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THE RELATIONSHIP BETWEEN CAUSAL CONSTRUCTS RELATED TO OBSESSIVE-COMPULSIVE DISORDER

A thesis submitted for the degree Doctor of Philosophy

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UNIVERSITY OF SUSSEX

GARY BRITTON

THE RELATIONSHIP BETWEEN CAUSAL CONSTRUCTS RELATED TO OBSESSIVE- COMPULSIVE DISORDER

Summary

Obsessive-Compulsive Disorder (OCD) is characterised by intrusions into conscious thinking by repetitive, personally abhorrent, absurd and alien thoughts (obsessions) which lead to endless repetitive acts or rehearsal of irrational and sometimes bizarre mental and behavioural rituals (compulsions). Although a number of clinical constructs have been proposed to have a causal influence on OC symptoms, extremely little research exists examining how these constructs are related to each other and, further, how the relationships between these constructs influences each constructs relationship with OC symptoms (e.g. does a given construct have an independent role in influencing OC symptoms or is the constructs influence on OC symptoms being mediated by its influence on another intervening construct or constructs?). In the current thesis, the relationships between 5 clinical constructs were examined, as well as how the pattern of these relationships may affect each constructs influence on OC symptoms. A large questionnaire study suggested that the five constructs are best seen as separate constructs rather than indicators of one underlying construct. Separate experimental studies in which all 5 constructs were manipulated individually suggest that whilst inflated responsibility, intolerance of uncertainty and negative mood, respectively, all causally influence every other construct focused on in this thesis, not just right experiences and as many as can stop rules, respectively, do not casually influence any other construct. Subsequent regression analyses suggest that whilst some constructs directly influence OC symptoms, other constructs influence on OC symptoms are mediated by intervening constructs in the final model, whilst some constructs have little to no influence on OC symptoms when the influence of other constructs in the final model are taken into account. Implications of these findings for existing models of OCD, for studies examining the relationship between multiple constructs and OC symptoms and for the treatment of OCD are discussed.

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Abbreviations

All abbreviations should be explained within the text. However, for ease of reference some of the most common abbreviations are listed below.

OCD: Obsessive-Compulsive Disorder

OC: Obsessive-Compulsive

IU: Intolerance of Uncertainty

NJRE: Not Just Right Experience/s

AMAC: “As many as can” stop rules

FLC: “Feel like continuing” stop rules

MAI: Mood as Input

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1. Chapter 1: General Introduction and overview

1.1.1. Obsessive-Compulsive Disorder and Compulsive Checking

1.1.2 Introduction

This chapter will begin with definitions of Obsessive-Compulsive Disorder and briefly discuss prevalence rates and comorbidity. It will then take a detailed look at 5 constructs which have been proposed as having potentially casual effects on OC symptoms and in particular on compulsive checking: inflated responsibility, intolerance of uncertainty (IU), not just right experiences (NJRE), negative mood and “as many as can” stop rules (AMAC stop rules). The chapter will conclude by outlining some of the limitations of research in this area and outlining briefly the experiments to be conducted in this thesis.

1.1.3 Definitions of OCD

OCD is an anxiety disorder and has been described as existing if an individual experiences repeated occurrences of an obsession and/or compulsion which are repeated with the behavioural signs of such experiences. The signs and symptoms are associated with at least a moderate degree of distress and a moderate degree of psychological impairment of psychological function (Rachman & Hodgson, 1980). OCD is considered somewhat differently from other anxiety disorders as it is primarily a thought disorder. OCD is characterised by intrusions into conscious thinking by repetitive, personally abhorrent, absurd and alien thoughts (obsessions) which lead to endless repetitive acts or rehearsal of irrational and sometimes bizarre mental and behavioural rituals (compulsions). The DSM IV (APA, 2000) clearly distinguishes between obsessions and compulsions and provides two separate classifications, one for each.

Obsessions must fulfil all four of the following criteria:

1. Recurrent and persistent thoughts, impulses, or images that are experienced at some time during the disturbance, as intrusive and inappropriate and that cause severe anxiety or distress.
2. The thoughts, impulses, or images are not simply excessive worries about real-life problems.

3. The person tries to ignore or suppress the thoughts, impulses, or images, or to neutralise them with some other thought or action.
4. The person recognises that the obsessional thoughts, impulses, or images are a product of his or her own mind (not imposed from without).

Compulsions are defined as:

1. Repetitive behaviours or mental acts that the person feels driven to perform in response to an obsession, or according to rules which must be applied rigidly.
2. The behaviours or mental acts are aimed at preventing or reducing distress or preventing some dreaded event or situation; however, these behaviours or mental acts either are not connected in a realistic way with what they are supposed to neutralise or prevent or are clearly excessive.

This thesis will be focused on constructs which, although applicable to OCD in general, have been proposed to specifically have a causal influence on compulsive checking. There is good reason for such a focus. Research has shown that checking compulsions are the most common compulsion among individuals with OCD (Rachman, 2003), observed in more than 80% of clinical presentations (Ball, Baer, & Otto, 1996; Rasmussen & Tsuang, 1986; Summerfeldt, Antony, Downie, Richter, & Swinson, 1997). Obsessive checkers engage in such activities as repeatedly checking that windows and doors are locked or that the gas on a fireplace or cooker has been switched off. These types of activities are inconsistent with the individual's belief system and are thus perceived as objectively irrational. They are also extremely distressing for the individual who is unable to continue with normal activities until the urge to compulsively check has totally passed.

1.1.4 Prevalence and comorbidity

Due to a small number of patients presenting with the condition historically OCD was considered a fairly rare disease. Many afflicted with OCD felt the need to keep their repetitive thoughts and behaviours a secret and so failed to seek treatment which resulted in underestimations of the number of people with the condition. However, a survey conducted in the USA in the early 80's by the National Institute of Mental Health (NIMH) provided new insights into the disorder suggesting that OCD affects over 2% of the population which would indicate it is more common than schizophrenia, bipolar disorder or panic disorder

(www.ocdaction.org.uk/ocdfacts.htm). More recent estimates suggest OCD has a lifetime prevalence of 1 to 2.5% (Kessler, Berglund, Demler, Jin, & Waters, 2005). OCD affects all cultural and ethnic groups (APA, 2000; Rasmussen & Eisen, 1992) and females may be slightly more affected than males (Bebbington, 1998). The typical age of onset in OCD is early to mid twenties (i.e., see Lensi *et al*, 1996; Rasmussen & Eisen, 1992) although most patients report some subclinical symptoms in the early teenage years (Rasmussen & Eisen, 1992).

OCD can be comorbid with depression (20.7% to 22%, LaSalle *et al*, 2004), eating disorders: (29.5%, Milos, Spindler, Ruggerio, Klaghofer & Schnyder, 2002), schizophrenia (26%, Nechmad *et al*, 2003) as well as a number of anxiety disorders such as generalised anxiety disorder (1% to 12%, LaSalle *et al*, 2004), social phobia (3.6% to 26%, LaSalle *et al*, 2004) and specific phobia (1% to 12%, LaSalle *et al*, 2004). OCD can also be comorbid with conduct disorders such as attention deficit hyperactivity disorder (25.5% in children, Masi *et al*, 2006.), alcohol abuse or dependence (24.1%, Karno, Golding, Sorenson & Burnam, 1998), other drug abuse or dependence (17.6%, Karno *et al*, 1998) and neurological disorders such as Tourette's syndrome (57% in patients initially diagnosed with either disorder, Leonard *et al*, 1992).

1.1.5 Why focus on the 5 specific constructs focused on in this thesis?

Before going to look in detail at the 5 constructs which will be the focus of this thesis here we briefly offer a justification as to why these five constructs were chosen as the specific focus.

Inflated responsibility was chosen as a specific focus of the thesis for several reasons. Firstly, it is the central construct in several of the most important theoretical models of OCD (Salkovskis 1985, 1989, Rachman, 2002) and plays a key if not central role in others (e.g. Rachman 1997, 1998). Secondly, it has been linked in the literature to OC symptoms probably more than any other construct through both a plethora of questionnaire studies (e.g. Freeston, Ladouceur, Gagnon & Thibodeau, 1993) and experimental studies which directly manipulate inflated responsibility (e.g. Lopatka and Rachman, 1995). Finally, it has been specifically linked to compulsive checking (Rachman, 2002).

IU was chosen as a focus of this thesis for several reasons. It has been linked to OCD through both theory (e.g. Beech and Liddell, 1974) and clinical observation (e.g. de Silva, 2003). It has also been linked to OC symptoms through a large number of questionnaire studies (e.g. Steketee, Frost and Cohen, 1998). Finally, there is a good deal of evidence specifically linking IU to compulsive checking (e.g. Tolin, Abramowitz, Brigidi and Foa, 2003).

NJREs were chosen as a focus of this thesis partly as both theory and research suggest they may be of particular importance to individuals whose OC symptoms are not characterised by *harm avoidance*, which is important to many of the theories of OCD based around inflated responsibility (see e.g. Summerfeldt, 2004, 2007). Further, NJRE have been implicated in important theoretical models of OCD (e.g. Pitman, 1987a), have been linked to OCD in a number of questionnaire studies (e.g. Coles, Frost, Heimberg, & Rhéaume, 2003) and through experimental manipulation (Coles, Heimberg, Frost, Steketee, 2005). Finally, Coles *et al* (2003) found NJREs had particularly strong relationships with specific OCD symptom clusters one of which was compulsive checking.

Negative mood was chosen as a focus for the thesis for a number of reasons. Firstly, it has been proposed to be both a causal factor and a maintenance factor in several models of OCD (Salkovskis 1985; Rachman 1997). Secondly, specific negative moods such as depression are highly comorbid with OCD (e.g. LaSalle *et al*, 2004). Thirdly, experimental research has shown that an increase in negative mood appears to lead to an increase in OC symptoms (e.g. Horowitz, Becker, Moslowitz & Rashid, 1972). Finally, there is specific evidence linking negative mood to compulsive checking (see e.g. McDonald & Davey, 2005b).

Whilst the 4 constructs above were chosen as focuses of this thesis partly as they were seen by the author to be the 4 of the “key” constructs linked to OC symptoms and compulsive checking in the literature at the time work began on this thesis, one less prominent constructs was also chosen as a focus: AMAC stop rules. Although not linked to OCD in the literature as frequently as the above constructs, stop rules have been linked to OC symptoms and compulsive checking through the “mood as in put” hypothesis which suggests that a combination of negative mood and the use of AMAC stop rules increases compulsive checking, with experimental research supporting such predictions (Davey, Startup, Zara, MacDonald & Field, 2003; MacDonald & Davey, 2005b). Whilst there is evidence to support the notion that that the combination of these two constructs increases compulsive checking little is known about how the two constructs interact. It could be the case that one is more proximal to OC symptoms than the other. Further, it has been proposed that AMAC stop rules may represent the precise mechanism through which other constructs like inflated responsibility may manifest their influence on OC symptoms (MacDonald & Davey, 2005a). AMAC stop rules were therefore selected to be a focus in this thesis largely to see how they interact with other mechanisms like negative mood and inflated responsibility.

1.2.1 Inflated responsibility

1.2.2 Definition

The first construct to be addressed here, which has been linked causally to OC symptoms in general and compulsive checking specifically, is perhaps the most prominent construct in the OCD literature, inflated responsibility. The most widely cited definition of inflated responsibility defines the construct as:

The belief that one has power which is pivotal to bring about or prevent subjectively crucial negative outcomes. These outcomes are perceived as essential to prevent. They may be actual, that is, having consequences in the real world, and/or at a moral level.

(Salkovskis, Rachman, Ladouceur, Freeston, Taylor, Kyrios, & Sica, 1996 cited in Salkovskis, 1999, p. 32).

A person high in inflated responsibility is preoccupied with the idea that their actions may lead to harm to themselves or to others and the individual is compelled to prevent such harm from occurring (Salkovskis, 1985, 1989). The individual's preoccupation with preventing harm is of such a magnitude that the individual will act to prevent harm even if the actual probability of harm occurring is very small (Salkovskis, 1985, 1989).

1.2.3 Theories and models

How is inflated responsibility connected to OCD and, more specifically, to compulsive checking? A number of models of OCD are based around the notion of inflated responsibility, the most comprehensive being the cognitive theory of OCD developed by Salkovskis (1985, 1989). This theory assumes that individuals with OCD are also likely to have an inflated sense of responsibility.

The theory begins by arguing that intrusions, such as the thoughts, images and impulses which intrude upon the consciousness in OCD, are experienced by most individuals. According to the theory, it is how these intrusions are *appraised* which is dysfunctional in OCD. Specifically, the individual with OCD appraises the occurrence of an intrusive thought as a sign that they may be responsible for harm to themselves or to others unless they move to prevent it (due to the individual's inflated sense of responsibility). This increases both the saliency and personal

responsibility of the intrusive thought and these two variables combine to turn the intrusion into an obsession. This appraisal also leads to a cycle of other events.

Firstly, according to Salkovskis (1985, 1989), the appraisal leads to adverse mood (anxiety and depression) and this adverse mood state heightens the individual's desire to engage in neutralising actions and safety strategies as well as further increasing the salience and availability of the intrusive thought. The appraisal also leads to the use of counterproductive safety strategies. One example of such a safety strategy is thought suppression. Thought suppression is used by the individual in an attempt to reduce the aversive nature of the thought's content. However, as was shown in the classic "white bear" experiment (Wegner, Schneider, Carter & White, 1987) on the effects of thought suppression on thought frequency, the attempts at thought suppression in fact lead to an increase in the saliency and frequency of the intrusive thought the individual is trying to suppress, which in turn goes on to increase the individual's urge to engage in neutralising actions. Finally, according to Salkovskis's (1985, 1989) model, the appraisal leads to an urge to neutralise the unwanted thought, image or impulse. One can define neutralisation as a voluntary activity which is intended to have the effect of reducing the perceived responsibility attached to the intrusive thought and can be overt (e.g. checking compulsions) or covert (e.g. thought rituals).

Most recently Salkovskis *et al* (1996) proposed that the appraisal also leads to selective attention to threatening aspects of the environment and that this also heightens the salience and availability of the intrusive thought, increases adverse mood and prompts the individual to engage neutralising actions and safety strategies. One can thus see how numerous maladaptive factors arising from the initial appraisal of responsibility help to maintain the intrusive thought and promote further subsequent dysfunctional appraisals. It is the initial dysfunctional appraisal of the intrusive thought however, which indicates that the individual may be responsible for harm to oneself or to others, which is central and most fundamental to the model, with all the other factors stemming from this initial appraisal. That is, it is the individual's sense of inflated responsibility which is the most crucial aspect of the model.

Inflated responsibility also plays a role in Rachman's (1997, 1998, 2002) cognitive theories of OCD. Although responsibility is not "critical" to Rachman's (1997, 1998) theory of obsessions, where obsessions arise from the catastrophic misinterpretations of intrusive thoughts as being of personal significance to the individual and indicative that they are a bad person, those high in responsibility are more vulnerable to making such catastrophic misinterpretations in the first instance.

Inflated responsibility does play a critical role in Rachman's (2002) theory of compulsive checking. Rachman (2002) claimed that checking occurs when an individual believes they have an elevated responsibility for preventing harm (that is, an inflated sense of responsibility). Arising from this initial checking behaviour is a subsequent belief that a perceived threat has not been sufficiently reduced or removed. In an attempt to achieve a degree of certainty about the absence of the threat or a sense of reduced probability that harm will occur the individual will repeatedly check for safety. Rather than reducing or removing the perceived threat however, paradoxically, according to Rachman (2002), these attempts actually generate negative consequences for the individual, which change checking into a self-perpetuating mechanism which comprises of four elements.

Firstly, the individual is unable to effectively seek out the degree of certainty they require that the probability of harm to themselves or others has been adequately reduced or removed. Secondly, the repeated checking actually tarnishes the individual's memory of the task they are undertaking. This subsequently makes achieving a degree of certainty about the reduction or removal of threat less attainable by reducing the individual's confidence in their memory that they have performed a check successfully. The more one checks, the less confidence one has in one's memory. Thirdly, the individual has a cognitive bias whereby they evaluate the probability of harm as being greater when they have a sense of elevated responsibility (e.g. when they are in charge or are on duty, Lopatka & Rachman, 1995). Finally, the individual experiences an *increase* in their sense of personal responsibility after they have completed a safety check (Lopatka & Rachman, 1995). These four elements, according to Rachman (2002), turn checking into a self perpetuating mechanism which maintains checking behaviour.

Although Salkovskis's (1985, 1989) and Rachman's (2002) models differ somewhat, in both models it is the individual's sense of inflated responsibility which is vital in the aetiology of checking compulsions. In both models checking compulsions are engaged in by the individual in order to prevent some perceived harm they believe they are responsible for bringing about. Finally, in both models, the checking behaviours paradoxically increase the individual's sense of responsibility which in turn increases those same checking behaviours.

1.2.4 Support for theories/models

There is support for Salkovskis's (1985, 1989) claim that the occurrence of intrusive thoughts are not confined to people suffering from obsessional problems, but are a universal phenomenon (Rachman & de Silva, 1978; Salkovskis & Harrison, 1984). Most individuals can identify with the experience of a disturbing thought entering consciousness. In fact, studies of the prevalence of intrusive thoughts in students and other nonclinical samples find that 80-99% of individuals report having experienced an intrusive thought in the last 2-4 weeks (Purdon & Clark, 1993, 1994). Despite the fact intrusive thoughts are a relatively common experience, with most individuals experiencing them relatively infrequently and dismissing them quickly, about 2-4% of the population are regularly haunted by obsessive thoughts (Rasmussen & Eisen, 1992. See also Fritzler, Hecker & Fawzy, 2008, for experimental support of some of Salkovskis's models more specific mechanisms).

Numerous studies support Rachman's (2002) claim that repeated checking reduces confidence in one's memory of the checking event (e.g. Coles, Radomsky & Horng, 2006). Several studies also support the idea that increasing responsibility specifically leads to a reduction in one's confidence in one's memory of a checking event. For example, Radomsky, Rachman, and Hammond (2001) manipulated responsibility by having compulsive checkers sign a responsibility contract in which they agreed to take complete responsibility for a check and its consequences and then completed the check themselves (high responsibility) or signed a different responsibility contract which assigned complete responsibility for the check and its outcome to the experimenter who then completed the check himself (low responsibility). Compulsive checkers expressed significantly less confidence in their memory for checking actions that were carried out under high responsibility than they did for comparable actions that were carried out under conditions of low responsibility. Boschen and Vuksanovic (2007) manipulated responsibility in 15 OCD patients and a non-anxious control group of 40 people. Participants were asked to repeatedly (20 times) check a virtual stove top and to check a virtual set of light bulbs on only one occasion. Participants in the high responsibility condition were told that a participant in another room would receive a mild electric shock each time the participant did not turn off the stove or light bulb on the computer checking task. Participants in the low responsibility condition were told that any electric shocks delivered to the other participant had nothing to do with their performance. The authors found that that the act of repeatedly checking lead to reductions in memory vividness, detail and confidence. Although

increasing responsibility had little effect on the control group, it led to a significant deterioration in memory confidence in individuals with OCD.

1.2.5 Supporting questionnaire studies

Moving beyond studies which look into the specific mechanisms proposed by Salkovskis's (1985, 1989) and Rachman's (2002) models respectively, several lines of evidence support the importance of inflated responsibility in OCD and compulsive checking more generally. One line of evidence comes from questionnaire studies. Numerous studies have shown that OCD patients and non-patients with OCD-symptoms tend to score higher on measures of responsibility (Freeston *et al*, 1992; Steketee *et al*, 1998). Further, several studies have suggested that this association seems to be specific to OCD and not to be characteristic of anxiety disorders in general (e.g. Libby, Reynolds, Derisly & Clark, 2004; Yorulmaz, Karranci, Bastug, Kisa & Goka, 2008).

1.2.6 Supporting experimental studies

Perhaps the most convincing evidence that inflated responsibility may play a *causal* role in OCD and compulsive checking comes from studies which have actually attempted to manipulate participants' levels of experienced responsibility.

Lopatka and Rachman (1995) performed an experiment using 30 clinically diagnosed OCD patients to test the cognitive hypothesis that changes in perceived responsibility are followed by corresponding urges in the need to check. They manipulated responsibility by having participants either take full responsibility for any negative consequences of performing a check relevant to the participant's compulsive symptoms (high responsibility group) or where the experimenter took on full responsibility for any negative consequences of performing the same check (low responsibility group). They reported a successful increase/decrease in responsibility manipulation and that decreased responsibility led to significant declines in the estimated probability of harm and its consequences. However, increased responsibility did not lead to a significant corresponding increase in the estimated probability of harm occurring, severity of anticipated harm, estimated length of the time needed to check, timing of anticipated harm and control over anticipated harm and in the urge to check. The authors argued that these findings were supportive of Salkovskis's (1985) theory in that the inability to produce any significant effects of deliberate inflation of responsibility could be due to the

already high levels of responsibility that the OCD participants already had and so there was little room for further inflation by experimental manipulation.

Ladouceur *et al* (1995) (study 2) manipulated responsibility using an analogue population. 200 pharmaceutical capsules filled with sugar and marked with 10 different colour combinations (20 capsules of each colour) were placed in front of participants along with 15 semi transparent bottles. The participants were told that they were to take one capsule at a time and put them in the bottles, with one type for each bottle. Participants in the HR group were told the research group specialised in colour perception and that a pharmaceutical company had commissioned them for a project concerning exportation of medication for a virus to a poverty stricken third world country where education was poor. The participants in the HR group were advised that based on their colour choices, a colour system would be developed to ensure the correct distribution of medication. Participant in the LR group were told simply that the researcher was interested in perception of colours and their results (to the “practice” trials used in the actual analysis) would not be analysed. The results of this study found that participants in the HR group hesitated and checked more than those in the LR group. They also reported greater preoccupation with errors and anxiety during the task than those in the LR group. The authors concluded that these results were supportive of the causal role of inflated responsibility in OCD and were especially supportive of Salkovskis’s (1985) model (for other experimental manipulations of inflated responsibility based on the manipulation used by Ladouceur *et al*, 1995, study 2, which provide support for a casual role of inflated responsibility in OCD see Bouchard, Rhaume and Ladouceur, 1999; Ladouceur, Rhéaume and Aublet, 1997; Mancini, D’Olimpio & Cieri, 2004; Arntz, Voncken & Goosen, 2007; Reeves, Reynolds, Coker & Wilson, 2010).

Finally, Shafran (1997) manipulated responsibility in 36 obsessional participants by indirectly varying the presence/absence of the experimenter during a behavioural task. The author reported that the manipulation was successful in influencing reports of perceived responsibility for threat. In the high responsibility condition; estimates of the urge to neutralize, discomfort and probability of threat were all significantly higher than in the low responsibility condition although estimates of responsibility for thoughts and the control over the threat did not change significantly between the conditions. The author interpreted the findings as supportive of the role of responsibility appraisal in obsessive-compulsive disorder.

1.2.7 Criticisms of theories/models

One can see that a good deal of evidence supports both Salkovskis's (1985, 1989) and Rachman's (2002) theories and the role of inflated responsibility in OCD more generally. However, these models have not gone without criticism and not all studies have supported the role of inflated responsibility in OCD.

O'Kearney (1998) suggested several problems with the Salkovskis's (1985, 1989) model. Firstly, he argued that the model was silent on and did not take account of the motivational aspects of OCD, proposing that beliefs alone are insufficient to bring about action. Second, he pointed out that the model does not make explicit why an individual will always find a negative interpretation of an intrusive thought upsetting (i.e. the theory does not explain why the use of the usual inhibitory mechanisms which would prevent such a reaction are absent in OCD). Third, O'Kearney (1998) claimed that the theory lacked an adequate account of the compulsive and repetitive quality of obsessional symptoms. Finally, O'Kearney (1998) criticises the theory for not giving the emotional concern of OCD sufferer a role in the aetiology and maintenance of OCD which he argues could, for example, account for the occurrence of intrusive thoughts in the first place (see Salkovskis and Freeman, 2001, for a direct response to these criticisms).

There is mixed evidence with regard to Rachman's (2002) claim that responsibility is most pronounced in individuals with checking compulsions when compared to other sub-types of OCD. Foa, Sacks, Tolin, Preworski and Amir (2002) compared OCD checkers, OCD non-checkers and non-anxious controls in low, medium and high responsibility situations and concluded that compared to the other two groups, OCD checkers had a heightened inflated sense of responsibility. However, others who have compared OCD checkers with other OCD sub-types have concluded that inflated responsibility is characteristic of OCD in general and not to any specific subtype (e.g. Salkovskis *et al*, 2000).

1.2.8 Non-supportive Questionnaire Studies

Moving beyond specific evaluations of Salkovskis's (1985, 1989) and Rachman's (2002) theories, other researchers have more generally failed to find a link between OCD and inflated responsibility. Some researchers have found that measures of inflated responsibility fail to distinguish between OCD sufferers and non-clinical controls (e.g. Sica, Coradeschi, Sanavio, Dorz, Manchisi & Novara, 2004) or between OCD patients and participants with other anxiety disorders (e.g. Bouvard *et al*, 2001).

Others research has suggested that the relationship between responsibility and OC symptoms diminishes when their relationships with other variables is taken into account. Steketee *et al* (1998) found that intolerance of uncertainty was the only construct (compared to responsibility, control, threat estimation, tolerance for anxiety, and coping) to successfully predict OCD symptoms above and beyond mood and worry. Lind and Boschen (2009) found using a mediation model that the relationship between responsibility and checking was fully mediated by intolerance of uncertainty. Pleva and Wade (2006) reported that the effect of responsibility attitudes on obsessive compulsive symptoms was partially mediated by perfectionism. Finally, Gwilliam, Wells, and Cartwright-Hatton (2004) reported that the relationship between responsibility beliefs and obsessive-compulsive symptoms was accounted for by the mediation of meta-cognitive variables (see also Myers, Fisher, & Wells, 2008; Myers, Fisher & Wells 2009a; Myers, Fisher & Wells 2009b).

1.2.9 Non-supportive experimental studies

Not all studies where responsibility has been manipulated have found subsequent increases in OCD symptoms. Ladouceur *et al* (1995) (study 1) manipulated responsibility using an analogue population. In this study, the high responsibility (HR group) was told that the researchers had been mandated by an insurance company to improve safety for blind and elderly individuals when crossing the road. Participants in this condition were informed that their recognition of sounds may affect any changes being made to the sound system at the traffic lights. Participants in the low responsibility condition (LR condition) were told only that the study concerned sound recognition and were told that their responses (to the “practice” trials used in the actual analysis) would not be analysed. The findings of this experiment which was intended to compare checking behaviours in HR and LR groups did not produce any significant links between responsibility and checking behaviour. The authors concluded that this study did not support a link between OCD and inflated responsibility.

1.2.10 Summary

In summary, there is a good deal of evidence linking inflated responsibility to OCD and compulsive checking. Some of this evidence is correlational in nature but impressively there are a large number of experimental studies showing a causal link between inflated responsibility and OCD symptoms. However, a minority of studies have not supported such link. Perhaps of more note is the fact that there is also a question about how strong the

relationship between responsibility and OC symptoms is when their relationships with other variables are taken into account.

1.3.1 IU

1.3.2 Definition

Another construct that has been linked with OCD is intolerance of uncertainty (IU). Several definitions of IU have been offered which differ somewhat in their emphasis (for a review see Birrell, Meares, Wilkinson & Freestone, In press). The definition of IU preferred for the purposes of this thesis, largely as it encompasses in the broadest sense how IU may affect an individual, is that offered by Dugas, Schwartz & Francis (2004, p.835) who defined IU as, “a cognitive bias that affects how a person perceives, interprets, and responds to uncertain situations on a cognitive, emotional, and behavioural level”. So people high in IU experience the possible occurrence of future negative events as stressful, believe that uncertainty is negative, reflects badly on a person, should be avoided, and have difficulties functioning well in uncertain situations (Buhr & Dugas, 2002).

1.3.3 Theories and models

How is IU related to OCD? Although, to the author’s knowledge, no specific theory has linked IU to OC symptoms, there are at least two broad theoretical lines of reasoning which form a link between IU and OCD and in particular a link between IU and checking behaviours. The first suggests a role IU may play in the aetiology of compulsive behaviours whilst the second suggests a way in which IU may serve directly as a maintenance factor in compulsive behaviours such as checking.

This first theoretical link starts with premise that individuals with OCD have generally high levels of IU (supporting evidence for this premise is discussed below). This high level of IU will lead the individual to find ambiguous future events threatening (Buhr & Dugas, 2002) and will lead the individual to desire a sense of control over ambiguous future events (Krohne, 1993). However, the individual’s high level of IU will also lead them to believe they do not have the capacity to deal with ambiguous future events and also convinces the individual that they will perform poorly in such events (Buhr & Dugas, 2002). This belief that the individual will not be able to cope with future ambiguous events increases the individuals desire to have a sense of control over such events whilst at the same time making such control seem impossible to gain. There is some evidence that individuals with OCD do indeed feel this way about ambiguous

future events. For example, it has been suggested that OCD patients have an excessive need for certainty in order to control and predict future events (Makhlouf-Norris & Norris, 1972) whilst several authors have suggested that individuals with OCD underestimate their ability to cope with threatening situations (e.g. Guidano & Liotti, 1983). This combination of a desire to control the ambiguous future event coupled with a perceived inability to cope with such an event leads the individual to seek a sense of control from an alternative source and the individual thus engages in compulsive or ritualistic behaviours in an attempt to provide themselves with this sense of control (Krohne 1993; Skette *et al*, 1998). That is, the individual engages in compulsive behaviour or rituals in order to achieve an increased sense of control over an ambiguous future event they believe they will have trouble coping with in real life. Engaging in the compulsive behaviour or ritual is likely to decrease uncertainty about the event and the distress associated with that uncertainty which will strengthen the urge to engage in such behaviours again in the future (Holoway, Heimberg & Coles, 2006).

