The Development of Intrusive Thoughts to Obsessions

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Lisa-Marie Berry

School of Psychological Sciences

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Abstract

The aim of this thesis was to consider the role of appraisals of intrusive thoughts in the development of Obsessive-Compulsive Disorder. A narrative literature review explored the hypothesis that 'normal' intrusive thoughts lie on a continuum with clinical obsessions. The review discussed previous research on intrusive thoughts in nonclinical samples and drew comparisons with characteristics of clinical obsessions. An internet-based empirical investigation employed a randomised controlled trial design in order to test the effectiveness of an intervention based on normalising information in reducing problematic meta-cognitive beliefs. A large sample (N = 148) of young adults (aged 18-20 years) was screened in to the study based on high levels of problematic meta-cognitive beliefs. Participants completed questionnaire measures of meta-cognitive beliefs, obsessive-compulsive symptoms, reactions to intrusive thoughts and experiential avoidance. Participants completed an interactive quiz based on normalising information (experimental condition) or pet information (control condition). Significant reductions in problematic meta-cognitive beliefs and experiential avoidance were observed in both conditions, thus no additional benefit of normalising information was indicated. The implications of these findings are discussed in the context of the potential normalising effects of symptom monitoring. Overall this thesis supports the comparison of 'normal' intrusive thoughts and obsessions and suggests that negative appraisals, such as problematic meta-cognitive beliefs, may not be the only defining factor in the development of Obsessive-Compulsive Disorder.

Declaration

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The Author

The author, Lisa-Marie Berry, graduated from The University of Sheffield in 2004 with a Bachelor of Arts (Class II Division I) in Psychology and Philosophy. In 2005, she was awarded a Masters degree in Psychological Research from The University of Sheffield. Subsequently, Lisa then achieved a PhD in Psychology (Title: Intrusive Thoughts in Craving: Cognition and Coping) from The University of Sheffield in 2008. After which, she commenced the Doctorate in Clinical Psychology at The University of Manchester.

Introduction

The thesis presented here is structured in the alternative 'paper-based' format, and therefore comprises sections that are in a format suitable for submission for publication. This format was chosen as a standard requirement of the degree for which it is submitted (Doctor of Clinical Psychology), and has allowed the researcher the experience of writing in journal paper formats. Two papers are presented that are in a format suitable for submission for publication in peer-reviewed academic journals. The first paper presents a literature review, which has been formatted for publication in Cognitive Therapy and Research. The second paper presents the empirical work conducted, and has been formatted for publication in Behaviour Research and Therapy. Each paper follows the guidelines of the Publication Manual of the American Psychological Association, Sixth Edition, as cited by both journals, in addition to extra guidelines specified in the information for authors. A reference to each journal is made on the title page of each paper, and the guidelines are attached in the appendices (see Appendices 1a and 1b). The order of authorship reflects the relative scientific and professional contributions of the individuals: the principal contributor appears first, and subsequent names are in order of decreasing contribution. The degree candidate assumed principal authorship, as the papers are based entirely on the work conducted for the thesis; the main supervisor assumed secondary authorship.

This thesis explores the role of 'normal' intrusive thoughts in the development of Obsessive-Compulsive Disorder (OCD), by investigating the effects of a normalising intervention on meta-cognitive beliefs in a nonclinical

sample. Cognitive theories of OCD give intrusive thoughts a prominent role in the development and maintenance of the disorder; this assertion is considered in more detail in the literature review presented in paper one of this thesis: Obsessive Intrusive Thoughts in the General Population. The review discusses previous research on intrusive thoughts in nonclinical samples, in order to assess whether thoughts similar to clinical obsessions occur in the general population. The similarities and differences between intrusive thoughts and clinical obsessions are considered and conclusions drawn about the validity of the comparison drawn between the two.

Cognitive theories of OCD claim that the negative appraisals of intrusive thoughts lead to the development of the disorder. The second paper in this thesis, Normalising Intrusive Thoughts in Young Adults, presents a large-scale internet-based study. This study tested the effects of an intervention aimed at reducing negative appraisals of intrusive thoughts. The intervention was developed based on information about the prevalence of intrusive thoughts. Questionnaire measures of meta-cognitive beliefs, obsessive-compulsive symptoms, emotional and behavioural reactions and experiential avoidance, were used to assess the effectiveness of the intervention.

The final section of this thesis, the Critical Appraisal, provides a discussion of the research presented, including the methodological limitations, potential improvements to and implications of this research. The researcher's reflections on the process of conducting the research are included.

1. Obsessive Intrusive Thoughts in the General Population

Lisa-Marie Berry[a] and Ben Laskey[a, b]

[a]Division of Clinical Psychology, University of Manchester, UK

[b]Cornwall CAMHS (CiC Team), Truro, UK

Address for correspondence: Lisa-Marie Berry
Division of Clinical Psychology
University of Manchester
M13 9PL.
UK
Tel: +44 (0) 161 306 0400
Email: lisa-marie.berry@postgrad.manchester.ac.uk

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1.1 Abstract

Intrusive thoughts feature as a key factor in our current understanding of Obsessive-Compulsive Disorder (OCD). Cognitive theories of OCD posit that the interpretation of normal intrusive thoughts leads to the development and maintenance of the disorder. Research that supports the role of beliefs and appraisals in maintaining distress in OCD is based on the supposition that clinical obsessions are analogous with normal intrusive thoughts. This paper reviews research investigating the occurrence of intrusive thoughts in nonclinical populations, in order to assess whether these thoughts have common features with obsessions. The prevalence of intrusive thoughts with obsessive content is assessed, as well as other aspects of these thoughts, such as triggers, appraisals and response strategies. Following a critique of literature in this field, this paper goes on to discuss the implications for future research.

Keywords: Obsessive-Compulsive Disorder; intrusive thoughts; obsessions.

Introduction

Intrusive thoughts are central in the current understanding of Obsessive Compulsive Disorder (OCD). DSM IV criteria (American Psychological Association [APA], 1994) specify recurrent and persistent thoughts (verbal, impulses or images), experienced as intrusive and inappropriate causing marked anxiety and distress. Cognitive models argue that intrusive thoughts contribute to the development and maintenance of OCD; these theories dominate our understanding of the disorder, as well as the recommended treatment (National Institute for Health and Clinical Excellence [NICE], 2005). Pioneering research by Rachman and de Silva (1978) can be cited as an instigating factor in the development of cognitive models of OCD. This questionnaire study investigated the presence of "intrusive, unacceptable thoughts and impulses, their frequency and dismissibility" (p.233), in a sample of nonclinical individuals and found that 80% described experiencing intrusive thoughts similar in content and form to clinical obsessions. Comparisons with reports from a limited sample of OCD patients highlighted differences in frequency, duration and intensity of intrusive thoughts. In addition, clinical participants appraised their thoughts as less acceptable, less resistible and less dismissible than nonclinical participants. The authors concluded that intrusive thoughts that resemble clinical obsessions are a common experience for nonclinical individuals. Clark and Rhyno (2005) described a severity continuum, whereby obsessions represent the extreme variant of intrusive thoughts, distinguished by a number of dimensions, for example, frequency, distress, and perceived thought

control. Such a continuum hypothesis forms the basis for current cognitive models of OCD.

Cognitive theories of OCD converge on the proposition that the individual's understanding of 'normal' intrusive thoughts is central in the development and maintenance of OCD, although they differ on the specific interpretation of intrusive thoughts. Rachman (1997, 1998) argued for a central role of beliefs that fuse the intrusive thought to the event or action; whereas, Salkovskis' (1985, 1999) theory placed emphasis on the belief that one is responsible for harm coming to oneself or others. A meta-cognitive understanding of OCD (Wells & Matthews, 1994; Wells, 1997) emphasises the role of beliefs about the significance of intrusive thoughts, including control of cognition and thought-fusion beliefs (as described by Rachman). Within each theory, negative appraisals of intrusive thoughts increase the salience of the thought, and subsequent attention to and accessibility of the thought and related stimuli. In addition, behavioural responses, such as neutralization and compulsions, are seen as attempts to reduce the perceived threat, responsibility or the occurrence of the thought. However, these responses maintain the disorder by preventing disconfirmation of problematic beliefs about intrusive thoughts.

Previous research supports the role of interpretations of intrusive thoughts in OCD. Correlational studies with nonclinical populations have demonstrated a positive relationship between OCD symptoms or obsessionality and responsibility appraisals (Rheaume, Freeston, Dugas, Letarte, & Ladouceur, 1995; Pleva & Wade, 2006); thought fusion beliefs (Rachman, Thordarson, Shafran & Woody, 1995; Amir, Freshman, Ramsey,

Neary, & Brigidi, 2001); and meta-cognitive beliefs (Emmelkamp & Aardema, 1999; Wells & Papageorgiou, 1998). OCD patients have reported higher levels of each proposed belief compared to nonclinical controls (responsibility, Salkovskis et al., 2000; thought-action fusion, Shafran, Thordarson, & Rachman, 1996; meta-cognitive beliefs, Janeck, Calamari, Riemann, & Heffelfinger, 2003). Experimental manipulations of thought-action fusion and of responsibility beliefs have demonstrated increased obsessive-compulsive symptoms and behaviour (Rassin, Merckelbach, Muris & Spaan, 1999; Lopatka & Rachman, 1995; Ladouceur, Rhéaume & Aubelt, 1997; Moulding, Kyrios, & Doron, 2007). However, this research is limited to the extent that it assumes the validity of the theoretical premise that 'normal' intrusive thoughts are the "raw material for full obsessions" (p.797, Rachman, 1997).

In a critique of the appraisal model of OCD (e.g. Salkovksis, 1985, 1999), Julien, O'Connor, and Aardema (2007) challenge the assumption that the interpretation of 'normal' intrusive thoughts cause their development into obsessions. Julien et al. critique previous literature on the universality of intrusive thoughts on the basis of inconsistency in definitions, inconsistent methods, and generalization from student populations. The authors concluded that the research lacks the necessary consistency to provide strong support for the appraisal model of OCD, and recommended further improved research to test the model using a consistent and robust methodology. Julien et al. critiqued the methodology of research on intrusive thoughts; however, the paper lacks a detailed consideration and comparison of the findings from previous research. Whilst the weaknesses in the evidence base identified by

Julien et al. are acknowledged, the current paper aims to fill this gap by providing an up-to-date narrative review of research investigating intrusive thoughts in nonclinical populations, in order to assess the accuracy of the basic premise of cognitive models of OCD: that intrusive thoughts and clinical obsessions lie on a continuum. Additional research since 2007 (eight papers) are considered within this review alongside previous work. Research findings on the prevalence of intrusive thoughts in nonclinical samples are considered to assess the assumption that they are a common nonclinical experience. A discussion of the nature of intrusive thoughts in nonclinical samples, including, themes, triggers, appraisals, and responses, assesses their similarity with their proposed clinical counter-parts. The paper concludes with a discussion of the similarities and differences between 'normal' intrusive thoughts and clinical obsessions currently indicated by the research reviewed.

Differences in the definition of the term 'intrusive thoughts' throughout the literature are discussed within this review; however, for the purposes of this review 'intrusive thoughts' refers to cognitions that are spontaneous, disruptive, difficult to control and unwanted (Rachman, 1981) and may include verbal thoughts, images, or impulses. A review of the literature was conducted on 26/11/2010 via web of science and PsycINFO databases; search words included intrusive thoughts, nonclinical obsessions, and intrusions (full list of search terms in Thesis Appendix 2). The search was limited to journal articles written in English, published from 1978 onwards. A manual search of the references of each paper, to identify other potential papers for inclusion, concluded the search of the literature. Of the resultant articles, empirical papers were included if they investigated intrusive thoughts

within a nonclinical sample in the theoretical context of OCD. This resulted in a total of 35 research papers.

1.2 Prevalence of Nonclinical Intrusive Thoughts

Since 1978, a number of questionnaire studies have aimed to replicate the findings of Rachman and de Silva (1978) and demonstrate that intrusive thoughts are a common nonclinical experience. A similar methodology has required nonclinical participants to endorse intrusive thoughts from a list. Salkovskis and Harrison (1984) used the questionnaire from Rachman and de Silva to confirm that 88% of a sample of nonclinical individuals endorsed at least one intrusive thought. Purdon and Clark (1993) and Belloch, Morillo, Lucero, Cabedo, and Carrió (2004) similarly reported that 99% of their nonclinical samples (N = 293, N = 336 respectively) reported ever experiencing at least one specific obsession-like intrusive thought listed in the Obsessive Intrusions Inventory (OII/ROII), which defines intrusive thoughts as egodystonic (in conflict with person's self-image). These items were drawn from the clinical literature and from intrusive thoughts reported by a nonclinical pilot sample (Purdon & Clark, 1993). However, it is worth noting that in the development of the final OII 16 items were excluded because less than 25% of a nonclinical sample endorsed these thoughts. Therefore the questionnaire was biased toward thoughts already commonly reported by nonclinical individuals, which suggests that the 99% reported in these two studies may be an overestimate.

In another item endorsement study by Langlois, Freeston, and Ladouceur (2000a), all participants indicated either a frequent or best representative intrusive thought. Two clinicians rated how typical of an

obsession each thought was: 74% of intrusive thoughts reported by this nonclinical sample were rated as clearly recognisable as an obsessive intrusive thought (items related to aggression, checking and sexuality). More recently Rassin, Cougle, and Muris (2007) investigated the classification of intrusive thoughts as 'obsession-like'. Nonclinical participants endorsed fewer clinical obsessions (12.2% from a list reported by OCD patients) than nonclinical obsessions (29.1% from a list taken from Rachman & de Silva, 1978); endorsement of clinical obsessions was positively associated with obsessionality (measured by the Padua Inventory). The data from this study reflects the variation in endorsement of intrusive thoughts, but the paper did not report statistics on how many participants overall reported their occurrence (i.e. prevalence). The findings provide support for the occurrence of obsessions in nonclinical populations, but suggest that thoughts with a clinical origin are less commonly experienced.

The method of endorsement of thoughts from a list fails to take account of individual differences in the content of intrusive thoughts; however, idiosyncratic thoughts have also been considered. Freeston, Ladouceur, Thibodeau, and Gagnon (1991) included space for idiosyncratic thoughts on the Cognitive Intrusions Questionnaire (CIQ) and the Intrusive Thoughts Questionnaire (ITQ); similar to rates reported in studies using the OII (Purdon & Clark, 1993; Belloch et al., 2004), 99% of participants in this study reported experiencing at least one intrusive thought in the past month. In studies of self-reported intrusive thoughts over a two-week period, high prevalence rates have been reported: 83.5% (England & Dickerson, 1988) and 93% (Wells & Morrison, 1994) of nonclinical participants reported at least

one intrusive thought. However, other studies that have screened thoughts reported by nonclinical participants have reported much lower rates: Clark and Purdon (2009) considered only 41% of idiosyncratic intrusive thoughts to be obsessional in nature (rated by two researchers); Trinder and Salkovksis (1994) screened in only 56% of respondents to a study on thought suppression, based on criteria of experiencing intrusive thoughts in the previous month. There are marked differences in the figures obtained using item endorsement on a questionnaire compared to idiosyncratic intrusive thoughts, but also within each method.

The wide range in possible prevalence rates of intrusive thoughts in nonclinical participants (41% to 100% in the research discussed) could be a product of differences in methodology, including differences in the definition of intrusive thoughts as well as the criteria for 'obsessive'. Definitions have been broad, such as "unpleasant, unwanted thoughts" (p.550, Salkovskis & Harrison, 1984) and specific, such as "repetitive, upsetting and unwanted thoughts, images or impulses that suddenly appear in consciousness and are considered irrational, unrealistic, foreign to one's character, and difficult to control" (p.715, Purdon & Clark, 1993). In addition, the different measures that list intrusive thoughts include different themes, for example, the CIQ (Freeston et al., 1991; used by Langlois et al., 2000a) assesses cognitions around personal health, an embarrassing or painful experience, personally unacceptable sexual behavior, verbal aggression, friend or family suffering from a fatal disease, and friend or family having an accident. In contrast, the OII (Purdon & Clark, 1993; used by Belloch et al., 2004) covers thoughts of sex, aggression, dirt and contamination. Differences in definition and

measurement have resulted in disagreement about the prevalence of intrusive thoughts in the literature.

The time frame of assessment has also varied between studies: participants have been asked about intrusive thoughts that have ever occurred (e.g. Salkovskis & Harrison, 1984; Purdon & Clark, 1993; Rassin, Cougle, & Muris, 2007), occurred within the last month (e.g. Freeston et al., 1991) and within a two week period (e.g. England & Dickerson, 1988). Different time frames mean that the research findings represent relative frequency of intrusive thoughts, as well as an estimate of prevalence. Frequency is a potential key difference between clinical and nonclinical intrusive thoughts (Clark & Rhyno, 2005): In a direct comparison of nonclinical and OCD patients using the OII, Morillo, Belloch, and García-Soriano (2007) reported significantly more intrusive thoughts experienced by the OCD group; further analysis confirmed that this was due to re-experiencing rather than greater variety of intrusions. These findings highlight the importance of distinguishing between the experience of intrusive thoughts and the regularity of that experience.

The inconsistencies in methodology make it difficult to draw specific conclusions on the prevalence of obsessive intrusive thoughts in the general population; tighter constraints in terms of definition of intrusive thoughts, timeframe of assessment, and themes assessed are necessary. A consensus on a definition of intrusive thoughts is required in order to establish how prevalent such thoughts are in the general population. Consideration of the nature of intrusive thoughts and their similarities and differences with obsessions will be essential in the development of such a specific definition,

as well as in the assessment of the proposed continuum between the two. Previous research on intrusive thoughts in nonclinical samples has drawn comparisons with clinical obsessions on specific features, including themes in content, triggers, appraisals and response strategies. The current paper will now consider this research in order to assess the comparability of intrusive thoughts and obsessions; the literature is discussed in terms of themes, triggers, appraisals, and response strategies. Some studies are detailed in more than one area.

