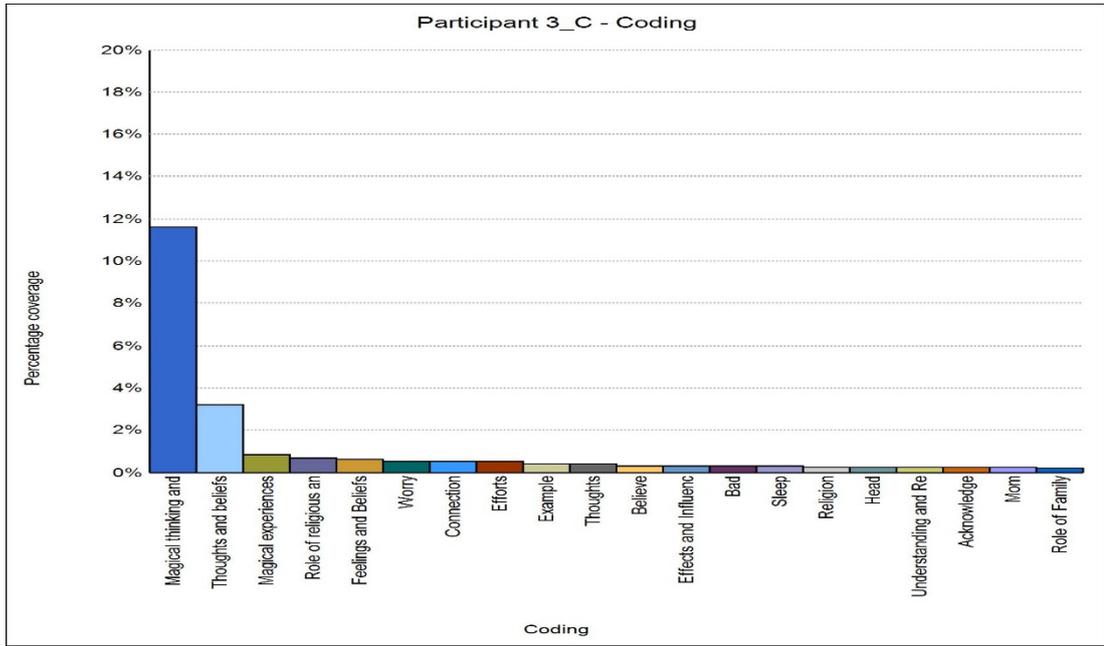
Khaustova O, Kovalenko NV

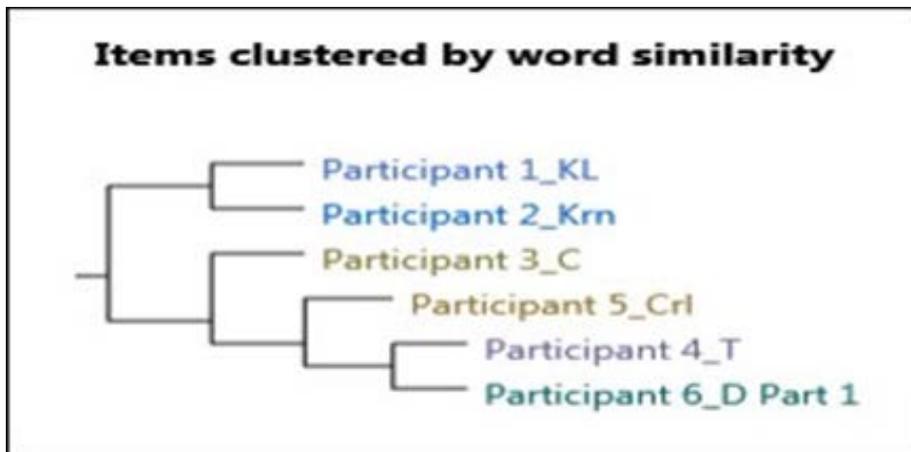
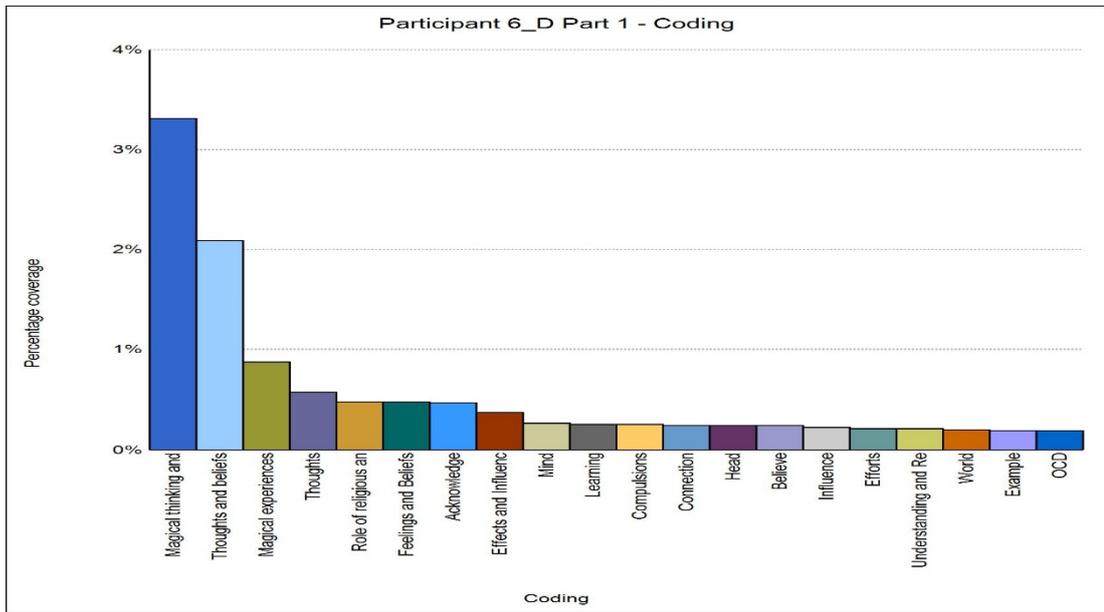
Str. M. Kotsyubynsky, 8 a, KYIV, Ukraine. E-mail: oksana.v@dinadis.ua