The second link between IU and OCD suggests a way in which IU may serve directly as a maintenance factor in compulsive behaviours such as checking. It is based on the idea that when engaged in compulsive behaviours the OC individual is doubtful about whether they have performed the task they are engaged in successfully or adequately. For example, a patient may doubt whether they have washed their hands sufficiently or doubt whether they have turned off a stove completely. According to this theoretical perspective the OC individual's high level of IU leaves them unable to cope with this uncertainty (doubt) about their performance and as a consequence the individual feels compelled to continue with the compulsive or checking behaviour to ensure it has been done successfully or adequately (Beech & Liddell, 1974).

1.3.4 Support for theories/models

There is evidence to support these theoretical links between IU and OCD. Supporting the idea that OCD sufferers often experience doubt when performing compulsive acts, clinically, individuals with OCD are often described as extremely doubting and as having decision-making difficulties (de Silva, 2003). Indeed a growing body of evidence associates OCD symptoms with an elevated experience of doubt in the individual's memory (e.g. Coles, Radomsky, & Horng, 2006) especially for those individuals with checking compulsions (Tolin *et al*, 2001). Given that individuals with OCD generally show high levels of IU (see evidence discussed below) it seems reasonable to assume that OC individuals' high level of IU may interact with their doubt about

having performed compulsive behaviours adequately to go on and increase those same compulsive behaviours. This increase in compulsive behaviour may then go on to further increase doubt in the OC individual's mind, given that repeated checking in itself has been shown to reduce confidence in one's memory of the checking event (e.g. Coles, Radomsky & Horng, 2006).

1.3.5 Supporting questionnaire studies

Beyond evidence supporting specific theories, what empirical evidence is there that OCD and IU are linked? Since the birth of IU as an empirical construct most studies examining this association have done so almost exclusively through correlational research using questionnaires designed specifically to measure IU (e.g. Steketee *et al*, 1998). A number of these studies have set out to examine if IU is a construct related specifically to OCD or if it is a construct common to other anxiety disorders, like GAD.

Some studies have suggested that IU may be a process more prominent in OCD than other anxiety disorders. For example, Steketee *et al* (1998) found individuals with OCD reported greater intolerance of uncertainty than those in a mixed anxiety disorder group which included 24 individuals with panic disorder (with and without agoraphobia), 11 with GAD, 7 with social anxiety disorder, and 7 with agoraphobia alone (see also: Sica *et al* 2004; Tolin, Worhunsky and Maltby, 2006).

Others studies have looked not at if IU is specific to OCD compared to other anxiety disorders but rather if IU is specific to certain OCD symptoms. Specifically, studies have examined if IU is of particular relevance to compulsive checking. Generally these studies support the view that IU is of particular relevance to compulsive checking. For example, Tolin, Abramowitz, Brigidi and Foa (2003) studied 55 patients with OCD, 43 of whom had checking compulsions, and 14 non-anxious controls. The authors found that patients with OCD did not report more IU than non-anxious controls, however, the subset of OCD patients identified as compulsive checkers reported significantly more IU than OCD participants without a checking compulsion or the non-anxious control group. The authors concluded that IU may be particularly relevant to compulsive checking (see also Holaway *et al*, 2006; Lind & Boschen, 2009; Overton & Menzies, 2002; Overton and Menzies, 2005).

Other studies have looked at how successful IU is at predicting OCD symptoms when other proposed causal constructs are also taken into account. Supporting the role of IU above and

beyond other constructs in OCD, Steketee *et al* (1998) found that intolerance of uncertainty was the only construct (compared to responsibility, control, threat estimation, tolerance for anxiety, and coping) to successfully predict OCD symptoms above and beyond mood and worry. Similarly, Fergus and Wu (2010), who looked at the specificity of IU and other cognitive processes, including negative problem orientation, responsibility and threat estimation, perfectionism and importance and control of thoughts in an analogue sample, found that IU was the only cognitive process to predict unique variance above and beyond the other cognitive processes in OCD symptoms.

1.3.6 Non-supportive questionnaire studies

Whilst some have found a specific relationship between IU and OCD compared to other anxiety disorders, other studies have found little or no difference between OCD and other anxiety disorders in terms of IU. For example, Boelen and Reijntjes (2009) examined analogue sample of 126 adults and found that IU was related with symptom levels of GAD, OCD, and social anxiety, but not depression, when controlling for the shared variance among these symptoms. The authors conclude that IU is of equal importance to a number of anxiety disorders (see also: Fergus and Wu, 2010; Holaway *et al*, 2006).

Yet other studies have suggested that IU is more prominent in GAD than in OCD. For example, Dugas, Gosselin and Ladouceur (2001) using a non-clinical sample of 347 undergraduates, found that although intolerance of uncertainty was strongly correlated with both pathological worry and OCD symptoms, the relationship between intolerance of uncertainty and worry was significantly stronger than the relationship between intolerance of uncertainty and symptoms of either OCD or panic disorder (see also Ladouceur *et al*, 1999; Sexton, Norton, Walker and Norton, 2003; Norton, Sexton, Walker and Norton, 2005).

Other researchers have found that IU appears to more generally be unrelated to OCD. Mancini, D'Olimpio, Del Genio, Didonna and Prunetti (2002) failed to find a link between IU and OCD symptoms in a non-clinical population. However, these authors defined IU in terms of a need for cognitive closure (Kruglansky, 1990) rather than as a general negative reaction to future uncertain situations (Dugas *et al*, 2004) and measured IU using the Need For Cognitive Closure Scale (Webster & Kruglansky, 1994). Therefore it is debatable if Mancini *et al* (2002) were measuring IU in its broadest sense as is encapsulated by the definition preferred in this thesis (Dugas *et al*, 2004).

Not all studies examining how successful IU is at predicting OCD symptoms when other proposed causal constructs are also taken into account have supported the role of IU. For example, Calleo, Hart, Björgvinsson and Stanley (2010) examined five belief domains concerning IU as well as responsibility/threat estimation, perfectionism, importance/control of thoughts and thought action fusion to see whether they could explain obsession severity in 69 patients with severe OCD. They found that thought-action fusion and responsibility were the only constructs to successfully predict OCD symptoms above and beyond depression and worry. Further, Myers *et al* (2009a) showed IU did not emerge as independent predictor of OC symptoms after controlling for worry, threat and metacognitive beliefs.

1.3.7 Summary

In summary, there is a good deal of evidence linking IU to OCD, and in particular to compulsive checking. However, all of these studies are correlational in nature, no study has shown a direct causal link between IU and OC symptoms. There is mixed evidence with regard to how specific IU is to OCD in comparison to other anxiety disorders, especially GAD. There is also mixed evidence with regards to how strong the relationship between IU is with OCD when their relationships with other constructs are taken into account.

1.4.1 NJRE

1.4.2 Definition

Another construct or feeling that has been linked with OCD is a sense of “incompleteness”. In 1903 Janet described the manifestation of OCD as “incompleteness”—an inner sense of imperfection, connected with the perception that actions or intentions have been incompletely achieved (see Pitman, 1987b). Since Janet, several authors have since recognised that this sensory-affective dysregulation may play an important part in bringing about OCD symptoms, although they have used different terms to describe the phenomena. Rasmussen and Eisen (1992), like Janet, described the phenomena with the classic term *incompleteness*. Rapoport’s (1991) idea of deficits in *the feeling of knowing* in OCD shows clear overlaps with the phenomena. Other examples include *not just right* experiences (Leckman, Walker, Goodman, Pauls, & Cohen, 1994; Coles *et al*, 2003), *sensory phenomena* (Miguel, do Rosario-Campos, da Silva, do Valle, Rauch & Coffey *et al*, 2000), and *sensitivity of perception* (Veale, Gournay, Dryden, Boocock, Shah, Willson, & Walburn, 1996). For the purposes of this thesis the term “not just right experiences” (NJREs) is preferred to describe the phenomenon. This preference is made largely on the basis that Coles *et al* (2003) have developed a questionnaire

to measure NJREs (a questionnaire used extensively throughout this thesis). NJREs can be defined as, “the subjective sense that something isn’t just as it should be”, an unsettled feeling due to something in the individual or in the world around them not being right (Coles *et al*, 2003).

1.4.3 Theories and models

How does a sense of incompleteness or a NJRE lead to obsessive compulsive symptoms and compulsive checking? Pitman (1987a) proposed a cybernetic model of OCD which was based on control systems theory. The theory suggested that behaviour is a process of matching perceptual input with internal reference signals. Pitman (1987a) proposed that the fundamental problem in OCD is due to a discrepancy between perceptual input and internal reference signals, such as expectations, and that compulsive checking might be the consequence of efforts to reduce this discrepancy.

According to Pitman (1987a) internal standards or reference points represent desired internal or environmental states, e.g. “I must make sure the cooker is turned off so that I do not cause the house to burn down”. A comparator system operates which compares these points of reference with internal and environmental stimuli (thoughts, feelings and actions), e.g. “did I turn the cooker off?”. When conflicts are detected (e.g. “I am not certain I turned my cooker off”) an error signal alerts cognitive, motoric and affective systems to enable correction of this conflict and they in turn determine how to act (e.g. “I must go back and turn my cooker off”). According to Pitman (1987a) individuals with OCD have greater and more persistent error signals that lead to increased anxiety, a sense that something is wrong and a need to correct the problem. So, for the cooker example, the individual would feel compelled to persist in checking behaviour until the conflict had been resolved and anxiety had been reduced. Similarly, the more recent model by Szechtman and Woody (2004) proposes that OCD stems from an inability to generate the normal “feeling of knowing” that would otherwise signal task completion and terminate the expression of a security motivational system.

Summerfeldt (2004, 2007) hypothesized that NJREs are one of the two core motivational processes underlying OCD and, similar to Pitman (1987a), conceptualised NJREs as a sensory-affective dysregulation or deficit in the ability to use emotional experience and sensory feedback to guide behaviour. Again, like Pitman, Summerfeldt (2004, 2007) proposed that this deficit seems to reflect malfunction in some internal signal that terminates behaviours by producing an emotional indicator that lets one know when a state has been satisfactorily

achieved. According to Summerfeldt (2004, 2007) the subjective experience of a NJRE may be manifested through any sensory modality, including the visual (e.g. the appearance of books on a shelf), auditory (e.g. preference for sameness in ambient noise), tactile (e.g. a certain feeling of the textures of clothes when getting changed), and proprioceptive (e.g. needing to “even up” actions). Summerfeldt (2004, 2007) argued NJREs may not be limited to sensory experiences but may also apply to more complex experiences such as cognition (e.g. the feeling one has not expressed themselves with the best possible combination of words).

As stated above, Summerfeldt’s (2004, 2007) model of OCD proposes two core, continuous, orthogonal dimensions to explain the motivational processes important to the development and maintenance of OCD: harm avoidance (as characterised broadly by the models of Salkovskis, 1985, 1989) and incompleteness (as described above). Summerfeldt (2004, 2007) emphasised the motivational heterogeneity of OCD symptoms to describe how these two different dimensions can lead to similar behaviours. The same symptomatic behaviours, e.g., compulsive washing or checking, can be motivated by harm avoidance (washing to decontaminate, checking to prevent a fire) or due to incompleteness or a NJRE (washing/checking until it feels “just right”). According to Summerfeldt (2004, 2007) these dimensions do not have to work separately but can also work in tandem to increase OCD symptoms. For example, while harm avoidance may trigger the initiation of checking rituals (e.g. checking electric appliances to minimise the risk of fire), incompleteness may be responsible for the subsequent failure to terminate them (e.g. re-checking to reduce NJREs). However, symptoms brought on by the two dimensions have separable motivations. Whilst symptoms brought on by harm avoidance are motivated by a desire to remove the anxiety associated with some potential harmful outcome, symptoms brought about by incompleteness, or NJREs, are motivated solely by the desire to reduce the distress caused by the sense of incompleteness. Summerfeldt (2004, 2007) argued that OCD dominated by incompleteness may exemplify the effects of lifelong deficits in the sensory-affective ability to use emotional experience and sensory feedback to guide behaviour.

1.4.4 Support for theories/models

Ghisi, Chiri, Marchetti, Sanavio and Sica (2010) observed that biological models of OCD seem compatible with the concept of NJREs as outlined in Pitman's (1987a) model. Dysregulated activity in frontostriatal system is proposed to underlie the enhanced response monitoring often observed in patients with OCD (e.g. Brieter *et al*, 1996; Gehring, Himle, & Nisenson, 2000, all cited in Ghisi *et al*, 2010) and may manifest as persistent "error signals" erroneously prompting the individual to (fruitless) corrective action (Maltby, Tolin, Worhunsky, O'Keefe, & Kiehl, 2005; Pitman, 1987a; Schwartz, 1999; Szechtman & Woody, 2004; Van Veen & Carter, 2002, all cited in Ghisi *et al*, 2010).

There is much empirical support for Summerfeldt's (2004, 2007) proposal that there are two core underlying motivational processes in OCD: harm avoidance and incompleteness. For example, when defining symptom subtypes, Baer (1994) identified a symmetry/hoarding factor characterised by sensations of incompleteness which was distinct from a contamination/checking factor characterised by harm avoidance whilst Pietrefesa and Coles (2008) used confirmatory factor analysis to provide evidence for the separation of harm avoidance and incompleteness as constructs and found that incompleteness showed unique relations with ordering and personally prescribed perfectionism whilst harm avoidance showed unique relations with obsessional thoughts (see also Feinstein, Fallon, Petkova, and Liebowitz 2003; Ecker and Gonner, 2008; Pietrefesa and Coles, 2009; Chik, Calamari, Rector and Riemann, 2010).

1.4.5 Supporting questionnaire studies

Moving beyond studies which look into the proposed by distinction between incompleteness and harm avoidance, several lines of evidence support the importance of incompleteness/NJRE in OCD more generally. One line of evidence comes from questionnaire studies. For example, Coles *et al* (2003) reported that NJREs were significantly related to OCD features (e.g. checking and ordering) in a undergraduate sample and that NJREs were significantly more strongly correlated with OCD symptoms than other domains of psychopathology (e.g. social anxiety, worry, depression) whilst Lee *et al* (2009) compared 47 OCD patients with 41 control participants and found that NJREs were more frequent and severe in OCD patients than control subjects (see also Leckman *et al*, 1994; Miguel *et al*, 2000; Ghisi *et al*, 2010).

1.4.6 Supporting Experimental Studies

Coles *et al* (2005) found that experimentally induced NJREs produced distress and urges to change something for those who experience greater NJRE intensity to naturally occurring NJREs compared to participants who experience less NJRE intensity to naturally occurring NJREs. Further, urges to respond to both experimentally induced and naturally occurring NJREs were also found to have significant relationships with students' self-reports of symmetry, ordering and arranging behaviours. Daily diary data showed that self-reported levels of incompleteness were significantly correlated with the strength of urges and discomfort experienced in response to naturally occurring NJREs.

1.4.7 Summary

In summary, there is good evidence to suggest that incompleteness and harm avoidance are separate constructs which are both related to OCD. There are also specific studies linking NJRE with OCD with at least two studies suggesting it is especially relevant to compulsive checking (Coles *et al.* 2003; Ecker and Gonner, 2008). However, these studies are correlational in nature and cause and effect cannot be implied. It may be of particular importance to establish a causal role for NJREs in OC symptoms because, as Ghishi *et al* (2010) remark, it is easy to see conceptually how NJREs may be simple epiphenomena rather than as cause of OC symptoms. Further, some have suggested that's NJREs link with OC symptoms may be limited to the fact that both NJREs and OC symptoms are impacted upon by a third causal variable/s (e.g. guilt, Mancini, Gangemi, Perdighe & Marini, 2008).

1.5.1 Negative Mood

1.5.2 Definition

Another candidate that has been put forward as having a causal influence on OC symptoms generally, and compulsive checking specifically, is negative mood. For the purposes of this thesis negative mood is defined in its broadest sense and special focus is given only to those parts of negative mood which one might consider most proximal to OCD; depression (c.f. Spengler & Jacobi, 1998) and anxiety (c.f. Welkowitz, Struening, Pittman, Guardino & Welkowitz, 2000). By restricting focus on negative mood to these areas it should be acknowledged that more discrete negative emotions which have been causally linked to OCD are not discussed here specifically (e.g. guilt, e.g. Mancini & Gangemi, 2004; disgust, e.g. Olatunji, Sawchuk, Lohr, & de Jong, 2004).

1.5.3 Comorbidity of negative mood with OCD

There is no doubt that both depression and anxiety are related to OCD. At the mid-point of the last decade a review was published which examined studies released in the previous decade which had investigated comorbidity patterns of mood and other anxiety disorders with OCD (LaSalle *et al*, 2004). A total of 6 studies were reviewed. Across these studies, major depressive disorder was the most common additional diagnosis with prevalence rates ranging from 20.7% to 22% and from 54% to 66% for additional current and lifetime diagnoses respectively. LaSalle *et al* (2004) noted that the high end of these estimates suggest that depression is 10 times more prevalent in OCD than in the general population. Moving onto generalised anxiety disorder [GAD] (a disorder characterised by heightened anxiety), prevalence rates ranging from 1% to 12% and from 12% to 18% were given for additional current and lifetime diagnoses. LaSalle *et al* (2004) noted, again, that the high end of these estimates suggest that GAD is 3-4 times more prevalent in OCD than in the general population. Whilst these increased incidents of depression and anxiety in OCD show that these negative emotions are related to OCD, they do not show that they are linked with OCD symptoms in a causal manner. How might negative mood cause an increase in OCD symptoms?

1.5.4 Theories and models

One set of theories which suggest that negative mood may play a part in bringing about obsessive compulsive symptoms are the cognitive theories of OCD which were mentioned earlier in the discussion of inflated responsibility. Salkovskis (1985) argued that the appraisal of responsibility that often accompanies intrusive thoughts in OCD usually leads to a negative mood state. Adverse mood arising from such appraisals, according to the theory, may influence the reoccurrence of intrusive thoughts, increase the accessibility of negative assumptions, increase the likelihood of inadequate appraisals and decrease the efficacy of dismissal, suppression, and other neutralising strategies (Salkovskis & Freeston, 2001). The theory, therefore, gives negative affect a causal role in compulsive behaviour and even suggests that mood may influence the level of responsibility experienced by an individual when making appraisals.

Rachman (1997) highlighted the role of anxiety in bringing about OC symptoms, proposing a feedback loop in which anxiety increases intrusive thoughts, interpretations of the intrusions as significant leads to increased anxiety which in turn further increases subsequent intrusions.

Rachman (1998) suggested that negative mood may have its influence on obsessions by reducing the OC sufferer's level of mental control.

Another way that negative mood may increase OC symptoms is if negative mood is used as *information* in such a way that it raises an individual's performance standards. Evidence suggests that emotion can influence cognition when people use emotion as a source of information about external events (e.g. Schwarz & Clore, 1983). This phenomenon has been attributed to a psychological mechanism labelled *affect-as-information*, whereby people take their emotions as information about the external world even if the emotion is not generated by the situation that is being evaluated. Several studies suggest that mood may influence judgments when they are experienced as providing judgment-relevant information (Clore, 1992; Schwarz & Clore, 1988, 1996). When making evaluative judgments the *affect-as-information* hypothesis suggests people may simply ask themselves how they feel about an event, an activity, or a topic to be evaluated (Schwarz & Clore, 1988). Gasper and Clore (1998) and Scott and Cervone (2002) found that normal adult participants used negative affect as information for performance standards and for judgements of risk. Scott and Cervone (2002) also found that negative affect can lead to the construction of higher performance standards even if the nature of the performance is unrelated to the source of the negative mood. Given that we know that compulsive checkers report significantly higher levels of negative mood, both generally (Frost, Sher & Geen, 1986) and while engaging in checking (Salkovskis, 1985), than do noncheckers, it may be the case individuals with OCD are using their mood as information about whether they have adequately performed a task, like compulsive checking. That is, when the OC individual asks themselves "have I checked enough?" in relation to some compulsive ritual, their negative mood, having raised their performance standards, will tell them they have not checked enough and so the individual will continue with their compulsive checking. Scott and Cervone (2002) further suggested that depressed mood in particular may increase performance standards, decreasing the chance that the standards are met. Given the high comorbidity rates between OCD and depression (LaSalle *et al*, 2004) the link between using negative mood as information to increase performance standards may be of particular relevance to OC symptoms.

1.5.5. Support for theories/models

There is some support for Salkovskis and Freestons' (2001) ideas that negative mood increases reoccurrence of intrusive thoughts, increases the accessibility of negative assumptions and so on. For example, a number of studies have shown that negative mood makes it harder to suppress unwanted thoughts (e.g. Howell & Conway, 1992). Furthermore, Gasper and Clore (1998) showed that negative mood can affect estimates of risk. Specifically, participants experiencing a negative mood estimated both personal and impersonal negative events as more likely and severe than the participants experiencing a positive mood. There is also evidence to suggest that both stress/anxiety and depression can increase the number of intrusive thoughts experienced as suggested by Rachman (1997). Experimental research by Horowitz (1985), Horowitz and Becker (1971) and Horowitz *et al* (1972) has shown that both patients and non-patients report increases in intrusive thoughts when exposed to stressful material, such as films, presumably as this increases their level of experienced anxiety. In a naturalistic study, Parkinson and Rachman (1980) found that mothers of children awaiting surgery experienced steep increases in the number of intrusive thoughts they experienced, and a rapid decline in intrusive thoughts when the child was safely out of surgery. Obsessions also increase during times of depression or dysphoria (c.f Rachman & da Silva, 1978). Riccardi and McNally (1995), for example, compared obsessive-compulsive symptoms in 150 patients with OCD who either had never experienced a mood disorder, had at one point in their life experienced a mood disorder or who had a current mood disorder and found that, "mood disorders seem selectively associated with worsening obsessions" (p.249).

1.5.6 Summary

In summary, there is a good deal of evidence linking negative mood to OCD. It appears that both anxiety and depression increase the frequency of intrusive thoughts and other OCD symptoms, although some argue that anxiety and depression may themselves be products of OCD symptoms, suggesting a reciprocal relationship (e.g. Besiroglu, Uguz, Saglam, Agargun & Cilli, 2007). Negative mood has also been less directly linked to OCD symptoms through raising performance standards. A final theory which links negative mood to OCD, the mood-as-input hypothesis, will be discussed shortly.

1.6.1 Stop rules

1.6.2 Definition

Another construct which has been linked to OCD, and specifically to compulsive checking, are *as many as can* (AMAC) stop rules. Stop rules can be best explained by linking them to task motivation. Broadly, two specific types of task motivation have been proposed, performance focused motivation and task focused motivation (Vaughn, Malik, Schwartz, Petkova, & Trudeau, 2006). A performance motivated individual who engages in a task will be focused on meeting a certain standard or criteria whilst engaged in that task. The person motivated in this way is likely to continue with the task until they have met their given standard or criteria for that task (e.g. Hirt, Melton, McDonald, & Harackiewicz, 1996). A person using AMAC stop rules whilst engaged in a task is analogous to someone using performance focused motivation, the individual's AMAC stop rule for that task will encourage them to continue with the task until they are sure they have met whatever their specific criteria or standard was for that task. In contrast, a task motivated individual who engages in a task will do so without concern about evaluation or without any particular performance standards for the task. Indeed, they may well enjoy the task and are likely to continue engaging in it until they no longer find it enjoyable (e.g. Hirt *et al*, 1996). A person using *feel like continuing* (FLC) stop rules whilst engaged in a task is analogous to someone using task focused motivation, the individual's FLC stop rule for that task will tell the individual to continue with the task for only as long as the individual finds it enjoyable. Although FLC stop rules are discussed extensively in the mood-as-input (MAI) literature (Martin & Davies, 1998; Martin, Ward, Achee, & Wyer, 1993) they are of limited clinical interest and so shall only be touched upon briefly in this thesis.

1.6.3 Theories and Models

Why might we expect AMAC stop rules to be related OC symptoms? Richards (1995, 1997) highlighted the importance of unusual checking criteria that OC checkers use to guide the decision to stop checking. Richards (1995, 1997) discussed evidence that obsessional patients are more likely to use difficult to achieve internal states (e.g. being 100% sure that something is safe) as criteria for ceasing repetitive activities such as checking. These types of stopping criteria closely resemble AMAC stop rules. Another reason for supposing a link between AMAC stop rules and OC symptoms is the fact obsessive checkers possess beliefs of inflated responsibility (Wilson & Chambless, 1999; Rachman, 1998) which could bias them towards deploying AMAC stop rules both before and during checking. That is, the OC checkers inflated

beliefs in their power to cause harm will motivate the individual to ensure that they have successfully completed a task as best they can (AMAC stop rules) rather than terminating a task when they simply feel like doing so (FLC stop rules).

The metacognitive model of OCD (Wells, 1997; Wells & Matthews, 1994), which proposes that it is individual's cognitions about their own cognitive processes and metacognitive regulatory strategies which are the key to understanding the development and maintenance of OCD, proposes a type of metacognitive knowledge which are linked with AMAC stop rules: stop signals, specific criteria for terminating rituals. According to the metacognitive model, OC individuals continue to perform rituals or neutralising behaviour until an internal subjective criteria, or stop signal, is met (Wells, 2000). Examples of such subjective criteria are "having a perfect memory of the action" or "having performed the rituals in the correct order." Stop signals can be seen as the specific standard or criteria an individual using AMAC stop rules has decided they must meet for a specific task before stopping engaging in the task.

1.6.4 Support for theories/models

There is preliminary evidence to suggest stop signals may be important in OCD symptomatology. Myers, Fisher & Wells (2009a) found that stop signals were significantly and positively associated with measures of OCD symptoms in a sample of 238 undergraduates. Further, stop signals explained significant variance in OCD symptoms even after worry, overestimation of threat, perfectionism, responsibility and other metacognitive variables had been controlled for, when stop signals shared variance with rituals and beliefs had been taken into account. Solem, Myers, Fisher, Vogel and Wells (2010) also found that stop signals were significantly correlated with OCD symptoms in a sample of 304 undergraduates, however, this study found that stop signals were not a significant predictor of OCD symptoms after overestimation of threat, perfectionism, responsibility and other metacognitive variables had been controlled for.

1.6.5 Summary

To summarise, although there is less research looking at AMAC stop rules when compared to the four other constructs focused on in this literature review, clinical observation and research into stop signals provides preliminary support for their link to OCD symptoms. A final theory which links stop rules to OCD, the mood-as-input hypothesis, is discussed below.

1.7.1 Mood as input hypothesis: a theory supportive of the role of negative mood and AMAC stop rules in causing compulsive behaviours

A theory which links both negative mood and stop rules to OCD symptoms and compulsive checking is the MAI hypothesis (Martin & Davies, 1998; Martin *et al*, 1993). The theory is largely concerned with explaining how perseveration at a task is affected by the way in which mood is used as information in determining whether the goals of a task have been achieved and whether participation in the task should be terminated or continued. The MAI hypothesis contests that it is an individual's interpretation of their mood rather than their actual mood that has implications for task performance. The MAI hypothesis is often explained by describing a study conducted by Martin *et al* (1993). In this study, participants were put into a negative or positive mood via a mood induction and asked to generate the names of birds. Half of the participants were told to stop generating the names of birds when they no longer felt like it (a FLC stop rule), whereas the other half were asked to stop when they thought they had generated as many as they could (an AMAC stop rule). The researchers found that the effect of mood on the number of words produced was dependent on the stop rule the participant had used. For participants using the FLC stop rule, participants in a positive mood persisted at the task for significantly longer than those in a negative mood. However, for participants using the AMAC stop rule, participants in a negative mood persisted for significantly longer than those in the positive mood. The MAI hypothesis suggests that these results occur due to the interaction of stop rule and mood. For example, participants in a negative mood interpret their mood in relation to the stop rule. If using a FLC stop rule, their negative mood tells them to stop. If using an AMAC stop rule, their negative mood tells them they are not satisfied with their performance on the task, and so they persist at the task for longer. It is the combination of a negative mood and AMAC stop rule use that is proposed to be of most clinical relevance to OCD given we know that OCD is highly associated with negative mood (LaSalle *et al*, 2004) and the use of stringent stop rules/strategies (Richards, 1995, 1997).

1.7.2 Experimental support for the mood as input hypothesis

There is some support for the idea that the combination of mood and AMAC may increase perseveration in compulsive behaviours such as checking. Davey *et al* (2003, study 1) placed participants into a negative, positive, or neutral mood condition and an 'as many as can' or 'feel like continuing' stop rule condition. Participants were then asked to generate items that should be checked for safety/security if they were leaving their home for 3 weeks to go on holiday. Results indicated that those in a negative mood using an 'as many as can' stop rule

generated significantly more items than those in a positive mood using the same stop rule. The same pattern of results was found for time spent on the checking-generation task supporting MAI hypothesis predictions. Davey *et al* (2003, study 2) placed participants into either negative or positive moods and again asked participants to use either an 'as many as can' or 'feel like continuing' stop rule. Participants were then asked to recall items from a comprehensive list of items that should be checked if they were to leave their home safe. Examining the amount of time spent recalling items to be checked around the home before going away revealed that when in a negative mood, those using an 'as many as can' stop rule spent significantly longer recalling check items than those in a negative mood using a 'feel like continuing' stop rule, again supporting MAI hypothesis predictions. Finally, MacDonald & Davey (2005b) placed participants in either a negative or positive mood and then asked participants to carry out a proof-reading task using either an AMAC or FLC stop rule. Results indicated that on all checking measures (time spent checking, number of items checked, and number of individual items rechecked) participants in a negative mood condition using an 'as many as can' stop rule showed significantly increased perseveration than those using a 'feel like continuing' stop rule.

1.8.1 Relative value of constructs in explaining OC symptoms

Before going on to specifically outline the purpose of this thesis it is necessary to ask the question, which of the five constructs looked at in this thesis might we expect to be the best predictor/s of OC symptoms? In order to answer this question one needs to look at studies which have directly compared two or more of the constructs which are focused on in this thesis in terms of their relative strength in predicting OC symptoms. The majority of studies which have done this have compared inflated responsibility and IU alongside other constructs not focused on in this thesis.