1.3 Themes

In a study of thought suppression in OCD, Rutledge (1998) asked participants to report personal unwanted and repetitive intrusive thoughts; the results included a description of the themes of thoughts rated as unpleasant: current/past romantic relationship (23.9%), death of or injury to self or other (20.2%); academic performance (17.4%) and money (10.1%). This study is discussed and placed within the context of OCD; however, the themes of the reported intrusive thoughts are not commonly considered as obsessional. This could be a result of the broad definition of intrusive thoughts employed, which did not specify an obsessive component.

Purdon and Clark (1993, 1994, 2001) used the OII to limit their research to intrusive thoughts with obsessional content (Purdon & Clark, 1993); intrusive thoughts in this measure cover themes of sex, aggression, accidents, dirt, disease and contamination. Purdon and Clark (1994) reported that items often selected as most upsetting included: running car off the road (6%); leaving heat or stove on thereby causing an accident (10%); having sex with an unacceptable person (11%); engaging in activity contrary to one's

sexual preference (8%). Purdon and Clark (2001) similarly reported that the same items were most often selected as most upsetting, in addition to thoughts of self-harm. Clark, Purdon, and Byers (2000) reported the most upsetting sexual and non-sexual intrusive thoughts in a student sample using the OII. Non-sexual items most often selected as most upsetting included: 'leaving the house without doing something important to prevent burglary or accident' (accident); 'when using a sharp object that I will slit my wrist or throat or otherwise harm myself' (harm); 'saying something rude or insulting to others' (aggression). The most upsetting sexual items included 'being sexually victimised'; 'having sex in public'; 'engaging in a sexual act with someone who is unacceptable to me because they have authority over me'. The findings from these three studies suggest that the most upsetting intrusive thoughts for nonclinical individuals relate to harm, accident or sex, but not disease and contamination. However, Belloch et al. (2004) reported that items from the OII most often selected as most upsetting included contamination, as well as accidents, harm and sex. Belloch et al. also reported the frequency of intrusive thoughts: The ten items reported to occur most frequently related to themes of accident, harm, sex and aggression; the top three items related to uncertainty. The least frequently occurring items related to aggression (to self and others) and bizarre contamination.

The content of thoughts commonly reported by nonclinical samples across studies fall broadly into themes of unacceptable sex, accidents, harm to self and aggression toward others. Nonclinical participants less commonly report thoughts of dirt, disease and contamination. Perhaps this suggests something unique about these thoughts, either that they are not prevalent in

the general population, or that they are not considered distressing and so are underreported. The former hypothesis is supported by findings from Purdon and Clark (1993) and Belloch et al. (2004): both studies found that thoughts of disease and contamination, along with more violent thoughts, were less frequently endorsed by a nonclinical sample.

The studies discussed in this section have reported a wide range in the endorsement of most upsetting intrusive thoughts (Purdon & Clark, 2001; Belloch et al., 2004), for example, Purdon and Clark (1994) reported that 45 out of 52 items on the OII were endorsed by their nonclinical sample. Consistent with these findings, Clark and Claybourn (1997) reported a mean score on the OII of 47.86, and a standard deviation of 35.82, reflecting the variation in responses. These findings suggest considerable individual differences in the content of intrusive thoughts and in emotional reactions to them, which merits further research. Previous research suggests a link between the variance in intrusive thoughts experienced by the individual and anxiety (Niler & Beck, 1989). Future research may help to clarify the between- and within-participant variations in intrusive thoughts and the relationship between such variations and obsessionality.

1.4 Triggers

Lee and Kwon (2003) proposed two types of obsessional intrusive thoughts, differentiated by their trigger. Autogenous intrusive thoughts are ‘out of the blue’, with a symbolic or less than logical connection with stimuli, e.g. sexual, aggressive and immoral thoughts; reactive intrusive thoughts are more logically linked to stimuli, e.g. thoughts about contamination, accidents and symmetry. Lee and Kwon argued that the trigger of an intrusive thought

determines the consequent appraisals and control strategies used. Autogenous thoughts are appraised in terms of control and importance, and subsequently avoidance and thought control are employed. Reactive intrusive thoughts are appraised in terms of responsibility and subsequently control behaviours or compulsions are employed. Responses on the OII from nonclinical individuals and OCD patients supported this distinction (Lee & Kwon, 2003; Lee, Kwon, Kwon, & Telch, 2005).

Julien, O'Connor, and Aardema (2009) reported findings from a comparison of reports from nonclinical and clinical individuals that suggest that autogenous intrusive thoughts are more common in OCD. Participants reported the frequency of intrusive thoughts from a list, which originated from clinical populations. For the three intrusive thoughts rated as most disturbing, participants then rated the link between the thought and the context as either directly linked, indirectly linked or no link. Nonclinical individuals were more likely to report that their most disturbing intrusion was directly linked to the context of its occurrence (approximately half, with one third indirectly linked), whereas clinical individuals were more likely to report an indirect link (approximately half, with one third directly linked). The authors concluded that this difference in trigger presents a challenge for the continuum hypothesis, as it suggests that nonclinical and clinical intrusive thoughts differ. However, the validity of this conclusion is uncertain, as significance analysis of the differences in the total number of types of links between groups was not possible (due to the limitations of Chi-square analysis).

The results from Lee and Kwon (2003) and Julien et al. (2009) demonstrated that nonclinical individuals experience both hypothesised types of intrusive thoughts. However, the proportions reported by Julien et al. differ from previous findings: Parkinson and Rachman (1981) reported that 69% nonclinical intrusive thoughts had identifiable triggers; Rachman and de Silva (1978) reported that 55% of clinical obsessions had identifiable triggers. It may be that a greater proportion of intrusive thoughts without an identifiable trigger or a logical connection to the context contribute to the development of OCD. In support of this idea, Parkinson and Rachman (1981) found that less frequent 'spontaneous' intrusive thoughts were reported to be more tormenting, discomforting and anxiety-provoking. Further research is needed to clarify the difference in reported triggers of nonclinical intrusive thoughts and clinical obsessions, and whether this is a distinguishing difference, which may consequently impact appraisal and response.

1.5 Appraisal

Appraisal is the way in which meaning is attached to intrusive thoughts (OCCWG, 1997), which may be influenced by a general enduring belief style about mental events (e.g. meta-cognitive beliefs). Cognitive models emphasise the role of the appraisal of intrusive thoughts in the development and maintenance of OCD; analogue studies with nonclinical samples have assessed the link between appraisals and other factors implicated in the development of OCD, such as frequency of intrusive thoughts and emotion.

Questionnaire studies have correlated appraisals of perceived dismissibility and control of intrusive thoughts with increased frequency and emotion. Dismissibility has been positively correlated with distress and

frequency of intrusive thoughts (Salkovskis & Harrison, 1984), anxiety and guilt (Niler & Beck, 1989). Perceived control has been positively correlated with frequency of intrusive thoughts (Purdon & Clark, 1994), perceived consequences of the thought (Clark, Purdon, & Wang, 2003), unpleasantness of the thought (Belloch et al., 2004), and obsessionality (Clark et al., 2003). Appraisal of intrusive thoughts in terms of control over cognition has also been linked to the beliefs implicated in the development of OCD, such as thought-action fusion and responsibility. Clark et al. (2000) found that thought-action fusion positively correlated with perceived control of both sexual and non-sexual intrusive thoughts. Purdon and Clark (1994) reported that uncontrollability and frequency were associated with responsibility appraisals; furthermore, in the development of the CIQ, Freeston Ladouceur, Thibodeau, and Gagnon (1992) reported that the evaluation of intrusive thoughts (interpreted by the authors as a responsibility appraisal), predicted dysphoria, and uniquely predicted compulsive activity.

Appraisals of intrusive thoughts in terms of their egodystonic nature have also been considered characteristic of obsessive thoughts, and key in causing distress; these appraisals have been linked to frequency of intrusive thoughts and distress in nonclinical samples. In a questionnaire study, Clark and Claybourn (1997) found that the belief that the thought may mean something about one's personality best predicted frequency of intrusive thoughts; Langlois et al. (2000b) correlated egodystonic appraisals with stronger emotions about intrusive thoughts. Egodystonia has been linked to the interpretation of intrusive thoughts: Teachman, Woody, and Magee (2006) reported that interpretations of intrusive thoughts were negatively affected by

an experimental manipulation to appraise the thought as meaning something about one's values. Corcoran and Woody (2008) reported that imagining an intrusive thought as the participant's own or that of their friend did not alter appraisals of the personal meaning of the thought; however, increased frequency of the same intrusive thought increased the strength of those appraisals. Therefore an intricate link between appraisals of intrusive thoughts, frequency and distress has been implicated by studies with nonclinical samples.

The research findings demonstrate that nonclinical individuals can interpret their intrusive thoughts in terms of the beliefs and appraisals implicated by theories of OCD. Consistent links between appraisals and frequency of intrusive thoughts support the hypothesised quantitative differences and the presence of a continuum between clinical and nonclinical intrusive thoughts. However, there has been variation in the appraisals linked to frequency of intrusive thoughts: the following appraisals have all been found to predict frequency of intrusive thoughts: dismissibility (Salkovskis & Harrison, 1984), guilt (Niler & Beck, 1989), uncontrollability, and belief that the thought could come true/responsibility (Purdon & Clark, 1994; Belloch et al., 2004), perceived consequences (Clark et al., 2003), worry the thought may mean something about one's personality (Clark & Claybourn, 1997). Studies comparing nonclinical groups with OCD patients shed some light on the potential key appraisals. Morillo, Belloch, and García-Soriano (2007) reported quantitative differences in responsibility (worry the thought will come true) and control (importance of control and uncontrollabililty) appraisals, such that OCD patients appraised their intrusive thoughts more frequently in this

manner than nonclinical individuals. The OCCWG (2001, 2005) developed the Obsessive Beliefs Questionnaire (OBQ) and Interpretation of Intrusions Inventory (III) with both nonclinical and clinical samples. Higher scores in the OCD group demonstrated quantitative differences in general assumptions (overestimation of threat, tolerance of uncertainty, importance of thoughts, control of thoughts, responsibility and perfectionism) and specific appraisals relating to the importance of thoughts, control of thoughts and responsibility. Consistent differences in appraisals of responsibility, uncontrollability and importance of intrusive thoughts suggest that these may be a key difference between nonclinical intrusive thoughts and obsessions. Future research should aim to replicate these findings and explicitly link different appraisals with frequency of intrusive thoughts and symptoms. The effects of different appraisals on measures of frequency, distress and symptoms should be considered to assess which is important in the development of OCD. Alternatively, as suggested by the meta-cognitive theory, the division of these appraisals may turn out to be arbitrary, and rather the important factor may be underlying beliefs about mental processes.

Appraisals have also been linked to the response strategies that nonclinical individuals engage in following an intrusive thought, such as thought suppression, which are hypothesised to have a maintaining role in OCD (e.g. Salkovskis, 1999). Therefore, consideration of the association between appraisals and response strategies is important in the comparison of nonclinical intrusive thoughts with clinical obsessions. Research findings linking suppression and responsibility in particular have been mixed. Purdon and Clark (2001) found that suppression of obsessional intrusive thoughts

increased subsequent discomfort, but did not affect frequency of intrusive thoughts or appraisals of pleasantness and responsibility. Marcks and Woods (2007) manipulated thought suppression and responsibility appraisals, which increased intrusive thought frequency over a 5-minute period; in addition, positive correlations between suppression and responsibility appraisal contradicted the findings of Purdon and Clark. Suppression was also related to a stronger urge to neutralise, increased anxiety and guilt, and increased perceived likelihood of the thought coming true. Further consideration of response strategies to intrusive thoughts in nonclinical individuals is important in consideration of the similarities between intrusive thoughts and clinical obsessions.

1.6 Response strategies

Response strategies used by nonclinical individuals have been compared to OCD populations. Previous research has demonstrated that the most commonly selected response by nonclinical individuals is a reasoning strategy, to reason with the self and prove that the thought is irrational (22%, Purdon & Clark, 1994; Clark et al., 2000). Furthermore, no differences in response strategy have been found between high and low obsessors (Purdon & Clark, 1994), which suggests that clinical and nonclinical populations may use similar strategies.

Previous research has investigated the factors that determine the selection of response strategy. Clark et al. (2000) demonstrated that non-sexual intrusive thoughts prompted the use of cognitive and behavioural distraction, reassurance seeking and thought stopping more than sexual intrusive thoughts; the authors concluded response strategy may be selected

on the basis of the content of the intrusion. Langlois et al. (2000b) demonstrated that appraisal also determines response strategy: escape/avoidance strategies were accounted for by appraisals of egodystonia, whereas, problem-focussed strategies (including neutralisation and reassurance seeking) were accounted for by appraisals of the reality of the intrusive thought. Clark and Purdon (2009) similarly linked appraisals to response strategy: common reasons for the dismissal of intrusive thoughts were that they were 'immoral/unethical' and 'inconsistent with ideal self'.

Freeston et al. (1991) also found evidence of the use of escape/avoidance strategies by nonclinical individuals. In this questionnaire study, participants reported their use of response strategies from three categories: avoidance/escape (40% of participants), thinking attentively (36%), and doing nothing (24%). Freeston et al. (1991) correlated these clusters with aspects of intrusive thoughts: In comparison to the 'do nothing' strategies, participants who engaged in avoidance reported increased mood difficulties (sadness, worry and guilt), and disapproval of the thought; those who engaged in 'attentive thinking' strategies reported more frequent and more varied forms of intrusive thoughts. The authors concluded that appraisal of intrusive thoughts determines a response style of avoidance or confrontation.

Effortful strategies also include thought suppression, which has been linked to the maintenance of OCD (e.g. Salkovskis, 1999). In a detailed analysis of control strategies used with intrusive thoughts, Clark and Purdon (2009) found that suppression was correlated with obsessional symptoms; the authors concluded that processes similar to those in clinical obsessions exist

in nonclinical intrusive thoughts. However, experimental studies of thought suppression have demonstrated mixed results. Rutledge (1998) asked participants to report the frequency of personal intrusive thoughts before, during and after the instruction to suppress those thoughts. Gender differences were observed: obsessionality was positively correlated with an enhancement effect (immediate increase in thought frequency) of thought suppression on intrusive thought frequency for females; however, obsessionality was negatively correlated with an enhancement effect of thought suppression for males. Rebound effects (post-suppression increase in thought frequency) were not related to obsessionality. The author suggested that the use of more ruminative strategies by females, compared to distraction strategies used by males, accounts for gender differences. In a similar experimental manipulation, Trinder and Salkovksis (1994) reported that thought suppression increased the frequency of personal negative intrusive thoughts and discomfort over a four day period compared to 'think through', or 'mentioning'; however, the longitudinal design precludes the analysis of enhancement and rebound effects. The research on thought suppression effects is currently inconclusive; inconsistencies may be due to gender differences, as highlighted by Rutledge (1998), or individual differences. In response to thought suppression instructions, participants may engage in any number of strategies, therefore future research could clarify individual differences in strategies used to suppress intrusive thoughts.

Another effortful response strategy related to OCD is neutralising. Salkovskis et al. (1997) compared the effects of participants' own neutralising to distraction (counting backwards mentally) in response to nonclinical

participants' most common unpleasant intrusive thought; findings provided support for the maintaining role of neutralising in OCD, as participants in the neutralising condition reported higher levels of discomfort.

Effortful strategies linked to OCD appear to be commonly used by nonclinical individuals. These response strategies have been linked to appraisals of intrusive thoughts, mood and frequency of intrusive thoughts, as well as obsessionality, which supports the comparison of intrusive thoughts with clinical obsessions. In specific comparisons of nonclinical and OCD groups quantitative differences have been observed in reported response strategies: Morillo, Belloch, and García-Soriano (2007) reported that similar strategies were endorsed on the OII, but that OCD patients were more likely to engage in specific strategies of overt neutralising, reasoning with self, seeking reassurance, suppression, saying a prayer, and reassuring myself. Furthermore, differences have been observed between clinical and nonclinical samples in the effects of specific response strategies. Janeck and Calamari (1999) confirmed that suppression of intrusive thoughts resulted in a higher frequency of intrusive thoughts and greater associated distress in a clinical group compared to a nonclinical group. Consistent with this finding, Najmi, Riemann, and Wegner (2009) reported greater distress following thought suppression in an OCD group compared to a nonclinical group; in addition, OCD patients reported significantly more intrusive thoughts overall compared to the nonclinical group.

Previous research on response strategies provides further support for the continuum hypothesis of intrusive thoughts, as similar strategies are engaged in by nonclinical individuals as by individuals with OCD, but with

quantitative differences. The differential effects of response strategies for nonclinical and clinical samples support the idea of a maintaining role of such strategies in cognitive theories of OCD. Future research is required to determine if there are strategies that nonclinical individuals use, which are protective against obsessionality. This may help to clarify possible differences between the response of nonclinical individuals and OCD patients to intrusive thoughts.

1.7 Conclusions

Intrusive thoughts are hypothesised to be similar to clinical obsessions, with the defining difference being degree not kind (Clark & Rhyno, 2005); the literature reviewed supports this hypothesis. Clinical obsessions are experienced in greater frequencies (re-experienced) to their nonclinical counter-parts, which supports a continuum of quantitative difference. However, additional differences in content, appraisals and response were identified. Clinical obsessions are more violent/aggressive and bizarre compared to nonclinical intrusive thoughts and may be experienced as more spontaneous (occurring in isolation of explicit triggers). As hypothesised in cognitive theories of OCD, clinical individuals are more likely to appraise intrusive thoughts in terms of responsibility and control, which has been linked to distress and frequency of intrusive thoughts. Although similar effortful response strategies were reported by clinical and nonclinical individuals (e.g. avoidance), clinical individuals are more likely to engage in them and to be distressed as a consequence. Observed differences in frequency suggest that clinical individuals re-experience their intrusive

thoughts in greater frequency than nonclinical samples, which is associated with increased distress, negative appraisals, and effortful responses.