**Background:** Violation of mental health is common in forced migrants. The lack of positive motivation to move and the physical impossibility of further stay at home, mental trauma caused by the history and causes of migration; difficulties in adapting to the new location determine the formation of specific experience Internally Displaced Persons (IDPs). The most common are psychogenic depression, anxiety and somatoform disorders.

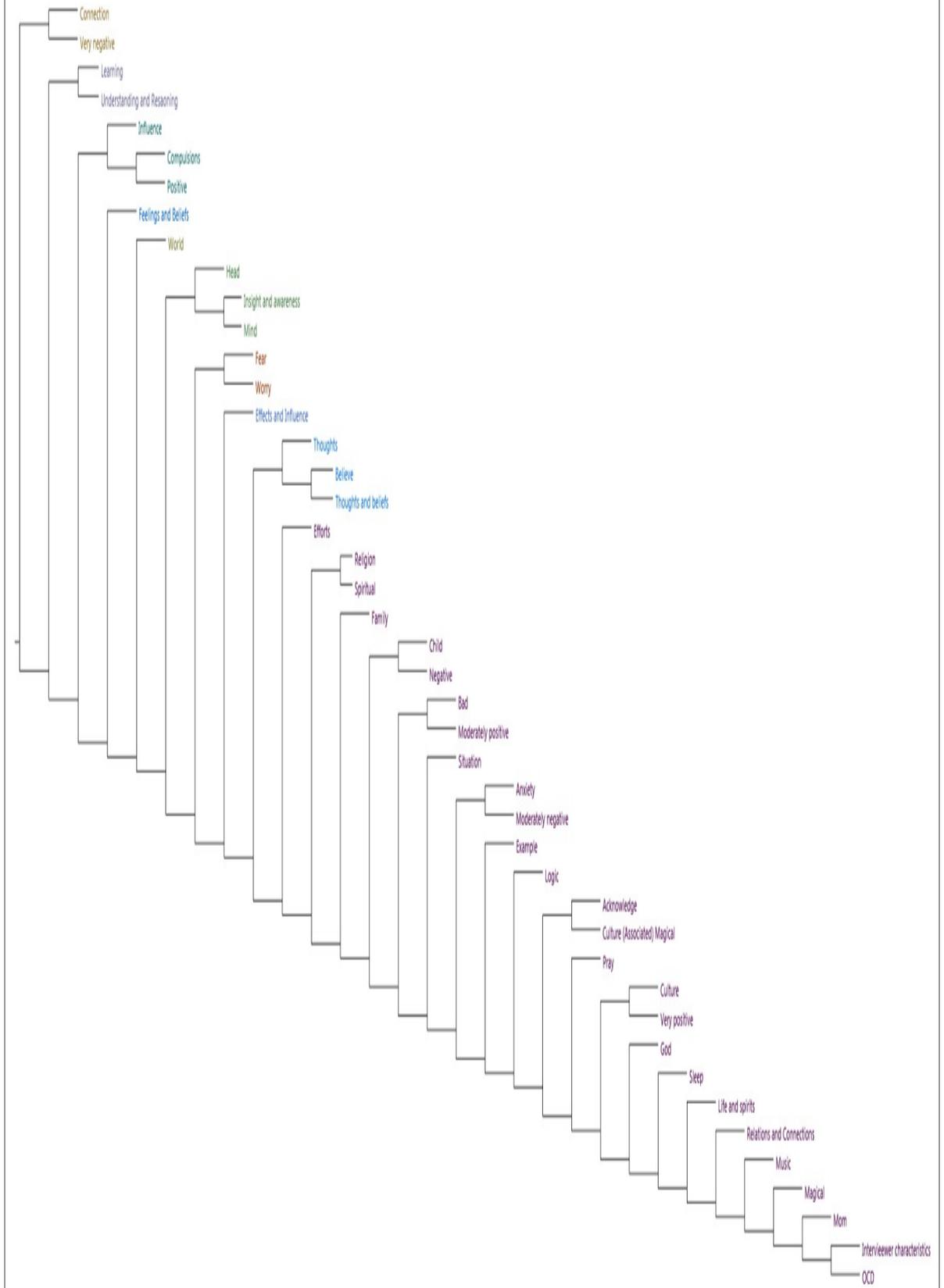
## APPENDIX XIV: Analysis exerts for the Qualitative study