In support of the notion that IU is a better predictor of OC symptoms than inflated responsibility, Steketee *et al* (1998) found that intolerance of uncertainty was the only construct (compared to responsibility, control, threat estimation, tolerance for anxiety, and coping) to successfully predict OCD symptoms above and beyond mood and worry. Fergus and Wu (2010), who looked at the specificity of IU and other cognitive processes, including negative problem orientation, responsibility and threat estimation, perfectionism and importance and control of thoughts in an analogue sample, found that IU was the only cognitive process to predict unique variance above and beyond the other cognitive processes in OCD symptoms. Sica *et al* (2004) compared individuals with OCD, GAD and non-clinical controls and found whilst intolerance of uncertainty, excessive concern about the importance

of controlling one's thoughts and perfectionism seemed specific to OCD, the over-importance of thoughts and inflated responsibility barely discriminate clinically anxious individuals from non-clinical ones. Similarly, Tolin *et al* (2006), who compared OCD patients, anxious control patients, and nonclinical controls, found OCD patients more strongly endorsed beliefs related to IU, threat estimation, importance and control of thoughts, and perfectionism than the other two groups but not inflated responsibility. Finally, Lind and Boschen (2009) found, using a mediation model, that the relationship between responsibility and checking was fully mediated by intolerance of uncertainty in a mixed sample of non-clinical controls and OCD patients. However, at least one study supports the notion that inflated responsibility is better predictor of OC symptoms than IU. Calleo *et al* (2010) examined five belief domains concerning responsibility/threat estimation, perfectionism, IU, importance/control of thoughts and thought action fusion to see whether they could explain obsession severity in patients with severe OCD. They found that thought-action fusion and responsibility were the only constructs to successfully predict OCD symptoms above and beyond depression and worry.

There is thus some evidence to suggest that IU may be a better predictor of OC symptoms than inflated responsibility. However, at least one study supports the opposite notion. Moreover, this evidence is all correlational in nature. Given that there are a large number of experimental studies showing a direct influence of manipulating inflated responsibility on OC symptoms but none (at least published) showing this relationship between IU and OC symptoms, caution is probably best advised in reaching any dramatic conclusions based on the four regression based studies above suggesting IU is a better predictor of OC symptoms than inflated responsibility.

Other studies have looked at whether IU and inflated responsibility may be better predictors of specific OC symptoms rather than OC symptoms in general. Julien, O'Connor, Aardema and Todorov (2006), who examined the links between cognitive constructs and specific symptoms in OCD patients found that, when controlling for negative mood states, responsibility/threat estimation predicted rumination symptom subtype whilst IU/perfectionism predicted checking and precision scores. Tolin, Brady and Hannan (2008), who also examined the links between cognitive constructs and specific symptoms in OCD patients, found that when controlling for comorbid symptoms, responsibility/threat estimation beliefs predicted washing symptoms and neutralising whilst IU/perfectionism beliefs predicted hoarding, obsessing and ordering. Although interesting the lack of research in this area makes specific predictions impossible to draw.

Two studies have looked at whether NJRE and inflated responsibility may be better predictors of specific OC symptoms. Ecker and Gonner (2008) examined the association of OCD symptom dimensions with incompleteness and harm avoidance (inflated responsibility and overestimation of threat) in a large clinical OCD sample and found incompleteness was uniquely associated with symmetry/ordering whilst harm avoidance was uniquely associated with obsessional thinking. In a study with markedly similar results, Pietrefesa and Coles (2008) used confirmatory factor analysis to provide evidence for the separation of harm avoidance and incompleteness as constructs and found that incompleteness showed unique relations with ordering whilst harm avoidance showed unique relations with obsessional thoughts. From these two studies it seems fair to provisionally hypothesise that we may expect inflated responsibility to be more linked to obsessions than NJRE. It also appears that NJRE may be more related to ordering than inflated responsibility, however, specific measures of ordering were not used in this thesis.

1.8.2 Constructs not included in thesis

Before going on to outline the specific purpose of this thesis it is necessary to acknowledge other constructs which have been linked to OC symptoms in the literature and briefly explain the reasons for their exclusion from this thesis. Whilst specific reasons are offered here for the exclusion of these constructs it should be acknowledged that part of the reason for focusing on only the five constructs which are the focus of this thesis is simply due to time and resource limitations placed on the author of the thesis. Possible limitations of excluding these constructs will be discussed in the general discussion section of the thesis.

Perhaps the most prominent theory of OC symptoms not directly addressed in this thesis is the metacognitive theory of OCD (Wells, 1997). Metacognition refers to the beliefs and processes used to appraise, regulate or monitor thinking (Flavell, 1979). The metacognitive model of OCD argues that OC symptoms are a product of three specific set of metacognitive beliefs: thought-fusion beliefs, beliefs about the need to perform rituals, and stop signals or criteria for terminating rituals. Whilst there has been an explosion of work on this model in relation to OCD in the published literature in the past three years (see e.g. Fisher, 2009; Myers *et al*, 2009a; Myers *et al*, 2009b; Fisher & Wells, 2008; Rees & van Koesveld, 2008; Solem, Haland, Vogel, Hansen, & Wells, 2009; Solem *et al*, 2010) relatively little work existed in the published literature when work began on this thesis back in 2007. Metacognitive beliefs, as defined in

Wells (1997) model, were therefore excluded from this thesis largely because of the relatively little amount of research linking them to OC symptoms when work began on this thesis.

Another prominent construct proposed to have a causal influence on OC symptoms is thought-action fusion (TAF, Rachman, 1993). TAF has two aspects. First, individuals with heightened TAF superstitiously believe that merely having unacceptable thoughts make them more likely to happen. Secondly, individuals with heightened TAF tend to equate having bad thoughts with actually carrying them out. If inflated responsibility and TAF are separate constructs or essentially the same thing has been subject to debate (see Berle & Starcevic, 2005, for a review). Amir, Freshman, Ramsey, Neary, and Brigidi (2001), Rassin, Merckelbach, Muris, and Spaan (1999) and Shafran, Thordarson and Rachman (1996) have alluded to TAF being closely connected to, but distinct from, inflated responsibility. Rachman (1997) proposed that inflated responsibility can both contribute to, and be a product of, TAF. Salkovskis, Shafran, Rachman, and Freeston (1999) suggest that TAF can be described as a variation of inflated responsibility but others have argued against this on the basis that measures of the two constructs are usually moderately but not highly correlated with one another (e.g. Berle & Starcevic, 2005). A more detailed discussion of this debate is beyond the scope of this thesis but one can see how opinion is divided as to whether inflated responsibility and TAF should be treated as separate constructs. For the purposes of this thesis, the definition of inflated responsibility takes into account those characteristics attributed to thought-action fusion. This is primarily due to a wish to incorporate inflated responsibility in its broadest sense and not to exclude from the definition conceptual ideas connected to TAF which also form part of at least some inflated responsibility definitions (Salkovskis *et al*, 1999). Therefore, TAF is excluded from this thesis in terms of being discussed, manipulated or measured as a construct separate from inflated responsibility.

Several other constructs were also excluded from this thesis for one or more of the following reasons: a relative lack of studies linking the construct to OC symptoms in the published literature, because the construct does not form part of a well developed model of OCD or because the construct appears to signify a general risk for psychological problems and is therefore not specific to OCD. Constructs excluded for these reasons include: *the overimportance of thoughts* and *beliefs about the importance of controlling ones thoughts* (see Obsessive Compulsive Cognitions Working Group {OCCWG}, 1997); *the overestimation of threat* (OCCWG, 1997); *perfectionism* (see e.g. Antony, Purdon, Huta & Swinson, 1998); *locus of control* (Moulding & Kyrios, 2007); the idea that individuals engage in rituals to improve

their *self-efficacy* (Franzblau, Kanadianian & Rettig, 1995), *beliefs about memory* (Alcolado & Radomsky, 2011) and *elevated evidence requirements* (Wahl, Salkovskis & Cotter, 2008).

1.8.3 Critique of past research into constructs

Having discussed past research into the five constructs to be focused on in this thesis it is clear there is a good deal of both theoretical and empirical evidence linking each construct to OC symptoms and compulsive checking, albeit that the evidence available varies in volume and nature between the constructs. Of note is the fact that of the research discussed in relation to the five constructs, most of it functions purely to substantiate a link between construct *x* and OC symptoms, usually through correlational research and occasionally through manipulation of construct *X*. Whilst establishing a relationship between construct *X* and OC symptoms is undoubtedly an important endeavour it tells us little about how construct *X* is related to construct *Y* or how these two constructs may interact to influence OC symptoms. The majority of studies in this area which do examine more than one construct in a single study do not explore how these constructs relate to each other or how they may interact to affect OC symptoms, but rather use regression based approaches wherein different constructs are pitted against one another in an attempt to find the one that best explains OC symptoms (such as the many of the studies discussed in the *Relative value of constructs in explaining OC symptoms* section above). For example, Steketee *et al* (1998) found that intolerance of uncertainty was the only construct (compared to responsibility, control, threat estimation, tolerance for anxiety, and coping) to successfully predict OCD symptoms above and beyond mood and worry. Whilst this type of regression based research in theory helps us to establish the relative importance of various constructs to OC symptoms it is limited in a number of ways. Firstly, studies of this nature can only examine the relative importance of whatever constructs are measured in a given study in relation to OC symptoms. To the author's knowledge, no study of this nature has included a measure of every construct in the literature which has been proposed to have a causal influence on OC symptoms. Secondly, as pointed out by Field & Cartwright–Hatton (2008), regression based approaches (particularly those employing a stepwise approach) can reach conclusions about superiority of processes in predicting disorders that are driven by very small statistical differences between constructs. Finally, and most significantly, studies of this nature do not directly address the relationships between the constructs themselves. In a given regression analysis, for example, construct *X* may not have a significant effect on OC symptoms whilst construct *Y* does. This analysis does not address the possibility, however, that construct *X* is exerting a strong causal influence on OC symptoms by having a causal effect on construct *Y*.

One way of addressing the problem of whether construct *X* is exerting an influence on OC symptoms partially or fully through its relationship with construct *Y* is through mediation analysis. Although relatively few studies in this area have adopted such an approach, a few pioneering studies have been conducted. For example, Pleva and Wade (2006) demonstrated that perfectionism partially mediated the relationship between responsibility beliefs and OC symptoms whilst Lind and Boschen (2009) showed that IU fully mediated the relationship between inflated responsibility and compulsive checking. Whilst such mediation studies no doubt have a role to play in uncovering how various constructs interact to effect OC symptoms, they are still limited in a number of ways. Firstly, studies of this nature can only examine the mediation effects of whatever constructs have been measured in a given study. Construct *Y* may not mediate the relationship between construct *X* and OC symptoms, yet, had construct *W* been measured in the study and included in a model as a potential mediator it may have been found that constructs *Y* and *W* together mediated the relationship between construct *X* and OC symptoms. Secondly, such studies are limited to the mediation models being tested. For example, whilst Lind and Boschen (2009) showed that IU fully mediated the relationship between inflated responsibility and compulsive checking they do not report the results of testing a mediation model in which inflated responsibility is specified to mediate the relationship between IU and compulsive checking. This raises the question as to how one should go about specifying mediational models. Whilst this can be done based on theory (as was done by Lind & Boschen, 2009) it would be preferable to base such models on experimental evidence which directly tests the relationship between constructs *X* and *Y* by manipulating each construct in turn and seeing what effect this has on the other construct. Only then can one specify such mediational models to test various constructs relationships with OC symptoms with a degree of confidence that the relationships specified between the constructs themselves are correct in terms of the direction of causal pathways.

1.8.4 Outline of experiments in thesis and basic predictions

The studies reported in this thesis were focused on doing exactly this. Each of the five constructs focused upon in this literature review were manipulated independently of one another to see what effect doing so would have on the remaining four constructs. Beyond simply informing mediation models it is hoped that the results of these experiments will more broadly have implications for current theoretical models of OCD by beginning to address how some of the many constructs proposed to have a causal relationship with OC symptoms are related to one another. It may well be the case that rather than each of these constructs

playing independent roles in the genesis of OC behaviour, some may act in series, with the ability of one domain to influence OC symptoms being controlled by its influence on another intervening variable.

Although no study has been conducted, to the author's knowledge, with the primary aim of examining the relationship between two (or more) of any of the five constructs focused on in this literature review, we can make some tentative hypothesis about possible causal relations which may emerge from the studies based on existing research and theory. Note that only predictions based on empirical evidence are offered here, other predictions which are perhaps not supported by existing empirical evidence yet make intuitive sense will be given in the specific introductions to individual experiments in which a given construct is manipulated.

Firstly, a reciprocal relationship is predicted between responsibility and negative mood. Specifically it is predicted that increasing negative mood through experimental manipulation will subsequently increase inflated responsibility and that increasing inflated responsibility through experimental manipulation will subsequently increase negative mood. This prediction is based partly on Salkovskis's (1985, 1989) theory, which suggests that appraising the occurrence of an intrusive thought as a sign that an individual maybe responsible for harm to themselves or to others (an appraisal the theory proposes occurs due to inflated responsibility) will increase the individual's level of negative mood and this negative mood in turn heightens the individual's level of inflated responsibility. The prediction that heightening inflated responsibility will in turn heighten negative mood is also based on experimental evidence. For example, Lopatka & Rachman (1995) found that the increasing responsibility led to increases in discomfort whilst Ladouceur *et al* (1995) found that increasing responsibility led to increases in anxiety (see also: Shafran, 1997; Arntz *et al*, 2007; Fritzler *et al*, 2008).

Secondly, a reciprocal relationship is predicted between NJREs and negative mood. Specifically it is predicted that increasing negative mood through experimental manipulation will subsequently increase NJREs and that increasing NJREs through experimental manipulation will subsequently increase negative mood. These two predictions are based on previous experimental findings. The former prediction is based on the finding that, for participants high in trait guilt, the experimental induction of guilt increases NJREs (Mancini, Gangemi, Perdighe & Marini, 2008). The latter prediction is based on the finding that experimentally induced NJREs produce increased distress in participants who experience greater NJRE intensity to naturally occurring NJREs compared to participants who experience less NJRE intensity to naturally occurring NJREs (Coles *et al*, 2005).

Thirty, and finally, it is predicted that increasing IU through experimental manipulation will subsequently increase negative mood. This prediction is based on a good deal of experimental evidence (although note that none of this evidence directly involved the manipulation of IU). For example, Miranda, Fontes and Marroquin (2008) found that IU predicted increases in depression over a 6 week period whilst Kirby and Yardley (2009) found IU seemed to be associated with increased anxiety in Meniere's disease.

2. Chapter 2: Questionnaire study

2.1 Introduction

Recently, several studies have suggested that constructs thought to underlie particular disorders may be derivatives of one core, underlying latent variable despite being discussed as separable and unique constructs in the literature. For example, a study examining participants with bipolar disorder, before and after treatment with cognitive behaviour therapy, used structural equation modelling to demonstrate that both at baseline and post-treatment a composite factor of personal beliefs, meta-cognitive beliefs, and dysfunctional attitudes were a better predictor of depression and mania symptoms than the individual, separate process measures (Schwannauer, 2007). Similarly, Field & Cartwright-Hatton (2008), examining social anxiety in a large group of undergraduates, found that a composite factor of rumination, worry, tendency to experience shame and metacognitive responses to intrusions were a better predictor of social anxiety than the individual, separate process measures.

To address the possibility that the five constructs focused upon in this thesis are separable constructs and not indicators of one (or more) core, underlying factors a questionnaire study was conducted in which measures of all five constructs were distributed to a large undergraduate sample. The relationships between the five conceptually separable factors were then explored through correlational and factor analyses. Regression analyses were also conducted to explore the relative power of each construct in predicting OC symptoms when all constructs are examined simultaneously. The method and results of this questionnaire study are presented in this chapter and the results are briefly discussed although in depth discussion of the results of this study will be left to the general discussion at the end of this thesis.

2.2.1 Method

2.2.2 Sample

The questionnaire booklet was completed by 370 participants (men: 74; women: 296). Aged ranged from 17 to 74 years ($M = 27.38$, $SD = 11.96$). 19.5% of the sample identified themselves as being employed full time, 27.3% as part time employed, 25.4% as unemployed, 27.3% as a full-time student and 0.5% as retired (note: participants were only allowed to chose one of these categories). 14.6% of the sample identified their marital status as married, 78.9% as single, 5.4% as separated or divorced and 1.1% as other (all specified as widowed). 48.3% of the sample in the current study consisted of psychology undergraduates at the University of Sussex who received partial fulfilment of a course requirement by taking part in the study.

20.6% of the participants in the current study were colleagues of the researcher who volunteered to fill in the questionnaire after being initially approached by the researcher. The remaining 31.10% of the participants in the current study represent other students, university staff and university visitors who volunteered to fill in the questionnaire after being initially approached by the researcher. The researcher set up a small stall in a cafe at the University of Sussex which displayed a simple sign saying “Help needed with Questionnaire Study”. The stall was set up for a two hour period over lunch break for five consecutive days. Anyone who approached the stall was asked to fill in the questionnaire. Anyone agreeing to take part was given a questionnaire. This third group of participants were all recruited through this method. These participants either returned their questionnaire to a box located near the researcher’s office or were provided with a stamped addressed envelope to return the questionnaire in. In total, 35.15% of the questionnaires handed out by the researcher using this final method were returned.

The latter two groups of participants described above received the gratitude of the researcher for participation but were not financially rewarded.

2.2.3 Procedure

Participants were provided with questionnaire-batteries, with every second questionnaire package reverse ordered. Participants were asked to supply some very basic demographic information and to provide informed consent before completing the questionnaire.

2.2.4 Measures

Note: In addition to the measures described in detail below, the questionnaire package also contained Beck’s Depression Inventory (BDI, Beck, Ward, Mendelson, Mock & Erbaugh, 1961), the Obsessive–Compulsive Beliefs Questionnaire-87 (OBQ-87, OCCWG, 1997), the State-Trait Anxiety Inventory (STAI, Spielberger, Gorsuch, & Lushene, 1970) and the Toronto Alexithymia Scale-20 (Taylor, Bagby & Parker, 1992). These questionnaires are not used in any of the analyses which follow and so are not described in detail here.

Clark-Beck Obsessive-Compulsive Inventory (CBOCI)

The Clark-Beck Obsessive-Compulsive Inventory (CBOCI, Clark, Antony, Beck, Swinson, & Steer, 2005) is a 25-item questionnaire developed to assess the frequency and severity of obsessive and compulsive symptoms. The CBOCI consists of a series of ordered statements relating to particular features of the measure’s two subscales, Obsessions (14 items) and Compulsions (11

items). Each item is rated on a four-point scale (0 – 3) according to levels of frequency or severity with higher scores indicative of higher frequency or severity. The item response format instructs respondents to select “one statement in each group that best describes your thoughts, feelings, or behaviour during the past 2 weeks including today”.

The CBOCI has demonstrated excellent internal consistency, with $\alpha = .95$ across clinical and nonclinical samples for both subscales (Clark *et al*, 2005). One-month test–retest reliability in a non-clinical sample was high (Clark *et al*, 2005). The CBOCI has been shown to have convergent validity as assessed through comparison of CBOCI scores with other OC measures in a clinical sample (Clark *et al*, 2005). The internal consistency of the both the compulsions ($\alpha = .87$) and obsessions ($\alpha = .84$) sub-scales in the current sample were good.

The CBOCI is preferred as a measure OCD over the MOCI in the analyses that follow as the MOCI mainly focuses on assessing two of the most common compulsions in OCD, i.e. washing and checking, and may therefore be somewhat limited in applicability. It has also been suggested that the MOCI is a weak measure in assessing obsessions (Clare, 2003). The CBOCI is also preferred over the OBQ-87 as this measure is concerned with measuring constructs related to OCD (e.g. responsibility, tolerance of certainty) as opposed to OC symptoms.

Intolerance of Uncertainty Scale (IUS)

The Intolerance of Uncertainty Scale (IUS, Freeston, Rheaume, Letarte, Dugas, & Ladouceur, 1994) was designed to measure an individual’s intolerance of uncertainty, particularly the ideas that uncertainty is unacceptable, reflects badly on a person, leads to frustration and stress, and leads to the inability to take action. The scale is comprised of 27 items and is scored on a 1 (“not at all characteristic of me”) to 5 (“entirely characteristic of me”) scale.

The IUS has demonstrated excellent internal consistency ($\alpha = .94$), good test–retest reliability ($r = .78$ over a five week period), and convergent and divergent validity (Buhr & Dugas, 2002).

Although factor analytic studies have suggested a variety of different factor structures may underlie the IUS (for a review see Birrell *et al*, In press) in the present study (and thesis as a whole) the scales total score was used as we are interested in the construct in its broadest sense. The IUS had excellent internal consistency in the current study ($\alpha = .95$).

Not Just Right Experiences – Questionnaire Revised (NJRE-QR)

The Not Just Right Experiences-Questionnaire Revised (NJRE-QR, Coles *et al*, 2003) is composed of 19 items. The first ten items measure how often NJRE occur. These 10 items present sample NJRE (e.g. “I have had the sensation after getting dressed that parts of my clothes did not feel just right”, “I have had the sensation while writing something down that the words did not look just how I wanted them to look”) with respondents instructed to indicate whether they experienced these within the past month. The next two items (items 11 and 12) ask respondents to indicate which NJRE occurred most recently and when it last occurred (past few hours to past month). The last 7 items in the questionnaire measure the intensity of NJRE. Specifically, respondents rate frequency, intensity, immediate distress, delayed distress, rumination, urge to respond, and sense of responsibility associated with the most recent NJRE on a scale from 1 (absence) to 7 (extreme).

Coles *et al* (2003) found good internal consistency ($\alpha = .79$) for the 10 sample NJRE items, and all 19 items showed good convergent and discriminant validity, evident in stronger correlations with OCD symptoms than with depressive symptoms, trait anxiety, social anxiety, or worry.

Coles *et al* (2005) found evidence to suggest that it is not the occurrence of NJRE themselves which are important to OC symptoms but the intensity of one’s reaction to them with the former showing a weaker relation to OCD symptoms in correlational analyses. It is possible that whilst many people experience the occurrence of NJRE (indeed most do, Coles *et al*, 2003), it is the individual’s reactions to these NJRE which makes their occurrence relevant to OC symptoms. Therefore the NJRE-QR produces two total scores, NJRE occurrence (composite score of NJRE-QR items 1-10) and NJRE intensity (composite score of NJRE-QR items 13-19).

In the current sample the NJRE occurrence sub-scale showed acceptable internal consistency ($\alpha = .74$) whilst the NJRE intensity scale showed excellent internal consistency ($\alpha = .94$).

Maudsley Obsessional-Compulsive Inventory

The Maudsley Obsessional-Compulsive Inventory (MOCI, Hodgson & Rachman, 1977) is a 30-item true-false questionnaire that measures OCD symptoms and contains 4 sub-scales measuring checking (9 items), cleaning (11 items), slowness (7 items) and doubting (7 items). This measure has satisfactory internal consistency and test-retest stability, as well as good convergent and divergent validity (Sanavio and Vidotto, 1985; Sternberger and Burns, 1990). The internal consistency of the 4 subscales in the current study varied from acceptable to poor

(checking sub-scale: $\alpha = .67$, cleaning subscale: $\alpha = .60$, slowness sub-scale: $\alpha = .40$ and doubting sub-scale: $\alpha = .53$).

Note that the MOCI is not used in any of the analyses which follow within this chapter, however, the questionnaire is used in an analysis reported in appendix 1 using data from the study reported in this chapter (see appendix 1).

Positive and Negative Affect Scales (PANAS)

The Positive and Negative Affect Schedule (PANAS, Watson, Clark, & Tellegen, 1988) consists of two 10-item mood scales. The first is a measure of positive affect and lists 10 “positive” emotions and the second is a measure of negative affect and lists 10 “negative” emotions. These items are interspersed with one another as opposed to being separately listed. Respondents are asked to rate to what extent they have experienced an emotion in the past year on a 5-point scale ranging from 1 (very slightly/not at all) to 5 (extremely). A composite score is made of the 10 positive and negative items respectively giving a total positive affect score and a total negative affect score. Confirmatory factor analysis has supported the conclusion that the PANAS measures two distinct, negatively correlated, factors: positive affect and negative affect (Crawford & Henry, 2004).

Watson *et al* (1988) report that both scales have good internal consistency (reliability of the positive affect scale ranged from .86 to .90, the negative affect scale from .84 to .87). The construct validity of the scale has been supported (see Crawford & Henry, 2004). In the current sample both the positive affect scale ($\alpha = .87$) and the negative affect scale ($\alpha = .88$) showed good internal consistency.

Responsibility Attitude Scale (RAS)

The Responsibility Attitude Scale (RAS; Salkovskis *et al*, 2000) is a 26-item questionnaire that measures general beliefs related to inflated responsibility. Respondents rate the extent to which they generally experience these beliefs on a 7-point scale ranging from 1 (totally disagree) to 7 (totally agree). The internal consistency of the scale is excellent and test–retest reliability is also excellent (.94, Salkovskis *et al*, 2000). Several studies attest to the measures convergent validity (Salkovskis *et al*, 2000, Yorulmaz, Karanci & Tekok-Kılıc, 2002). Although factor analytic studies have suggested specific factor structures may underlie the RAS (see e.g. Bouvard *et al*, 2001) in the present study (and in the thesis as a whole) the scales total score

was used as we are interested in the construct in its broadest sense. The RAS had excellent internal consistency in the current study ($\alpha = .92$).

Stop Rule Questionnaire (SRQ)

As the SRQ has not appeared in the published literature review before, the measures content, factor structure and reliability were examined in detail. A study was also conducted to examine the questionnaires validity. The results of these analyses and of the validation study can be found in appendix 1 of this thesis. The AMAC scale had excellent internal consistency ($\alpha = .91$) as did the FLC scale in the current study ($\alpha = .89$).

2.3.1 Results

2.3.2 Missing data

There was very little missing data in the sample; overall 99.12% of the total number of questions were answered across the sample. Therefore, any missing data was replaced simply by adding the mean of the relevant question.

2.3.3 Preliminary analysis

A preliminary analysis was conducted to examine the Pearson correlation between the total scores (or relevant sub-scale scores) of all five questionnaire measures of the five casual OCD constructs to see how the various constructs were related to one another and to the compulsions and obsessions scales of the CBOCI. IU, inflated responsibility, negative mood, AMAC stop rule use and NJRE occurrence and intensity were all significantly correlated, with correlations of a moderate size (correlations ranging from .69 to .36, see table 1).

IU, inflated responsibility, negative mood, AMAC stop rule use and NJRE occurrence and intensity were all significantly correlated with both the obsessions and compulsions, with correlations of a moderate size (correlations ranging from .63 to .46). It thus appears that IU, inflated responsibility, negative mood, AMAC stop rule use and NJRE occurrence and intensity are all moderately related to one another and all display moderate correlations with both obsessions and compulsions.

Table 1: Pearson Correlation Coefficients between the total scores on the 5 causal OCD constructs and obsessions and compulsions (n = 370).

	IU	Inflated Responsibility	Negative mood	<u>NJRE Occurrence</u>	<u>NJRE Intensity</u>	<u>AMAC</u>	<u>Obsessions</u>	<u>Compulsions</u>
IU	†	.59*	.56*	.48*	.44*	.48*	.63*	.50*
Inflated Responsibility		†	.42*	.36*	.36*	.48*	.62*	.48*
Negative mood			†	.37*	.37*	.40*	.56*	.57*
<u>NJRE Occurrence</u>				†	.69*	.43*	.50*	.55*
<u>NJRE Intensity</u>					†	.44*	.50*	.46*
<u>AMAC</u>						†	.56*	.63*
<u>Obsessions</u>							†	.71*
<u>Compulsions</u>								†

* $p < .001$, One-tailed significance reported.

2.3.4 Pre-factor analysis

In order to explore to explore if the constructs focused upon in this thesis are separable constructs and not indicators of one (or more) core, underlying factors, a two-stage approach was taken. Firstly, an exploratory factor analysis was conducted to provide an indication of how many factors may underlie the data set. Secondly, plausible factor structures (as suggest by exploratory factor analysis) were compared directly using confirmatory factor analysis.

Kline (2005) suggests that when using a two stage approach like the one used here it is preferable to use two separate data sets where one data set is initially used to explore the factor structure underlying a set of items (exploratory factor analysis) and a separate data set is then used to compare plausible factor structures to emerge from the exploratory factor analysis (using confirmatory factor analysis). This is because the results of an exploratory factor analysis are subject to capitalisation on chance variation, and specification of a confirmatory factor analysis based on the results of an exploratory factor analysis with the same data may confound this problem.

In the current study, both the exploratory factor analysis and the confirmatory factor analysis were conducted on the same data set. The reasons for this are as follows. Firstly, due to time limitations placed on the author in terms of finishing this thesis, collecting a second sample of a similar size to the one used in this study (n = 370) was simply not possible. One approach the author could have taken to conform to Kline's (2005) suggestion would have been to split the sample used in present study in half, performing a exploratory factor analysis on one half of

the data set and then performing a confirmatory factor analysis on the second half of the data set. However, this option was not chosen due to sample size issues. Kline (2005), along with others, suggest ideally using a minimum ratio of 10 cases (participants) per parameter to be estimated in a factor analysis in order to produce a “trustworthy” analysis. In the analyses which follow the minimum number of parameters to be estimated in any given analysis was 164; which would therefore be ideally explored using a sample with 1640 cases (Kline, 2005). Obtaining such a large, ideal sample for the purposes of this study was not possible and the author did not want to reduce the sample size which had been obtained in this study ($n = 370$) further in each analysis by splitting the sample in half. Therefore the decision was made to conduct both the exploratory factor analysis and confirmatory factor analysis on the same data set. It should still be noted that the results of the current study and subsequent conclusions would be strengthened by demonstrating their validity in a separate sample.