The differences between intrusive thoughts and clinical obsessions observed in previous research have led some authors to speculate that they may be distinct phenomenon, undermining support for the continuum. Belloch et al. (2004) suggested that intrusive thoughts and clinical obsessions are different cognitive experiences, based on their finding that violent, aggressive and bizarre contamination intrusive thoughts were not selected by nonclinical individuals. Belloch et al. recognised that the thoughts were similar in theme, and difficult to differentiate, and subsequently concluded that the differences between intrusive thoughts and clinical obsessions are "mystical" (p.2803). Julien et al. (2009) similarly asserted that intrusive thoughts are distinct from clinical obsessions, on the basis of the finding that a greater proportion of intrusive thoughts experienced by clinical individuals do not have a direct link to the context in which they occur. Freeston et al. (1991) suggested that response strategy may define types of intrusive thoughts and that thoughts that prompt avoidance are akin to obsessions. The imposition of this criterion could alter the prevalence of intrusive thoughts observed in nonclinical samples (40% using avoidance in Freeston et al., 1991) and challenge the assumption that they are a common experience in nonclinical samples. Future research should aim to clarify whether trigger, content or response to intrusive thoughts does in fact distinguish types and whether these differ for clinical and nonclinical experiences. In addition, further investigation may be required to clarify the role of what comes before and after the thought in defining that thought as intrusive or obsessive.

The observed differences in content and trigger offer a challenge to a continuum hypothesis based only on frequency. However, these differences could be considered as another continuous aspect of the experience of intrusive thoughts. The theme of intrusive thoughts is similar between clinical and nonclinical individuals, suggesting that the difference in content is one of degree. In addition, the experience of intrusive thoughts without a direct link to context are experienced by nonclinical individuals (one third of thoughts were reported to have an indirect link; Julien et al, 2009), albeit less commonly than in nonclinical individuals. Therefore the observed differences between intrusive thoughts and clinical obsessions in previous literature may suggest that a more complex continuum of experience exists, and necessitate a revision of this hypothesis.

An important task for future research is to elucidate the defining differences between nonclinical and clinical obsessive intrusive thoughts, and to investigate the possibility that it may not be one specific factor, but rather a combination. Morillo, Belloch, and García-Soriano (2007) concluded that the defining difference between clinical and nonclinical intrusive thoughts is re-experiencing of thoughts, which consequently determines the subjective experience of the thought and the level of interference in daily living. Alternatively, obsessions may differ on a number of dimensions to intrusive thoughts, and it is the combination of these that contributes to the development of OCD. In addition, the direction of cause and effect is currently unclear; differences between intrusive thoughts and clinical obsessions may be products of OCD rather than contributing to the development of the disorder. Abramowitz, Khandker, Nelson, Deacon, and

Rygwall (2006) conducted a prospective study of expectant parents, who were assessed prenatal and postpartum, as this is thought to be a time of increased OCD symptoms. In this study, Abramowitz et al. confirmed that dysfunctional beliefs (Obsessive Beliefs Questionnaire) held at the prenatal stage predicted severity of OCD symptoms, (Yale-Brown Obsessive Compulsive Scale) at postpartum stage. Thus, parents with beliefs that intrusive thoughts are significant and threatening were more likely to have severe obsessive compulsive symptoms, to a mild clinical level. The authors concluded that dysfunctional beliefs about 'normal' intrusive thoughts are risk factors for the development of OCD. In a similar prospective study of a student sample, Myers, Fisher, and Wells (2009) demonstrated that meta-cognitive beliefs predicted obsessive-compulsive symptoms at three-month follow-up. Further longitudinal studies could clarify the key factors in the development of intrusive thoughts into clinical obsessions.

Addressing the limitations of the reviewed research will help to further our understanding of intrusive thoughts. The body of research may be biased toward the assumption that intrusive thoughts do occur in nonclinical populations: questionnaires assessing appraisals, etc., which assume the presence of intrusive thoughts, could be leading for participants; other studies have only included participants who reported frequent or distressing intrusive thoughts. Such methodological biases may exaggerate the evidence for the comparability of intrusive thoughts with obsessions, and thus limit our understanding of the prevalence and nature of intrusive thoughts in the nonclinical population. Future qualitative research may provide more information on the experience of intrusive thoughts in nonclinical individuals.

Such research may also clarify and refine a consistent definition of intrusive thoughts, which is lacking in previous research.

It is essential for future research that a clear consensus on the definition of intrusive thoughts is reached, which distinguishes them from other negative cognitions. A detailed consideration of the definition of intrusive thoughts, and comparison to other unwanted cognitions, has already been made within the literature (Berry, Andrade, May and Kavanagh, under review; Clark & Rhyno, 2005). Intrusive thoughts have been described as similar to rumination and worry as unwanted forms of cognition that disrupt ongoing activity and cause distress; but are distinguished from these long elaborative cognitive processes, as brief cognitive experiences. Comparisons have also been drawn between intrusive thoughts and negative automatic thoughts; Clark and Rhyno (2005) have considered both to be spontaneous, but negative automatic thoughts are distinguished as "longer, more elaborative chains of evaluative thought" (p.18). Berry, Andrade, May and Kavanagh (under review) consider a possible overlap between the two types of cognitions, suggesting that some initial negative automatic thoughts may be intrusive thoughts, which then lead to subsequent elaboration. Thus there is potential for intrusive thoughts to be confused with other forms of cognition, and future research requires consideration of specific distinguishing features of intrusive thoughts and appropriately targeted assessment.

Intrusive thoughts are not unique to OCD, and have been implicated within other clinical disorders, such as Generalised Anxiety Disorder (GAD), Depression and Post-Traumatic Stress Disorder (PTSD; Brewin, 1998; Green, 2003; Watkins, 2004). Berry, Andrade, May and Kavanagh (under review)

propose a Transdiagnostic Model of intrusive thoughts, which argues that similar cognitive processes are involved across clinical disorders. According to this model, the experience of an intrusive thought is interpreted as meaningful, thus capturing attentional processes, and leading to subsequent elaboration. Cognitive processes involving attention and accessibility increase the likelihood of the intrusive thought being re-experienced, and with increased automaticity. The research on intrusive thoughts across disorders, and the Transdiagnostic Model proposed by Berry et al. highlights the importance of specificity when studying obsessive intrusive thoughts. An important question for future research is what defines an obsessive intrusive thought? or what factors lead to the development of OCD as opposed to other disorders in which intrusive thoughts are characteristic? Other cognitive processes reviewed in the current paper may also be considered as transdiagnostic, for example thought suppression as a response to cognitive experiences (within GAD, phobias and depression: Becker, Rinck, Roth & Margraf, 1998; Muris, De Jongh, Merckelbach, Postema & Vet, 1998; Kuyken & Brewin, 1995), and negative appraisals, including meta-cognitions (within GAD, PTSD, and psychosis; Wells & Papageorgiou; 1998; Holeva, Tarrier, & Wells, 2001; Papageorgiou & Wells, 2003). One possible aspect that may distinguish intrusive thoughts between disorders is theme or content; specific obsessive content of intrusive thoughts, in combination with transdiagnostic processes, could determine the development of OCD. The suggestion that some cognitive processes are similar across disorders adds further weight to the call for a clear and concise definition of obsessive intrusive thoughts, which distinguishes them from intrusive thoughts in other

disorders on the important features. Such a definition requires extensive consideration of the processes that overlap between clinical disorders, and those that define the development of one disorder over the other.

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2. Normalising Intrusive Thoughts in Young Adults

Lisa-Marie Berry[a] and Ben Laskey[a,b]

[a]Division of Clinical Psychology, University of Manchester, UK

[b]Cornwall CAMHS (CiC Team), Truro, UK

Address for correspondence: Lisa-Marie Berry
Division of Clinical Psychology
University of Manchester
M13 9PL.
UK
Tel: +44 (0) 161 306 0400
Email: lisa-marie.berry@postgrad.manchester.ac.uk

Second author information: Ben Laskey
Cornwall CAMHS (CiC Team)
17 Treyew Road
Truro, Cornwall.
TR1 2BY.
UK.
Email: blasky@cornwall.gov.uk

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2.1 Abstract

The aim of the present study was to investigate the effectiveness of a brief online normalisation intervention about intrusive thoughts (in the form of an interactive quiz) in a group of young adults. It was predicted that compared to a control group, participants in the normalisation condition would report a greater decrease in problematic meta-cognitive beliefs, obsessive-compulsive symptoms, emotional and behavioural reactions to intrusive thoughts and experiential avoidance. Dependent measures were assessed at pre-intervention, post-intervention and two-week follow-up. An overall reduction in meta-cognitive beliefs was observed across both conditions, and maintained at follow-up in the normalisation condition. Reductions in experiential avoidance were observed from pre to post for the normalisation group, and a delayed reduction was observed at follow-up in the control condition. Reductions in obsessive-compulsive symptoms were observed from pre to post for the control condition only. No effects were observed on reactions to intrusive thoughts. The overall normalising effects of the study are discussed in the context of research on symptom monitoring and previous psychoeducation interventions.

Keywords: intrusive thoughts, normalisation, psychoeducation, obsessions, OCD

Highlights

- This paper examines the effects of an online normalisation intervention on meta-cognitive beliefs
- Reductions in meta-cognitive beliefs were observed in both normalisation and control conditions
- The completion of questionnaires about intrusive thoughts is sufficient to bring about change in meta-cognitive beliefs

2.2 Introduction

Intrusive thoughts are characterised by their spontaneous, non-volitional nature, which makes them disruptive to the current thought stream and consequently they can often be experienced as unwanted and difficult to control. Intrusive thoughts are a defining feature of obsessive-compulsive disorder (OCD). The Diagnostic and Statistical Manual of Mental Disorders (DSM IV; American Psychological Association [APA], 1994) criteria for OCD specify the experience of recurrent and persistent cognitions, experienced as intrusive and inappropriate and causing marked anxiety and distress. Cognitive models of OCD, which currently dominate our understanding and recommended treatment (National Institute for Health and Clinical Excellence [NICE], 2005), purport that intrusive thoughts contribute to the development and maintenance of OCD.

Intrusive thoughts similar in content to those experienced by individuals with OCD are also a common experience in the general population: for example, Rachman and de Silva (1978) reported that 80% of a nonclinical sample reported experiencing intrusive thoughts considered to be similar in content and form to clinical obsessions. Rachman and de Silva also reported a comparison of intrusive thoughts of nonclinical participants with those reported by obsessional patients; the key differences identified were in frequency, duration and intensity of the thoughts. Obsessional participants also reported that their thoughts were less acceptable and less dismissible in comparison to nonclinical participants. The authors concluded that normal intrusive thoughts similar to clinical obsessions are a common experience. Following on from the research by Rachman and de Silva, current cognitive

models of OCD purport that the meaning attached to ‘normal’ intrusive thoughts, within the context of existing beliefs, contributes to the development and maintenance of the disorder.

Cognitive Theory of OCD

Current cognitive theories of OCD converge on the proposition that the individual’s understanding of ‘normal’ intrusive thoughts is central in the development and maintenance of OCD; however, theories differ with respect to the proposed beliefs that influence the interpretation of these thoughts.

According to Rachman (1997, 1998) ‘normal’ intrusive thoughts are interpreted as significant due to beliefs that fuse the thought to the event (thought-event-fusion [TEF]) or action (thought-action-fusion [TAF]), which consequently results in increased perceived responsibility and guilt. Subsequent emotional reactions are associated with perceived dismissibility of that thought and frequency of intrusive thoughts (Rachman, 1981). Salkovskis (1985, 1999) suggested that the key belief in the misinterpretation of normal intrusive thoughts is that one is responsible for harm coming to oneself or others. According to Salkovskis, responsibility beliefs increase the salience of intrusive thoughts to the individual, thus increasing attention to and accessibility of the thought and related stimuli. Rachman and Salkovskis suggest that the individual’s response to the occurrence of intrusive thoughts further maintains obsessional processes. Cognitive and behavioural strategies, such as thought suppression, neutralization and compulsions, are engaged in to manage threat and reduce associated anxiety and beliefs of responsibility. Avoidant responses to internal experiences have been shown to be higher in those with high OC symptoms, specifically a reluctance to experience

upsetting thoughts and emotions (Abramowitz, Lackey & Wheaton, 2009). However, these responses maintain dysfunctional beliefs and appraisals of intrusive thoughts, and thus ultimately maintain the disorder.

Wells and Matthews (1994) and Wells (1997) also emphasised the meaning attached to intrusive thoughts in a meta-cognitive understanding of OCD. According to this model, meta-cognitive beliefs (beliefs about cognition and response strategies), including thought-action/thought-event fusion beliefs, directly influence the appraisal of intrusive thoughts as well as subsequent emotional and behavioural responses. Positive meta-cognitive beliefs about behavioural responses, such as compulsions and rituals, motivates their use in response to an intrusive thought; negative meta-cognitive beliefs, such as fearing loss of control, are activated by the continued experience of intrusive thoughts and resultant anxiety. The meta-cognitive theory similarly understands responses to intrusive thoughts as maintaining OCD by reducing opportunities for disconfirmation of problematic meta-cognitive beliefs.

Thus the interpretation of 'normal' intrusive thoughts is thought to be key in the development of OCD, as well as contributing to the maintenance of the disorder. Problematic meta-cognitive beliefs may indicate elevated risk of developing OCD. Meta-cognitive beliefs have previously been correlated with symptoms of OCD in a nonclinical sample (Wells & Papageorgiou, 1998). Further investigations have demonstrated that specific meta-cognitive beliefs implicated by the meta-cognitive model of OCD are predictive of obsessive-compulsive symptoms, such as the uncontrollability and danger of intrusive thoughts and the need for cognitive control (Myers & Wells, 2005; Gwilliam,

Wells & Cartwright-Hatton, 2004), as well as thought-action fusion (Gwilliam, Wells & Cartwright-Hatton, 2004; Emmelkamp & Aardema, 1999. Myers, Fisher and Wells (2009) demonstrated that meta-cognitive beliefs are uniquely predictive of obsessive-compulsive symptoms in a prospective study, thus specifically supporting a causal relationship. Identification of problematic meta-cognitive beliefs about intrusive thoughts may offer the opportunity for early intervention in OCD.

Prevention

Rachman (1998) suggested that if the catastrophic misinterpretation of intrusive thoughts could be altered to a benign alternative, then the associated internal and external cues would no longer be seen as threatening, thus reducing emotional reaction to that thought. With a benign interpretation of intrusive thoughts and little emotional reaction, the perceived dismissibility of that thought might be increased and thus the intrusive thought could be dismissed as insignificant and further avoidant responses could be prevented. Consistent with Rachman, Salkovskis (1985) also stated, "If they believe that odd thoughts with an unpleasant content can occur and have no further implications, then the sequence will terminate here." (p. 578). Individuals who endorse problematic meta-cognitive beliefs could be at risk of developing OCD, thus an intervention targeted at reducing these beliefs could act to prevent transition into clinical status.

Previous research has demonstrated that the alteration of meta-cognitive beliefs through Cognitive-Behavioural techniques, such as exposure and response prevention, is associated with a reduction in symptoms in OCD patients (e.g. Fisher & Wells, 2005), and that this alteration in meta-cognitive

beliefs accounts for a significant amount of variation in symptoms (Solem, Håland, Vogel, Hansen, & Wells, 2009). Normalisation is another component of CBT, which is regularly included in treatment manuals for OCD (e.g. Wells, 1997), and could offer a means of altering sub-clinical levels of beliefs about intrusive thoughts. Psychoeducation about intrusive thoughts has been shown to effectively reduce endorsement of meta-cognitive beliefs. Zucker, Craske, Barrios and Holguin (2002) randomly assigned participants with high scores on the TAF scale (Shafran, Thordarson, & Rachman, 1996) to receive psychoeducational information about intrusive thoughts and thought action fusion or information about stress only. Effects on anxiety and TAF endorsement were assessed following induction of thought-action fusion through a sentence completion task: participants were asked to complete the following sentence with the name of a friend or relative: 'I hope _____ is in a car accident' (originally developed by Rachman, Shafran, Mitchell, Trant, & Teachman, 1996). Psychoeducation about TAF led to a decrease in endorsement of TAF beliefs pre- to post-task, compared to the control 'stress education'. Anxiety was shown to increase in both groups (measured by visual analogue scale, and state measure), but psychoeducation about TAF mitigated the increase in anxiety, such that the control group reported greater increase in scores (visual analogue measure only). Zucker, Craske, Blackmore and Nitz (2006) extended this work in order to test the effects of a 3-hour cognitive behavioural workshop on OCD symptoms and TAF endorsement for individuals classed as experiencing 'subclinical OCD'. Individuals with high scores on the Maudsley Obsessive Compulsive Inventory (Hodgson & Rachman, 1977) and the Self Report Yale-Brown Obsessive Compulsive

Scale (Baer, 1991) (cut offs selected to represent minimal levels of obsessive-compulsive symptomatology) were assigned to either the workshop group or a waitlist control group. The workshop included psychoeducational content about intrusive thoughts, compulsive behaviours, thought suppression, distraction and avoidance; also included was an exposure and response prevention task, cognitive restructuring and a plan for dealing with intrusive thoughts. Although no difference was observed in symptoms between groups (both decreased over time), the workshop led to significant reductions in endorsements of intrusive thoughts, compulsive habits and TAF beliefs at one- and five-month follow ups.