Items clustered by word similarity





Text Search Query - Results Preview

but you're more spiritual and do not believe in any no cause and effect relationship, so anything - Interviewee: It's like the masses. Interviewer: So the rationality that you apply for Christianity is bullshit because that was taken from every other was stolen from every other bloody religion. So, even if worship one god. Christianity was stolen from every other bloody that's how my brain works. If someone else, they have I suppose I'm not really just - but you do know saying religion can be a protective factor, if you say you hope? Interviewee: I don't know. I was just saying vulnerable, so if we disclosed religion from - because I think of, I'd say probably more vulnerable, so if we disclosed to die. And then I think cultures where there's more Yeah. I've covered a lot of different areas, like from disciplined. Interviewer: Very disciplined on it, that if it is absolutely. That is just so powerful. Actually this is where you equate spirituality to religion or do you differentiate - ? Interviewee: cause a problem somewhere. And to me, religion limits. All So I believe in a lot of things about agnostic part of their psyche because she was - as far as and effect? It could be premonition or it could be our psyche. She was so badly crushed by a masculine that anymore because I don't believe in religion anymore, do you differentiate - ? Interviewee: Religion is a manmade thing, organised thinking, their ability to - Interviewer: Do you equate spirituality beliefs, then it talks about spirituality. It boils down engaged in? Interviewee: No problem. In terms of spirituality talking about the example where you talked about church at the goddess rather than God. God is a manmade agnostic religion. I believe that the Catholic religion is one of the biggest things, like music's my placebo. Magical Yeah, in my life - I suppose, in general, religion came related to Hinduism a lot but it's not really of religion do you follow? Interviewee: I don't follow but you don't have to be religious or ten being the highest, how would you rate yourself I don't do that anymore because I don't believe Interviewee: I don't follow a religion. and OCD? Interviewee: Culture is very often bound up of how magical thinking you were talking about, somebody other way 'cause I didn't want anything to do a lot more because science is now bringing us matter who you pray to you - whatever - doesn't matter what in. All religions are one and it wondering if anybody in your family believed in superstition think would be the influence of family or culture don't distinguish that? Interviewee: Well, I don't like religiosity do before we eat our food. Interviewer: Which kind me wonder. What do you think is the influence Interviewee: Ten, because whenever I skip to the script doctrine in there. I believe in the broader aspects of things about agnostic religion. I believe that the sick. And to me, a lot of a very religious. She was brought in the Roman Catholic re-emerge again and they say I have a lot of beliefs and understandings about that no matter what - as long as you follow what you mean. So that's why I said exclude is, technically, to a normal person, it's broken. So doing, like somebody who is religious, didn't pass on upset somebody or cause a problem somewhere. And to me you engage in it, the triggers, influence of family, culture more religion, probably again that's what I was talking about general. Interviewee: Yeah, in my life - I suppose, in general Interviewer: Very disciplined on it, that if it is religion Interviewer: So powerful? Interviewee: Yeah. It's just a cultural belief