2.3.5 Categorical data

Items entered into a factor analysis should generally be continuous as opposed to categorical (Kline, 2005). Although not strictly continuous it is generally accepted that items measured on a 1-5 point Likert scale are appropriate for factor analysis (Bentler & Chou, 1987). Within the current data set, 10 items are measured on scales with less than 5 levels. These 10 items are the first ten items of the NJRE-QR. Each of these items ask the participant to state if they have experienced a specific NJRE within the past month (e.g. I have had the sensation after getting dressed that parts of my clothes tags, collars, pant legs, etc, didn’t feel just right) and participants are simply asked to offer a yes or no response. Kline (2005) suggests one way to overcome the problem of categorical items in factor analysis is to parcel items together, that is to create one or more total scores (linear composites) across a set of two or more items. These parcels can then be treated as continuous indicators. It was decided to therefore make two composite variables (both of which would have a range of possible scores from 0 to 5). The response to NJRE items 1, 2, 3, 4, and 5 were combined to make a composite score, NJRE occurrence 1. In support of the combination all of these items into one score, all of the individual items were significantly correlated with each other (all correlations significant at $p < .001$). The responses to NJRE items 6, 7, 8, 9, and 10 were combined to make a second composite score, NJRE occurrence 2. In support of the combination all of these items into one score, all of the individual items were significantly correlated with each other (all correlations significant at $p < .01$). With these 10 variables transformed into two composite scores, all variables in the data set were now measured on a scale with at least 5 levels.

2.3.6 The factor analysis

A factor analysis was performed on the five constructs proposed to have a causal influence on OC symptoms to explore the factor structure underlying these constructs. All of the 26 items measuring inflated responsibility (the RAS), the 27 items measuring IU (the IUS), the 10 items measuring AMAC stop rule use (from the SRQ) and the 10 items measuring negative mood (from the PANAS) were examined in the analysis. In addition, the two composite NJRE occurrence variables described earlier and the items in the NJRE-QR measured on separate 7-point Likert scales (items 13-19) were also examined in the analysis (giving a total of 82 items). As there was no theoretical reason a priori to assume any particular number of factors would underlie these constructs (apart from the fact the constructs are discussed separately in the literature) an exploratory rather than a confirmatory analysis was initially conducted. An exploratory factor analysis was performed using principle components analysis.

Communalities ranged from .50 to .84. Fifteen components had eigenvalues over 1: 23.29, 5.02, 4.59, 3.37, 3.15, 1.97, 1.70, 1.54, 1.36, 1.25, 1.20, 1.13, 1.12, 1.07, 1.01. The scree plot (Cattell, 1966) was used to determine the optimum number of factors. The scree plot strongly indicated either a one or a five factor solution and so these two options were explored further.

Firstly, a factor analysis was run extracting one factor. This solution explained 23.29% of the variance (factor loadings reported in table 2). The internal consistency for this scale was excellent ($\alpha = .96$). Examination of the factor loadings showed that while most of the items had moderate loadings (.40 or above, Field, 2009) on the one emergent factor, 9 items did not. Of the items which did not load moderately onto the emergent factor, 7 were from the RAS, one from the SRQ and one from the PANAS.

Table 2: Factor Loadings for OCD related constructs from 1 factor Principle Component Analysis (n = 370).

Factor Loadings	
Items	1
1.Uncertainty makes me vulnerable, unhappy, or sad (IUS)	.72
2.Uncertainty makes me uneasy, anxious, or stressed (IUS)	.70
3.When I am uncertain I can't function very well (IUS)	.69
4.Being uncertain means that I lack confidence (IUS)	.69
5.The smallest doubt stops me from acting (IUS)	.68

6.The ambiguities in life stress me (IUS)	.67
7. Being uncertain means that I am not first rate (IUS)	.66
8. It frustrates me not having all the information I need (IUS)	.65
9. I must get away from uncertain situations (IUS)	.64
10. Unforeseen events upset me greatly (IUS)	.64
11. When I am uncertain I can't go forward (IUS)	.63
12. If I cannot be CERTAIN I am blameless, I feel I am to blame (RAS)	.63
13. Everything I do can cause serious problems (RAS)	.62
14. Unlike me, others always seem to know where they are going with their lives (IUS)	.62
15. My mind can't be relaxed if I don't know what will happen tomorrow (IUS)	.62
16. A small unforeseen event can spoil everything, even with the best of planning (IUS)	.62
17. Its not fair that there are no guarantees in life (IUS)	.61
18. How intense was this NJRE (NJRE-QR)	.61
19. I can't stand being undecided about my future (IUS)	.61
20. I worry a great deal about the effects of things that I do or don't do (RAS)	.60
21. When its time to act uncertainty paralyses me (IUS)	.60
22. I often think that bad things will happen if I am not careful enough (RAS)	.60
23. Once I think it is possible that I have cause harm, I can't forgive myself (RAS)	.59
24. I often take responsibility for things that other people do not think are my fault (RAS)	.59
25. Uncertainty makes life intolerable (IUS)	.59
26. To what degree did this NJRE bother you or cause you distress AT THE TIME (NJRE-QR)	.59
27. I must always think through the consequences of even the smallest actions (RAS)	.58
28. I had better check again because I want everything to be perfect (SRQ)	.57
29. I have to make sure other people are protected from all of the	.56

consequences of things I do (RAS)	
30. Uncertainty stops me from having a firm opinion (IUS)	.56
31. I think its unfair that other people seem sure about their future (IUS)	.56
32. I must think of all the things I might have done wrong, and then check them (SRQ)	.55
33. I always want to know what the future has in store for me (IUS)	.55
34. To what degree did this NJRE bother you or cause you distress LATER THAT SAME DAY (NJRE-QR)	.55
35. Uncertainty stops me from sleeping well (IUS)	.55
36. One should always look ahead so as to avoid surprises (IUS)	.55
37. NJRE occurrence 2 (NJRE-QR)	.54
38. NJRE occurrence 1(NJRE-QR)	.54
39. To what extent did you feel that you couldn't get this NJRE out of your mind (NJRE-QR)	.53
40. Is should be able to organize everything in advance (IUS)	.53
41. Upset (PANAS)	.52
42. I must check things one more time – just to be on the safe side (SRQ)	.52
43. I had better check everything to make sure nothing bad happens (SRQ)	.52
44. Guilty (PANAS)	.51
45. I have probably forgotten something obvious, so I had better have one last check (SRQ)	.51
46. How frequently did you experience this NJRE (NJRE-QR)	.51
47. Being uncertain means that a person is disorganized (IUS)	.51
48. I wasn't concentrating the last time I checked, so I had better do it again (SRQ)	.51
49. I will be condemned for my actions (RAS)	.50
50. I am too sensitive to feeling responsible for things going wrong (RAS)	.50
51. In all kinds of daily situations, my Inactivity can cause as much harm as deliberate bad intentions (RAS)	.49
52. Perhaps I didn't check everything properly, I had better check	.49

again (SRQ)	
53. Jittery (PANAS)	.49
54. Afraid (PANAS)	.49
55. I hate being being taken by surprise (IUS)	.49
56. I think I've checked everything, but I may not have done it properly, so better keep checking (SRQ)	.48
57. Distressed (PANAS)	.48
58. If I think bad things, this is as bad as DOING bad things (RAS)	.47
59. To what extent did you have an urge to do something about this NJRE (NJRE-QR)	.47
60. Ashamed (PANAS)	.47
61. Nervous (PANAS)	.47
62. I may think I've checked everything properly, but in reality perhaps I haven't (SRQ)	.47
63. Irritable (PANAS)	.47
64. To me, not acting where disaster is a slight possibility is as bad as making that disaster (RAS)	.47
65. I am often close to causing harm (RAS)	.47
66. To what extent did you feel that it was your responsibility to do something about this NJRE (NJRE-QR)	.46
67. For me, even slight carelessness is inexcusable when it might affect others (RAS)	.46
68. If I can have even a slight influence on things going wrong, then I must act to prevent it (RAS)	.45
69. I often feel responsible for things that go wrong (RAS)	.44
70. Scared (PANAS)	.44
71. Being uncertain allows me to foresee the consequences beforehand and to prepare for them (IUS)	.44
72. To me, not acting to prevent disaster is as bad as making disasters happen (RAS)	.42
73. Even if harm is a very unlikely possibility, I should always try to prevent it at any cost (RAS)	.41
74. If I know that harm is possible, I should always try to prevent it, however unlikely it seems (RAS)	.39

75. I must just double check that I have done everything (SRQ)	.38
76. If I don't act when I can foresee danger, then I am to blame for any consequences if it happens (RAS)	.36
77. Hostile (PANAS)	.36
78. I should never cause even the slightest harm to others (RAS)	.35
79. I must protect others from harm (RAS)	.30
80. Other people should not rely upon my judgement (RAS)	.30
81. Many of my past actions have been intended to prevent harm (RAS)	.29
82. If I take sufficient care then I can prevent any harmful accidents (RAS)	.26

A factor analysis was then run extracting five factors with varimax rotation (a varimax rotation was used to aid with interpretation of the emergent factors, however, it is of note that an oblique rotation was also run which produced a nearly identical factor solution to the varimax rotation. The results of the oblique rotation are therefore not reported). After rotation the five emergent factors had eigenvalues of: 12.28, 8.55, 6.65, 6.23 and 5.61. This solution explained 47.94% of the variance. Looking at the rotated component matrix the resulting scale produced 5 reliable subscales each separately measuring each of the original 5 constructs; IU, inflated responsibility, negative mood, NJRE, AMAC stop rules (see table 3 for factor loadings and internal consistency, see table 4 for means and standard deviations on the five scales and correlations between factors). Of note is the fact that *all* of the items thought to measure a particular construct loaded most strongly onto the factor thought to represent that construct. All but 4 of the items loaded onto their factor to at least a moderate degree.

Table 3: Rotated Factor Loadings for OCD related constructs from 5 factor Principle Component Analysis (n = 370)

Items	Factor Loadings				
	1	2	3	4	5
<i>IU: ($\alpha = .95$)</i>					
Uncertainty makes me vulnerable, unhappy, or sad	.75				
Unforeseen events upset me greatly	.72				
When I am uncertain I can't function very well	.72				
Uncertainty makes me uneasy, anxious, or stressed	.72				
I must get away from uncertain situations	.70				
The ambiguities in life stress me	.70				
When I am uncertain I can't go forward	.66				
My mind can't be relaxed if I don't know what will happen tomorrow	.66				
It frustrates me not having all the information I need	.66				
One should always look ahead so as to avoid surprises	.65				
A small unforeseen event can spoil everything, even with the best of planning	.64				
The smallest doubt stops me from acting	.63				
When its time to act uncertainty paralyses me	.62				
Being uncertain means that I lack confidence	.62				
Being uncertain means that I am not first rate	.61				
I can't stand being undecided about my future	.61				
Is should be able to organize everything in advance	.60				
I hate being taken by surprise	.59				
I always want to know what the future has in store for me	.58				
Uncertainty makes life intolerable	.57				
Uncertainty stops me from sleeping well	.52				
Unlike me, others always seem to know where they are going with their lives	.51				
Its not fair that there are no guarantees in life	.50				
I think its unfair that other people seem sure about their future	.49				

Being uncertain allows me to foresee the consequences beforehand and to prepare for them	.47				
Uncertainty stops me from having a firm opinion	.44				
Being uncertain means that a person is disorganized.	.43				
<i>Inflated Responsibility: ($\alpha = .92$)</i>					
If I can have even a slight influence on things going wrong, then I must act to prevent it	.72				
To me, not acting where disaster is a slight possibility is as bad as making that disaster	.70				
Even if harm is a very unlikely possibility, I should always try to prevent it at any cost	.65				
I have to make sure other people are protected from all of the consequences of things I do	.63				
For me, even slight carelessness is inexcusable when it might affect others	.63				
To me, not acting to prevent disaster is as bad as making disasters happen	.62				
If I know that harm is possible, I should always try to prevent it, however unlikely it seems	.62				
In all kinds of daily situations, my Inactivity can cause as much harm as deliberate bad intentions	.61				
Once I think it is possible that I have cause harm, I can't forgive myself	.61				
If I don't act when I can foresee danger, then I am to blame for any consequences if it happens	.54				
I should never cause even the slightest harm to others	.54				
I must protect others from harm	.53				
I must always think through the consequences of even the smallest actions	.53				
If I cannot be CERTAIN I am blameless, I feel I am to blame	.52				
Many of my past actions have been intended to prevent harm	.52				
I often think that bad things will happen if I am not careful enough	.50				
I will be condemned for my actions	.49				
If I think bad things, this is as bad as DOING bad things	.48				

Everything I do can cause serious problems		.44			
I often take responsibility for things that other people do not think are my fault		.44			
If I take sufficient care then I can prevent any harmful accidents		.44			
I worry a great deal about the effects of things that I do or don't do		.43			
I am too sensitive to feeling responsible for things going wrong		.40			
I often feel responsible for things that go wrong		.38			
I am often close to causing harm		.34			
Other people should not rely upon my judgement		.31			
<i>Negative Mood: ($\alpha = .89$)</i>					
Afraid			.72		
Scared			.69		
Upset			.67		
Distressed			.67		
Ashamed			.64		
Guilty			.62		
Irritable			.57		
Jittery			.57		
Nervous			.56		
Hostile			.48		
<i>NJRE: ($\alpha = .91$)</i>					
To what extent did you have an urge to do something about this NJRE?				.85	
To what degree did this NJRE bother you or cause you distress AT THE TIME?				.82	
To what extent did you feel that it was your responsibility to do something about this NJRE?				.82	
How frequently did you experience this NJRE?				.82	
How intense was this NJRE?				.81	
To what extent did you feel that you couldn't get this NJRE out of your mind?				.74	
To what degree did this NJRE bother you or cause you distress LATER THAT SAME DAY?				.73	
NJRE occurrence 1				.62	

NJRE occurrence 2				.60	
<i>AMAC stop rules: ($\alpha = .91$)</i>					
Perhaps I didn't check everything properly, I had better check again					.80
I must check things one more time – just to be on the safe side					.72
I must just double check that I have done everything					.70
I may think I've checked everything properly, but in reality perhaps I haven't					.67
I think I've checked everything, but I may not have done it properly, so better keep checking					.65
I wasn't concentrating the last time I checked, so I had better do it again					.65
I had better check everything to make sure nothing bad happens					.62
I have probably forgotten something obvious, so I had better have one last check					.61
I had better check again because I want everything to be perfect					.61
I must think of all the things I might have done wrong, and then check them					.52

Note: only the highest factor loading for each individual item is shown.

A confirmatory factor analysis was performed to directly compare the five factor model and the one factor model. As there was no a prior theoretical reason to assume a factor structure other than a one factor or five factor solution may underlie the data set, and given the results of the exploratory factor analysis strongly suggested a one factor or five factor solution, alternative models (e.g. a two factor model) were not explored using confirmatory factor analyses as there was no theoretical or statistical justification to do so.

The one factor model was specified so that all items loaded directly onto one factor. In the five factor model items were specified to load onto only one of five factors according to the pattern indicated by the five factor solution reported in table 3 (i.e. all IU items loading only onto factor 1, or the IU factor, all RAS items loading only onto factor 2, or the inflated responsibility factor and so on). In the model all five factors were specified to correlate with one another (as suggested in table 4).

Table 4. Descriptive statistics for the 5 constructs and correlations between factors (n = 370).

	Mean (SD)	2	3	4	5
1. AMAC	2.46 (.90)	.48*	.48*	.44*	.40*
2. Inflated responsibility	3.60 (.91)		.60*	.37*	.41*
3. IU	1.98 (.71)			.47*	.55*
4. NJRE	4.72 (3.64)				.39*
5. Negative Mood	2.59 (.81)				

Note: * $p < .001$. One-tailed significance reported.

This analysis showed the 5 factor model is a significantly better fit than the one factor model, $\Delta\chi^2(10) = 4840, p < .001$. The five factor solution is therefore preferred over the one factor solution.

It should be noted that neither the one factor nor the five factor model were a especially good fit to the data using many conventional fit indices, although observation of these indices support the findings of the chi-square test, suggesting that the five factor model is a better fit to the data than the one factor model. Values for selected fit indices for the one factor model are: CFI = .51, RMR = .22, RMSEA = .08 with 90% confidence interval .08-.09. Values for selected fit indices for the five factor model are: CFI = .79, RMR = .12, RMSEA = .06 with 90% confidence interval .05-.06. The lack of especially good fit of both the one factor and five factor models to the data was to be expected.

In order to improve model fit in an exploratory analysis, model building is often used. In model building significant pathways between, for example, two items, or between two factors, or between an item and a factor not specified in the original model are added into the model, resulting in a better fit of the overall model to the data (Kline, 2005). Overall model fit using conventional fit indices should generally be best when all significant pathways unspecified in the original model are added into a model (Kline, 2005).

In both the one factor and the five factor model a large number of significant pathways (as identified using the statistical package Analysis of Moment Structures 17 [AMOS]) were not specified in the relevant models. In the one factor model 2432 significant pathways were not included in the model. Unspecified significant pathways in this analysis include correlations

between items and correlations between the error terms associated with items (see Kline, 2005). These correlations are to be expected; given that all 5 constructs are positively significantly correlated with each other (see table 1), we would expect items measuring those constructs to also correlate with one another. In the five factor model 1621 significant pathways are not included in the model. Unspecified significant pathways in this analysis include correlations between items, correlations between the error terms associated with items, correlations between items and error terms associated with another item and correlations between items and factors (see Kline, 2005). These correlations are also to be expected; given that all 5 constructs are positively significantly correlated with each other (see table 1), we would expect items measuring those constructs to also correlate with one another and items specified to measure one factor (e.g. IU) to correlate with other factors they are not specified to measure (e.g. inflated responsibility factor).

The reason that model building was not used in these analyses is that to do so would compromise the very point of these analyses. For example, with respect to the five factor model, allowing an item specified to measure one construct (e.g. IU) or its associated error term to correlate with a factor representing a construct it is not specified to measure (e.g. inflated responsibility factor) would break the assumption made in the original analysis that the five factors, and items associated with those factors, are separate.

It was therefore not appropriate to use model building in these analyses. Given that conventional fit indices are dependent on the specification of significant pathways in order to achieve a good fit, it was felt that using these indices as the primary basis to compare the one and five factor models was not appropriate. Although sensitive to model fit, the chi-square test is suitable for comparing which of two nested models (as we have here) is the best fit to the data regardless of if these models may be a good fit to the data as measured by conventional fit indices (Kline, 2005). Therefore, only the chi square test was used here to directly compare the fit of the one factor and five factor models, although, as shown earlier, conventional fit indices support the conclusion of the chi square test, namely that the five factor model is a better fit to the data than the one factor model.

We thus conclude that the items included in the factor analysis seem to measure the five separable constructs they are thought to measure rather than all being indicators of one underlying variable.

2.3.7 Regression Analyses

Two regression analyses were performed to see which of the five “causal” OCD constructs would significantly account for variance in obsessions and compulsions when all were examined simultaneously. These analyses were performed using the statistical package AMOs 17. The constructs are represented in each analysis by the total score on the questionnaire (or questionnaire subscale) used to measure the construct. Obsessions and compulsions are represented by the total score on the obsessions or compulsions sub-scale of the CBOCI.

Table 5. Regression analysis of five “causal” OCD constructs using obsessions as criterion variable.

<i>Construct</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>P</i>
IU	.12	.02	.24	< .001
Responsibility	.14	.02	.36	< .001
Negative Mood	.11	.02	.25	< .001
NJRE Occurrence	.21	.07	.14	= .001
AMAC	.09	.02	.22	< .001
NJRE Intensity	.03	.01	.12	= .002

Note: One tailed significance reported.

Firstly, a regression was performed where the obsessions scale of the CBOCI was used as the criterion variable. All 5 constructs were specified to predict obsessions in the analysis. As the nature of the relationship between the constructs themselves had yet to be explored (as they would be in the experiments to follow) no relationship was specified between the constructs. All 5 constructs were significant predictors of obsessions (see table 5).

Secondly, a regression was performed where the compulsions scale of the CBOCI was used as the criterion variable and all 5 constructs were specified to predict compulsions in the analysis. Again, as the nature of the relationship between the constructs themselves had yet to be explored no relationship was specified between the constructs.

Whilst inflated responsibility, negative mood, NJRE occurrence and AMAC stop rules were significant predictors of compulsions, IU and NJRE intensity were not significant predictors of compulsions (see table 6). This regression argues that once the shared variance explained by

the five causal constructs in compulsions is taken into account, IU and NJRE intensity do not account for substantial variance in compulsive symptoms.

Table 6. Regression analysis of five “causal” OCD constructs using compulsion as criterion variable.

<i>Construct</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>P</i>
<i>Significant predictors</i>				
AMAC	.20	.02	.46	< .001
Responsibility	.06	.02	.13	= .001
Negative Mood	.08	.02	.17	< .001
NJRE occurrence	.58	.07	.32	< .001
<i>Non-significant predictors</i>				
IU	-.01	.01	.05	= .32
NJRE Intensity	.30	.02	-.02	= .10

Note: One tailed significance reported.

The results of these two regression analyses will be returned two after the experiments in which the five causal constructs are manipulated have been described (in chapter 8). In this chapter the results of these analyses will be looked at in view of the model of the relationships between the five causal constructs which emerge from the five experimental chapters. It may be the case, for example, that whilst IU does not have a direct influence on compulsions once the shared variance explained by the five causal constructs has been taken into account (see the above regression) it may be having an influence on compulsions through its relationship with the four other causal constructs.

2.4 Discussion

The results of the current study support the idea that the five constructs specifically being focused upon in this thesis are best seen as distinct and separate entities rather as being indicators of some core underlying factor or factors. Although all of the constructs are significantly correlated with one another none of these correlations are above a moderate level suggesting that the five constructs are related but separate. The five factor solution, when directly compared with the one factor solution using confirmatory factor analysis, emerged as a significantly better fit to the data. It therefore seems justifiable to treat the five constructs as separate throughout this thesis. Although the fact that one factor explained a

good deal of shared variance in the five constructs should be noted this is not really surprising given that all of these constructs are linked to OC symptoms and compulsive checking in the literature. It would seem quite plausible that this factor simply represents a general vulnerability to OC symptoms. Whilst the possibility the factor represents something more specific cannot be discounted it is beyond the scope of this chapter to speculate on what this could be (see general discussion section of thesis).

The regression analyses suggest that whilst all the constructs account for significant and unique variance in obsessive symptoms, IU and NJRE intensity do not account for substantial variance in compulsive symptoms. It is possible that these two constructs (or sub-construct in the case of NJRE intensity) may be having an influence on compulsive symptoms indirectly as opposed to directly by having a causal influence on the three other constructs and one sub-construct (NJRE occurrence). This possibility will be discussed after the experimental manipulations of the five constructs have been described to see if the affects manipulating these constructs has on other constructs supports this possibility.

3. Justification of the statistical analyses used in experimental chapters and justification of choice of measures used to decide if two groups differ on a given construct.

This section of the thesis will briefly attempt to justify the statistical analyses used in the experimental chapters and the choice of which measures to look at to decide if two groups differ on a given construct.

3.1 Justification of statistical analyses

Each of the 5 experimental chapters to be described in this thesis involve the comparison of two different groups, usually a group high and a group low on the construct being manipulated in a given chapter (e.g. for the responsibility chapter, comparisons are made between a high responsibility group vs a low responsibility group). Given that each pair of groups were independent, comparisons between these groups were made using independent samples t-tests.

Although each pair of groups will be compared on several dependent variables within each experiment, multivariate analysis of variance (MANOVA) was not performed prior to comparisons between the groups on individual dependent variables. The reason for this is that, although chapter 2 suggests that all five of the constructs are positively related (probably due to each constructs connection with OC symptoms) the primary aim of the experimental chapters is to explore specifically how each individual construct is related to one another. Multivariate effects are therefore not of particular interest to the primary aim of the thesis. Further, if we were to follow the traditional method and not follow up a non-significant MANOVA with individual tests on separate dependent variables (Field, 2009) we might risk missing interesting group differences on measures of the individual constructs.

All results reported in the experimental chapters, and the mediation analyses and tests of indirect effects which follow (see chapter 8), are reported at a one tailed level of significance. There are two reasons for this. Firstly, although few studies have manipulated any of the constructs looked at in this thesis and subsequently examined the effects of doing so on the other constructs, those which have show an increase in scores on the construct not being manipulated (e.g. Lopatka & Rachman, 1995; Shafran, 1997; Arntz *et al*, 2007; Mancini *et al*, 2008; Coles *et al*, 2005; Miranda *et al*, 2008; Kirby & Yardley, 2009). Secondly, although research in this area is scarce, we do know that all of the constructs being focused on in this thesis are significantly positively correlated with one another and with OC symptoms (see

chapter 2) and therefore we can predict that any influence of manipulating one construct on another will be in a positive direction: a one tailed hypothesis.

Usually when making comparisons across several dependent variables within a given experiment one would adjust the level of significance required in order for an effect to be considered significant to take into account the number of comparisons being made. For example, the Bonferroni correction adjusts the criterion for significance by dividing the criterion for significance by the number of comparisons being made (Field, 2009). However, in the analyses which follow, in each individual experiment unadjusted significance values are reported and taken to be significant if a given significance test reaches the level of $p < .05$ at an unadjusted level and if effect size for a given comparison reaches the minimum criteria considered a “medium” effect size ($d = .50$) according to Cohens (1992) criteria. The reasons for reporting and using unadjusted significance values are three-fold. Firstly, given the large number of comparisons being made in each experiment (for example, 19 individual comparisons are made between the two mood groups in the first experiment reported in the thesis) it was felt that using Bonferroni corrections would be overly stringent and could dilute power of detecting real differences between groups. Secondly, Cohen (1992) suggests that to detect a medium difference ($d = .50$) between two independent sample means at an unadjusted significance level of $p < .05$ a sample size of $n = 128$ is required (that is, $n = 64$ for each group). In the experiments that follow in this thesis the average sample size is $n = 60$ (that is, $n = 30$ in each group) as obtaining larger sample sizes was unrealistic. Therefore, the experiments which follow are underpowered for detecting a medium difference at an unadjusted significance level of $p < .05$ which provides further justification for interpreting unadjusted significance values and not applying conservative adjustment methods such as Bonferroni corrections. Finally, the APA is increasingly recognising the arbitrariness of $p < .05$ and the fact that this kind of dichotomous significant/non-significant distinction is outdated, and is increasingly encouraging the reporting of and interpretation of effect sizes (see e.g. Wilkinson and APA Task Force on Statistical Inference, 1999). Within the experiments that follow a result is considered as significant only if a given significance test reaches the level of $p < .05$ and if an associated effect size is equal to or bigger than Cohen’s (1992) criteria for a medium effect size.

3.2 Justification of choice of measures to decide if two groups differ on a given construct

In every experiment that follows every construct (apart from mood and NJRE intensity) were measured using two instruments. Firstly, short (usually 3-4 question) VAS item/s derived to

measure specifically how the person scored on a given construct at that *precise moment in time* were given to participants. In addition, longer form trait measures of each construct were also given (these were outlined in chapter 2).

In order to decide if two groups differed on a given construct in each experimental chapter it was necessary to decide whether to base this information on VAS scales alone, long form trait measures alone or both VAS and long form trait measures. The following criteria was chosen: Two groups were considered to differ on a given construct if the VAS measure of that construct (if more than one question was used, then a composite of these VAS measures) reached the level of $p < .05$ *and* if the associated effect size reached the criteria for a medium effect size *and* if the VAS measure of the construct correlated significantly with the trait measure of the construct.

It was decided to base the decision about whether two groups differ on a given construct primarily on VAS measures as these types of measures were thought to be more sensitive to experimental manipulations and a better measure of how the participant feels *at that moment in time* as opposed to broader trait measures of constructs which were thought to be less likely to be influenced by experimental manipulations and instead be more reflective of a participant's position on the spectrum of a given trait in general. In order to ensure the VAS measure of a construct possessed convergent validity with the full trait measure, significant differences between groups on VAS measures are only accepted as valid if the VAS measure is significantly positively correlated with the full trait measure.

In the unexpected event that two groups are found to differ significantly on the trait measure of a given construct but *not* on the VAS measure of the same construct, it was decided to treat this difference as significant as long as the effect size associated with the trait measure reaches the criteria for a medium effect size. This decision was made as trait measures of constructs should be more informative about where an individual lies on the spectrum of a given construct than the VAS measures employed in these experiments and so should a situation arise where a significant difference is found on the trait measure but not the VAS measure of a construct it makes sense to prioritise the trait measure.

Note 1: Mood was only measured using VAS measures due to the author being primarily interested in positive and negative mood in their broadest sense (and not more specific mood states). Therefore, for this construct only VAS measures are taken into consideration when deciding if a manipulation had a significant effect on the construct.

NJRE intensity was not measured using VAS measures, primarily as this part of the NJRE construct seemed to be best captured by the full measure employed in NJRE-QR, apart from in the NJRE experimental manipulation chapter (chapter 7) when a VAS measure of this part of the NJRE construct was developed. Therefore, only the full measure of this construct is taken into consideration when deciding if a manipulation had a significant effect on the construct apart from in chapter 7 when both the VAS measure and full measure of this construct are taken into consideration.

Note 2: For a detailed discussion of the pros and cons and the implications of using, 1. Unadjusted significance values and 2: One-tailed tests, in the experimental chapters of this thesis please see the general discussion section.

Note 3: It should be noted that in each of the 5 experimental chapters, the correlations between VAS measure of construct X and the full measure of construct X in any given experiment are the correlations for all participants taking part in that experiment and the correlations are not broken down at a group level. For example, in the experiment in which negative mood is manipulated, the correlation between the VAS measure of inflated responsibility and the full measure of responsibility (RAS) reported is the correlation between these two measures across all 59 participants who took part in this experiment. The correlation between the VAS measure of responsibility and the full measure of responsibility (RAS) for the negative mood group and positive mood group, separately, are not reported. It should be noted that the correlations reported therefore break the assumption in correlational analysis that all participants be drawn from the same population. In all 5 experiments reported in this thesis, when group membership is ignored, all correlations between VAS measures and the respective full measures are significant. That is, all of the VAS measures used in this thesis appear to have convergent validity with their associated full measure when group membership is ignored. Had these correlations been reported at a group level in each experiment (e.g. in chapter 3, for the negative and positive mood group separately), all correlations between VAS measures and their associated full measures within each experimental group would have also been significant. Therefore, all of the VAS measures used in this thesis appear to have convergent validity with their associated full measure regardless of if one ignores group membership or examines correlations at a group level. Given this fact, and in order to be succinct, in the 5 experiments reported in this thesis, correlations between VAS and full measures are reported across groups rather than for each experimental group separately, even though doing so breaks the assumption in correlational analysis that all participants should be drawn from the same population.