Marino-Carper, Negy, Burns and Lunt (2010) also examined the effects of a psychoeducational intervention on TAF and responsibility beliefs, including a measure of the tendency to suppress thoughts (White Bear Suppression Inventory; Wegner & Zanakos, 1994). Individuals with high endorsements of TAF beliefs were randomly assigned to either the experimental condition, for which they received a psychoeducational message about intrusive thoughts and TAF, or one of two control conditions: psychoeducaton on intrusive thoughts only or psychoeducation on stress only. Differential effects were observed in the experimental group for TAF beliefs, compared to the control groups: TAF-morality, the belief that having a thought is morally equivalent to carrying the action out, was reduced by TAF education, but the intervention did not reduce TAF likelihood, the belief that having a thought increases the probability of it occurring. The effects on TAF-morality were not maintained at 2-week follow-up; however, TAF-likelihood had reduced in the TAF-education group at follow-up. TAF education was

also demonstrated to prevent an increase in thought suppression scores observed in the control conditions. The findings reported by Marino-Carper et al. further support those from Zucker et al. (2002, 2006), and demonstrate that psychoeducation can reduce endorsements of meta-cognitive beliefs about thought-action fusion. Thus, normalisation may alter meta-cognitive beliefs about intrusive thoughts, mitigating the distress associated with these thoughts, and reducing obsessive-compulsive symptoms.

The current study was designed to add to the literature in several ways: the measurement of beliefs about intrusive thoughts is extended to meta-cognitive beliefs more generally in order to assess the effects of normalisation on a collection of problematic meta-cognitive beliefs. The psychoeducational information on intrusive thoughts is delivered as an online intervention in an interactive format, thus extending previous research to more accessible and brief means of delivery. A further advantage of this delivery method is a reduction in experimenter or therapist effects, thereby partialling out non-specific effects in order to more accurately estimate intervention-specific effects.

Thus, the current study aims to test the hypothesis that normalising information will lead to a reduction in the endorsement of meta-cognitive beliefs and presence of obsessive-compulsive symptoms, as well as reductions in emotional and behavioural reactions and experiential avoidance as responses to intrusive thoughts. Young adults (18-20 years) with high levels of problematic meta-cognitive beliefs were recruited to represent a group at potential risk of developing OCD (Karno, Golding, Sorenson, & Burnam, 1988).

2.3 Method

Design

A one-within one-between participant design was employed. Participants were randomly allocated to the normalisation or control conditions. The effects of condition were examined on four dependent measures: meta-cognitive beliefs, obsessive-compulsive symptoms, emotional and behavioural reactions to intrusive thoughts and experiential avoidance at time one (pre-intervention), time two (post-intervention) and time three (two week follow up).

In the normalisation condition participants received information about the experience of intrusive thoughts in the general population via an interactive quiz. Participants in the control condition completed an interactive quiz about pets in the UK, delivered in the same format as the normalisation quiz.

The study was delivered via the internet, advertised within the University of Manchester volunteering webpages (Thesis Appendix 3) and hosted within the University of Manchester School of Psychological Sciences webpages.

Participants

Two hundred and sixteen students, aged 18-20 years, from the University of Manchester, were screened for subsequent selection. These participants accessed detailed information about the study (Thesis Appendix 4) and completed an informed consent form (Thesis Appendix 5), demographics questionnaire (gender and age), and the Meta-Cognitions Questionnaire

(Wells & Cartwright-Hatton, 2004) online. In exchange, all participants that completed the screening process were entered into a prize draw for three £20 cash prizes. Of those students, 148 (68.52%) scored at least one standard deviation above the mean of a nonclinical sample, as established in previous research (Wells & Cartwright-Hatton, 2004) and were invited to participate in the study. The mean age of participants was 19.14 years (SD = .76) and 65.5% were female. Each participant was randomly assigned to either the normalisation (n = 75) or the control condition (n = 73). As the study was online, the attrition rate varies through the course of the study: The CONSORT diagram in Figure 1 illustrates the flow of participants through each stage of this study, and represents those included in data analyses.

[Insert figure 1 about here]

Materials

Intervention.

The normalisation quiz consisted of eight questions (over six webpages) that asked participants to estimate how common intrusive thoughts are in the general population. For example, participants were asked what proportion of young people said that they have intrusive thoughts and to place example intrusive thoughts into pre-defined categories, such as 'thoughts about sex' and 'self-doubt'. Questions were based on information from previous research on intrusive thoughts in nonclinical samples (Rachman and de Silva, 1978; Parkinson & Rachman, 1981). The normalisation information was designed to

emphasise the high occurrence of such thoughts in the general adult population.

Prior to beginning the quiz, participants were given the following definition of intrusive thoughts:

> Intrusive thoughts are thoughts that pop into your head unexpectedly. People have different beliefs about these thoughts, and react differently to them: some are upset by them, others are not.

The control quiz consisted of eight questions (over six webpages) that asked participants to estimate how common different pets are within the United Kingdom, representing a neutral topic. For example, participants were asked to rank order the type of animals that are most commonly kept as pets and to put example animal breeds into their correct animal category, such as 'dog' and 'bird'. Questions were designed to match the format of the normalisation quiz, and based on pet statistics information obtained from the Pet Food Manufacturers' Association webpages (2010).

Prior to beginning the quiz, participants in the control condition were given the following definition of a pet:

> A pet is a tamed animal kept for amusement or companionship.

For both quizzes, participants were presented with the correct answers to each question following the submission of their own answers on each webpage.

The normalisation and control quizzes are available from the first author (Thesis Appendices 6a and 6b).

Questionnaires.

The following measures were completed online at the three time points (pre-, post-intervention and two-week follow-up) and were ordered as follows:

The Meta-Cognition Questionnaire – 30 (MCQ-30; Wells & Cartwright-Hatton, 2004; Thesis Appendix 7) is a 30-item self-report questionnaire measuring beliefs about thinking and thinking processes. Participants are required to rate their agreement to each item on a 4-point Likert scale ranging from 1 (do not agree) to 4 (agree very much). Meta-cognitive beliefs are measured on five sub-scales: 1) cognitive confidence; 2) positive beliefs; 3) cognitive self-consciousness; 4) uncontrollability and danger; 5) need to control thoughts. Wells and Cartwright-Hatton (2004) reported good temporal stability (coefficient of .75 for test-retest over 22-118days) and internal consistency (α = .72 to .93 for subscales).

Leyton Obsessional Inventory – Short Form (LOI-SF; Mathews, Jang, Hami, & Stein, 2004; Thesis Appendix 8) is a 30-item self-report inventory measuring presence of OCD symptoms using a yes/no format. Symptoms are measured within four factors: 1) contamination; 2) doubts/repeating; 3) checking/detail; 4) worries/just right. Mathews et al. reported good internal reliability (α = .81) and validity, demonstrated by predicted correlations with measures of psychopathology, including anxiety and depression.

Emotional and Behavioural Reactions to Intrusions Questionnaire (EBRIQ; Berry, Andrade, May, & Kavanagh, 2010; Thesis Appendix 9) is a seven-item

self-report questionnaire, measuring individual reactions to intrusive thoughts. Participants are required to rate each item according to how often it applies when they experience intrusive thoughts on a 5-point Likert scale from 0 (never) to 4 (every time). Two subscales represent emotional reactions and behavioural reactions to intrusive thoughts. Berry et al. (2010) reported good temporal stability (coefficient = .68 for test-retest over 30-70 days) and validity, demonstrated by predicted correlations with measures of avoidant cognitive strategies of thought suppression and experiential avoidance. The scale was originally developed within the context of intrusive thoughts in craving, but has been successfully adapted to assess reactions to other intrusive thoughts (e.g. self harm; Batey, May & Andrade, 2010).

Action and Acceptance Questionnaire (AAQ; Hayes et al., 2004; Thesis Appendix 10) is a nine-item self-report questionnaire, measuring severity of experiential avoidance, cognitive fusion, and difficulty in acting in the presence of negative private events. Participants are required to rate each item according to how often it is true for them on a 7-point Likert scale ranging from 1 (never true) to 7 (always true). Hayes et al. (2004) reported good temporal stability (coefficient of .64 for test-retest over four months) and internal consistency (α = .70).

Procedure

Participants began by completing all questionnaire measures above (Time 1: pre-intervention), after which they were directed to complete either the control or intervention quiz online, depending on their condition. Following completion of the intervention stage, all participants were directed to complete the questionnaire measures for a second time (Time 2: post-

intervention). Participants were then directed to a webpage thanking them for their participation so far and informing them that they would be emailed in two weeks time to complete the study.

Two-weeks after they had completed the first phase of the study, each participant was emailed an invitation and a web-link to complete the questionnaire measures for a third time (Time 3: follow-up). Of 148 participants emailed (those who completed pre-intervention MCQ-30), 41.21% accessed the follow-up questionnaire measures (those who completed follow-up MCQ-30). Following completion of the questionnaire measures, participants were directed to a webpage thanking them for their participation in the study and informing them that they will be emailed again shortly with further details of the study. All participants that registered to take part in the study were emailed debrief information, which included support information on mental health support services. Prize draw winners were randomly selected using the random sampling option within Microsoft Excel; winners were notified by email and subsequently arranged to collect their prize from the experimenter.

Data analysis

Means, standard deviations, medians and inter-quartile ranges were computed for each of the measures at pre-intervention, post-intervention, and two-week follow-up. All measures were scrutinised for outliers through inspection of descriptive box-plots for each measure (a total of seven outliers were identified across measures). In cases where outliers emerged, analyses were repeated without the outliers; none of the significance levels changed with the exclusion of these outliers. Thus, the analyses reported below are with the

entire sample. The actual N varies across analyses to reflect the attrition rate at each point: Pairwise deletion was employed for missing data.

Due to the selected sample of high scorers on the MCQ-30, some of the measures did not meet parametric assumptions. Variables were transformed; however, little improvement in skewness and kurtosis confirmed no advantage to transformation (Logarithm, Square Root, and Inverted transformations). Therefore, Wilcoxon signed ranks tests were used to compare pre and post scores on the self-report measures for the control and normalisation conditions. Change scores on the MCQ-30 (pre to post) were compared between conditions using a Mann-Whitney U test. Finally, stability of changes was assessed by comparing pre and follow-up scores using Wilcoxon signed ranks tests for the control and normalisation conditions.

2.4 Results

Group equivalence

A Mann-Whitney U test indicated no significant difference between groups on the baseline measurements of the MCQ-30 ($U(148) = 2648$, $z = -.34$, $p = .73$, $r = .03$), LOI-SF ($U(144) = 2253$, $z = -1.36$, $p = .18$, $r = .11$), EBRIQ ($U(140) = 2154$, $z = -1.23$, $p = .22$, $r = .10$) and AAQ ($U(133) = 1917$, $z = -1.33$, $p = .19$, $r = .11$). Both groups can thus be considered equivalent. Descriptive statistics for each of the self-report measures by condition are displayed in Table 1.

Main analyses

Wilcoxon signed-rank tests showed a significant reduction in MCQ-30 scores pre- to post-intervention for both control, $z(61) = -4.41$, $p < .001$, $r = .40$, and normalisation groups, $z(60) = -4.51$, $p < .001$, $r = .41$. A Mann-Whitney U test

revealed no significant difference in MCQ-30 change scores (pre to post-intervention) between the control group and normalisation group, $U(121) = 1532.5$, $z = -1.55$, $p = .12$, $r = .14$. The decrease in LOI-SF scores in the control group was significant ($z(58) = -2.12$, $p = .03$, $r = .20$), but no significant difference in LOI-SF scores was found for the normalisation group ($z(60) = 1.30$, $p = .76$, $r = .03$). Pre- and post-intervention EBRIQ scores did not differ for either control ($z(48) = -1.55$, $p = .12$, $r = .16$) or intervention groups ($z(60) = -.01$, $p = .993$, $r = .001$). Post-intervention AAQ scores were found to be significantly lower than pre-intervention AAQ scores for the normalisation group ($z(59) = -2.58$, $p = .01$, $r = .24$), but not for the control group ($z(53) = -1.20$, $p = .23$, $r = .12$.

[Insert Table 1 about here]

Subscale analysis.

Pre and post comparisons of scores on the five MCQ-30 subscales were made using Wilcoxon Signed Ranks tests. Bonferroni corrections were applied to reduce the possibility of type 1 errors; therefore a conservative alpha level of .005 was adopted for the ten comparisons. A significant reduction in scores on the 'uncontrollability and danger' subscale was observed for the normalisation condition ($z(60) = -4.33$, $p < .001$, $r = .40$), pre ($Md = 16$; $IQR = 6$) to post ($Md = 15$; $IQR = 8$), and the control condition ($z(61) = -4.71$, $p < .001$, $r = .43$), pre ($Md = 17$; $IQR = 6$) to post ($Md = 15$; $IQR = 7$). In addition, scores on the 'need to control' subscale significantly reduced for both the normalisation condition ($z(60) = -4.90$, $p < .001$, $r = .45$), pre ($Md = 14$; $IQR = 4$) to post ($Md = 11$; $IQR = 5$), and the control condition ($z(61) = -3.56$, $p <$

.001, r = .32), pre (*Md* = 13; *IQR* = 5) to post (*Md* = 12; *IQR* = 5). A significant reduction in scores on the 'cognitive self-consciousness' subscale was observed in the control condition only ($z(61) = -2.80$, $p < .005$, r = .25), from pre (*Md* = 18; *IQR* = 5.5) to post (*Md* = 17; *IQR* = 7). All other MCQ-30 subscale comparisons were non-significant.

Follow-up analysis

Of the 41.21% of participants that accessed the follow-up questionnaires four were excluded from follow-up analyses as they had not completed post-intervention measures. Mann-Whitney U tests confirmed that participants who completed the self-report measures at follow-up were not different to those who did not in terms of MCQ-30, LOI-SF, EBRIQ, or AAQ scores at pre and post-intervention.

Follow-up scores were compared with pre scores for each condition. Wilcoxon signed ranks tests confirmed a significant difference between pre and follow-up MCQ-30 scores for the normalisation condition ($z(27) = -3.03$, $p = .002$, $r = .41$); in the control condition the difference approached significance ($z(30) = -1.75$, $p = .08$, $r = .23$). The LOI –SF differences were non-significant for the normalisation ($z(27) = -.62$, $p = .536$, $r = .08$) and the control condition ($z(28) = -.26$, $p = .80$, $r = .03$). The EBRIQ differences were non-significant for the normalisation condition ($z(27) = -1.27$, $p = .21$, $r = .17$) and the control condition ($z(28) = -1.10$, $p = .27$, $r = .15$). The decrease in AAQ scores was significant for the normalisation condition ($z(27) = -2.21$, $p = .03$, $r = .30$) and the control condition ($z(28) = -3.39$, $p = .001$, $r = .45$).

2.5 Discussion

The aim of this study was to examine the effectiveness of a brief online normalisation intervention for problematic meta-cognitive beliefs in a sample of young adults with elevated meta-cognitive beliefs. It was hypothesised that individuals who completed a quiz about the prevalence of intrusive thoughts would report significant reductions in meta-cognitive beliefs, reactions to intrusive thoughts, obsessive-compulsive symptoms and experiential avoidance; it was also predicted that these effects would be greater than those found in a control condition, who completed a quiz about pets. These predictions were partly supported. Reductions in meta-cognitive beliefs from pre to post were observed in both conditions; however, there were no differences between conditions. At a two-week follow-up the reduction in meta-cognitive beliefs was maintained for the normalisation group, but dropped below significance for the control group. No changes were observed for reactions to intrusive thoughts for either condition, and reduction in OC symptoms was only observed from pre to post for the control group. The normalisation group demonstrated a reduction in experiential avoidance pre to post, which was maintained at follow-up. Although, no change was observed in experiential avoidance for the control group post-intervention, reductions were observed at follow-up.

The results from this study add to the growing body of literature on the alteration of meta-cognitive beliefs through educational material. The lack of difference between conditions is inconsistent with previous studies that have demonstrated that compared to controls, educational interventions lead to a

greater reduction in thought-action fusion beliefs (Zucker et al., 2002, 2006). The overall reduction in meta-cognitive beliefs extends the current literature by demonstrating that structured interventions may not be necessary to bring about change in meta-cognitive beliefs, but rather the process of completing questionnaires may be sufficient in itself to bring about change. This finding is comparable to the overall reduction in obsessive-compulsive symptoms observed by Zucker et al. (2006), which the authors explained in terms of the waxing and waning nature of OCD, but rather may have been an artefact of completing measures relating to symptoms. A normalising effect of completing questionnaires is consistent with previous research demonstrating effective change through symptom monitoring. Previous studies have illustrated that symptom monitoring over the course of just four weeks can bring about a reduction in Post-Traumatic Stress Disorder (PTSD) symptoms to below the previously diagnosed level (Reynolds & Tarrier, 1996; Tarrier et al., 1999). Hardy and Stallard (2008) have replicated these findings in a group of children that had recent experience of a road-traffic accident, demonstrating that symptom monitoring led to a reduction in accident-related thoughts and a significant reduction PTSD symptoms.

Subscale analysis of pre and post scores on the MCQ-30 indicated that ‘uncontrollability and danger’ and ‘need to control’ reduced across both conditions. These findings are consistent with previous research demonstrating the role of these specific meta-cognitive beliefs in the development of OCD. Myers and Wells (2005) reported that meta-cognitive beliefs about uncontrollability and danger and need to control thoughts, alongside thought-fusion beliefs, were uniquely correlated with obsessive-

compulsive symptoms. Changes in beliefs about uncontrollability and danger and the need to control thoughts are understandable given that the process of completing the current study may highlight that intrusive thoughts are common and normal, therefore participants may reconsider the implications of experiencing such thoughts. The control condition also demonstrated a reduction in scores on the 'cognitive self-consciousness' scale; although, the effect size was reduced in comparison to the other subscale effects. A possible reduction in 'cognitive self-consciousness' may also be understood within normalising effects of completing the study, as participants may conclude that heightened awareness of their conscious stream is not necessary. However, the lack of reduction in the normalisation condition does not support this conclusion. Therefore, further replication of potential normalising effects of completing questionnaires about intrusive thoughts should aim to clarify specific meta-cognitive beliefs that may be affected.