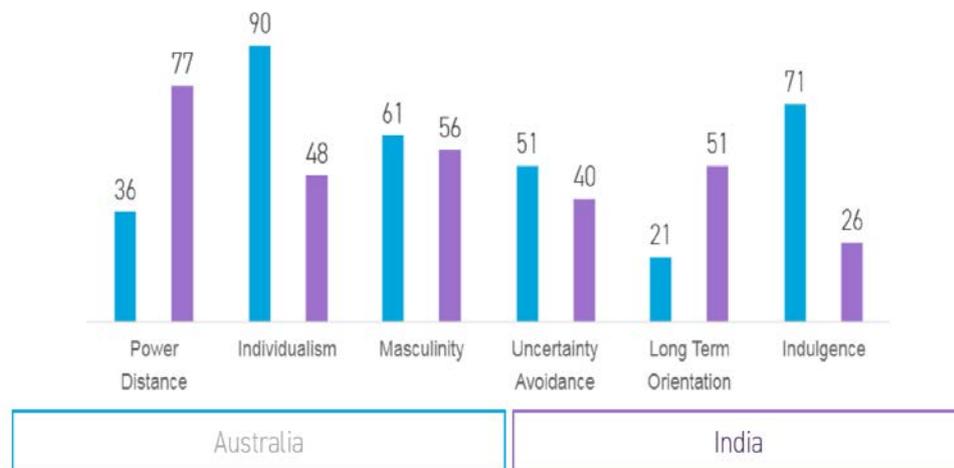
religion

anymore, organised religion anyway. I used to pray quite a guides everything. If it's not guiding, it's wrong or it would think differently. Do you come from a religious family? was born out of necessity to explain why the thunder came - religion was born out of necessity to explain why might be somebody else's placebo. I don't think it's a saves people and it also harms people but if they're can be a protective factor, if you say religion is probably help OCD in terms of a lot of people from - because I think religion probably help OCD in terms aspect of it, and it also talks about something like down to a belief and energy or whatever and a in the right way because there's a lot of people you're in as long as you have god in your have tried to say for such a long time over you were in. All religions are one and it doesn't do you follow? Interviewee: I don't follow a religion. I has made her inferior to the masculine. So she's there, anyway. I used to pray quite a lot. So I've comes from, it's from culture. It's so powerful. Interviewer: So as such it's more to do with - it's just to magical thinking. I'm talking about normal religious beliefs, not limits. All religion limits people's thinking, their ability to - Interviewer: people's thinking, their ability to - Interviewer: Do you equate or religious belief systems, even in islanders that got their do you differentiate - ? Interviewee: Religion is a manmade thing. that she fled into the unconscious and I believe that Mary the mother was put back into the realms because they are terrified and threaten by females and needed that kind of puts a certain doctrine in there. to believe in god. I mean, we believe that pretty you. Interviewee: No, because, I read the bible and My mother was a very religious. She was brought It's a big thing. It's a very big thing. ? Interviewee: Yeah. Interviewer: It was very interesting for me to What about if it is in a manmade religion because they are terrified and threaten by quite sick and it's been because men control it magical thinking, but I think other forms of magical real, even if gods are real, Christianity is bullshit a manmade thing. Organised religion is a manmade thing. Spirituality is something entirely different. To We believe this is more to do with the - I So, even if religion is real, even if gods are Easter was - it's a pagan ritual, all the holidays have I believe that the Catholic religion is manmade religion because don't believe in religion. We believe this is more just thought that's too much. Interviewer: What is - are has very little to do with the reality, so was educated in her own Catholic school by the superstition in development of magical thinking? Interviewee: Because I all the magical thoughts, I suppose, they're helping me spirituality, the life goes along beautifully. If I shift those are the basic principles, as in the basic how it's been built my males and created to much would you rate yourself from spirituality? Interviewee: spirituality, how did that come into the picture in your then do you see benefits - It's basically - this is all it's never an ordinaire. I'm not particularly spiritual or religious, probably again that's what I was talking about, religion, I I wouldn't call it magical thinking because we can't ascertain they know they might need to pray to Jesus or do you think, for the odd numbers, you can apply isn't it? Interviewer: So they take it like an umbrella religion guides everything. If it's not guiding, it's wrong or really, and I think science will prove it, but science

## APPENDIX XV: Hofstede's 6-D Culture comparison between India and Australia

3/9/2019

Country Comparison - Hofstede Insights



Source: Culture Compass™ (n.d.). In *Hofstede Insights*. retrieved from <https://www.hofstede-insights.com/country-comparison/australia,india/>