4. Ethical Issues

This section of the thesis will briefly address ethical issues relevant to the 5 experimental chapters and steps taken to ensure participants left the experimental setting in a similar mindset to how they entered it. All 5 experiments (and the two questionnaire studies described in chapters 2 and appendix 1) received ethical clearance from The School of Life Sciences Research Governance Committee (University of Sussex). All 5 experiments complied with the British Psychological Society's Ethical Principles for Conducting Research with Human Participants (www.dcs.gla.ac.uk/ethics/bps-conduct.pdf).

Before taking part in the 5 experiments participants were asked to complete and sign an informed consent form which stated very briefly the purpose of the experiment. The informed consent form informed participants of their right to withdraw from the experiment at anytime. In two experiments participants were explicitly deceived about the true purpose of the experiment from the experiment's outset.

The first experiment to explicitly deceive participants about the true purpose of the experiment from the outset was the experiment in which negative mood was manipulated (chapter 3). In this experiment participants were told the study was concerned with music comprehension and memory and how this is related to personality. Participants were told they were being asked to listen to the music as they would later be asked questions about it. In fact, listening to music constituted the mood manipulation in this study, participants were asked to listen to one of two pieces of music shown in previous research to induce either a negative or positive mood state. Due to a wish not to make it obvious to participants that the purpose of the music was to induce a specific mood state, a "cover" story was used to explain why participants were asked to listen to the music. Participants were fully debriefed as to the actual purpose of using the music at the end of the experiment. It is also worth noting that in this study any participants experiencing a negative mood induction were offered the chance to experience a positive mood induction after the experiment had finished.

The second experiment in which participants were explicitly deceived about the true purpose of the experiment from the outset was the experiment in which NJRE were manipulated (chapter 7). In this experiment participants were told the study was broadly interested in examining the link between personality and perception. As part of this experiment participants were asked to take part in a short visualisation task in which they were asked to look around the experimental room and imagine that the experimental room was "their" room. The state of the experimental room in this study actually constituted the experimental manipulation, the

room was either extremely tidy for participants in one condition (low NJRE group) and extremely messy for participants in the other condition (high NJRE group). The point of engaging participants in the visualisation task was simply to get participants to look around the room. Due to a wish not to make it obvious to participants that the visualisation task was simply being used as a method to get the participant to look around the room (as this may have made participants aware of the purpose of the manipulation) a “cover” story was used in which participants were told that the study involved perception and personality (participants were asked to later fill in a personality questionnaire). Participants were fully debriefed as to the true purpose of the visualisation task and the true purpose overall experiment at the end of the experiment. In all other experiments the informed consent form simply described what participants would be asked to do (and so did not involve deception from the experiments outset).

In the three remaining experiments (the manipulation of stop rules: chapter 4, the manipulation of inflated responsibility: chapter 5 and the manipulation of IU: chapter 6) participants were asked to read a story about a young women with a problem and to write down some advice to help her with her problem (the stories differed between the experiments). Participants were deceived as they were told that they were reading a true story when the stories were in fact fictitious. Participants were told the stories were true to try to help participants empathise with the protagonist in the story which it was hoped would, in turn, enhance the strength of the manipulation. It is important to note that at no stage were participants told that their advice would be subsequently offered to the fictitious character. Participants were told at the end of the experiment that the character was fictitious as part of the debriefing procedure.

In all of the experiments participants were asked to fill in a questionnaire for Professor Graham Davey and were told that this questionnaire was related to a different experiment when in fact the questionnaire was part of that experiment and contained the VAS measures of the constructs. The reason for this deception was two-fold. Firstly, as the questionnaire contained the manipulation check measures and was given to participants immediately after they had experienced the manipulation used in a given experiment, it was felt participants might connect the manipulation check questions with the manipulation itself thus making participants aware of the purpose of the manipulation. It was hoped that by telling participants that the questionnaire was part of a separate study participants would not make this connection easily. More generally, it was felt that having participants think that this questionnaire was part of a separate study would help reduce socially desirable responses.

At the end of the experiment participants were given a debriefing form and were given the chance to ask the experimenter any questions. The debriefing form briefly outlined the construct being manipulated in a given study, the purpose of the manipulation, any deception involved in the study (i.e. the questionnaire being used for a “separate study” outlined in the previous paragraph) and the rationale behind this deception. The debriefing sheet also emphasised that all data would be kept anonymous and informed participants of their right to withdraw retrospectively any consent given and to require that their own data be destroyed. Finally, the debriefing form contained the contact details of the University’s counselling service in case the participant found the experiment at all distressing.

5. Chapter 3: Negative Mood Manipulation

5.1 Introduction

The first experiment was designed to investigate what effect manipulating mood would have on the other four constructs focused on in this thesis. Participants were induced into either a positive or a negative mood and the effects of doing so on AMAC/FLC stop rules, inflated responsibility, IU and NJRE were examined. One may recall from the literature review that whilst various discrete negative emotions have been linked to OC symptoms (e.g. guilt, Mancini & Gangemi, 2004; disgust, e.g. Olatunji *et al*, 2004) for the purposes of this thesis negative mood is defined in its broadest sense and special focus is given only to those parts of negative mood which one might consider most proximal to OCD; depression (c.f. Spengler & Jacobi, 1998) and anxiety (c.f. Welkowitz *et al*, 2000). Subsequently measurement of negative mood is based on the measurement of sadness and anxiety.

In order to manipulate mood a music mood induction procedure was used. Whilst a detailed evaluation of mood induction procedures is beyond the scope of this thesis (see e.g. Clark, 1983; Martin, 1990) Martin (1990) reported that mood induction procedures such as Velten self-referent statements and the manipulation of facial expressions induce the desired mood in approximately 50% of cases, whereas other procedures (such as film and music) induce the desired mood in more than 75% of cases. Similarly, Clark (1983) reported a 50% success rate for Velten self-referent statements and a 100% success rate for music mood induction procedures. Music mood induction, therefore, seems a fairly efficacious in inducing desired mood states when compared to other mood induction procedures.

What affect might we expect the manipulation of mood to have on the four other constructs? There is experimental evidence to suggest that increasing negative mood will subsequently increase NJRE. Mancini *et al* (2008) manipulated participant's level of guilt and found that, for participants high in trait guilt, inducing guilt experimentally led to increases in NJRE. Although guilt is somewhat separate from depression and anxiety this suggests, at least for those who may have a predisposition to experience negative mood states, increasing negative mood may lead to an increase in NJRE.

In Salkovskis's (1985, 1989) cognitive model of OCD, inflated responsibility is seen as a cause of negative mood. Thus, when an individual experiences an intrusive cognition his or her response to the intrusion will initially be affected by the individual's level of inflated responsibility, which then in turn may affect mood. However, adverse mood arising from

appraisals, according to the theory, may also increase the level of responsibility experienced by an individual when making subsequent appraisals (Salkovskis & Freeston, 2001). Salkovskis's (1985, 1989) model predicts, therefore, that increasing negative mood will in turn increase responsibility (although it should be noted that Salkovskis's model is less clear in terms of whether adverse mood arising independently from dysfunctional appraisals should also lead to a subsequent increase in responsibility).

A theory which links both negative mood and stop rules to OCD symptoms and compulsive checking is the MAI hypothesis (Martin & Davies, 1998; see chapter 1). Briefly, the theory states that perseveration at a task such as compulsive checking should be greatest when an individual is in a negative mood and uses AMAC stop rules. Research has yet to examine if being in negative mood may precede the use of AMAC stop rules or vice versa. Negative mood is known to induce comparatively higher performance standards than positive or neutral mood (Scott & Cervone, 2002), causing individuals to become relatively dissatisfied with any given level of imagined performance (Cervone, Kopp, Schaumann & Scott, 1994, see also chapter 1). Raising performance standards in such a way is likely to encourage the use of AMAC stop rules (e.g. "I must just double check that I have done everything"). Negative moods effect on performance standards thus represents one possible mechanism through which negative mood could increase the use of AMAC stop rules.

Negative mood is also known to promote a more systematic and deliberate information-processing style than positive mood (Ambady & Gray, 2002; Batra & Stayman, 1990; Tiedens & Linton, 2001). Systematic processing is a bottom-up data-driven and comprehensively analytic style in which perceivers access and scrutinize all informational input for its relevance and importance to their judgement task, and integrate all information in forming their judgement (Chaiken, Liberman & Eagly, 1989), and this is often contrasted with heuristic processing which is a more top-down processing mode that demands much less cognitive effort and capacity than systematic processing. Negative mood provides information that characterizes a situation as problematic and fosters the spontaneous adoption of a systematic, detail-oriented, bottom-up processing style while positive mood characterizes the situation as benign and fosters the adoption of a top-down processing style that relies on pre-existing knowledge structures and routines (Schwarz, 2002). One can see how use of systematic processing could raise performance standards which in turn may lead to an increase in the use of AMAC stop rules. Positive mood, conversely, through its links with more heuristic type processing, might encourage the use of FLC stop rules (e.g. "I'm pretty sure I've checked properly, so don't worry

about it anymore"). Systematic processing thus represents a second mechanism through which negative mood may encourage the use of AMAC stop rules whilst positive mood may encourage the use of FLC stop rules through promoting heuristic processing.

Finally, although IU has been shown to be linked with depression in a number of studies (e.g. Yook, Kim, Suh, Lee, 2010) to the author's knowledge no-one has experimentally examined the effects of manipulating negative mood on IU, however, given negative mood states such as anxiety are known to increase the perception of future situations as threatening and problematic (e.g. Clark and Wells, 1995) increasing negative mood could conceivably lead to an increase in IU.

Based on the above evidence, theories and possible theoretical links, as well as the fact all four dependent constructs in this experiment are positively correlated with negative mood to at least a moderate degree (chapter 2), it is predicted that increasing negative mood will subsequently lead to an increase in the endorsement of AMAC stop rules, IU, inflated responsibility and NJRE occurrence and intensity. It is also predicted, due to possible theoretical link described above, that increasing positive mood will subsequently lead to an increase in the endorsement of FLC stop rules.

5.2.1 Method

5.2.2 Participants

Participants were 59 psychology undergraduates from the University of Sussex (men: 7; women: 52). Aged ranged from 18 to 43 years ($M = 21.03$, $SD = 5.61$). All of the participants were volunteers who received partial fulfilment of a course requirement by taking part in the experiment.

5.2.3 Measures

VAS measures (given in the short questionnaire)

Mood: Mood was measured using four questions where participants were asked to rate their current level of sadness, happiness, anxiety and arousal on separate 100 point VASs (where 0 = *not at all sad/happy/anxious/aroused* and 100 = *extremely sad/happy/anxious/aroused*).

Stop rules: AMAC stop rules and FLC stop rules were each measured using 1 question taken from the SRQ. Participants were asked to imagine they were checking something at the present moment in time and to indicate to what extent two statements represent the kinds of things the participant would be thinking when deciding whether to continue or to stop checking on separate 100 point VASs (where 0 = *Don't agree at all* and 100 = *Completely Agree*). The two statements were "I must check things one more time – just to be on the safe side" (AMAC statement) and "Everything is probably fine, so stop checking" (FLC statement).

Responsibility: Responsibility was measured using 3 items taken from the RAS (Salkovskis *et al*, 2000). Participants were asked to rate how much they agreed with each statement at this exact moment in time on separate 100 point VASs (where 0 = *Totally Disagree* and 100 = *Totally Agree*). The 3 items were "If I think bad things, this is as bad as DOING bad things", "I will be condemned for my actions ", and "Other people should not rely on my judgment". The 3 items had acceptable internal consistency ($\alpha = .78$).

IU: IU was measured using 3 items taken from the IUS (Freeston *et al*, 1994). Participants were asked to rate to what extent they agreed with the items at this exact moment in time on 3 separate 100 point VASs (where 0 = *Totally Disagree* and 100 = *Totally Agree*). The three items were "Uncertainty stops me having a firm opinion", "It's unfair there are no guarantees in life" and "Being uncertain means I am not first rate". The 3 items had acceptable internal consistency ($\alpha = .80$).

NJRE Occurrence: NJRE occurrence was measured using 3 scenarios taken from the NJRE-QR (NJRE-QR, Coles *et al*, 2003). Following a description of NJRE taken from the NJRE-QR, participants were asked to rate to what extent they felt they may experience a NJRE if a given scenario was happening to them at that exact moment in time on 3 separate VASs (where 0 = *Not at all* and 100 = *Very much so*). The three scenarios were, "You are getting dressed before you go to a lecture. To what extent do you feel that parts of your clothes (tags, collars, pant legs, etc.) don't feel just right?", "You are hanging a picture on the wall. To what extent do you feel that the picture doesn't look just right?" and "You are describing your day to a friend on the telephone. To what extent do you feel that what you are trying to say didn't sound just right?". The 3 items had modest internal consistency ($\alpha = .70$). (*Note:* NJRE intensity was measured only through the NJRE-QR).

Full measures (given in the full questionnaire booklet)

Mood: Although not a full measure, mood was measured again in the full questionnaire (time 2) using the same four questions as had been used to measure mood in the short questionnaire (time 1).

Stop rules: AMAC and FLC stop rules were measured in the full questionnaire using the SRQ (see appendix 1 for details). In the present study the AMAC subscale had excellent internal consistency ($\alpha = .93$) whilst the FLC subscale had very good internal consistency ($\alpha = .89$).

Responsibility: Responsibility was measured in the full questionnaire using the RAS (Salkovskis *et al*, 2000, see chapter 2 for details). In the present study the scale had excellent internal consistency ($\alpha = .95$).

IU: IU was measured in the full questionnaire using the IUS (Freeston *et al*, 1994, see chapter 2 for details). In the present study the scale had excellent internal consistency ($\alpha = .96$).

NJRE: NJRE occurrence and intensity were measured in the full questionnaire using the NJRE-QR (Coles *et al*, 2003, see chapter 2 for details). In the present study the NJRE occurrence subscale showed modest internal consistency ($\alpha = .67$) whilst the NJRE intensity scale showed excellent internal consistency ($\alpha = .93$).

5.2.4 Procedure

Participants were randomly assigned to one of two groups, depending on the valence of the mood induction they were to receive, these groups were labelled positive ($n = 30$) and negative ($n = 29$). Participants were tested individually in a small room containing a PC with headphones and an angle-poise lamp. There was a retractable blind over the only window in the room which could be open or closed (closing of the blind almost completely stopped day light from entering the room). Participants were told the experiment was about music comprehension and memory and how this is related to personality. They were told that they would be asked to listen to some music and then, after a ten minute break, that they would be asked to fill in some questionnaires. This information was presented in a consent form which participants were asked to sign.

Stage 1. Mood Induction: Participants were asked to put the headphones in place so they could listen to a short piece of music. The music lasted approximately 8 minutes. The experimenter left the room whilst the music was playing and returned after 8 minutes. Participants in the negative mood group were asked to listen to a piece of music which had previously been

shown to induce a negative mood state (MacDonald & Davey, 2005b): Gyorgy Ligeti, *Lux Aeterna*. In addition, the blinds were drawn over the windows and the main room lights were switched off, only the angle-poise lamp was used to illuminate the room. Participants in the positive mood group were asked to listen to a different piece of music: Delibes, *Mazurka* from *Coppelia* (only the section from 1m 46secs to 3m10secs, looped). The blinds in the room were left open allowing full day light into the room, the main lights were turned on and so was the angle poised lamp.

Stage 2. Ten minute break and short questionnaire: Participants were told in the informed consent form that after listening to the music there would be a ten minute break before they would be given follow up questionnaires. The experimenter re-entered the room immediately after the music had finished and reminded the participant about the impending ten minute break. The experimenter then asked the participant if they would mind filling in a questionnaire unrelated to the experiment during the ten minute break. Participants were told the questionnaire was related to a separate questionnaire study being conducted by the experimenter's supervisor and that the questionnaire would take just over five minutes to complete. All participants agreed to fill in the questionnaire. The experimenter left the room for ten minutes whilst the participant filled in the questionnaire. The data collected in this questionnaire was actually to be used in the analysis of the present study. The reason for deceiving participants about this questionnaire was to reduce any experimental demand effects and minimize any perceived link between the music as a mood induction procedure and subsequent data collection.

The short questionnaire contained a separate consent form. The consent form informed participants the questionnaire study was being conducted by Professor Graham Davey and was broadly concerned with decision making. The questionnaire contained 15 questions which were the visual analogue scale (VAS) measures of the five constructs (see measures section).

Stage 3. Full questionnaires. The experimenter re-entered the room after the 10 minute "break" had finished. The experimenter thanked the participant for filling in the previous questionnaire and then gave the participant another questionnaire booklet. The experimenter asked the participant to inform the experimenter when they had finished the questionnaire booklet. The experimenter then left the room until the participant had finished the questionnaire booklet.

This questionnaire booklet contained a number of questionnaires. The first questionnaire was a "music comprehension and memory" questionnaire designed specifically for the purposes of

this experiment. It asked participants a number of questions about the piece of music they had listened to at the start of the experiment (e.g. what genre the music was; if a piano was played during the piece). This questionnaire was not used in the data analysis and was given to participants purely to strengthen the belief that the experiment was related to music comprehension and memory. This questionnaire booklet also contained further VAS mood measures and the full measures of the 4 remaining constructs (see measures section). Full measures of each construct were given to participants in order to validate the VAS measures.

Stage 4. Debrief: After completing the questionnaire booklet, participants were thanked and debriefed, and any participant who had undergone a negative mood induction was offered a positive mood induction before they left.

5.3 Results

Mood Manipulation Check: Table 7 shows the ratings on mood and VAS measures of the dependent constructs at time 1 (short questionnaire) and mood and full questionnaire measures of the dependent constructs at time 2 (long questionnaire) for the two mood groups. Each measure was subjected to an independent measures sample t-test.

Table 7. Mean (standard deviation) ratings on mood and VAS measures of the dependent constructs at time 1 (short questionnaire) and mood and full questionnaire measures of the dependent constructs at time 2 (long questionnaire) for the two mood groups. Note: untransformed means are reported even if a variable was transformed prior to significance testing.

<u>Group</u>	<u>Negative</u>		<u>Positive</u>	
<u>Time</u>	<u>1</u>	<u>2</u>	<u>1</u>	<u>2</u>
Sadness	30.65*** (22.23)	36.38* (24.10)	09.57*** (08.07)	20.90* (13.74)
Happiness	56.79*** (19.46)	57.66** (21.39)	73.90*** (10.33)	70.80** (11.69)
Anxiety	37.59** (26.48)	39.90* (26.09)	18.20** (17.28)	24.47* (19.24)

Arousal	40.93**	45.38	54.37**	51.37
	(21.08)	(22.93)	(20.69)	(19.24)
AMAC VAS	60.38**	-	46.89**	-
	(23.98)	-	(24.91)	-
AMAC FQ	-	2.89**	-	2.37**
	-	(.93)	-	(.96)
FLC VAS	48.41**	-	66.63**	-
	(22.97)	-	(19.13)	-
FLC FQ	-	2.58**	-	3.04**
	-	(.73)	-	(.98)
R VAS	35.82*	-	25.72*	-
	(19.47)	-	(17.97)	-
R FQ	-	3.89**	-	3.27**
	-	(.81)	-	(1.08)
IU VAS	41.35	-	32.28	-
	(19.21)	-	(19.23)	-
IU FQ	-	2.20	-	1.92
	-	(.85)	-	(.74)
NJRE Occ VAS	35.61	-	28.90	-
	(18.77)	-	(17.95)	-
NJRE Occ FQ	-	.34	-	.31
	-	(.22)	-	(.23)
NJRE Inten	-	3.23	-	2.54

-	(1.66)	-	(1.60)
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*Note: FQ = full questionnaire. AMAC = As many as can. FLC = Feel like continuing. R = Inflated responsibility. IU = Intolerance of Uncertainty. NJRE Occ = NJRE occurrence. NJRE Inten = NJRE intensity. * = $p < .05$, ** = $p < .01$, *** = $p < .001$. If a difference on a measure was significant at $p < .05$ but the associated effect size was not equal to or greater than $d = 0.5$ then this difference it is not noted as significant.*

The sadness measure at time 1 appeared to be non-normally distributed, however, a log transformation appeared to correct for this. The negative mood group scored significantly higher on the sadness measure than the positive mood group at time 1, $t(57) = -4.07$, $p < .001$ (see figure 1). The effect size of the manipulation on sadness at time 1, according to Cohen's (1988) criteria, was large (Cohen's $d = -1.080$). The sadness measure at time 2 appeared to be non-normally distributed, however, a log transformation appeared to correct for this. The negative mood group also scored significantly higher on the sadness measure than the positive mood group at time 2, $t(57) = -2.37$, $p = .01$ (see figure 2). The effect size of the manipulation on sadness at time 2, according to Cohen's (1988) criteria, was moderate (Cohen's $d = -0.628$).

Figure 1: Mean scores of two mood groups on sadness VAS measure at time 1.

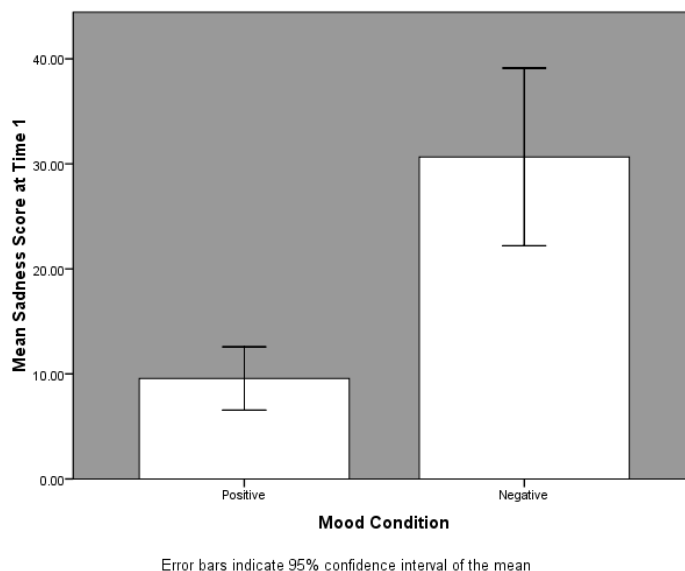
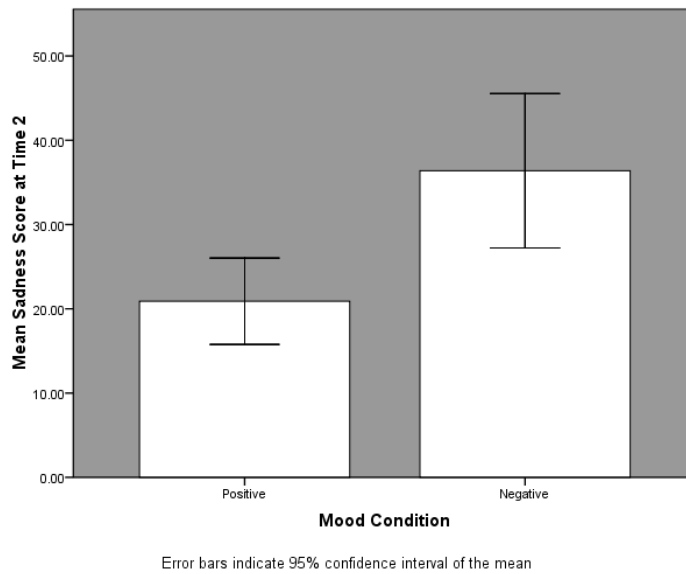


Figure 2: Mean scores of two mood groups on sadness VAS measure at time 2.



The happiness measure at time 1 appeared to be non-normally distributed, however, a log transformation appeared to correct for this. The positive mood group scored significantly higher on the happiness measure than the negative mood group at time 1, $t(57) = 4.32, p < .001$ (see figure 3). The effect size of the manipulation on happiness at time 1, according to Cohen's (1988) criteria, was large (Cohen's $d = 1.144$). The positive mood group also scored significantly higher on the happiness measure than the negative mood group at time 2, $t(43.04) = 2.94, p = .003$ (see figure 4). The effect size of the manipulation on happiness at time 2, according to Cohen's (1988) criteria, was large (Cohen's $d = 0.890$).

Figure 3: Mean scores of two mood groups on happiness VAS measure at time 1.

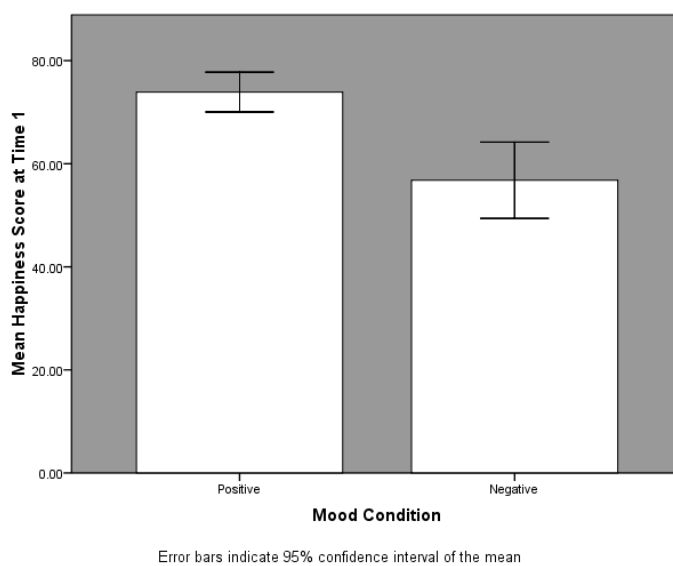
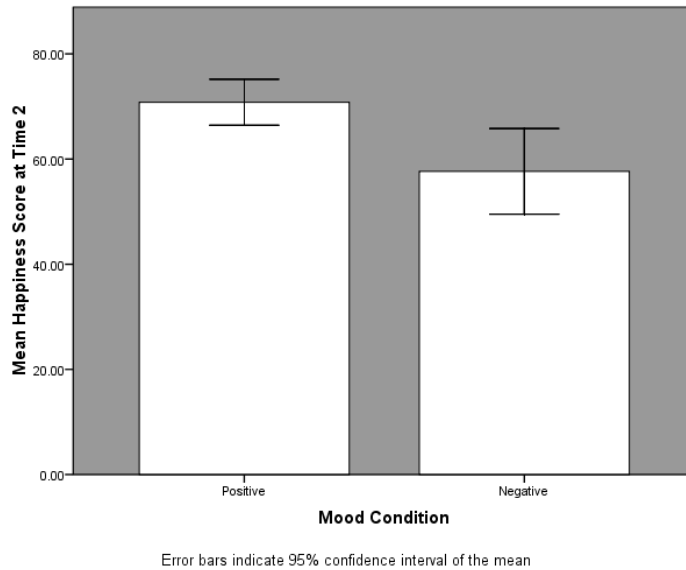


Figure 4: Mean scores of two mood groups on happiness VAS measure at time 2.



The anxiety measure at time 1 appeared to be non-normally distributed, however, a square root transformation appeared to correct for this. The negative mood group scored significantly higher on the anxiety measure than the positive mood group at time 1, $t(57) = -3.15$, $p = .002$ (see figure 5). The effect size of the manipulation on anxiety at time 1, according to Cohen's (1988) criteria, was large (Cohen's $d = -.0.834$). The anxiety measure at time 2 appeared to be non-normally distributed, however, a log transformation appeared to correct for this. The negative mood group also scored significantly higher on the anxiety measure than the positive mood group at time 2, $t(57) = -2.30$, $p = .01$ (see figure 6). The effect size of the manipulation on anxiety at time 2, according to Cohen's (1988) criteria, was moderate (Cohen's $d = -.0.610$).

Figure 5: Mean scores of two mood groups on anxiety VAS measure at time 1.

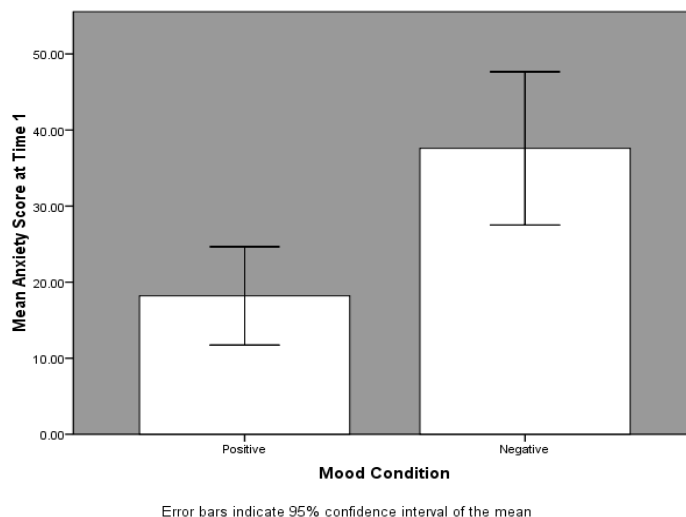
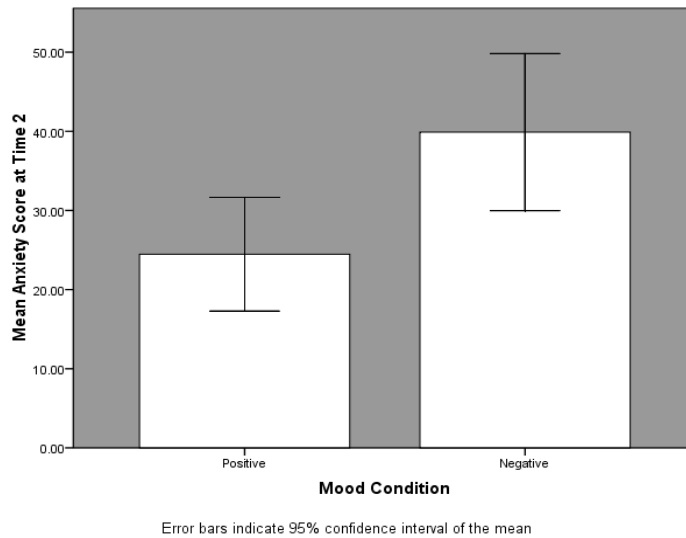
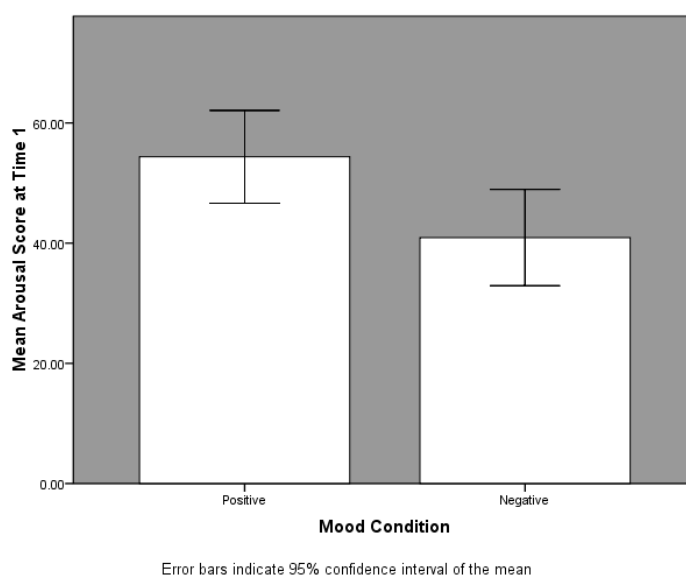


Figure 6: Mean scores of two mood groups on anxiety VAS measure at time 2.