The reduction in total MCQ-30 scores should be interpreted with caution; although the observed reduction in meta-cognitive beliefs was significant in the current study, the post-intervention means remained at least 1.5 standard deviations above the established nonclinical group mean (Wells & Cartwright-Hatton, 2004). Thus the benefits of completing the study for this high-risk group were not sufficient enough to bring about a reduction to below mean. The observed findings could be a reflection of regression toward the mean (which would be expected to bring about a reduction of approximately 6.6 points), and therefore require replication. In addition, it is possible that the normalising intervention employed in this study could be

developed further to produce a meaningful change in meta-cognitive beliefs; this is discussed below in comparison with previous studies.

In addition to the effects on meta-cognitive beliefs, the current findings demonstrated that psychoeducation can be effective in reducing experiential avoidance, and that the process of completing questionnaires may bring about a delayed effect on experiential avoidance. Alongside the effects on meta-cognitive beliefs, this finding supports the maintaining role that avoidant strategies may play in OCD, such that the appraisal of intrusive thoughts fuels ineffective response strategies. Further research is needed to clarify the relative effects of specific interventions compared to symptom monitoring alone, and to investigate the links between meta-cognitive beliefs and experiential avoidance.

The inconsistent effects on OCD symptoms, and lack of change in reactions to intrusive thoughts, are difficult to reconcile within current models of OCD and did not support the direct link between meta-cognitive beliefs and OCD symptoms suggested by the meta-cognitive model. The observed mean pre score on the Leyton Obsessional Inventory- short form for both conditions was within one standard deviation above the previous nonclinical mean in young adults; in addition, the percentage scoring above 20 (indicative of probable OCD) was in line with previous studies (Mathews, Jang, Hami, & Stein, 2004). The pattern of scores on the LOI-SF in the present study suggests that screening by scores on the MCQ-30 resulted in a sample of individuals high in obsessionality. Therefore, the lack of change cannot be explained as a lack of presence of symptoms overall. However, the lack of change in obsessionality could be due to the measure used: the LOI-SF is

limited in terms of assessing symptom presence/absence. An additional measure of severity of symptoms (such as the Self-report Yale-Brown Obsessive Compulsive Scale [Y-BOCS], Baer, 1991) would have been beneficial and potentially more sensitive to changes; previous studies have suggested the inclusion of multiple measures of obsessive-compulsive symptoms (Solem et al., 2009). Wider measures of psychopathology may also have indicated different results. Meta-cognitive beliefs are not a unique feature of OCD, but rather feature in a number of disorders, therefore, measures assessing symptoms of other mental health problems have the potential to extend the findings here (e.g. Generalised Anxiety Disorder). Future research may also consider the inclusion of measures of intrusive thoughts directly, to assess effects on frequency, duration, intensity, and dismissibility, for example. Diary studies could track the effects on intrusive thoughts over the course of several weeks.

A longer follow-up period in future studies may help to ascertain the duration of normalising effects from the process of completing questionnaires. Zucker et al. (2006) illustrated effects of psychoeducation on symptoms at a 5-month follow up. The findings from the current study suggested that changes in meta-cognitive beliefs through completion of questionnaires may wane after a couple of weeks, but that normalisation information may have an additional benefit. Thus, future research could be directed toward a comparison of the longevity of the two effects in order to better understand any additional benefits of psychoeducation. The reduced response rate for follow-up may have limited the findings within the current study. The response rate may have biased the findings in terms of the participants; for

example, participants that responded at follow-up may have been more engaged or attentive to the interventions, or potentially may have represented individuals for whom intrusive thoughts are more salient. Comparisons of participants who responded to follow-up and those who did not confirmed no differences in the variables assessed. Future research may wish to reduce the attrition rate for follow-up assessments; the addition of a further incentive for participation at follow-up may increase the response rate.

To the authors' knowledge, this study represents the first attempt to use an interactive online format for delivering psychoeducational information. Therapeutic effects of experimenter contact were removed in the present study, thus the observed effects can be attributed to the process of completing the study alone. This study indicates the potential for internet-based psychoeducational interventions. Future research should consider the use of online interventions in order to reach a wide audience and to engage an increasingly virtually focussed generation. Further to this, the format of online interventions is important to consider. The interactive quiz format utilised in the current study may provide an explanation for the lack of effect of psychoeducation on meta-cognitive beliefs: that is that the intervention was potentially too brief to bring about greater changes.

Previous psychoeducation interventions that have targeted meta-cognitive beliefs have ranged from a brief audio psychoeducation message (Zucker et al., 2002) to a 3-hour cognitive-behavioural workshop (Zucker et al., 2006). It is possible that reading psychoeducational information prior to the quiz may have consolidated the information further to engender greater changes in meta-cognitive beliefs. Relatedly, the normalisation information

used in the current study related to the prevalence of intrusive thoughts more generally; whereas, previous studies have demonstrated successful changes in beliefs by providing specific educational information about thought-action fusion (e.g. Zucker et al., 2002). More substantial reductions in meta-cognitive beliefs might be observed with the addition of specific information about the nature of these beliefs.

The intervention developed for the current study was based upon widely cited research findings on the prevalence and nature of intrusive thoughts in non-clinical samples (Rachman & de Silva, 1978; Parkinson & Rachman, 1981). The provision of this information is recommended within CBT for OCD as part of education about mental events. For example, Wells (1997) states that information relating to the prevalence of normal obsessions should be provided to obsessional patients as part of educational 'bibliotherapy', citing the research by Rachman and de Silva as a source for this information (p. 237). However, more formal means of validation of the intervention were not undertaken in the current study. The assessment of content validity could provide confirmation that the intervention developed is considered a 'normalisation' intervention. For example, inter-rater agreement on the essential nature of the information provided could be obtained from consultation with an expert panel. Alternatively, the intervention could be developed in consultation with focus groups sampled from the target population.

In summary, the current study demonstrated that completion of questionnaires relating to meta-cognitions can be sufficient to bring about real change in those and related avoidant responses. Future research should aim to

replicate and extend these findings. An increased understanding of the respective effects of symptom monitoring and psychoeducation may aid the development of effective preventative interventions for OCD and potentially other mental health problems in which meta-cognitive beliefs play a key role.

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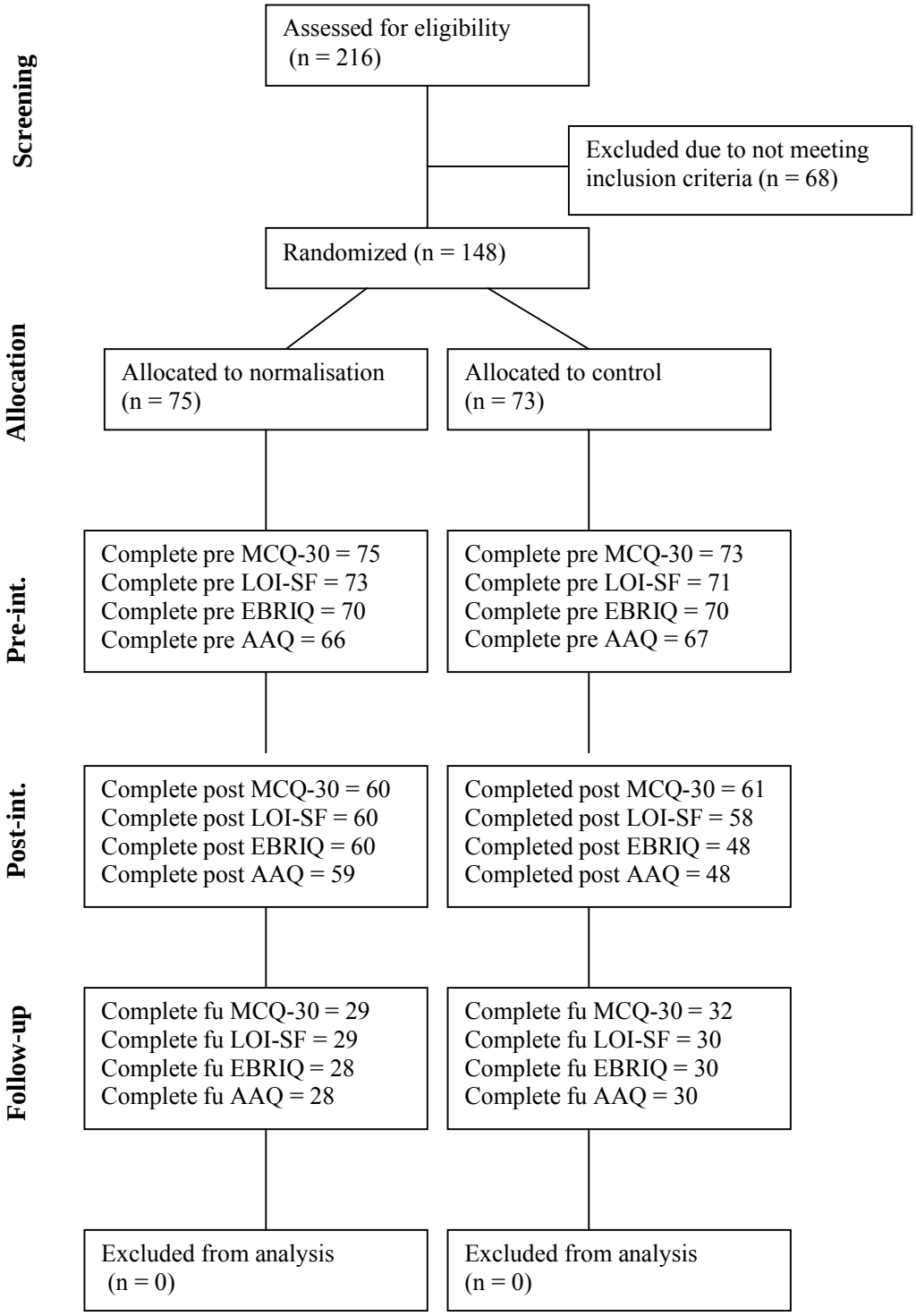
Table 1. Descriptive statistics for each self-report measure at pre, post and follow-up by condition

	Dependent variables											
	MCQ-30			LOI-SF			EBRIQ			AAQ		
	Pre	Post	f-u	Pre	Post	f-u	Pre	Post	f-u	Pre	Post	f-u
Control condition												
Mean	74.82	71.89	71.40	12.14	11.62	11.32	41.65	40.63	38.18	39.72	39.21	37.68
Median	74	71	69	13	12	12	41.5	42.5	36.50	41	39	37.5
Standard deviation	8.67	9.04	9.55	4.38	4.77	3.85	9.97	10.82	10.63	6.81	6.72	8.19
Interquartile range	14	11	15.25	7	6.25	3	13.25	13	15.75	10	9	12.25
Normalisation condition												
Mean	74.9	70.77	68.74	11.27	11.47	11.96	38	37.72	36.85	38.53	37.25	36.11
Median	72	69	68	11	11	11	41	42	40	40	39	35.5
Standard deviation	9.49	10.54	9.30	4.31	4.52	3.66	13.55	13.69	14.47	6.93	7.46	8.63
Interquartile range	11	13.75	13	5	7	5	19.75	20.75	24	11.25	12	12

Figure Captions

Figure 1. A consort diagram illustrating the flow of participants through each stage of the study.

Figure 1.



Note. fu = follow-up

3. Critical Appraisal

The aim of the work in this thesis was to utilise the current cognitive understanding of obsessive intrusive thoughts in the nonclinical population, alongside cognitive theory of Obsessive Compulsive Disorder (OCD), in order to develop and test an online intervention intended to mitigate the development of normal intrusive thoughts into clinical obsessions in at risk young adults. The first paper presented within this thesis is a literature review of previous research investigating intrusive thoughts in nonclinical samples. The literature review constitutes the background for the research conducted, which is subsequently presented in the second paper in this thesis. There are limitations to the literature review process and the study conducted, which are discussed below in more detail within a critique of the papers. In addition, this section of the thesis includes a consideration of the implications for clinical and research practice, and the researcher's reflection on the process of conducting the body of work presented.

3.1 Critique of Papers

A main supposition of cognitive theories of OCD is that negative interpretations of 'normal' intrusive thoughts determine the development and maintenance of the disorder (e.g. Rachman, 1997; 1998; Salkovskis, 1985; 1999; Wells & Matthews, 1994; Wells, 1997). Thus intrusive thoughts are assumed to be a normal experience in the nonclinical population, and the misinterpretation of these thoughts leads to clinical obsessions. The first paper presented in this thesis addressed this assumption in a narrative review of the literature: the aim of the literature review was to investigate whether nonclinical individuals experience intrusive thoughts similar to obsessions

that are experienced by individuals with OCD. The findings from research that investigated obsessive intrusive thoughts in nonclinical samples were discussed within sections considered important to the comparison with obsessions, including prevalence and content of intrusive thoughts, and response strategies used. The literature review concluded that research findings demonstrate that intrusive thoughts with obsessive content do occur in the general population, but that important differences exist between these cognitions and obsessions in clinical samples. Intrusive thoughts were experienced by clinical samples as more frequent, severe and spontaneous; reported re-experiencing of intrusive thoughts by clinical samples was related to differences in appraisals and response strategies, compared to nonclinical samples. The current assumption by Cognitive theories of OCD, that the appraisal of intrusive thoughts leads to their development into obsessions was supported by previous research, which demonstrated that appraisals of guilt, dismissibility, thought control, thought-action fusion and responsibility, all correlate with the frequency of intrusive thoughts. The reported differences in appraisals between clinical and nonclinical samples support cognitive theories, which suggest that the appraisal of intrusive thoughts is a key factor in the development of OCD. The literature review highlighted the current lacunae in research on intrusive thoughts and obsessions; further clarification is required about the defining differences between obsessions and nonclinical intrusive thoughts. Although, many differences have been highlighted, for example, frequency, severity, and appraisal, it is currently not clear which of these differences determines the status of ‘obsession’ and thus the development of OCD. The correlations between appraisals and frequency

require further investigation in future research to clarify the causal direction of these relationships; in particular, it will be important for future research to consider whether appraisals determine the frequency of intrusive thoughts, or whether frequency influences how the intrusive thought is appraised.

The method with which the literature search was conducted allowed the identification of relevant empirical papers that investigated obsessive intrusive thoughts in nonclinical samples. The literature search did not allow for the inclusion of nonpublished material, such as theses or dissertations, nor work published in book chapters. However, a flexible approach, which included a manual review of references in each paper, allowed the identification of a substantial body of relevant studies (thirty-five papers). Meaningful conclusions in line with the aims of the literature review were drawn from a discussion of this research. An aim of the literature review presented in this thesis was to provide an overview of the research on intrusive thoughts in the nonclinical population, and a discussion of the relevance of this literature to OCD, therefore a narrative approach was adopted in order to synthesise the wide-ranging literature. An alterative approach to the literature review process would have been to conduct a systematic literature review. A systematic approach would have set tighter constraints on the methodology of the literature review and the question addressed, which would have been appropriate for a review of one aspect of intrusive thoughts, such as appraisal. The aims of the review were to provide a comparison of intrusive thoughts with obsessions, and so multiple aspects of the nature of intrusive thoughts were included. Thus, a narrative approach was favoured in order to allow scope for a wider discussion and critique. As the

body of literature on intrusive thoughts grows, and provides further data on each specific aspect of these cognitions, then a systematic review or a meta-analysis would be a useful addition to the literature. For example, a meta-analysis on the difference in frequency of intrusive thoughts between nonclinical and OCD samples would further the current understanding of the potential defining differences between nonclinical intrusive thoughts and obsessions.

Although the literature review covered many aspects of intrusive thoughts, including prevalence, content and appraisal, a detailed consideration of the form of intrusive thoughts was not included. The definition of intrusive thoughts adopted for the purposes of the review was deliberately broad and included different forms of intrusive thoughts, for example images and verbal thoughts. However, many of the studies discussed focussed on the verbal form of intrusions through questionnaire measurement; this reflected the dominance in the literature of the assessment of verbal intrusive thoughts. Consideration of the form of obsessive intrusions in future reviews could add to the understanding of OCD and the hypothesised continuum from 'normal' intrusive thoughts to obsessions. It is possible that individuals with OCD may experience more urges/impulses that drive cognitive and behavioural responses, as compared to the verbal intrusions reported by nonclinical individuals in previous research. Thus a worthy pursuit for future reviews of the literature would be to consider the form of intrusive thoughts in both clinical and nonclinical samples. The purpose of the literature review in this thesis was achieved with a broad definition of intrusive thoughts; a wide range

of studies were considered from which meaningful conclusions were drawn in line with the aims.

Consistent with the focus of this thesis, the literature review was limited to intrusive thoughts in the context of OCD. However, intrusive thoughts feature in a number of other clinical disorders, such as posttraumatic stress disorder (Reynolds & Brewin, 1998), generalised anxiety disorder (Ruscio & Borcovec, 2004), and psychosis (Morrison & Baker, 2000). A review of the research on intrusive thoughts across disorders was beyond the scope and aims of this thesis; however, the aims of the literature review could be extended to other contexts in the future, in order to determine if intrusive thoughts experienced within other clinical disorders are also experienced by nonclinical individuals.