The positive mood group scored significantly higher on the arousal measure than the negative mood group at time 1, $t(57) = 2.47$, $p = .009$ (see figure 7). The effect size of the manipulation on arousal at time 1, according to Cohen's (1988) criteria, was moderate (Cohen's $d = 0.654$). The positive mood group scored higher on the arousal measure than the negative mood group at time 2 although this difference was not significant, $t(57) = 1.08$, $p = .14$. The effect size of the manipulation on arousal at time 2, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.286$).

Figure 7: Mean scores of two mood groups on arousal VAS measure at time 1.



These data suggest that participants in the negative mood group were significantly more anxious and sad, and less happy and aroused than participants in the positive mood group at time 1. These significant mood differences also persisted through to time 2 (with the exception of arousal at time 2).

Stop Rule Measures: The negative mood group scored significantly higher on the AMAC VAS measure than the positive mood group, $t(57) = -2.12, p = .02$ (see figure 8). The effect size of the manipulation on this AMAC VAS measure, according to Cohen's (1988) criteria, was moderate (Cohen's $d = -.561$).

This AMAC VAS measure was significantly correlated with the full AMAC subscale of the SRQ, Spearman's $\rho(59) = .69, p < .001$, suggesting the AMAC VAS measure possessed convergent validity with the full AMAC measure.

The negative mood group also scored significantly higher on the full AMAC subscale of the SRQ than the positive mood group, $t(57) = -2.10, p = .02$ (see figure 9). The effect size of the manipulation on the full AMAC score, according to Cohen's (1988) criteria, was moderate (Cohen's $d = -0.556$).

Figure 8: Mean scores of two mood groups on AMAC VAS measure.

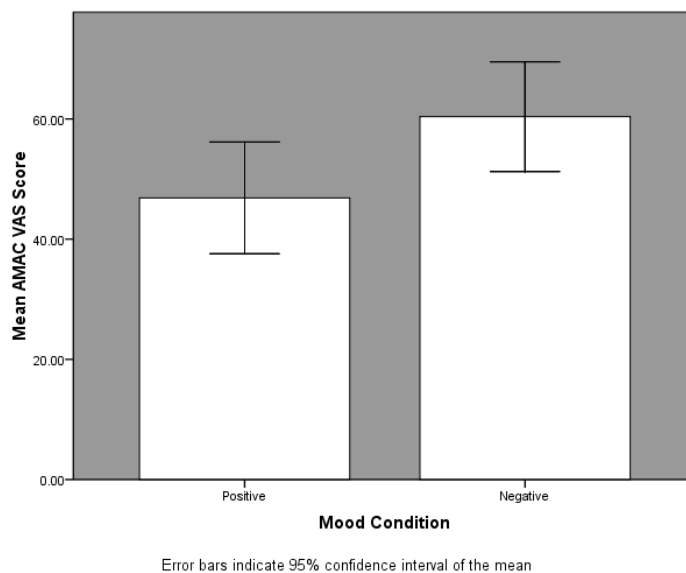
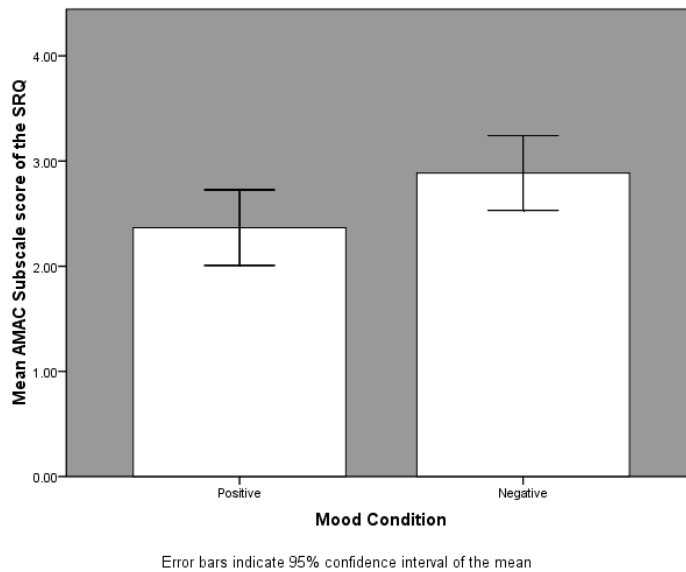


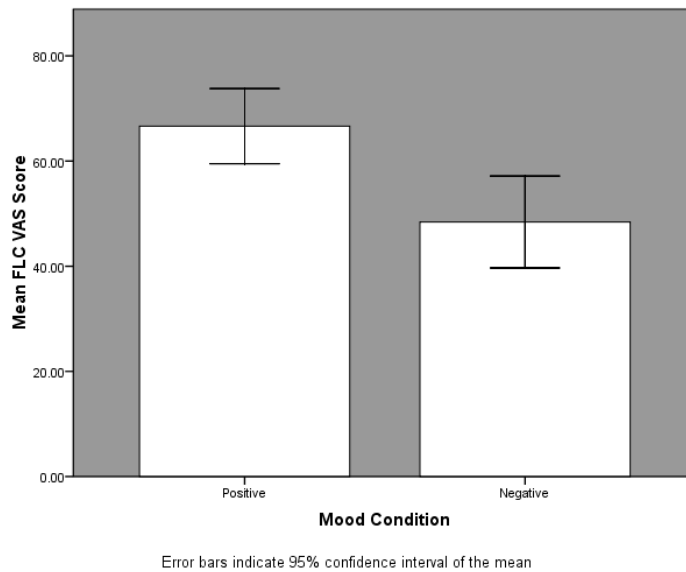
Figure 9: Mean scores of two mood groups on AMAC subscale of the SRQ.



As there has been some debate as to whether negative and positive emotions are orthogonal rather than representing two ends of the same continuum (see e.g. Tellegen, Watson and Clark, 1999) an analysis was conducted to ensure that the relationship between negative mood and AMAC stop rule use was consistent across participants in both conditions rather simply representing an effect of the negative mood manipulation. Across all participants there were significant correlations between the AMAC VAS measure and measures of sadness ($\rho = .26, p = .02$), and anxiety ($\rho = .27, p = .02$), but not happiness ($\rho = -.11, p = .21$) nor arousal ($\rho = .11, p = .20$). Similarly, there were significant correlations between the full AMAC score and measures of sadness ($\rho = .34, p = .005$), anxiety ($\rho = .44, p < .001$), but not happiness ($\rho = -.16, p = .11$) or arousal ($\rho = .05, p = .37$). These findings are consistent with the idea that the relationship between negative mood and AMAC stop rule use was consistent across participants in both conditions rather simply representing an effect of the negative mood manipulation.

The positive mood group scored significantly higher on the FLC VAS measure than the negative mood group, $t(57) = 3.32, p = .001$ (see figure 10). The effect size of the manipulation on this FLC VAS measure, according to Cohen's (1988) criteria, was large (Cohen's $d = 0.880$).

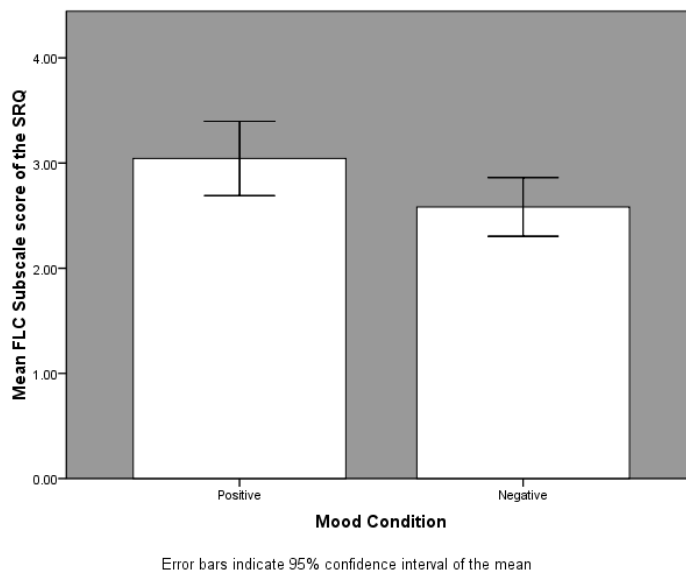
Figure 10: Mean scores of two mood groups on FLC VAS measure.



This FLC VAS measure was significantly correlated with the full FLC subscale of the SRQ, Spearman's $\rho(59) = .57, p < .001$, suggesting the FLC VAS measure possessed convergent validity with the full FLC measure.

The positive mood group also scored significantly higher on the full FLC subscale of the SRQ than the negative mood group, $t(57) = 2.08, p = .02$ (see figure 11). The effect size of the manipulation on the full FLC score, according to Cohen's (1988) criteria, was moderate (Cohen's $d = .551$).

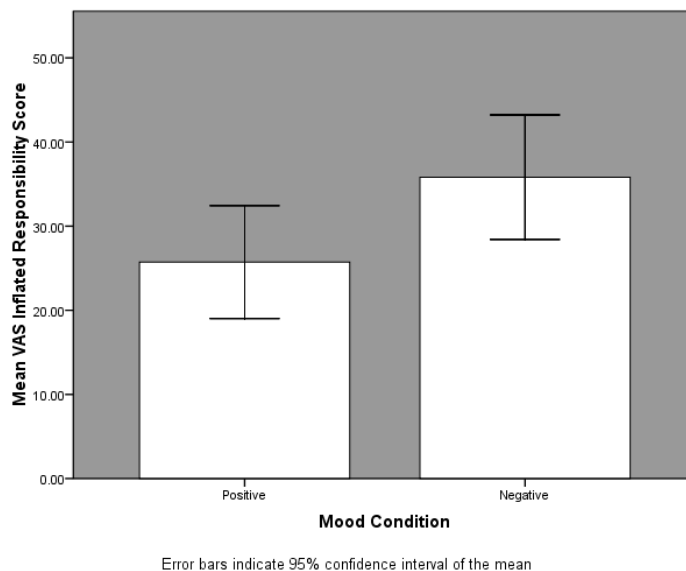
Figure 11: Mean scores of two mood groups on FLC subscale of the SRQ.



As there has been some debate as to whether negative and positive emotions are orthogonal rather than representing two ends of the same continuum (see e.g. Tellegen *et al*, 1999) an analysis was conducted to ensure that the relationship between positive mood and FLC stop rule use was consistent across participants in both conditions rather simply representing an effect of the positive mood manipulation. Across all participants there were significant correlations between the FLC VAS measure and measures of sadness ($\rho = -.28, p = .02$), and anxiety ($\rho = -.24, p = .03$) and happiness ($\rho = .25, p = .03$) but not arousal ($\rho = -.10, p = .23$). Similarly, there were significant correlations between the full FLC score and measures of sadness ($\rho = -.27, p = .02$) and happiness ($\rho = .22, p = .045$), but not anxiety ($\rho = -.16, p = .12$) or arousal ($\rho = -.17, p = .11$). These findings are consistent with the idea that the relationship between positive mood and FLC stop rule use was consistent across participants in both conditions rather simply representing an effect of the positive mood manipulation.

Responsibility Measures: A composite responsibility score was created by combining the means of the three questions measuring responsibility used in the short questionnaire. This composite measure appeared to be non-normally distributed, however, a log transformation appeared to correct for this. The negative mood group scored significantly higher on this composite responsibility measure than the positive mood group, $t(57) = -2.31, p = .01$ (see figure 12). The effect size of the manipulation on this composite responsibility measure, according to Cohen's (1988) criteria, was moderate (Cohen's $d = -0.612$).

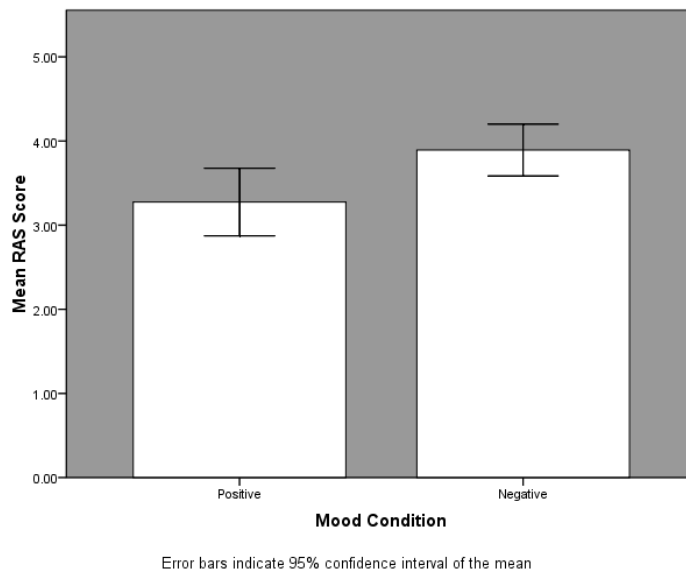
Figure 12: Mean scores of two mood groups on inflated responsibility VAS measure.



This composite VAS measure of responsibility was significantly correlated with the full RAS questionnaire, Spearman's $\rho(59) = .68, p < .001$, suggesting that the 3-item measure possessed convergent validity with the full measure of responsibility.

The negative mood group also scored significantly higher on the full RAS than the positive mood group, $t(57) = -2.49, p = .008$ (see figure 13). The effect size of the manipulation on the RAS score, according to Cohen's (1988) criteria, was moderate (Cohen's $d = -0.660$).

Figure 13: Mean scores of two mood groups on the RAS.



As there has been some debate as to whether negative and positive emotions are orthogonal rather than representing two ends of the same continuum (see e.g. Tellegen *et al*, 1999) an analysis was conducted to ensure that the relationship between negative mood and inflated responsibility was consistent across participants in both conditions rather simply representing an effect of the negative mood manipulation. Across all participants there were significant correlations between the composite responsibility score and measures of sadness ($\rho = .26, p = .02$), and anxiety ($\rho = .41, p = .001$), but not happiness ($\rho = -.15, p = .11$) nor arousal ($\rho = -.04, p = .37$). Similarly, there were significant correlations between the full RAS score and measures of sadness ($\rho = .44, p < .001$), anxiety ($\rho = .35, p = .003$), and happiness ($\rho = -.34, p = .004$), but not arousal ($\rho = -.01, p = .46$). These findings are consistent with the idea that the relationship between negative mood and inflated responsibility was consistent across participants in both conditions rather simply representing an effect of the negative mood manipulation.

IU Measures: A composite IU score was created by combining the means of the three questions measuring IU used in the short questionnaire. The negative mood group scored significantly higher on this composite IU measure than the positive mood group, $t(57) = -1.81$, $p = .04$. The effect size of the manipulation on this composite IU measure, according to Cohen's (1988) criteria, was small (Cohen's $d = -0.479$). As this effect size failed to reach the criteria for a moderate effect size this effect is considered non-significant (see "Justification of the statistical analyses used in experimental chapters and justification of choice of measures used to decide if two groups differ on a given construct" section of thesis).

This composite VAS measure of IU was significantly correlated with the full IUS, Spearman's $\rho(59) = .68$, $p < .001$, suggesting that the 3-item measure possessed convergent validity with the full IUS.

The negative mood group also scored higher on the full IUS than the positive mood group but this difference did not reach significance, $t(57) = -1.36$, $p = .09$. The effect size of the manipulation on the IUS score, according to Cohen's (1988) criteria, was small (Cohen's $d = -0.360$).

NJRE Occurrence: A composite NJRE occurrence score was created by combining the means of the three questions measuring NJRE occurrence used in the short questionnaire. The negative mood group scored higher on this composite NJRE occurrence measure than the positive mood group, but this difference was not significant, $t(57) = -1.40$, $p = .08$. The effect size of the manipulation on this composite NJRE occurrence measure, according to Cohen's (1988) criteria, was small (Cohen's $d = -0.370$).

This composite VAS measure of NJRE occurrence was significantly correlated with the full NJRE occurrence measure, Spearman's $\rho(59) = .73$, $p < .001$, suggesting that the 3-item measure possessed convergent validity with the full measure in the NJRE-QR.

The negative mood group also scored higher on the full NJRE occurrence measure than the positive mood group, but this difference again did not reach significance, $t(57) = -.64$, $p = .26$. The effect size of the manipulation on the NJRE occurrence full score, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = -0.169$).

NJRE Intensity: The negative mood group also scored higher on the full NJRE intensity measure than the positive mood group, but this difference did not reach significance, $t(57) = -1.62$, $p =$

.06. The effect size of the manipulation on the NJRE intensity score, according to Cohen's (1988) criteria, was small (Cohen's $d = -0.429$).

5.4 Discussion

In the present study mood was manipulated to see what the effect of doing so would have on the four remaining constructs being focused on in this thesis. The negative mood group scored significantly higher on measures of inflated responsibility and AMAC stop rule endorsement than participants in the positive mood group. Participants in the positive mood group scored significantly higher on measures of FLC stop rule endorsement than participants in the negative mood group. Although the negative mood group scored significantly higher on the VAS measure of IU than the positive mood group as the effect size associated with this test did not meet Cohen's (1988) criteria for a moderate effect size it is not accepted here as a significant effect (see "Justification of the statistical analyses used in experimental chapters and justification of choice of measures used to decide if two groups differ on a given construct" section of thesis). Finally, the groups did not appear to differ in terms of NJRE occurrence or intensity.

The finding that the negative mood group scored significantly higher on the endorsement of AMAC stop rules than the positive mood group whilst, conversely, the positive group scored significantly higher on the endorsement of FLC stop rules than the negative mood group, has implications for the MAI hypothesis (Martin & Davies, 1998). As stated in the introduction, this theory predicts that perseveration at a task should be greatest when an individual is in a negative mood and uses AMAC stop rules. However, up until now research had yet to examine if being in negative mood precedes the use of AMAC or vice versa. The findings of the present study suggest that being in a negative mood increases the use of AMAC stop rules. Given we know that compulsive checkers report significantly higher levels of negative mood both generally (Frost *et al*, 1986) and whilst engaging in checking (Salkovskis, 1985), it may be the case that compulsive checkers endemic negative mood leads to them adopting AMAC stop rules and the combination of these two elements increases checking behaviour. A few possible mechanisms which may mediate the relationship between negative mood and AMAC stop rules were outlined in the introduction (e.g. raising performance standards) and future research may wish to address these possibilities further.

The finding that the negative group scored higher than the positive mood group on measures of inflated responsibility has implications for models of OCD based around this construct (e.g.

Salkovskis, 1985, 1989). In Salkovskis's cognitive model inflated responsibility is seen as a cause of negative mood. Salkovskis, Richards & Forrester (1995, p.296) state that, "...The cognitive hypothesis is predicated on the assumption that inflated responsibility appraisals can focus on both the occurrence and the content of intrusive cognitions, which then acquire emotional significance as a result of the particular idiosyncratic pattern of appraisal". Thus, when an individual experiences an intrusive cognition his or her response to the intrusion will initially be affected by the individual's level of inflated responsibility, which then in turn may affect mood (as well as subsequently generating OC symptoms such as compulsive checking). Although, as outlined in chapter 1, such models give negative affect a maintenance role in compulsive behaviour and even suggest that mood may influence the level of responsibility experienced by an individual when making subsequent appraisals, negative affect is still seen by the theory as being brought about by an initial appraisal, which is affected by an individual's level of inflated responsibility and not, initially, by an individual's emotional state. Whilst the findings of the present study are supportive of the notion that negative mood arising from dysfunctional appraisals may affect subsequent feelings of responsibility, the findings also suggests that the negative mood states commonly experienced by OCD sufferers, which are not necessarily related to appraisals, may be a direct causal factor in elevating inflated responsibility beliefs and that this negative mood is not simply a consequence of cognitions associated with inflated responsibility such as dysfunctional appraisals. Given evidence exists suggesting that inflated responsibility plays a casual role in increasing negative mood (e.g. Lopatka & Rachman, 1995) theories of OCD that adopt inflated responsibility as a central explanatory construct need to account for the bidirectional nature of this construct's relationship with negative mood.

The finding that the negative mood group did not significantly differ from the positive mood group in terms of NJRE occurrence and NJRE intensity was slightly unexpected given that Mancini *et al* (2008) found that increasing a specific negative mood, guilt, led to increases in NJRE for participants high in trait guilt. There are several possibilities for the seemingly contradictory nature of these results. Firstly, unlike the manipulation used by Mancini *et al* (2008), the negative mood manipulation used in the present study was aimed at manipulating negative mood at a general level, specific types of negative mood were not targeted. It may be that any causal relationship between negative mood and NJRE is limited to one or more discrete negative emotions, such as guilt. Indeed Mancini *et al* (2008, study 2), found that induction of a "general negative mood" did not alter feelings of NJRE when compared to the induction of guilt specifically. Secondly, Mancini *et al* (2008) found that the induction of guilt

only increased NJRE for those participants high in trait guilt (that is those with a predisposition to experience guilt). In the present study, trait measures of negative mood (e.g. depression and anxiety) were not taken, only measures of participants' current level of sadness and anxiety were taken. It may be the case that the induction of negative mood (in this case sadness/depression and anxiety) only increases feelings of NJRE for those with a predisposition to experience such negative mood states in the first place. Applying this to the current study, the induction of sadness/depression and anxiety may only increase feelings of NJRE for individuals who have a predisposition to experience depression or anxiety in the first place.

The finding that the negative mood group and the positive mood groups did not differ significantly in terms of IU sheds further light on the relationship between these two constructs. As noted in chapter 1, there is a good deal of evidence to suggest that IU has a causal influence on negative mood (although note that none of this evidence is experimental and generally these studies are of a prospective in nature, see Miranda *et al*, 2008; Kirby & Yardley, 2009). The findings from the present study would seem to suggest that this relationship is uni-directional. The fact that negative mood had no effect on IU could be seen as somewhat surprising given we know that negative mood states such as anxiety are known to increase the perception of future situations as threatening and problematic (e.g. Clark & Wells, 1995) and individuals high on IU are characterised by being preoccupied with and worried about future ambiguous events. One possibility as to why negative mood has no effect on IU is that IU creates a ceiling affect whereby individuals with high IU are already so preoccupied/worried with future ambiguous events the usual effect we would expect to see negative mood have on such perceptions no longer emerges.

Discussion of the results of this experiment in light of the results of the other four experimental chapters will be left until the general discussion section of the thesis.

6. Chapter 4: Stop Rule Manipulation

6.1 Introduction

The second experiment was designed to investigate what effect manipulating stop rules would have on the other four constructs focused on in this thesis. Stop rules were manipulated in such a way that participants were more likely to endorse either AMAC or, alternatively, FLC stop rules and the effects of this manipulation on mood, inflated responsibility, IU and NJRE were examined. As outlined in chapter one, stop rules can be best explained by linking them to task motivation. Broadly, two specific types of task motivation have been proposed, performance focused motivation and task focused motivation (Vaughn *et al*, 2006). A performance motivated individual who engages in a task will be focused on meeting a certain standard or criteria whilst engaged in that task. The person motivated in this way is likely to continue with the task until they have met their given standard or criteria for that task (e.g. Hirt *et al*, 1996; Martin *et al*, 1993). A person using AMAC stop rules whilst engaged in a task is analogous to someone using performance focused motivation, the individual's AMAC stop rule for that task will encourage them to continue with the task until they are sure they have met whatever their specific criteria or standard was for that task. In contrast, a task motivated individual who engages in a task will do so without concern about evaluation or without any particular performance standards for the task. Indeed, they may well enjoy the task and are likely to continue engaging in it until they no longer find it enjoyable (e.g. Hirt *et al*, 1996; Martin *et al*, 1993). A person using FLC stop rules whilst engaged in a task is analogous to someone using task focused motivation, the individual's FLC stop rule for that task will tell the individual to continue with the task for only as long as the individual finds it enjoyable. It is the use of AMAC as opposed to FLC stop rules which are thought to be linked with OC symptoms.

To the author's knowledge no previous experiment has attempted to specifically manipulate stop rules, at least implicitly, although several studies examining the MAI hypothesis have explicitly instructed participants to use either an AMAC or FLC stop rule when engaging in certain tasks (e.g. MacDonald & Davey, 2005b). Due to a desire to keep the manipulation of stop rules as implicit as possible, a somewhat novel manipulation of stop rules was used in the present study. Briefly, participants were asked to give advice to a fictitious character promoting either the use of AMAC or FLC stop rules with the rationale that through this endorsement of AMAC or FLC stop rules in the form of giving advice participants would come to endorse the use of either AMAC or FLC stop rule themselves.

What affect might we expect the manipulation of stop rules to have on the four other constructs? As noted in chapter 1, research looking into stop rules is fairly limited when compared to the other constructs examined in the current thesis with almost all the research examining this construct being focused around the MAI hypothesis (although recently some research has begun looking at a conceptually similar construct to stop rules, stop signals e.g. Myers *et al*, 2009). Therefore, whilst it is difficult to base predictions on empirical evidence/models, some possible mechanisms through which stop rules may have a causal effect on some of the constructs focused on in this thesis, based on more speculative links, are offered below.

A theory which links both negative mood and stop rules to OCD symptoms and compulsive checking is the MAI hypothesis (Martin & Davies, 1998; see chapter 1). Briefly, the theory states that perseveration at a task such as compulsive checking should be greatest when an individual is in a negative mood and uses AMAC stop rules. Research has yet to examine if use of AMAC stop rules may precede the experience of negative mood or, conversely, if negative mood may precede the use of AMAC stop rule use. Research has shown that when there is a discrepancy between the demands of the task that an individual is preparing to engage in and the resources that the individual has at their disposal to cope with the situation, individuals are likely to experience negative mood states due to this discrepancy (Carver & Scheier, 1990; Martin & Tesser, 1996) and this process of weighing task demands against personal resources is likely to be affected by the individual's self-efficacy (Bandura, 1990). It is therefore possible that should an individual adopting AMAC stop rules not feel they have adequate resources to achieve the goals or standards they have set for a given task this may lead to an increase in negative mood. Such a reaction is much less likely for an individual adopting FLC stop rules who will be more concerned with their enjoyment whilst engaged with the task than whether or not the task is successfully completed. An individual's self-efficacy thus represents one possible mechanism which may mediate the relationship between AMAC stop rules and negative mood.

One can also conceptually see how increasing the use of AMAC stop rules could lead to an increase in NJRE. As state above, an individual using AMAC stop rules will be focused on meeting a certain standard or criteria whilst engaged in a task whilst an individual using FLC stop rules task will engage in the task without any particular performance standards for the task. One can imagine how NJRE - an inner sense of imperfection connected with the perception that actions or intentions have been incompletely achieved (see Pitman, 1987b)

would be more likely to arise for individuals using AMAC stop rules, who are concerned with meeting certain standards and may worry about whether these standards have been incompletely achieved, than for individuals using FLC stop rules who are unconcerned with such standards.

Although it is difficult to suggest exactly how manipulating stop rules might affect inflated responsibility and IU (partly due to a lack of theory and empirical evidence incorporating the idea of stop rules), based on the fact all four dependent constructs in this experiment are positively correlated with AMAC stop rules to at least a moderate degree (see chapter 2), as well as the above possible links with respect to negative mood and NJRE, it is predicted that increasing AMAC stop rule endorsement will subsequently lead to an increase in the negative mood, IU, inflated responsibility and NJRE occurrence and intensity.

6.2.1 Method

6.2.2 Participants

Participants were 59 undergraduates from the University of Sussex (men: 15; women: 44). Aged ranged from 18 to 41 years ($M = 19.75$, $SD = 3.01$). All of the participants were volunteers who received partial fulfilment of a course requirement or received a small monetary fee for taking part in the experiment.

6.2.3 Measures

VAS measures (given in the short questionnaire)

Stop rules: AMAC stop rules and FLC stop rules were each measured using 2 questions taken from the SRQ. Participants were asked to imagine they were checking something at the present moment in time and to indicate to what extent the four statements represent the kinds of things the participant would be thinking when deciding whether to continue or to stop checking on separate 100 point VASs (where 0 = *Don't agree at all* and 100 = *Completely Agree*). The AMAC statements were "I must check things one more time – just to be on the safe side" and "I must check things until I'm sure everything is correct". The FLC statements were "Everything is probably fine, so stop checking" and "If I don't feel like checking anymore I should just stop". The 2 AMAC items had mediocre internal consistency ($\alpha = .51$) whilst the 2 FLC items had acceptable internal consistency ($\alpha = .78$).

Mood: Mood was measured using the same four questions as were used in experiment one but in addition a fifth question was added. Participants were asked to rate their current level of negativity on a 100 point VAS (where 0 = *not at all negative* and 100 = *extremely negative*). The 3 items measuring negative mood (sadness, anxiety and negativity) had acceptable internal consistency ($\alpha = .80$).

Responsibility: Responsibility was measured using the same three items used in experiment one. The 3 items had mediocre internal consistency ($\alpha = .52$).

IU: IU was measured using the same three items used in experiment one. The 3 items had mediocre internal consistency ($\alpha = .63$).

NJRE Occurrence: NJRE occurrence was measured using the same three items used in experiment one. The 3 items had mediocre internal consistency ($\alpha = .57$). (*Note:* NJRE intensity was measured only through the NJRE-QR).

Full measures (given in the full questionnaire booklet)

Stop Rules: AMAC and FLC stop rules were measured in the full questionnaire using the SRQ (see appendix 1 for more details). In the present study the AMAC subscale had good internal consistency ($\alpha = .84$) whilst the FLC subscale had excellent internal consistency ($\alpha = .90$).

Responsibility: Responsibility was measured in the full questionnaire using the RAS (Salkovskis *et al*, 2000, see chapter 2 for details). In the present study the scale had excellent internal consistency ($\alpha = .92$).

IU: IU was measured in the full questionnaire using the IUS (Freeston *et al*, 1994, see chapter 2 for details). In the present study the scale had excellent internal consistency ($\alpha = .96$).

NJRE: NJRE occurrence and intensity were measured in the full questionnaire using the NJRE-QR (Coles *et al*, 2003, see chapter 2 for details). In the present study the NJRE occurrence subscale showed modest internal consistency ($\alpha = .66$) whilst the NJRE intensity scale showed excellent internal consistency ($\alpha = .92$).

6.2.4 Procedure

Participants were randomly assigned to one of two groups, depending on the manipulation they were to receive, these groups were labelled AMAC ($n = 29$) and FLC ($n = 30$). Participants were tested individually in a small room which simply contained a chair and a desk.

Participants were told that they would be asked to read a “true story” and that they would be asked some questions about the story. They were told that there would then be a ten minute break and that they would then be asked to fill in some questionnaires. This information was presented in a consent form which participants were asked to sign.

Stage 1. Stop rule manipulation: Participants were then given one of two stories to read, dependent on the group to which they had been assigned. Both pieces were written from an autobiographical perspective by a character called Lora. Participants were told that Lora was a 25 year old woman. Although participants were told they were reading a true story the stories were in fact fictitious and were created for the experiment. Both stories were printed on A4 paper and were of a similar length (about one and a half sides of A4).

In the story given to the AMAC group Lora is a careless person who does not check or ensure that things have been done properly. In the story she discusses her carelessness and gives descriptions of incidences in which she has neglected to check something or ensure that something has been done properly. She describes how her failure to check or ensure things have been done properly in these incidences (and others) had led to negative consequences for her (e.g. her house being robbed as she forgot to check the front door was locked; getting into trouble at work for failing to check accounts totals were correct). Throughout the story she expresses regret about her carelessness and towards the end of the story states that she wants to become a less careless person who checks things more but that she feels she needs some help in doing this. Participants in the AMAC group are asked to write down advice to help Lora become a more careful person and convince her that she needs to check things and ensure things have been done properly. Five pieces of “example advice” are given after the story to give participants some idea of the sort of advice they may want to offer. These five pieces of “example advice” are based fundamentally around the idea of advising Lora to adopt general AMAC stop rules into her life, for example, “You may have checked once but are you sure you were concentrating? You may not have checked properly, so you better check again”, (see appendix two for full story and example advice). Care was taken to ensure that this story conveyed that Lora’s carelessness is due to her lack of motivation or strength of motivation to engage with tasks until they have been done correctly, rather than being due to her not caring about what may happen as a result of not doing these tasks correctly (i.e. being irresponsible). This was done to ensure the manipulation targeted stop rules as opposed to inflated responsibility.

In the story given to the FLC group Lora is a person who is obsessed with checking things and ensuring things have been done correctly. In the story she discusses her obsession and gives descriptions of incidences which have occurred where her obsession with checking things and ensuring they are done properly has been excessive. She describes how her obsession with checking things and ensuring they have been done properly has led to negative consequences for her (e.g. missing her sister's wedding due to checking something; losing her job for failing to turn up to work on time due to her preoccupation with ensuring things had been done correctly). Throughout the story she displays an awareness regarding the negative effect her obsession is having on her life and towards the end of the story states that she wants to become a person who checks things less but that she feels she needs some help in doing this. Participants in the FLC group are asked to write down advice to help Lora feel less compelled to check things and ensure things have been done properly. Five pieces of "example advice" are given after the story to give participants some idea of the sort of advice they may want to offer. These five pieces of "example advice" are based fundamentally around the idea of advising Lora to adopt general FLC stop rules into her life, for example, "You know in reality that nothing bad is going to happen if you don't check again, so relax and leave it", (see appendix three for full story and example advice). Care was taken to ensure that this story conveyed that Lora's preoccupation to ensure that things have been done correctly were not linked to thoughts about causing harm to herself or to others but rather come from a purely intrinsic motivation to check. This was done to ensure the manipulation targeted stop rules as opposed to inflated responsibility.

The stop rule manipulation is based on Bem's self-perception theory that proposes that an individual will infer his or her attitude based on information derived from his or her behaviour (Bem, 1972). Salancik and Conway (1975) proposed that the individual will infer his or her attitude through a process of generating and assessing relevant information from the past and present, and that the individual will be especially likely to use information made most conspicuous to them at the time. Therefore, when an individual describes an attitude or behaviour positively or negatively he or she will generate cognitions consistent with their endorsement.

After reading their respective vignettes, participants in both groups were asked to write their advice on A4 paper. The experimenter left the room whilst the participant read the story and wrote down their advice and the participant was asked to get the experimenter when they had finished. Participants were given no set time limit to complete this task.

Stage 2. Ten minute break and short questionnaire: Participants were told in the informed consent form that after reading and commenting on the story there would be a ten minute break before they would be given follow up questionnaires. The experimenter re-entered the room immediately after participants had finished writing down their advice. The experimenter then asked the participant if they would mind filling in a questionnaire unrelated to the experiment during the ten minute break. As with experiment 1, participants were told the questionnaire was related to a separate questionnaire study being conducted by the experimenter's supervisor and that the questionnaire would take just over five minutes to complete. All participants agreed to fill in the questionnaire. The experimenter left the room for ten minutes whilst the participant filled in the questionnaire. As in experiment 1, the data collected in this questionnaire was actually to be used in the analysis of the present study. The questionnaire contained 18 questions which were the visual analogue scale (VAS) measures of the five constructs (see measures section).

Stage 3. Full questionnaires. The experimenter re-entered the room after the 10 minute "break" had finished. The experimenter thanked the participant for filling in the previous questionnaire and then gave the participant another questionnaire booklet. The experimenter asked the participant to inform the experimenter when they had finished the questionnaire booklet. The experimenter then left the room until the participant had finished the questionnaire booklet. This questionnaire booklet contained full measures of 4 of the constructs (there was no full measure of mood). Full measures of each construct were given to participants in order to validate the VAS measures.

Stage 4. Debrief: After completing the questionnaire booklet, participants were thanked and debriefed.

6.3 Results

Stop Rule Manipulation Check: Table 8 shows the ratings on the VAS measures and full questionnaire measures of the five constructs for the AMAC and FLC groups. Each measure was subjected to an independent measures sample t-test.

Table 8. Mean (standard deviation) on VAS measures and full questionnaire measures of the 5 constructs for the AMAC and FLC groups.

<u>Group</u>	<u>AMAC</u>	<u>FLC</u>
AMAC VAS	64.83*	52.77*
	(18.17)	(19.02)
AMAC FQ	3.03**	2.37**
	(.70)	(.53)
FLC VAS	37.60**	61.10**
	(17.42)	(22.92)
FLC FQ	2.68**	3.56**
	(.73)	(.81)
Sadness	30.03	21.30
	(22.28)	(17.85)
Happiness	63.00	66.23
	(18.81)	(14.55)
Anxiety	41.21	33.63
	(27.13)	(22.77)
Arousal	51.83	53.13
	(17.03)	(20.82)
Negativity	31.93	27.47
	(20.32)	(21.04)
Comp Neg	34.39	27.47
	(20.05)	(17.03)
R VAS	36.26	33.71

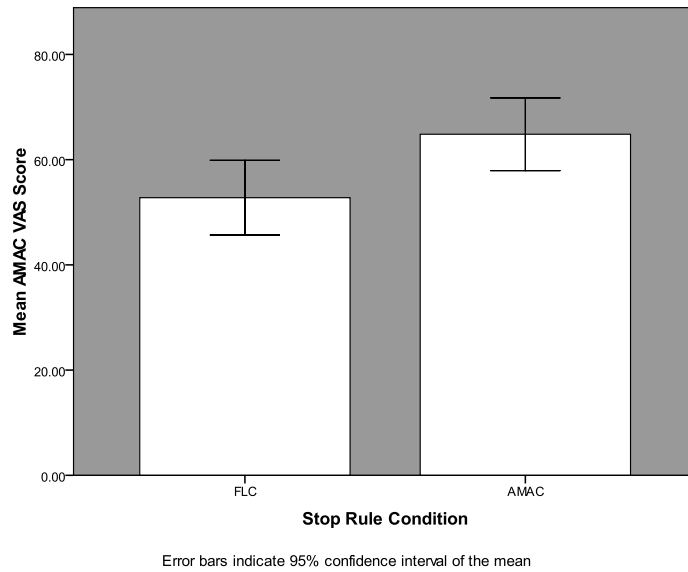
	(15.44)	(15.71)
R FQ	3.89	3.69
	(.85)	(.80)
IU VAS	43.26	36.63
	(17.91)	(17.93)
IU FQ	2.28	1.98
	(.62)	(.60)
NJRE Occ VAS	36.76	32.71
	(15.60)	(20.47)
NJRE Occ FQ	.41	.34
	(.21)	(.23)
NJRE Inten	3.23	2.62
	(1.53)	(1.37)

*Note: FQ = full questionnaire. AMAC= As many as can FLC = Feel like continuing. Comp Neg: Composite Negative Mood. R = Inflated responsibility. IU = Intolerance of Uncertainty. NJRE Occ = NJRE occurrence. NJRE Inten = NJRE intensity. * = $p < .01$, ** = $p < .001$. If a difference on a measure was significant at $p < .05$ but the associated effect size was not equal to or greater than $d = 0.5$ then this difference it is not noted as significant.*

A composite AMAC score was created by combining the means of the two questions measuring AMAC stop rules used in the short questionnaire. The AMAC group scored significantly higher on the composite AMAC measure than the FLC group, $t(57) = -2.49$, $p = .008$ (see figure 14). The effect size of the manipulation on this composite AMAC measure, according to Cohen's (1988) criteria, was moderate (Cohen's $d = 0.648$).

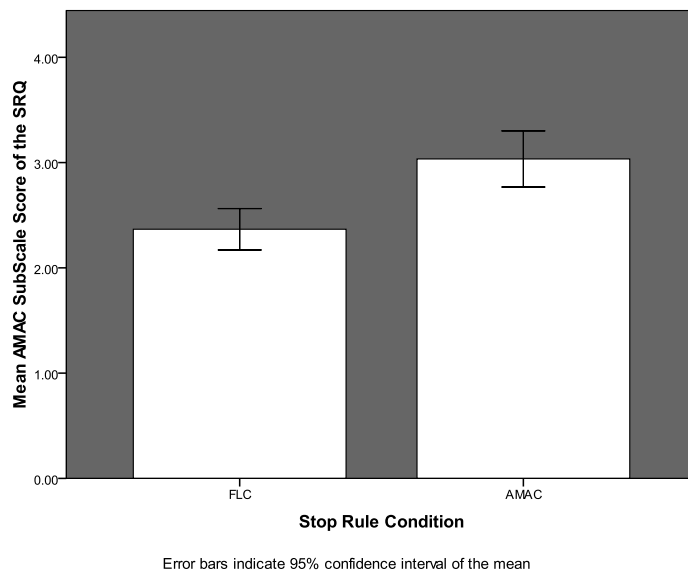
This AMAC composite measure was significantly correlated with the full AMAC subscale of the SRQ, Spearman's $\rho(59) = .59$, $p < .001$, suggesting the AMAC composite measure possessed convergent validity with the full AMAC measure.

Figure 14: Mean scores of AMAC and FLC groups on AMAC VAS measure.



The AMAC group also scored significantly higher on the full AMAC subscale of the SRQ than the FLC group, $t(57) = -4.15$, $p < .001$ (see figure 15). The effect size of the manipulation on the full AMAC score, according to Cohen's (1988) criteria, was large (Cohen's $d = 1.063$).

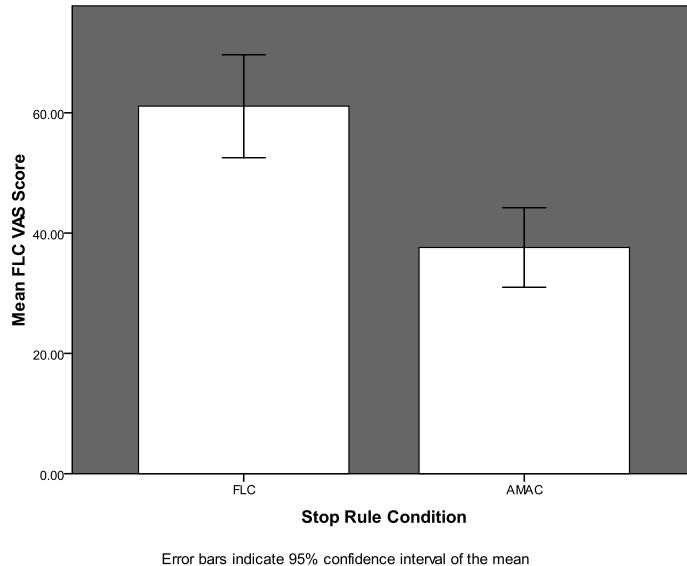
Figure 15: Mean scores of AMAC and FLC groups on AMAC subscale of the SRQ.



A composite FLC score was created by combining the means of the two questions measuring FLC stop rules used in the short questionnaire. The FLC group scored significantly higher on the composite FLC measure than the AMAC group, $t(57) = 4.42$, $p < .001$ (see figure 16). The effect

size of the manipulation on the composite FLC measure, according to Cohen's (1988) criteria, was large (Cohen's $d = 1.154$).

Figure 16: Mean scores of AMAC and FLC groups on FLC VAS measure.



This FLC composite measure was significantly correlated with the full FLC subscale of the SRQ, Spearman's $\rho(59) = .59, p < .001$, suggesting the FLC composite measure possessed convergent validity with the full FLC measure.

The FLC group also scored significantly higher on the full FLC subscale of the SRQ than the AMAC group, $t(57) = 4.40, p < .001$ (see figure 17). The effect size of the manipulation on the full FLC score, according to Cohen's (1988) criteria, was large (Cohen's $d = 1.141$).

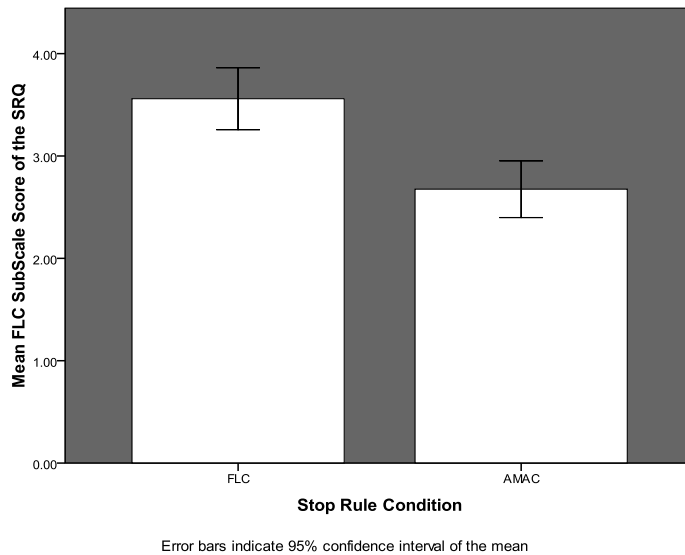
In summary, the AMAC group scored significantly higher on both measures of AMAC stop rule use whilst the FLC group scored significantly higher on both measures of FLC stop rule use, suggesting that the manipulation of stop rules was successful.

Mood Measures: The AMAC group scored higher on the sadness measure than the FLC group and this difference was on the verge of significance, $t(57) = -1.66, p = .05$. The effect size of the manipulation on the sadness measure, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.432$). As this effect size failed to reach the criteria for a moderate effect size this effect is considered non-significant (see "Justification of the statistical analyses used in experimental chapters and justification of choice of measures used to decide if two groups differ on a given construct" section of thesis).

The FLC group scored higher on the happiness measure than the AMAC group, although this

difference was not significant, $t(57) = .74, p = .23$. The effect size of the manipulation on the happiness measure, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.192$).

Figure 17: Mean scores of AMAC and FLC groups on FLC subscale of the SRQ.



The AMAC group scored higher on the anxiety measure than the FLC group, although this difference was not significant, $t(57) = -1.16, p = .13$. The effect size of the manipulation on the anxiety measure, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.302$).

The FLC group scored higher on the arousal measure than the AMAC group, although this difference was not significant, $t(57) = .26, p = .40$. The effect size of the manipulation on the arousal measure, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.068$).

The AMAC group scored higher on the negativity measure than the FLC group, although this difference was not significant, $t(57) = -.83, p = .21$. The effect size of the manipulation on the negativity measure, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.216$).

A composite negative mood score was created by combining the means of the three questions measuring negative mood used in the short questionnaire. The AMAC group scored higher on the composite negative mood measure than the FLC group, although this difference was not significant, $t(57) = -1.43, p = .08$. The effect size of the manipulation on this composite AMAC measure, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.372$).

In summary, the groups did not differ significantly on any of the mood measures.

Responsibility Measures: A composite responsibility score was created by combining the means of the three questions measuring responsibility used in the short questionnaire. The AMAC group scored higher on this composite responsibility measure than the FLC group, but this difference did not reach significance, $t(57) = -.63$, $p = .27$. The effect size of the manipulation on this composite responsibility measure, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.135$).

This composite VAS measure of responsibility was significantly correlated with the full RAS questionnaire, Spearman's rho (59) = .62, $p < .001$, suggesting that the 3-item measure possessed convergent validity with the full measure of responsibility.

The AMAC group also scored higher on the full RAS than the FLC group, but again this difference did not reach significance, $t(57) = -.92$, $p = .18$. The effect size of the manipulation on the RAS score, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.242$).

IU Measures: A composite IU score was created by combining the means of the three questions measuring IU used in the short questionnaire. The AMAC group scored higher on this composite IU measure than the FLC group, but this difference was not significant, $t(57) = -1.42$, $p = .08$. The effect size of the manipulation on this composite IU measure, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.370$).

This composite VAS measure of IU was significantly correlated with the full IUS, Spearman's rho (59) = .67, $p < .001$, suggesting that the 3-item measure possessed convergent validity with the full IUS.

The AMAC group scored significantly higher on the full IUS than the FLC group, $t(57) = -1.90$, $p = .03$. The effect size of the manipulation on the IUS score, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.490$). As this effect size failed to reach the criteria for a moderate effect size this effect is considered non-significant (see “Justification of the statistical analyses used in experimental chapters and justification of choice of measures used to decide if two groups differ on a given construct” section of thesis).

NJRE Occurrence: A composite NJRE occurrence score was created by combining the means of the three questions measuring NJRE occurrence used in the short questionnaire. The AMAC group scored higher on this composite NJRE occurrence measure than the FLC group, but this difference was not significant, $t(57) = -.86$, $p = .20$. The effect size of the manipulation on this

composite NJRE occurrence measure, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.223$).

This composite VAS measure of NJRE occurrence was significantly correlated with the full NJRE occurrence measure, Spearman's $\rho(59) = .56, p < .001$, suggesting that the 3-item measure possessed convergent validity with the full measure in the NJRE-QR.

The AMAC group also scored higher on the full NJRE occurrence measure than the FLC group, but this difference again did not reach significance, $t(57) = -1.05, p = .15$. The effect size of the manipulation on the NJRE occurrence full score, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.318$).

NJRE Intensity: The AMAC group also scored higher on the full NJRE intensity measure than the FLC group, but this difference did not quite reach significance, $t(57) = -1.62, p = .06$. The effect size of the manipulation on the NJRE intensity score, according to Cohen's (1988) criteria small, (Cohen's $d = 0.420$).

6.4 Discussion

In the present study stop rules were manipulated to see what the effect of doing so would have on the four remaining constructs being focused on in this thesis. Although the AMAC group scored significantly higher on the trait measure of IU than the FLC group as the effect size associated with this difference did not meet Cohen's (1988) criteria for a moderate effect size it is not accepted here as significant effect (see "Justification of the statistical analyses used in experimental chapters and justification of choice of measures used to decide if two groups differ on a given construct" section of thesis). The groups therefore did not appear to differ in terms of mood, IU, inflated responsibility, NJRE occurrence or NJRE intensity.

The finding that the AMAC and FLC groups did not differ on either measures of negative or positive mood has implications for the MAI theory hypothesis (Martin & Davies, 1998). As stated in the introduction, this theory predicts that perseveration at a task should be greatest when an individual is in a negative mood and uses AMAC stop rules. However, up until now research had yet to examine if the use of AMAC stop rules may precede the experience of negative mood or vice versa. The findings of the present study suggest that the use of AMAC stop rules does not subsequently lead to an increase in negative mood. It does not therefore appear that the use of AMAC stop rules precedes negative mood. It is perhaps more likely that negative mood precedes AMAC stop rule use. Given we know that compulsive checkers report

significantly higher levels of negative mood both generally (Frost *et al*, 1986) and whilst engaging in checking (Salkovskis, 1985) it may be the case that compulsive checkers endemic negative mood subsequently leads to them adopting AMAC stop rules and these two constructs then combines to increase checking behaviour. Yet another possibility is that both negative mood and AMAC stop rule use are dependent on some third construct which causes an increase in both of these constructs which subsequently leads to increased task perseveration.

The finding that increasing AMAC stop rules does not lead to an increase in NJRE could be seen as somewhat surprising. As noted in the introduction, one may have assumed that individuals using AMAC stop rules concern with meeting certain standards associated with a task may have lead them to worry about whether these standards have been incompletely achieved or fulfilled and this worry may have given rise to NJRE. One reason the adoption of AMAC stop rules may not lead to increases in NJRE may be connected to the fact that NJRE are concerned with the *subjective* sense that something isn't just as it should be (Coles *et al*, 2003). Whilst the use of AMAC stop rules may lead to increased worry about whether certain standards have been fulfilled when engaging in a task it may be the case that this worry will be centred around more *objective* concerns that something hasn't been done correctly rather than the type of *subjective* feelings and concerns associated with NJRE. Summerfeldt (2004, 2007) conceptualised NJREs as a sensory-affective dysregulation or deficit in the ability to use emotional experience and sensory feedback to guide behaviour. It maybe the case therefore that the experience of NJRE are caused more by some underlying deficit rather than being a by product of having specific concerns or worries about a task which may come about from approaching a task whilst using AMAC stop rules. An alternative explanation as to why the two groups did not differ in terms of NJRE could due to the fact that, at least after a checking bout has taken place, individuals adopting stringent AMAC stop rules are more likely to feel confident that a task has been successfully completed than individuals using FLC stop rules (MacDonald & Davey, 2005b). This greater confidence that the task has been successfully completed may counteract the greater concern of the individual using AMAC stop rules that this is indeed the case leading to individuals using AMAC stop rules being equally likely to have a NJRE as an individual using FLC stop rules.

The finding that the AMAC and FLC groups did not differ in terms of inflated responsibility or IU is not entirely unexpected. Although these constructs are significantly positively correlated with AMAC stop rules (see chapter 2) from a more theoretical stand point there is no real

reason to logically expect that increasing AMAC stop rule use would lead to an increase either inflated responsibility or IU. Indeed, from a theoretical perspective it is much easier to see how these two constructs may have a causal effect on AMAC stop rule use rather than vice versa. For example, possessing inflated responsibility beliefs could bias an individual toward deploying AMAC stop rules both before and during checking. That is, beliefs about the power to cause harm associated with inflated responsibility beliefs could motivate the individual to ensure that they have successfully completed a task as best they can (AMAC stop rules) rather than terminating a task when they simply feel like doing so (FLC stop rules) (Salkovskis, 1985). With respect to IU, one can conceptually see how an individual with high IU may be unable to cope with the uncertainty surrounding a given task/event and this uncertainty may lead to the individual using AMAC stop rules in an attempt to ensure that a task has been done successfully or adequately or that an event goes well (Beech & Liddell, 1974). If these constructs affect stop rules will be addressed in separate experiments in this thesis.

Overall, it may be useful to briefly speculate on why the manipulation of stop rules did not have an effect on the other 4 constructs focused on in this thesis. One possibility is that whilst most, if not all, of the other constructs focused on in this thesis may represent something akin to dispositional traits, the deployment of stop rules may be much more situationally specific. As alluded to in the introduction, both AMAC and FLC stop rules are intrinsically tied to task motivation, with AMAC stop rules linked with performance focused motivation and FLC stop rules with task focused motivation (Vaughn *et al*, 2006). Whilst task motivation may play an important part in promoting behaviours (e.g. checking) in certain situations, it is unlikely to have a profound effect on more dispositional type traits, rather, different types of task motivation are more likely to come about because of and/or affected by different dispositional traits. Applying this to AMAC stop rules, whilst the adoption of AMAC stop rules in a given situation may, for example, lead to an increase in compulsive checking, it is likely that the use of AMAC stop rules will have initially been prompted by a more enduring dispositional trait (e.g. inflated responsibility). If this is the case we would expect stop rules to be affected by at least some of the more dispositional type constructs manipulated in this thesis. Whether this is the case or not will be addressed in the general discussion section of the thesis.

Discussion of the results of this experiment in light of the results of the other four experimental chapters will be left until the general discussion section of the thesis.

7. Chapter 5: Responsibility Manipulation

7.1 Introduction

The third experiment was designed to investigate what effect manipulating inflated responsibility would have on the other four constructs focused on in this thesis. Responsibility was manipulated in such a way that participants either fell into a high or a low responsibility group and the effects of this manipulation on mood, AMAC/FLC stop rules, IU and NJRE were examined. The most widely cited definition of inflated responsibility defines the construct as:

The belief that one has power which is pivotal to bring about or prevent subjectively crucial negative outcomes. These outcomes are perceived as essential to prevent. They may be actual, that is, having consequences in the real world, and/or at a moral level.

(Salkovskis *et al* 1996 cited in Salkovskis, 1999, S.32).

A number of studies have previously attempted to manipulate inflated responsibility (e.g. Lopatka and Rachman, 1995) using a variety of different manipulations. These studies are summarised in chapter 1 of the thesis and so are not described again here. For the present study it was decided to use a novel manipulation of inflated responsibility and not to base this manipulation on those used in previous experiments. There are two reasons for this. Firstly, the vast majority of studies in which inflated responsibility has been manipulated did not include a manipulation check of inflated responsibility. The author therefore had little *apriori* reason to expect that these manipulations would work any more successfully than a more novel responsibility manipulation. Secondly, the author wanted to ensure that any experimentally-induced changes in responsibility complied with definitions of the inflated responsibility construct. It can be argued that past manipulations of inflated responsibility are targeted more at manipulating responsibility in a general sense, for example, by simply having one group feel responsible for event x and one group not feel responsible for event x, rather than specifically targeting inflated responsibility. It is hard to see how these general manipulations might affect some of the specific types of cognitions associated with inflated responsibility (e.g. TAF type beliefs: If I think bad things, this is as bad as DOING bad things). In this study a manipulation is used which targets specific features of inflated responsibility as identified by definitions of the construct (e.g. Salkovskis *et al* 1996).

What affect might we expect the manipulation of inflated responsibility to have on the four other constructs? There is both theoretical and experimental evidence to suggest that increasing inflated responsibility will increase negative mood. In Salkovskis's (1985, 1989) cognitive model of OCD, inflated responsibility is seen as a cause of negative mood. When an individual experiences an intrusive cognition his or her response to the intrusion will initially be affected by the individual's level of inflated responsibility and this in turn may lead to an increase in negative mood (e.g. anxiety and depression). There is also experimental evidence to support this causal link. For example, Lopatka & Rachman (1995) found that the increasing responsibility led to increases in discomfort whilst Ladouceur *et al* (1995) found that increasing responsibility led to increases in anxiety.

Although there is no specific theoretical or experimental evidence to suggest that increasing inflated responsibility will lead to a subsequent increase in the use of AMAC stop rules, there are conceptual reasons to suggest that possessing inflated responsibility beliefs could bias an individual toward deploying AMAC stop rules. Specifically, one might expect that beliefs about the power to cause harm associated with inflated responsibility might motivate the individual to ensure that they have successfully completed a task as best they can (i.e. use AMAC stop rules) rather than terminating a task when they simply feel like doing so (i.e. use FLC stop rules).

Whilst there is no specific theoretical or experimental evidence to suggest that increasing inflated responsibility will lead to a subsequent increase in the use of IU, Lind & Boschen (2009) offer a plausible argument as to why such a causal link might be expected. These authors propose that heightened beliefs about the power to cause harm associated with inflated responsibility will lead to an individual finding doubt or uncertainty about an event or outcome more aversive and less tolerable. They proposed that the effect of inflated responsibility on compulsive checking is mediated by IU. For example, if an individual holds beliefs about their responsibility in ensuring all windows and doors to the family home are locked before retiring of an evening, then this will be associated with a particular aversion to uncertainty about the status of the doors. In turn, this exacerbated sensitivity to doubt would be related to an increased need to check (and recheck) the locks. In support of their prediction, Lind & Boschen (2009) found that the relationship between inflated responsibility and compulsive checking was fully mediated by IU.

Finally, although there is theoretical evidence to suggest that increasing inflated responsibility may increase NJRE, there is also evidence to suggest that increasing inflated responsibility

should have no effect on NJRE. In support of such a causal link, Wahl *et al* (2008) proposed that individuals high in inflated responsibility will subsequently display *elevated evidence requirements* (EER). According to Wahl *et al* (2008) EER are:

“...“stop criteria”, where the person actively seeks to achieve a particular subjective or emotional state as a way of deciding that they have completed an activity. This includes the deliberate seeking of a particular mood state, a sense of satisfaction or completeness and “just right” feelings as a way of deciding that it is appropriate to stop behaviour.”