A thorough review of the relevant literature supported the hypothesis that obsessive intrusive thoughts are a common experience in the nonclinical population. This premise set up the empirical work subsequently presented in the second paper of this thesis, which investigated the effects of an interactive normalising intervention on meta-cognitive beliefs. In this way, the intervention targeted dysfunctional appraisals of intrusive that are proposed to lead to the development of OCD (Wells & Matthews, 1994; Wells, 1997). A large group of young adults were screened into the study based on higher than average endorsements of meta-cognitive beliefs; the inclusion criteria aimed to produce a sample of individuals who may have elevated risk of developing OCD. Participants were recruited online and completed an interactive quiz based on either data regarding the occurrence of intrusive thoughts (normalising) or relating to pet ownership (control). Effects of each quiz were

assessed on measures of meta-cognitive beliefs (MCQ-30), OCD symptoms (LOI-SF), experiential avoidance (AAQ) and reactions to intrusive thoughts (EBRIQ). Means plots for each measure can be seen in Appendix 11.

The results did not support the main hypothesis that normalising would reduce endorsements of meta-cognitive beliefs, but rather an overall reduction in meta-cognitive beliefs was observed across both experimental and control groups. Two possible explanations for this finding were discussed within the second paper. First, that the completion of the study, including repeated exposure to questionnaire measures, in itself reduced meta-cognitive beliefs, which is in line with previous studies illustrating effects from symptom monitoring alone within other clinical contexts (Reynolds & Tarrier, 1996; Tarrier et al., 1999). The other possible explanation is that the difference between pre and post intervention scores represented the effect of a regression to the mean. The point change expected through regression to the mean (6.6 point reduction; calculated using previous data from Wells and Cartwright-Hatton, 2004) was above that observed in each condition of the current research. Therefore it is feasible that the observed effect was due to a regression to the mean. The study sample was specifically selected for high scores on the pre MCQ-30, and represented the top 15.8% of the population. Therefore the mean score had room to regress to the mean. One way to reduce the effect of regression to the mean is to compare post scores between groups with pre-intervention scores as a covariate within an analysis of covariance (Vickers & Altman 2001). However, the violation of parametric assumptions in the current data precluded the use of an analysis of covariance.

The normality of each measure was assessed prior to the statistical analyses. A formal test of normality (Kolmogorov-Smirnov statistic) supplemented the inspection of skewness and kurtosis values (see Appendix 12), as well as Histograms of the distribution of data for each measure. Field (2005) recommended that skewness and kurtosis values that diverge from zero may be acceptable if they fall within +/- 1.96 standard errors. Some of the measures violated the normality assumptions of parametric analyses on the basis of the criteria imposed by Field (2005), as well as significance indicated by Kolmogorov-Smirnov statistic ($p < .05$) Appropriate transformations were applied to the data (Square root, log transformation and inversion), as recommended by Tabachnick and Fidell (2007), in an attempt to produce skewness and kurtosis values nearest to zero. Inspection of the transformed data revealed little benefit of the transformation, as they did not improve the skewness or kurtosis values. Therefore, non-parametric statistical analyses were considered as the recommended alternative (Pallant, 2010); although less powerful than parametric analyses, the non-parametric alternative imposes less stringent criteria on the distribution of the data.

A non-parametric alternative for an analysis of covariance (rank analysis of covariance) is outlined by Quade (1967); the results from the analysis of the MCQ-30 were consistent with the reported Wilcoxon tests (see Appendix 13, which indicated no differences between the two conditions). The Wilcoxon test results were favoured in the report, as the method for analysis is more established and widely reported than the rank analysis of covariance. In addition, the Wilcoxon test provided information about the difference between pre and post scores within each condition. Given the

characteristics of the data in the current research, it is difficult to conclude whether the observed reduction in meta-cognitive beliefs resulted from effects of the study or from regression to the mean; future work should aim to replicate the effect and extend the current method to the wider population. A broad nonclinical sample would be more likely to produce data that was normally distributed, which would allow parametric analyses to be applied.

The sample in the current research was selected to represent a population at risk of developing OCD based upon endorsement of meta-cognitive beliefs. However, the mean pre MCQ-30 scores of the current sample were elevated above that previously reported for individuals with OCD (64.37; Solem, Håland, Vogel, Hansen, & Wells, 2009), which may account for the lack of effect from normalising information as the intervention may have been insufficient to target the strength of meta-cognitive beliefs. The screening criteria for the current research may have resulted in a sample of individuals with clinical levels of meta-cognitive beliefs; however, the proportion of participants screened in to the study (68.52%) was not in line with the incidence rate of OCD (2-3%; Karno, Golding, Sorenso, & Burnam, 1988). In addition, the mean pre LOI-SF scores for the current sample suggested that the percentage of individuals with probable OCD (3.38%) was similar to that previously reported from a university sample (2.1%; Mathews, Jang, Hami, & Stein, 2004). Exclusion of participants with extreme scores on the MCQ-30 and LOI-SF (outliers) did not affect the results obtained. Future research could relax the screening criteria for a replication study, and investigate the effects of normalising information with participants with scores within one standard deviation above the mean of previous nonclinical

samples on the MCQ-30 (i.e. range of 48.41 – 61.72; Wells & Cartwright-Hatton, 2004).

The results from the empirical paper did not support the hypothesised reduction effects of normalising information on OCD symptoms. The pattern of obsessionality scores in the sample of the current research indicated a sample high in obsessionality compared to previous research (Mathews, Jang, Hami, & Stein, 2004), thus the stability of scores from pre to post is unlikely to be due to a lack of symptoms in the sample. Methodological limitations of the study design may explain the lack of effect on symptoms. For example, the time-scale of the current research may have precluded significant effects on symptomatology; changes in well-practised behavioural symptoms of OCD, such as compulsions and rituals, may require longer than two weeks to manifest. The inclusion of further assessment time points in future research could clarify whether there are delayed effects on symptom levels.

Limitations in the measurement of symptoms may have precluded detection of subtle effects of normalising information: The measure of OCD symptoms used in the study (LOI-SF) was a measure of presence of symptoms, and did not include an indication of severity. The LOI-SF was chosen for this study as it is a short measurement that is easily administered without the presence of a researcher, in comparison to other self-report measures of OCD symptoms (e.g. Yale-Brown Obsessive Compulsive Scale – Self Report; Y-BOCS-SR, which includes the assessment of 58 symptoms, and analysis of six specified symptoms through a further ten questions). The LOI-SF has demonstrated good internal consistency and discriminant validity (Mathews, Jang, Hami, & Stein, 2004); however, there is little knowledge on

further psychometric properties of relevance (e.g. test-retest reliability) and of the sensitivity to treatment effects. Many self-report measures of OCD symptoms carry unique advantages and disadvantages; Grabill et al. (2008) discussed the relative merits of nine different measures, including an omission of specific symptoms, a lack of psychometric data and data on treatment effects. Future research should include multiple measures of OCD symptoms to account for shortfalls of one specific measure alone. The inclusion of more extensive measurements of OCD symptoms was beyond the scope of the current research, as a brief and easy to complete self-report measure was required to avoid high attrition rates and to fit with the online design of the study. In addition the main aim of the current research was to reduce problematic meta-cognitive beliefs; therefore, OCD symptoms were a secondary dependent variable. Future research focussed on the effects of psychoeduation on different aspects of OCD symptoms can extend the current research, for example a measure of symptom severity would supplement the LOI-SF, such as the Obsessive-Compulsive Inventory-Revised (Foa, Kozak, Salkovskis, Coles, & Amir, 1998), which has demonstrated good psychometric properties and published clinical cut-off scores can be used to indicate diagnostic symptom levels.

The difference in the observed results for OCD symptoms (LOI-SF) and meta-cognitive beliefs (MCQ-30) are inconsistent with the proposed role of meta-cognitions in OCD: participants reported elevated endorsements of meta-cognitive beliefs to beyond the level of previous clinical samples (e.g. Solem, Håland, Vogel, Hansen, & Wells, 2009), whereas symptom levels were below the cut-off indicative of clinical status (Mathews, Jang, Hami, &

Stein, 2004). In addition, the observed reduction in meta-cognitive beliefs was followed by a reduction in symptoms. Although the direct relationship between symptoms and meta-cognitions was not assessed in the current research, the different pattern of results for each measure appear to be contrary to previous research that has demonstrated an association between OCD symptoms and meta-cognitive beliefs (Wells & Papageorgiou, 1998). This inconsistency could be accounted for by a difference in the measurement of symptoms, as the aspect of symptomatology assessed differs; whereas the current research investigated effects on symptom presence, Wells and Papageorgiou employed the Padua Inventory (PI-WSUR, Burns et al., 1996), which assesses the degree of distress associated with OCD symptoms. The presence of symptoms may not relate to meta-cognitions in the same way that degree of distress caused does. The current research did not include a measure of distress associated with symptoms; however, as previously suggested, future research might include multiple measures of OCD symptoms that could address different aspects of symptomatology.

Salkovskis' (1985) theory of OCD suggested that responsibility beliefs are key in the misinterpretation of intrusive thoughts and development of OCD; although responsibility beliefs are alluded to on the MCQ-30 (Item 6: 'if I did not control a worrying thought, and then it happened, it would be my fault'), a full assessment of responsibility beliefs was not included. Rather, the current research focussed on meta-cognitive beliefs, which included many beliefs thought to influence the development of OCD, such as thought-action fusion (Rachman, 1997, 1998) and beliefs about the control of thoughts (Wells & Mathews, 1994; Wells, 1997). Previous research has supported the

unique contribution of meta-cognitive beliefs, over responsibility beliefs, in the development of OCD: the relationship between responsibility beliefs and obsessive-compulsive symptoms was accounted for by meta-cognitive beliefs (Gwilliam, Wells, & Cartwright-Hatton, 2004), and suggested to be a by-product of meta-cognitive processing (Myers & Wells, 2005). Meta-cognitive beliefs therefore represent a sensible target for early intervention. A full assessment of all beliefs was not within the aims of the current research; however, a comparison of normalising effects on the different beliefs suggested to play a role in OCD would add to the current literature that compares their relative contributions to symptomatology. Furthermore, a comparison of the effects on different beliefs with associated effects on OCD symptoms, might help to further understanding on the development and maintenance of OCD, and clarify the accuracy of existing cognitive models of the disorder.

A further methodological limitation of the current research includes external validity. Students have previously been shown to score higher on measures of general distress compared to a community sample (OCCWG, 2003). The application of the screening criteria for the current research within a community population would obtain a similar sample in terms of the variables of interest. However, the demographics of the sample in the current research were not considered, for example ethnicity and educational level, which prevents of the generalisability of the findings to different populations. Future research could consider possible cultural differences through extension of the investigation of normalisation of intrusive thoughts to a more diverse sample.

3.2 Implications of research

The research presented within this thesis has wider implications for research and clinical practice, including an indication of potential areas for future directions in research. In order to extend the current research toward the development of an effective early intervention for OCD, it is necessary to understand the development of "normal" intrusive thoughts to clinical obsessions. Thus, the difference between clinical and nonclinical intrusive thoughts merits further attention. Longitudinal studies could track the progress of the differences in intrusive thoughts currently suggested by the literature; for example, frequency, severity, appraisals and beliefs about intrusive thoughts, as well as symptoms, could be assessed at yearly intervals in a large sample of young people for the duration of an 'at risk' age (e.g. 18-25; Karno, Golding, Sorenso, & Burnam, 1988). The prevalence rate of OCD in adults (2-3%; Karno, Golding, Sorenso, & Burnam, 1988) would mean that a very large sample would be required in order to collect sufficient data to draw conclusions about the most influential factors in the development of OCD. In a prospective study of a university sample (aged 18-59 years), Myers, Fisher and Wells (2009) demonstrated that meta-cognitive beliefs predicted obsessive-compulsive symptoms over the course of three months. Similar prospective studies could correlate a wide battery of measures to assess the predictive power of aspects of intrusive thoughts (e.g. frequency, form), in addition to beliefs about these thoughts, in OCD symptoms. Such prospective studies could extend the time between assessments to further assess changes over the course of a year or two.

Alternatively, further research that directly compares nonclinical individuals and OCD sufferers on dimensions of intrusive thoughts could clarify which differences are most explanatory of OCD. The literature review in this thesis discussed previous research comparing nonclinical samples to those with OCD; significant differences in frequency and severity of intrusive thoughts have been demonstrated, as well as differences in the relative proportions of intrusive thoughts that have an identifiable trigger, and those that are truly spontaneous (Lee & Kwon, 2003; Julien et al., 2009). Future research should work to clarify the relationship between these observed differences and the beliefs purported to have a role in the development of OCD.

Causal direction could be inferred through experimental manipulation, for example, the effects of different intrusive thoughts, considered more and less severe, could be assessed on different beliefs, such as meta-cognitive and responsibility beliefs. In a recent thought suppression experiment, Corcoran and Woody (2009) compared the effects of suppressing blasphemous thoughts by religious and non-religious participants. Similar manipulations could be applied to obsessional intrusive thoughts in order to assess the effects of severity on beliefs. The manipulation of frequency of intrusive thoughts poses a challenge to future research; however, participants could be divided into high and low frequency groups according to self-report, and comparisons of their subsequent endorsement of different beliefs could be made. Psychoeducational interventions for OCD have been shown to be more effective with increased specificity of the information to specific beliefs (e.g. Zucker, Craske, Barrios & Holguin, 2002). Therefore with an improved

understanding of which beliefs are key in the development of OCD, and their relationship with differences in frequency, severity, and triggers, would allow early interventions to be targeted to features of intrusive thoughts that confer vulnerability to OCD.

The possibility that the observed effects in the current research were due to repeated completion of questionnaires about dimensions relating to mental health has potential implications for Clinical Psychology practice. Questionnaire measures of symptoms and diaries used during the assessment process may have therapeutic benefits for the individual and may serve to disrupt maintaining processes of OCD. As future research clarifies the relative effects of symptom monitoring and normalisation, then clinical practice may develop in parallel. For example, future considerations for clinical practice may include a standard period of time between assessment and therapy in order to allow potential normalising effects of regular symptom monitoring. Previous research has suggested that symptoms of OCD may dissipate with time in those of a vulnerable age (adolescent/young adult; Mathews et al., 2004). The LOI-SF scores in the current research support this conjecture; as many individuals indicated the presence of obsessional symptoms, but very few reached the cut off considered indicative of OCD. Therefore, many young adults may experience symptoms of OCD, without developing to clinical levels. 'Watchful waiting' is a term used within health settings to describe an allowed period of time prior to intervention; mild depression is sometimes treated in this manner within the National Health Service (NHS) in the United Kingdom (NHS, 2011). The effectiveness of watchful waiting periods for symptoms of depression has been shown to be minimal in those seeking

treatment in primary care and mediated by avoidant coping styles (Hegel, Oxman, Hull, Swain, & Swick, 2006); however, research on the potential benefits of watchful waiting for those with mild symptoms of OCD, in particular young adults, is required. An alternative to watchful waiting could be a period of 'active waiting', during which the individual could engage in symptom monitoring. The effects of watchful waiting, symptom monitoring and psychoeducation as stand-alone interventions require further research in order to clarify the most effective approach to 'sub-clinical' or mild levels of OCD.

Intrusive thoughts are a key feature in OCD, but are also characteristic of other mental health disorders, such as Generalised Anxiety Disorder (GAD), Depression and Post-Traumatic Stress Disorder (PTSD; Brewin, 1998; Purdon, 1999; Green, 2003; Watkins, 2004). Thus the development of an effective early intervention for OCD has implications for the prevention and intervention with other disorders. An effective intervention for intrusive thoughts based on psychoeducation could span a number of clinical disorders; however, potential differences between disorders should be taken into consideration and psychoeducation information adapted to be specific. Previous research on intrusive thoughts in clinical disorders suggests that they are more frequent, unpleasant and uncontrollable in OCD compared to depression and other anxiety disorders (Morillo, Belloch, and García-Soriano, 2007). Future research should continue to examine the potential differences in the experience of intrusive thoughts between clinical disorders in order to determine whether they might be treated in the same manner, or whether their respective features require different treatment approaches. Future work might

consider a continuum framework of disorders, and focus on the comparison of clinical symptoms with similar 'normal' experiences. Such an understanding could help to develop a normalising approach within mental health, and could potentially serve to reduce the stigma associated with a range of mental health problems.

3.3 Reflections

The process of conducting the current research was an excellent professional development experience for the researcher. The difficulties and successes encountered allowed the researcher to build upon existing skills, and develop new skills. Reflection upon the methodological choices made highlights alternative solutions, which can inform future research and practice; a discussion of the researcher's experience follows.

Previous experience of doctoral level research in Psychology afforded the researcher a good grounding in applied psychology, including knowledge and skills in quantitative research methods. The researcher was able to extend previous research conducted within Cognitive Psychology to a study with clinical implications, and thus develop further a keen interest in intrusive thoughts. A familiarity with research on intrusive thoughts aided the researcher in developing ideas for the current study, in collaboration with the supervisor. In particular, the researcher included measures of reactions to intrusive thoughts (EBRIQ) and experiential avoidance (AAQ), in order to test whether normalising information may impact how the individual responds to their intrusive thoughts in a broader sense. In addition, the researcher's previous research included the use of the internet to develop a questionnaire

measure of intrusive thoughts, which allowed the application of existing skills to create a database for the collation of online data files.

The process of the current research has also allowed the researcher to gain new skills and knowledge. The researcher's knowledge about the cognitive factors relating to OCD was developed, specifically, knowledge about the cognitive models of OCD and an increased awareness of self-report measurement of OCD symptoms and the application of these within research. Upon reflection and with a broader knowledge of the measures of obsessive symptoms, the researcher can consider the benefit of assessing different aspects of OCD symptomatology, for example measures of symptom severity (Y-BOCS-SR) and associated distress (PI-WSUR) would add to the measure used (LOI-SF). Multiple measures were considered inappropriate within the design of the current research, as increased length of assessment time would potentially impact attrition rate through the study.

The process of conducting the current research also allowed the researcher to develop skills in quantitative research with clinical implications; through the planning stages, the researcher learned that it is important to consider the impact of the study on clinical practice and to develop aims accordingly. The researcher also developed more generic skills in time management and organisation; for example, in order to write the current research into a thesis it was necessary to carefully plan available time and set regular deadlines, which helped the researcher to mark achievements and keep track of progress.

The researcher was challenged to develop further skills and knowledge in order to overcome specific difficulties encountered during the process of

the research; for example, difficulties with recruitment necessitated a re-design of the study part way through the research process. The initial design of the study included recruitment from an adolescent population (12-16 years); a plan to recruit through schools was implemented. Secondary schools within the North of England were contacted by email and telephone and asked to help with the research by allowing the researcher to promote the study to their pupils. Unfortunately the initial part of this strategy was unsuccessful and no schools were able to provide help with recruitment: The timing of the project was cited as the main reason for schools being unable to participate, as many were entering an exam period, followed by summer holidays. A solution to this difficulty was decided between the researcher and supervisor; and online recruitment via advertising on 'Facebook' (the online social networking site) was subsequently pursued. Ethical approval for this amendment was gained. The advert was targeted to individuals aged 13-16 years on Facebook, and gained 1,645,103 impressions within the profiles of those that met the age criteria. Within the course of four weeks, the advert attracted 557 'clicks' (individuals that clicked the advert were directed to the study 'homepage', which contained further information on the study); 15 individuals registered to participate in the study, of which only 5 were screened in and randomised to a condition. Therefore the researcher and supervisor concluded that advertising through Facebook was not an efficient form of recruitment for the current research. The researcher reinvested recruitment energies into continued contact with schools at the start of a new school year; however, there was limited uptake. Eighty-three schools were contacted; two schools allowed the researcher to promote the study to pupils

during assembly; fifteen pupils registered to participate in the study and three were screened in.

The researcher had previous experience of successful recruitment to an online study via University webpages; therefore, the decision was made to alter the age range of the target population in order to include undergraduate students at the University of Manchester and thus allow recruitment through the University's volunteering webpages. The undergraduate student population represented an age at high risk of developing OCD, and an appropriate limitation on age was selected (18-20 years) in order to capture individuals for whom a preventative intervention might be most effective. Due to the alteration in the target population, further changes to the study were also necessary: the adult versions of the Meta-cognitions Questionnaire (MCQ-30) and Leyton Obsessional Inventory (LOI-SF) replaced the child versions (MCQ-A; LOI-CV). In addition, ethical approval was sought for an amendment to the study by re-submission of a revised protocol to the School of Psychological Studies ethical committee. Following these changes, recruitment to the study was successful for participants aged 18-20 years; within three months of advertising the research on the University volunteering webpage a sufficient number of participants (n = 216 completed screening; n = 148 screened into the second phase of study) had completed the study.

Upon reflection on the recruitment process for an adolescent sample, it is disappointing that modern possibilities (e.g. Facebook) were not successful. Although the advert was accessed, this did not translate into completed participants. Two possible reasons for this drop in numbers were considered. Firstly, potential participants were not offered an incentive for completing the

study. Many advertisements on Facebook offer an incentive for the completion of surveys such as a prize draw for money or valuable items. However, ethical considerations prevented the inclusion of payment for adolescent participants. In addition, the length and formality of the study may have discouraged potential participants from taking part, as this presentation is inconsistent with the usual informality of Facebook. Participants were asked to provide parental consent, as well as their own assent, to participate in the study. The necessary dual consent may have been a barrier to adolescents registering to take part in the research, as they may not want their parents to monitor their access on the internet. Although, recruitment of adolescents may have been more successful if parental consent were not necessary for under 16 years, this would instigate ethical concerns about the control that parents have over their child's welfare.

Recruitment within schools may have been more successful with increased time. The study may have required further adjustments to encourage pupils to participate; for example, rather than an online presentation that participants access at home, an alternative may be for a paper or hard disk based version that could be conducted within the school. The current research was time limited and did not allow for these adjustments; however, future research in this area may consider alternative formats and designs in order to maximise recruitment of an adolescent sample.

A large sample was afforded through online recruitment of undergraduate students; however, this design led to a high attrition rate and resultant missing data. Pairwise deletion of cases during statistical analyses allowed a resolution for the problem of missing data, which maintained the

maximum amount of data within each analysis. The attrition rate of the current research highlights an ethical benefit of online research for the participant; participants may feel less obligation or pressure to complete the study and therefore more readily withdraw. However, the rate of withdrawal may not accurately reflect the proportion of people that no longer wish to participate, but rather may be a product of the setting conditions in which they are participating. The increased accessibility of the internet within modern culture may have resulted in some participants accessing the study in less than ideal circumstances, which may have been a hindrance to participating in the study through to the end. For example, participants may have accessed the study in public places, such as the library, and been disturbed when attempting to participate. The attrition rate may be reduced in future online research by consideration of the setting conditions; for example, provision of an appropriate environment for individuals to access the study, or stating that privacy and quiet may be required to complete the study. An alternative reason why individuals may have withdrawn before completing the study is that the questionnaire measures used were too long (the MCQ-30 and LOI-SF were the longest measures, with thirty items each). Future studies could make use of brief but valid measures; existing measures could be developed to be shorter, or idiosyncratic measures could be developed to capture the variable of interest, for example one question that assesses a particular meta-cognitive belief, such as thought-action fusion. The advantage of briefer measures on retention rates within research must be considered alongside the potential loss of detail, which would be obtained from longer, more extensive measures.

The response rate to the two-week follow-up may be considered to be low, and representing a limitation to the research presented. Those participants that responded at follow-up may not accurately represent the population of interest, or the sample at time of intervention. Those individuals lost to follow-up may have been less motivated to complete the study, and may have shown a difference in the observed outcome compared to those participants that did respond at follow-up. Higher levels of concern about intrusive thoughts may have motivated follow-up respondents, which could also bias the observed outcome. Therefore statistical analyses were conducted to confirm whether the two sub-groups differed on pre and post measures; non-significant results indicated that the groups were similar at the first two time points.

A high drop out rate is a common problem of internet-based health research; Eysenbach (2005) specifically referred to high drop out rates as a "natural and typical feature" of internet-based trials, particularly self-help applications (p.e11). High rates of attrition have been reported by previous internet-based health research; for example 1% and 0.5% of two samples completed self-help trials for panic disorder (Farvolden, Denisoff, Selby, Bagby, & Rudy 2005) and for depression (Christensen, Griffiths, Korten, Brittliffe, & Groves, 2005) respectively. Similarly low response rates at follow-up have previously been reported within internet-based studies, for example, 35% of a sample completed one-month and two-month follow-up questionnaires within an online smoking-cessation trial (Etter, 2005). Differences in the length of the current and previous studies may account for differences in attrition; for example, the trial reported by Farvolden et al.

consisted of 12-weekly sessions of Cognitive Behavioural Therapy. However, the low retention and follow-up response reported within previous research is illustrative of the difficulties with retaining participants within internet-based research. Eysenbach described “the law of attrition” as a “fundamental characteristic and methodological challenge” of online health trials and purported that a possible solution may be to “weed out” participants that have been randomised to the intervention group who will not want to continue with it (p.e11). Future online research may consider the use of such a method of selection; the possible selection bias that may result would require consideration when interpreting results. However, the success of any intervention is dependent upon the target population gaining access; perhaps a consideration for internet-based interventions is whether the willingness to commit to an internet-based trial is a necessary characteristic of the target population.

The general success of recruitment via the internet in the current research illustrates the potential for online research; the internet provides a means of reaching a wide audience and therefore has great potential for psychological research. However, further work on the effectiveness of different methodologies is warranted. The current approach is to apply existing quantitative methods to this new forum; perhaps it would be a fruitful line of research to investigate the relative success of these methods (e.g. questionnaire, intervention), and consider the possibility of developing new specific research methods for online research. The success of online communities and online social networks may be a valuable source of information in how to conduct psychology research online, indicating the

ways in which people access the internet and for what purpose. In addition, collaborations between psychologists and computer/internet experts may be beneficial to the development of psychological research in the modern age. In light of the current research, it is evident that the internet offers a means for large-scale or public-level interventions. If early interventions for OCD, such as psychoeducation and normalisation, are shown to be successful, further research could assess the effectiveness of delivery via the internet to large samples.

3.4 Summary

This thesis investigated the continuum of intrusive thoughts to obsessions; the work presented represents a developed understanding of obsessive intrusive thoughts and a test of an intervention aimed at normalising intrusive thoughts in a sample of individuals with high levels of problematic meta-cognitive beliefs. The literature review (paper one) provided the context and background to the empirical work by exploring the experience of intrusive thoughts in the nonclinical population. The empirical work (paper two) expanded on previous research on psychoeducation and the effects of this information on beliefs about intrusive thoughts. The findings of an overall reduction in meta-cognitive beliefs, but no benefit of the normalising information, were discussed within the context of symptom monitoring and regression to the mean. The work presented within this thesis extends the research on intrusive thoughts, and suggests future directions for both research and clinical practice.

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Appendix 1a

Cognitive Therapy and Research Instructions for Authors

Cognitive Therapy and Research

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Rick E. Ingram, Ph.D

Department of Psychology

1415 Jayhawk Blvd

University of Kansas

Lawrence, KS 66045

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Appendix 1b

Behaviour Research and Therapy Instructions for Authors

Guide for Authors

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Appendix 2

List of search terms used for literature review

Intrusive thoughts

Non-clinical obsessions

Obsessions

Obsessional thoughts

Cognitive intrusions

Intrusive thoughts AND non-clinical

Obsessive intrusive thoughts

Appendix 3

Advertisement for Recruitment

Posting subject (title):
Coping with intrusive thoughts

Details:
We are looking for people aged 18-20 years to take part in an online questionnaire study about intrusive thoughts. Those who take part will be entered into a prize draw to win one of three £20 cash prizes!

Intrusive thoughts are the kind of thoughts that pop into your head unexpectedly. This research looks at young people's beliefs about intrusive thoughts and how they cope with them.

The research is entirely online and involves providing your answers to a number of questionnaires. There are three parts to the study:

The first part involves completing four questionnaires about your thoughts and how you cope with them; this part will take about 10 minutes.

Eligible individuals will then be asked to complete an online quiz, which will take about 10 minutes. After the quiz you will be asked to complete part two of the study, which is to complete the same online questionnaires as in part one. The third and final part of the study will involve completing those online questionnaires again in two weeks time.

All participants in the study will be entered into a prize draw to win one of three £20 cash prizes!

If you would like to take part you can follow the link below. On our webpage you will find further information about the study, be able to register to take part, and get started straight away!

http://www.howteensthing.org.uk

If you would like any further information you can email the experimenter, Lisa-Marie Berry:

lisa-marie.berry@postgrad.manchester.ac.uk

Appendix 4

Participant Information Sheet

MANCHESTER 1824

The University of Manchester

Project no
588/07p

SCHOOL OF PSYCHOLOGICAL SCIENCES

Participant Information Sheet

Title of project: Intrusive thinking in young people

Introduction

Intrusive thoughts are thoughts that pop into your head unexpectedly. People have different beliefs about these thoughts, and react differently to them: some are upset by them, others are not. This study will look at young people's beliefs about intrusive thoughts and how they cope with having such thoughts.

What will I be asked to do if I take part?

The research is entirely online. Therefore you will complete the study through the University webpages.

Part one: You will be asked to fill in four questionnaires about your experience of intrusive thoughts. These questionnaires should take about 10mins.

The questionnaires include the following questions:

- When I start worrying I cannot stop
- Are you fussy about keeping your hands clean?"

- I often catch myself daydreaming about things I've done and what I would do differently next time
- My thoughts distract me

Part two: Straight after the questionnaires, those people that score over our cut off on the questionnaires, will be asked to complete an online quiz. The answers will then be given to you, so you can see how you did. The quiz should take about 10minutes. You will then be asked to fill in the same four questionnaires again online. This should take about 10mins.

Part three: Those people that completed part two will be emailed two weeks later and asked you to finish the study. This will involve filling in the four questionnaires one last time online, which will take about 10mins.

Will my data be confidential?

The questionnaires that you answer in the study will be made anonymous. This means that all information that identifies you will be removed from the data. The data will be stored securely at all times. It will not be possible for anyone to identify you in any report produced from this research.

Do I have to take part?

You do not have to take part in the study. If you decide to take part you will be asked to indicate that you have read this information sheet and consent to taking part. If you decide to take part and then later change your mind, either before you start the study or during it, you can withdraw without giving reason.

Where can I get more information if I need it?

If you want more information about the research or have any questions please contact:

The experimenter:

Lisa-Marie Berry.

Email: lisa-marie.berry@postgrad.manchester.ac.uk

Or the project supervisors:

Dr. Ben Laskey.

Email: blasky@cornwall.gov.uk

Dr. Dan Pratt

Email: daniel.pratt@manchester.ac.uk

Thank you for taking the time to read this information.

This project has been approved by the

School of Psychological Sciences Research Ethics Committee

Appendix 5

Participant Consent Form

Before you register to take part in this study, we are required to ask you to indicate your consent by answering the questions below.

1. Have you read the Participant Information Sheet?

Yes

No

2. Have you received enough information about the study?

Yes

No

3. Do you understand that you do not need to take part in the study and if you do enter you are free to withdraw:

- at any time
- without having to give a reason for withdrawing
- and without detriment to you?

Yes

No

4. Do you agree to take part in this study?

Yes

No

To print this page, please click on the print button in your browser.

This project has been approved by the School of Psychological Sciences Research Ethics Committee.

Research Ethics Committee

School of Psychological Sciences

The University of Manchester

Oxford Road

Manchester

M13 9PL

Appendix 6

Quizzes

Appendix 6a

Control (pet) quiz

A pet is a tamed animal kept for amusement or companionship.

The following 6 webpages make up a quiz based on information about pets in the U.K. – you'll be asked about pets and how common different types are. Please read each question carefully and have a go at guessing the answer!

Page one:

What proportion of people in the U.K. said that they have a pet?

Less than 1/4

Between ¼ and ½

Between ½ and ¾

Over ¾

(Answer: between ¼ and ½)

Can you estimate the percentage of people that said that they have a pet?

(Answer = 43%)

Page two:

Can you put these different types of pets in their correct category?

Categories:

1. Dog

2. Cat

3. Rabbit

4. Bird

5. Guinea pig

Greyhound (Answer = 1)

Lionhead (Answer = 3)

Budgie (Answer = 4)

Manx (Answer = 2)

Peruvian (Answer = 5)

Holland Lop (Answer = 3)

Bengal (Answer = 2)

Texel (Answer = 5)

Border Collie (Answer = 1)

Cockatiel (Answer = 4)

Page three:

Please rank order these types of pets according to which are most common in the U.K. So that 1 is most common and 5 is least common.

Birds (Answer = 4)

Guinea pigs (Answer = 5)

Dogs (Answer = 1)

Rabbits (Answer = 3)

Cats (Answer = 2)

Page four:

Of all of the pets in the U.K., what percentage are of these types?

Birds (Answer = 1.8%)

Guinea pigs (Answer = 1.3%)

Dogs (Answer = 23%)

Rabbits (Answer = 2.8%)

Cats (Answer = 20%)

Page five:

What was the maximum number of pets people reported having?

(Answer = 5)

What was the most common number of pets people reported having?

(Answer = 1)

Page six:

What percentage of people in the U.K. do not own any pets?

0-100% (Answer = 67%)

Appendix 6b

Normalisation quiz

Introduction

Intrusive thoughts are thoughts that pop into your head unexpectedly. People have different beliefs about these thoughts, and react differently to them: some are upset by them, others are not.

A survey was conducted with a group of young adults about their experience of intrusive thoughts. The following 6 webpages make up a quiz based on this information – you'll be asked different questions about how common intrusive thoughts are. Please read each question carefully and have a go at guessing the answer! The answers will appear so you can check how you've done.

Page one:

What proportion of young people said that they have intrusive thoughts?

(Please select one answer)

Less than ¼

Between ¼ and ½

Between ½ and ¾

Over ¾

(Answer = over ¾)

Can you estimate what percentage of young people said that they have intrusive thoughts?

0 – 100%

(Answer = 99%)

Page two:

Can you put these different types of intrusive thoughts in their correct category?

Categories:

1. Self-doubt
2. Reckless driving
3. Thoughts about sex
4. Thoughts about verbal or physical aggression
5. Thoughts about disease and contamination

An accident resulting from leaving the oven or hob on (Answer = 1)

Running the car off the road (Answer = 2)

Insulting strangers (Answer = 4)

Being robbed due to leaving the house unlocked (Answer = 1)

Thinking about dirt in unseen places (Answer = 5)

Having sex in public (Answer = 3)

Imagining strangers naked (Answer = 3)

Catching a sexually transmitted disease (Answer = 5)

Throwing something (Answer = 4)

Imagining authority figures naked (Answer = 3)

Page three:

Please put the following intrusive thoughts in order of which is most

commonly experienced by people, so that 1 is the least common and 10 is the most common.

An accident resulting from leaving the oven or hob on (Answer = 9)

Running the car off the road (Answer = 6)

Insulting strangers (Answer = 5)

Being robbed due to leaving the house unlocked (Answer = 10)

Thinking about dirt in unseen places (Answer = 2)

Having sex in public (Answer = 7)

Imagining strangers naked (Answer = 8)

Catching a sexually transmitted disease (Answer = 4)

Throwing something (Answer = 1)

Imagining authority figures naked (Answer = 3)

Page four:

We asked people which of these intrusive thoughts they commonly experienced. Estimate what percentage of people reported having the thought (out of 100% for each thought).

An accident resulting from leaving the oven or hob on (Answer = 72%)

Running the car off the road (Answer = 60%)

Insulting strangers (Answer = 55%)

Being robbed due to leaving the house unlocked (Answer = 73%)

Thinking about dirt in unseen places (Answer = 35%)

Having sex in public (Answer = 64%)

Imagining strangers naked (Answer = 66%)

Catching a sexually transmitted disease (Answer = 52%)

Throwing something (Answer = 27%)

Imagining authority figures naked (Answer = 48%)

Page five:

Out of a list of 52 intrusive thoughts, what was the maximum number of intrusive thoughts that women reported having?

(Answer = 21)

And men…

(Answer = 40)

Out of a list of 52 intrusive thoughts, what was the average number of intrusive thoughts that women report having?

(Answer = 7)

And men…

(Answer = 8).

Page six:

What percentage of people reported experiencing no intrusive thoughts?

0-100% (Answer = 1%)

Appendix 7

The Meta-Cognitions Questionnaire - 30

Listed below are a number of beliefs that people have about their thoughts.

Please read each item and indicate how much you agree with it by clicking the appropriate button.

Please respond to all the items. There are no right or wrong answers.

(Scale: do not agree = 1; agree slightly = 2; agree moderately = 3; agree very much = 4)

1. Worrying helps me to avoid problems in the future
2. My worrying is dangerous for me
3. I think a lot about my thoughts
4. I could make myself sick with worrying
5. I am aware of the way my mind works when I am thinking through a problem
6. If I did not control a worrying thought, and then it happened, it would be my fault
7. I need to worry in order to remain organized
8. I have little confidence in my memory for words and names
9. My worrying thoughts persist, no matter how I try to stop them
10. Worrying helps me to get things sorted out in my mind
11. I cannot ignore my worrying thoughts

12. I monitor my thoughts
13. I should be in control of my thoughts all of the time
14. My memory can mislead me at times
15. My worrying could make me go mad
16. I am constantly aware of my thinking
17. I have a poor memory
18. I pay close attention to the way my mind works
19. Worrying helps me cope
20. Not being able to control my thoughts is a sign of weakness
21. When I start worrying, I cannot stop
22. I will be punished for not controlling certain thoughts
23. Worrying helps me to solve problems
24. I have little confidence in my memory for places
25. It is bad to think certain thoughts
26. I do not trust my memory
27. If I could not control my thoughts, I would not be able to function
28. I need to worry, in order to work well
29. I have little confidence in my memory for actions
30. I constantly examine my thoughts

Appendix 8

The Leyton Obsessional Inventory – Short Form

Please read each question and rate whether it is true or false for you by clicking the appropriate button.

There are no right or wrong answers.

(Scale: Yes = 1; No = 0)

(Reverse scored items: 5, 9, 11, 13, 15, 16, 17, 19, 21, 22, 23, 24, 25)

1. I avoid using the public telephone because of possible contamination
2. I frequently get nasty thoughts and have difficulty getting rid of them
3. I am more concerned than most people about honesty
4. I am often late because I can't seem to get through everything on time
5. I don't worry unduly about contamination if I touch an animal
6. I frequently have to check things; for example, gas or water taps, doors, etc., several times
7. I have a very strict conscience
8. I find that almost every day I am upset by unpleasant thoughts that come into my mind against my will
9. I do not worry unduly if I accidentally bump into somebody

10. I usually have serious doubts about the simple, everyday things I do
11. Neither of my parents was very strict during my childhood
12. I tend to get behind in my work because I repeat things over and over again
13. I use only an average amount of soap
14. Some numbers are extremely unlucky
15. I do not check letters over and over before mailing them
16. I do not take a long time to dress in the morning
17. I am not excessively concerned about cleanliness
18. One of my major problems is that I pay too much attention to detail
19. I can use well-kept toilets without any hesitation
20. My major problem is repeated checking
21. I am not unduly concerned about germs and diseases
22. I do not tend to check things more than once
23. I do not stick to a very strict routine when doing ordinary things
24. My hands do not feel dirty after touching money
25. I do not usually count when doing a routine task
26. I take a rather long time to complete things my washing in the morning
27. I do not use a great deal of antiseptics

28. I spend a lot of time every day checking things over and over again

29. Hanging and folding up my clothes at night does not take up a lot of time

30. Even when I do something very carefully, I often feel that it is not quite right

Appendix 9

Emotional and Behavioural Reactions to Intrusions Questionnaire

Intrusive thoughts are spontaneously occurring thoughts that "pop" into your head without effort and capture your attention

This question is about how you react to intrusive thoughts.

Please rate each statement using the scale provided (Scale: 0 = never; 4 = every time)

When you have an intrusive thought, how often do each of the following statements apply:

1. It makes me feel I am losing control of my thoughts
2. It makes me feel miserable
3. It distracts me from what I am doing
4. I act on the thought
5. It makes me anxious
6. It interferes with how well I carry out what I'm doing
7. It makes me irritable

Appendix 10

The Action and Acceptance Questionnaire

Below you will find a list of statements. Please rate your to what extent you agree with each statement as it applies to you. Use the following scale to make your choice.

(Scale: 1 = never true, 2 = very rarely true, 3 = seldom true, 4 = sometimes true, 5 = frequently true, 6 = almost always true, 7 = always true)

(Scoring: 1, 4, 5, 6 reverse coded. Total of all items)

1. I am able to take action on a problem even if I am uncertain what is the right thing to do.
2. I often catch myself daydreaming about things I've done and what I would do differently next time.
3. When I feel depressed or anxious, I am unable to take care of my responsibilities.
4. I rarely worry about getting my anxieties, worries, and feelings under control.
5. I'm not afraid of my feelings.
6. When I evaluate something negatively, I usually recognize that this is just a reaction, not an objective fact.
7. When I compare myself to other people, it seems that most of them are handling their lives better than I do.

8. Anxiety is bad.
9. If I could magically remove all the painful experiences I've had in my life, I would do so.

Appendix 11

Means Plots

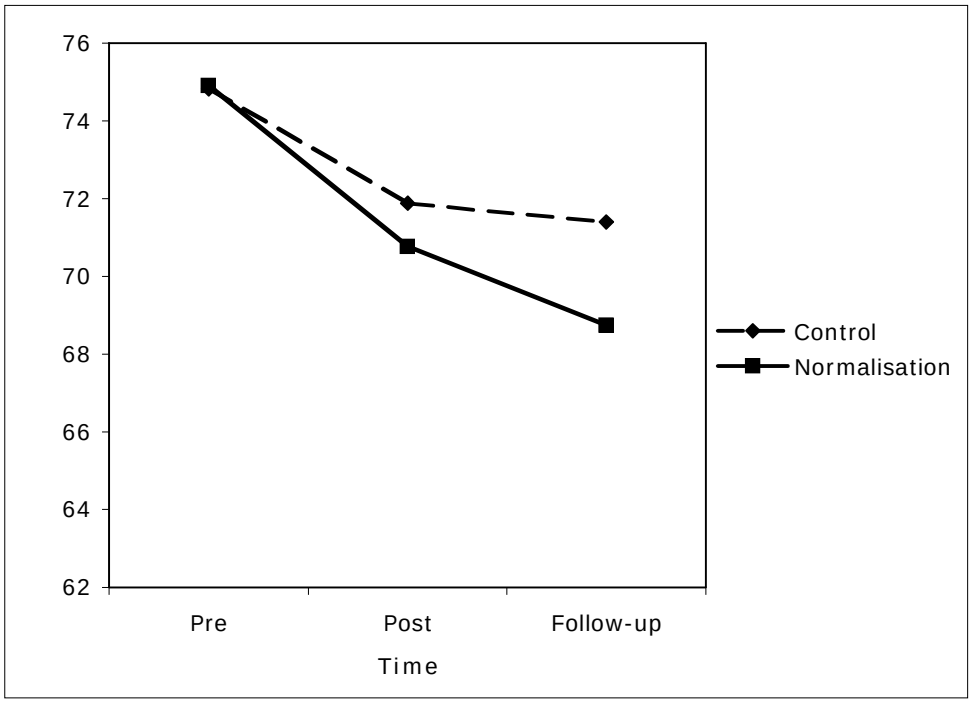

Figure 2. Mean MCQ-30 total scores over time by condition

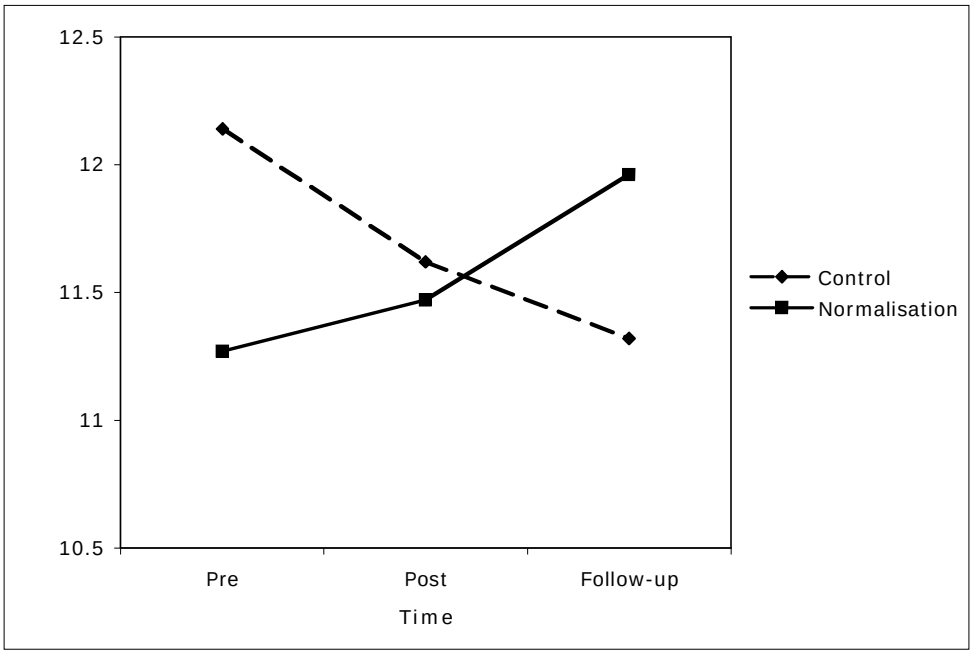

Figure 3. Mean LOI-SF score over time by condition

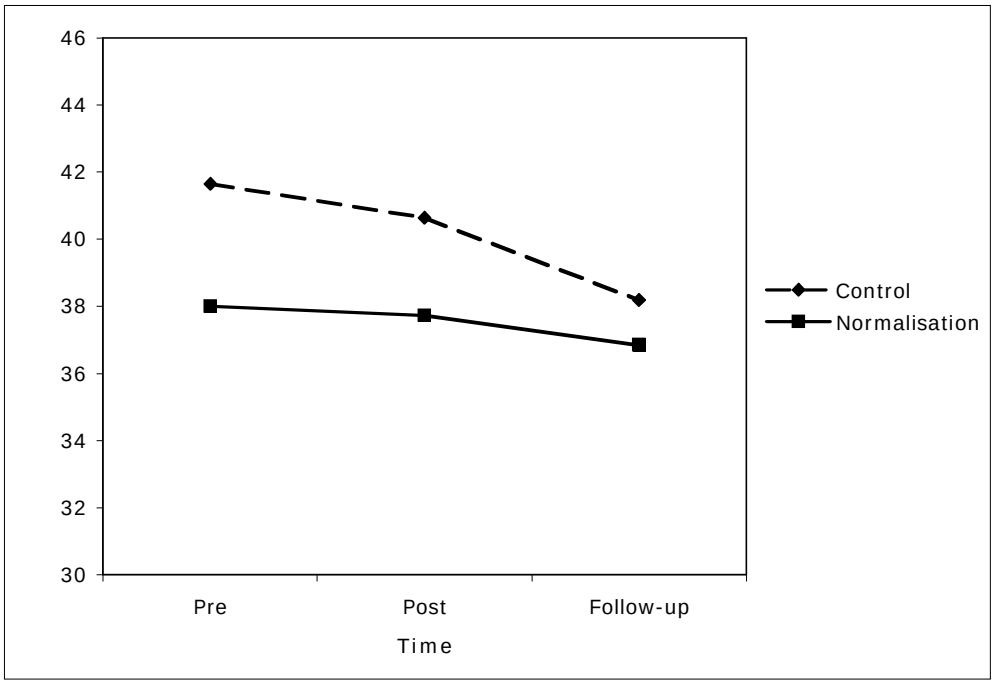

Figure 4. Mean EBRIQ score over time by condition

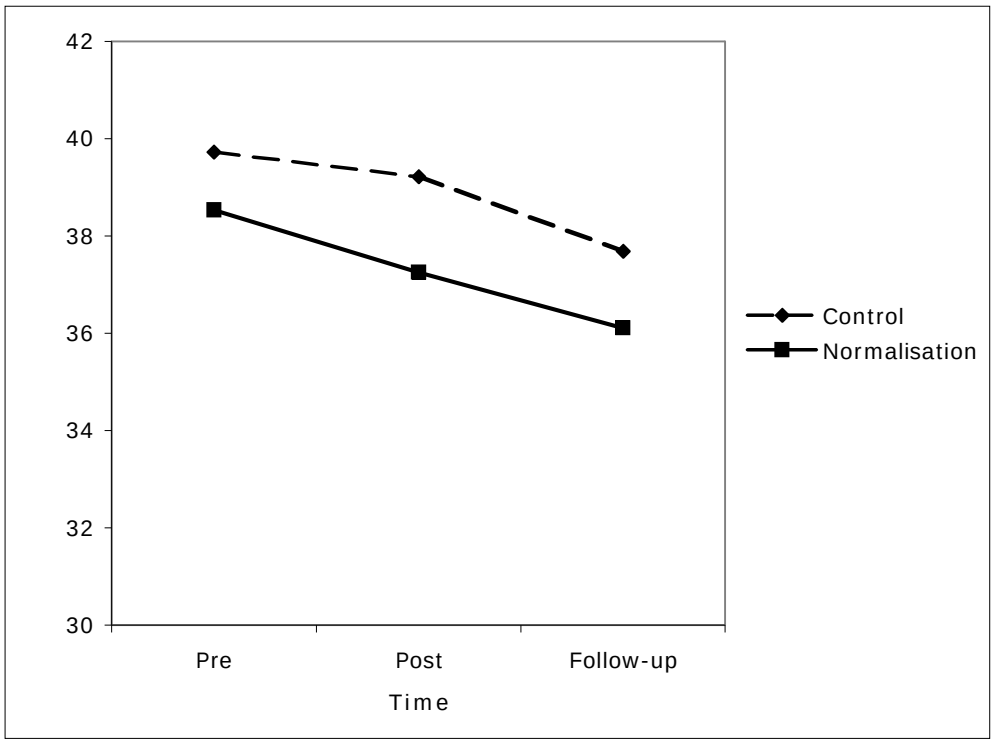

Figure 5. Mean AAQ score over time by condition.

Appendix 12

Preliminary Analysis: Normality Assessment

Table 2. Normality assessment

Measure	Skewness (SE)	Kurtosis (SE)	Kolmogorov-Smirnov (df)
Pre MCQ-30			
Control	.42 (.28)	-.34 (.56)	.08 (73)
Normalisation	.84 (.28)	.16 (.55)	.13 (75)**
Pre LOI-SF			
Control	.01 (.29)	-.53 (.56)	.08 (71)
Normalisation	.05 (.28)	-.53 (.56)	.11 (73)*
Pre EBRIQ			
Control	-.31 (.29)	.30 (.56)	.08 (70)
Normalisation	-.46 (.29)	-.48 (.57)	.14 (70)**
Pre AAQ			
Control	.09 (.29)	-.43 (.58)	.09 (67)
Normalisation	-.16 (.30)	-.24 (.58)	.10 (66)
Post MCQ-30			
Control	.27 (.31)	-.25 (.60)	.10 (61)
Normalisation	.76 (.31)	.47 (.61)	.11 (60)
Post LOI-SF			
Control	.14 (.31)	-.17 (.62)	.08 (58)
Normalisation	.17 (.31)	-.58 (.61)	.09 (60)

Measure	Skewness (SE)	Kurtosis (SE)	Kolmogorov-Smirnov (df)
Post EBRIQ			
Control	-.88 (.34)	1.10 (.67)	.10 (48)
Normalisation	-.54 (.31)	-.58 (.61)	.09 (60)**
Post AAQ			
Control	.13 (.33)	-.22 (.64)	.06 (53)
Normalisation	.00 (.31)	-.79 (.61)	.10 (59)
Follow-up MCQ-30			
Control	.89 (.41)	.30 (.81)	.14 (32)
Normalisation	.28 (.43)	.93 (.85)	.10 (29)
Follow-up LOI-SF			
Control	.05 (.43)	-.16 (.83)	.15 (30)
Normalisation	.80 (.43)	-.50 (.85)	.20 (29)**
Follow-up EBRIQ			
Control	.54 (.43)	-.67 (.83)	.13 (30)
Normalisation	-.73 (.44)	-.15 (.86)	.12 (28)
Follow-up AAQ			
Control	.02 (.43)	-.24 (.83)	.10 (30)
Normalisation	.24 (.44)	-.49 (.86)	.09 (28)

* $p < .05$
** $p < .005$

Appendix 13

Rank Analysis of Covariance

The following procedure was followed within SPSS to replicate the rank analysis of covariance (Quade, 1967):

1. All cases of the dependent variable (MCQ-30 total) were ranked.

2. A linear regression of the ranks of the dependent variable (post MCQ-30) on the ranks of the covariates (pre MCQ-30) was conducted. The residuals from this analysis were saved.

3. A one-way analysis of variance (ANOVA) was conducted with the residuals (from the regression analysis in step 2) as the dependent variable, and condition as the independent variable. The F statistic provided a test of the difference between conditions on post MCQ-30 scores, controlling for pre MCQ-30 scores.

The difference in post MCQ-30 scores between the control normalisation conditions, controlling for pre MCQ-30 scores was non-significant $F(119) = 1.61$, $p = .207$.