(Wahl *et al*, 2008, p.144).

One would imagine individuals with EER, who engage in a process of attempting to achieve a feeling of “just rightness” before disengaging with a behaviour, would be particularly vulnerable to experiencing NJRE (as Wahl *et al*, 2008, allude to in their paper). One can thus predict, from Wahl *et al*’s (2008) theoretical perspective, that increasing inflated responsibility should lead to an increase in EER which in turn will make an individual more vulnerable to experiencing NJRE. In opposition to such a causal link, Summerfeldt (2004, 2007) proposed that two core, continuous, orthogonal dimensions explain the motivational processes important to OCD: harm avoidance (as characterised inflated responsibility) and incompleteness (as characterised by NJRE). Summerfeldt (2004, 2007) conceptualised NJREs as a sensory-affective dysregulation or deficit in the ability to use emotional experience and sensory feedback to guide behaviour (which presumably should not be affected by inflated responsibility beliefs). There is good empirical evidence to support the separation of OCD characterised by harm avoidance and incompleteness respectively (see chapter 1). From this theoretical perspective, one might not expect increasing inflated responsibility to affect NJRE.

Based on the above evidence, theories and possible theoretical links (expect the above by Summerfeldt, 2004, 2007), as well as the fact all four dependent constructs in this experiment are positively correlated with inflated responsibility to at least a moderate degree (see chapter 2), it is predicted that increasing inflated responsibility will subsequently lead to an increase in the negative mood, the endorsement of AMAC stop rules, IU and NJRE occurrence and intensity.

7.2.1 Method

7.2.2 Participants

Participants were 63 psychology undergraduates from the University of Sussex (men: 6; women: 57). Aged ranged from 18 to 56 years ($M = 22.06$, $SD = 7.45$). All of the participants were volunteers who received partial fulfilment of a course requirement by taking part in the experiment.

7.2.3 Measures

VAS measures (given in the short questionnaire)

Responsibility: Responsibility was measured using 4 items taken from the RAS (Salkovskis *et al*, 2000). Participants were asked to rate how much they agreed with each statement at this exact moment in time on separate 100 point VASs (where 0 = *Totally Disagree* and 100 = *Totally Agree*). The 4 items were, “I often take responsibility for things that other people do not think are my fault”, “Even if my actions are unlikely to bring about negative consequences for others, I should always try to prevent them from occurring”, “I should always try to ensure my actions do not bring about detrimental consequences for others”, and “If I think bad things, this is as bad as DOING bad things”. These 4 items had mediocre internal consistency ($\alpha = .55$).

Mood: Mood was measured using the same five questions as were used in experiment two. The 3 items measuring negative mood had good internal consistency ($\alpha = .86$).

Stop rules: AMAC stop rules were measured using the same 2 questions used in experiment 2 as were FLC stop rules. The 2 AMAC items had mediocre internal consistency ($\alpha = .63$) whilst the 2 FLC items had acceptable internal consistency ($\alpha = .76$).

IU: IU was measured using 5 items taken from the IUS (Freeston *et al*, 1994). Participants were asked to rate to what extent they agreed with the items at this exact moment in time on 5 separate 100 point VASs (where 0 = *Totally Disagree* and 100 = *Totally Agree*). The five items were, “Uncertainty stops me from having a strong opinion”, “Uncertainty makes life intolerable”, “I can’t stand being taken by surprise”, “I can’t stand being undecided about my future” and, “Being uncertain means that I am not first rate”. The 5 items had moderate internal consistency ($\alpha = .69$).

NJRE Occurrence: NJRE occurrence was measured using the same three items used in experiment one. The 3 items had moderate internal consistency ($\alpha = .69$). (*Note:* NJRE intensity was measured only through the NJRE-QR).

Full measures (given in the full questionnaire booklet)

Responsibility: Responsibility was measured in the full questionnaire using the RAS (Salkovskis *et al*, 2000, see chapter 2 for details). In the present study the scale had excellent internal consistency ($\alpha = .95$).

Stop Rules: AMAC and FLC stop rules were measured in the full questionnaire using the SRQ (see appendix 1 for details). In the present study the AMAC subscale had excellent internal consistency ($\alpha = .92$) whilst the FLC subscale also had excellent internal consistency ($\alpha = .91$).

IU: IU was measured in the full questionnaire using the IUS (Freeston *et al*, 1994, see chapter 2 for details). In the present study the scale had excellent internal consistency ($\alpha = .95$).

NJRE: NJRE occurrence and intensity were measured in the full questionnaire using the NJRE-QR (Coles *et al*, 2003, see chapter 2 for details). In the present study the NJRE occurrence subscale showed acceptable internal consistency ($\alpha = .79$) whilst the NJRE intensity scale showed excellent internal consistency ($\alpha = .90$).

7.2.4 Procedure

Stage 1. Responsibility manipulation: Participants were randomly assigned to one of two groups, the high responsibility (HR) group ($n = 31$) and the low responsibility (LR) group ($n = 32$). Participants were then given one of two stories to read, dependent on the group to which they had been assigned. Both pieces were written from an autobiographical perspective by a character called Clara. Participants were told that Clara was a 25 year old woman. Although participants were told they were reading a true story the stories were in fact fictitious and were created for the experiment. Both stories were printed on A4 paper and were of a similar length (about two sides of A4).

In the story given to the high responsibility group Clara is a person who lacks any sense of responsibility. In the story she describes her lack of responsibility and gives descriptions of incidences that she was partly or wholly responsible for but over which she had failed to take any responsibility. She describes how her failure to take responsibility for these incidences (and others) had led to negative consequences for her (e.g. being grounded for not apologising to her Dad as a child for an accident she had helped cause; losing a friend as an adult for not

taking responsibility for another incident). Throughout the story she expresses regret about her lack of responsibility and towards the end of the story states that she wants to become a more responsible person but that she feels she needs some help in doing this. Participants in the high responsibility group are asked to write down advice to help Clara feel, and act, like a more responsible person. Five pieces of “example advice” are given after the story to give participants some idea of the sort of advice they may want to offer (see appendix four for full story and example advice).

In the story given to the low responsibility group Clara is a person who has an inflated sense of responsibility. In the story she describes her inflated sense of responsibility and gives descriptions of incidences which have occurred which she had little or no control over but over which she felt immense responsibility. She describes how her inflated sense of responsibility has had negative consequences for her (e.g. not being able to talk to her Dad for months due to feeling responsible for something that had happened to him she had no control over; feeling unable to be left alone with her child due to feeling responsible for something that had happened to the child she had no control over). Throughout the story she displays an awareness regarding the negative effect her inflated sense of responsibility is having on her life and towards the end of the story states that she wants to become a person who feels less responsible but that she feels she needs some help in doing this. Participants in the low responsibility group are asked to write down advice to help Clara feel less responsible. Five pieces of “example advice” are given after the story to give participants some idea of the sort of advice they may want to offer (see appendix five for full story and example advice).

To ensure that any experimentally-induced changes in responsibility complied with definitions of the inflated responsibility construct (e.g. Salkovskis *et al* 1996), four specific features of inflated responsibility were defined and explicitly referred to in the advice vignettes given to participants. These features were: 1, a sense of feeling overly responsible in the most literal sense (i.e. feeling bad for harm caused, taking on responsibility for things that are not necessarily the individual’s fault), 2, the idea that thinking about something (e.g. causing harm) is as bad as doing something, 3, the idea that not preventing harm is as bad as causing harm, 4, worrying about causing harm before anything has actually happened (e.g. hyper vigilance).

In the story given to the low responsibility group Clara displays all of these defined features whilst the “example advice” offered to Clara is aimed at advising her about how to minimise or eliminate these feelings from her life. In the story given to the high responsibility group Clara is described as not displaying any of these defined features and displays a range of opposing

feelings. The “example advice” offered to Clara is aimed at advising her about how she can, and should, bring these constitute feelings into her life.

The responsibility manipulation is based on Bem’s self-perception theory that proposes that an individual will infer his or her attitude based on information derived from his or her behaviour (Bem, 1972). Salancik and Conway (1975) proposed that the individual will infer his or her attitude through a process of generating and assessing relevant information from the past and present, and that the individual will be especially likely to use information made most conspicuous to them at the time. Therefore, when an individual describes an attitude or behaviour positively or negatively he or she will generate cognitions consistent with their endorsement.

After reading their respective vignettes, participants in both groups were asked to write their advice on A4 paper. The experimenter left the room whilst the participant read the story and wrote down their advice and the participant was asked to get the experimenter when they had finished. Participants were given no set time limit to complete this task.

Stage 2. Ten minute break and short questionnaire: Participants were told in the informed consent form that after reading and commenting on the story there would be a ten minute break before they would be given follow up questionnaires. The experimenter re-entered the room immediately after participants had finished writing down their advice. The experimenter then asked the participant if they would mind filling in a questionnaire unrelated to the experiment during the ten minute break. As with Experiment 1, participants were told the questionnaire was related to a separate questionnaire study being conducted by the experimenter’s supervisor and that the questionnaire would take just over five minutes to complete. All participants agreed to fill in the questionnaire. The experimenter left the room for ten minutes whilst the participant filled in the questionnaire. As in Experiment 1, the data collected in this questionnaire was actually to be used in the analysis of the present study. The questionnaire contained 21 questions which were the visual analogue scale (VAS) measures of the five constructs (see measures section).

Stage 3. Full questionnaires. The experimenter re-entered the room after the 10 minute “break” had finished. The experimenter thanked the participant for filling in the previous questionnaire and then gave the participant another questionnaire booklet. The experimenter asked the participant to inform the experimenter when they had finished the questionnaire booklet. The experimenter then left the room until the participant had finished the questionnaire booklet. This questionnaire booklet contained full measures of 4 of the

constructs (there was no full measure of mood). Full measures of each construct were given to participants in order to validate the VAS measures.

Stage 4. Debrief: After completing the questionnaire booklet, participants were thanked and debriefed.

7.3 Results

Responsibility Manipulation Check: Table 9 shows the ratings on the VAS measures and full questionnaire measures of the five constructs for the HR and LR groups. Each measure was subjected to an independent measures sample t-test.

Table 9. Mean (standard deviation) on VAS measures and full questionnaire measures of the 5 constructs for the HR and LR groups.

<u>Group</u>	<u>HR</u>	<u>LR</u>
R VAS	54.11*** (13.55)	33.95*** (17.76)
R FQ	4.33*** (.85)	3.34*** (1.00)
Sadness	34.45*** (21.45)	14.75*** (13.01)
Happiness	55.55** (19.44)	68.15** (18.03)
Anxiety	39.36* (25.52)	26.93* (21.08)
Arousal	52.84 (14.95)	44.09 (25.23)

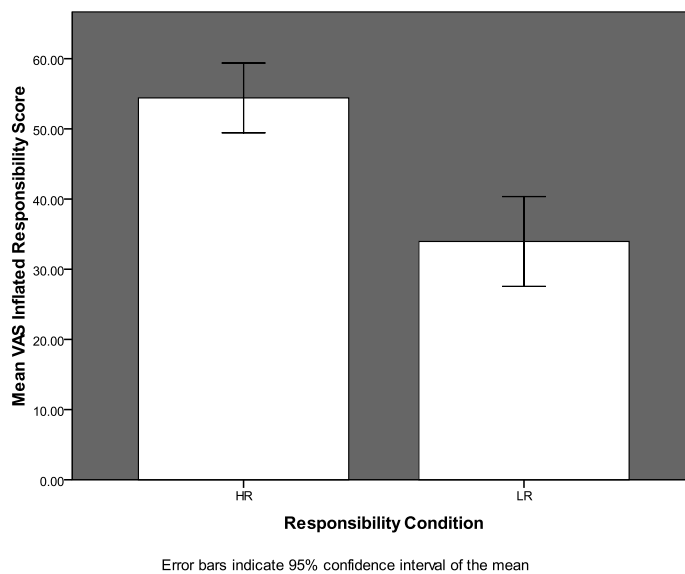
Negativity	35.48***	15.44***
	(24.73)	(14.80)
Comp Neg	36.43***	19.04***
	(21.11)	(13.52)
AMAC VAS	62.76	61.30
	(24.00)	(22.15)
AMAC FQ	3.05	2.94
	(.92)	(1.03)
FLC VAS	47.73	48.50
	(21.71)	(26.23)
FLC FQ	2.62	2.51
	(1.01)	(.81)
IU VAS	41.55*	32.11*
	(16.88)	(15.11)
IU FQ	2.36**	1.93**
	(.77)	(.63)
NJRE Occ VAS	28.35	26.73
	(14.10)	(16.38)
NJRE Occ FQ	.36	.37
	(.32)	(.32)
NJRE Inten	3.54*	2.71*
	(1.23)	(1.66)

Note: FQ = full questionnaire. AMAC= As many as can FLC = Feel like continuing. Comp Neg: Composite Negative Mood. R = Inflated responsibility. IU = Intolerance of Uncertainty. NJRE Occ

= NJRE occurrence. NJRE Inten = NJRE intensity. * = $p < .05$ ** = $p < .01$, *** = $p < .001$. If a difference on a measure was significant at $p < .05$ but the associated effect size was not equal to or greater than $d = 0.5$ then this difference it is not noted as significant.

A composite responsibility score was created by combining the means of the four questions measuring responsibility used in the short questionnaire. The HR group scored significantly higher on this composite responsibility measure than the LR group (see figure 18), $t(61) = 5.13$, $p < .001$. The effect size of the manipulation on this composite responsibility measure, according to Cohen's (1988) criteria, was large (Cohen's $d = 1.314$).

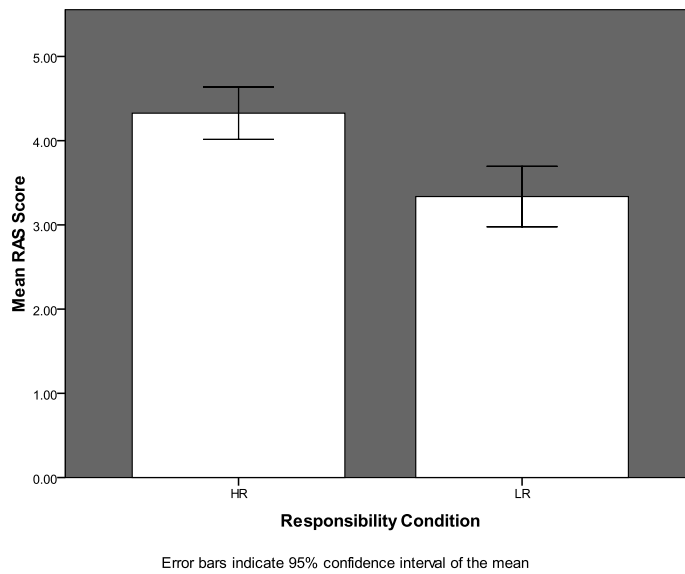
Figure 18: Mean score of HR and LR groups on inflated responsibility VAS measure.



The composite measure was significantly correlated with the full RAS questionnaire, Spearman's $\rho(63) = .78$, $p < .001$, indicating it is a good measure of the inflated responsibility construct as a whole.

On the RAS, the HR group scored significantly higher than the LR group (see figure 19), $t(61) = 4.24$, $p < .001$. The effect size of the manipulation on RAS, according to Cohen's (1988) criteria, was large (Cohen's $d = 1.086$).

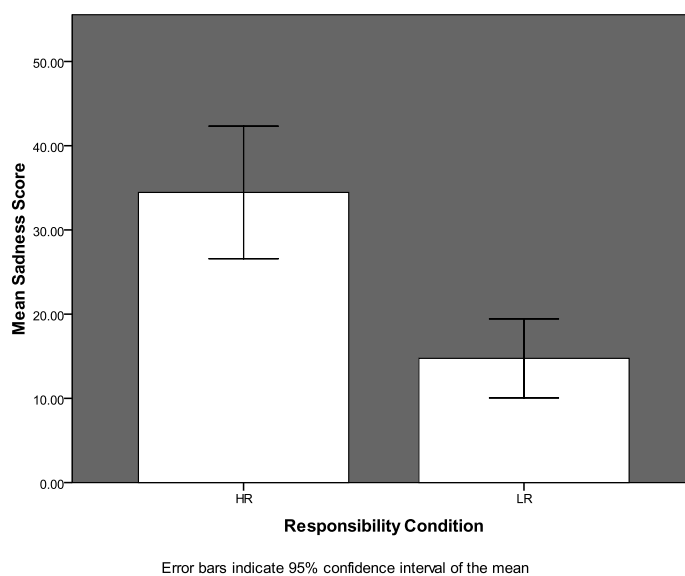
Figure 19: Mean score of HR and LR groups on RAS.



In summary the HR group scored significantly higher than the LR group on both measures of inflated responsibility.

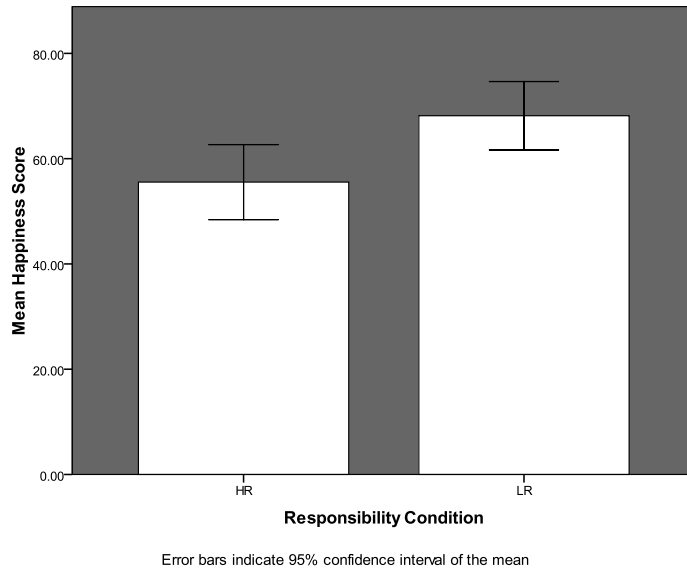
Mood Measures: The HR group scored significantly higher on the sadness measure than the LR group (see figure 20), $t(49.15) = 4.39$, $p < .001$. The effect size of the manipulation on sadness, according to Cohen's (1988) criteria, was large (Cohen's $d = 1.252$).

Figure 20: Mean score of HR and LR groups on sadness measure.



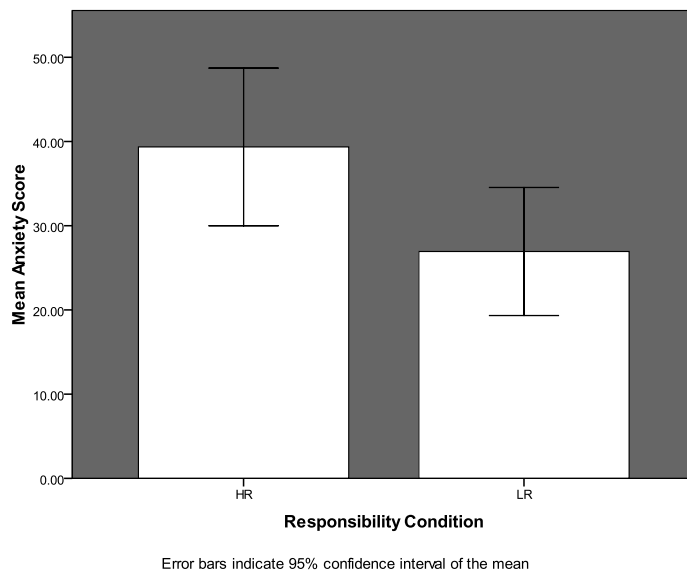
The LR group scored significantly higher on the happiness measure than the HR group, $t(61) = -2.67$, $p = .005$ (see figure 21). The effect size of the manipulation on happiness, according to Cohen's (1988) criteria, was moderate (Cohen's $d = -0.683$).

Figure 21: Mean score of HR and LR groups on happiness measure.



The HR group scored significantly higher on the anxiety measure than the LR group (see figure 22), $t(61) = 2.11$, $p = .02$. The effect size of the manipulation on anxiety, according to Cohen's (1988) criteria, was moderate (Cohen's $d = 0.540$).

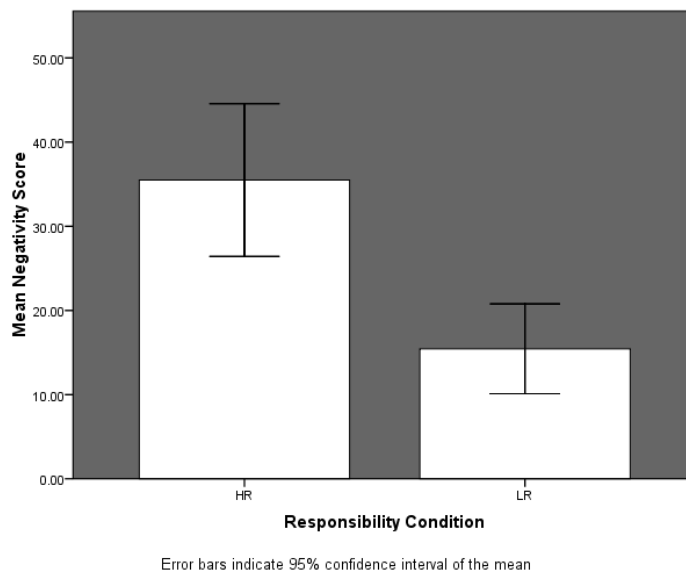
Figure 22: Mean score of HR and LR groups on anxiety measure.



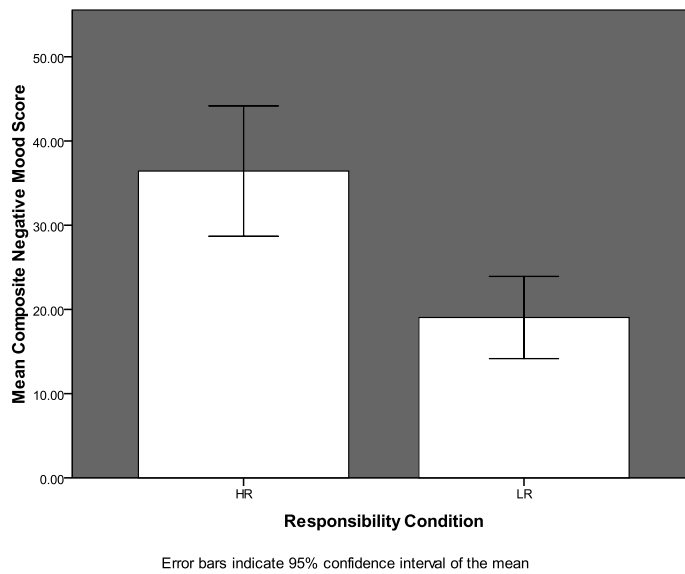
The HR group scored higher on the arousal measure than the LR group although this difference did not quite reach significance, $t(50.68) = 1.68, p = .05$. The effect size of the manipulation on arousal, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.471$). As this effect size failed to reach the criteria for a moderate effect size this effect is considered non-significant (see "Justification of the statistical analyses used in experimental chapters and justification of choice of measures used to decide if two groups differ on a given construct" section of thesis).

The HR group scored significantly higher on the negativity measure than the LR group (see figure 23), $t(48.75) = 3.89, p < .001$. The effect size of the manipulation on negativity, according to Cohen's (1988) criteria, was large (Cohen's $d = 1.114$).

Figure 23: Mean score of HR and LR groups on negativity measure.



A composite negative mood score was created by combining the means of the three questions measuring negative mood used in the short questionnaire. The HR group scored significantly higher on this composite measure of negative mood than the LR group (see figure 24), $t(50.81) = 3.88, p < .001$. The effect size of the manipulation on composite negative mood score, according to Cohen's (1988) criteria, was large (Cohen's $d = 1.089$).

Figure 24: Mean score of HR and LR groups on the composite negative mood measure.

In summary, these data suggest that the HR group was more anxious, sadder, and less happy than the LR group. The high responsibility group also reported significantly higher ratings of negative mood, both on the direct measure of negativity and the composite measure of negative mood.

In order to assess whether the two differing vignettes may have directly affected mood by containing differential levels of negative material, eight independent participants (men: 2; women: 6; age: $M = 24.38$, $SD = 3.89$) were asked to read each vignette (only the story part without the subsequent advice examples) and to report on a 100-point VAS scale how the vignette made them feel (where 0 = extremely positive, 50 = neither positive or negative, and 100 = extremely negative). A repeated measures t-test indicated that the low responsibility vignette created significantly more negativity ($M = 62.75$, $SD = 8.21$) than the high responsibility vignette ($M = 53.38$, $SD = 5.63$), $t(7) = -2.61$, $p = .035$, two tailed). The effect size, according to Cohen's (1988) criteria, was large (Cohen's $d = 1.972$). This suggests that the facilitated negative mood in participants receiving the full high responsibility manipulation is not simply due to that story having a direct negative effect, but in accordance with Bem's self-perception theory, participants are probably inferring their responsibility feelings by generating cognitions which are consistent with the advice they provide after reading the vignettes, and it is these cognitions that cause facilitated negative mood.

Stop Rules Measures: A composite AMAC score was created by combining the means of the two questions measuring AMAC stop rules used in the short questionnaire. The HR group

scored higher on the composite AMAC measure than the LR group, but this difference was not significant, $t(61) = .25, p = .40$. The effect size of the manipulation on this composite AMAC measure, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.064$).

This AMAC composite measure was significantly correlated with the full AMAC subscale of the SRQ, Spearman's rho (63) = .60, $p < .001$, suggesting the AMAC composite measure possessed convergent validity with the full AMAC measure.

The HR group also scored higher on the full AMAC subscale of the SRQ than the LR group, but again this difference did not reach significance, $t(61) = .41, p = .34$. The effect size of the manipulation on the full AMAC score, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.105$).

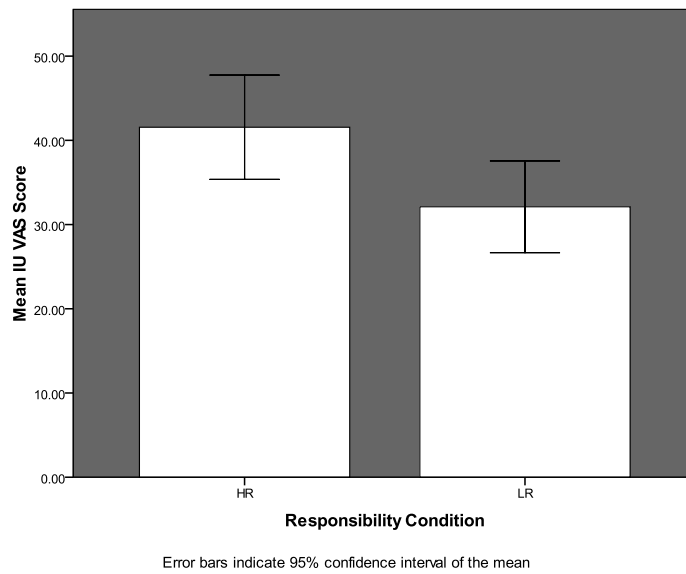
A composite FLC score was created by combining the means of the two questions measuring FLC stop rules used in the short questionnaire. The LR group scored higher on the composite FLC measure than the HR group, but this difference did not reach significance, $t(61) = -.13, p = .45$. The effect size of the manipulation on the composite FLC measure, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = -0.033$).

This FLC composite measure was significantly correlated with the full FLC subscale of the SRQ, Spearman's rho (63) = .50, $p < .001$, suggesting the FLC composite measure possessed convergent validity with the full FLC measure.

The HR group scored higher on the full FLC subscale of the SRQ than the LR group, but this difference did not reach significance, $t(61) = .51, p = .31$. The effect size of the manipulation on the full FLC score, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.130$).

IU Measures: A composite IU score was created by combining the means of the five questions measuring IU used in the short questionnaire. The HR group scored significantly higher on this composite IU measure than the LR group (see figure 25), $t(61) = 2.34, p = .01$. The effect size of the manipulation on this composite IU measure, according to Cohen's (1988) criteria, was moderate (Cohen's $d = 0.599$).

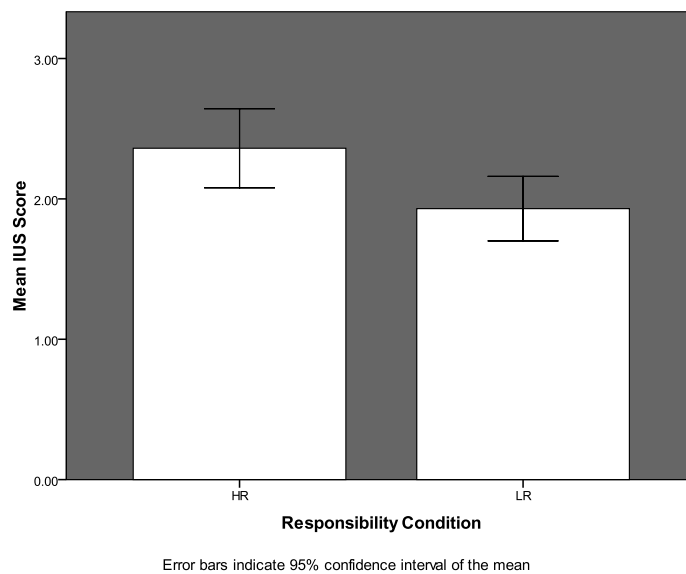
Figure 25: Mean score of HR and LR groups on the IU VAS measure.



This composite VAS measure of IU was significantly correlated with the full IUS, Spearman's $\rho(63) = .72, p < .001$, suggesting that the 5-item measure possessed convergent validity with the full IUS.

The HR group scored significantly higher on the full IUS than the LR group (see figure 26), $t(61) = 2.42, p = .009$. The effect size of the manipulation on the IUS score, according to Cohen's (1988) criteria, was moderate (Cohen's $d = 0.620$).

Figure 26: Mean score of HR and LR groups on the IUS.



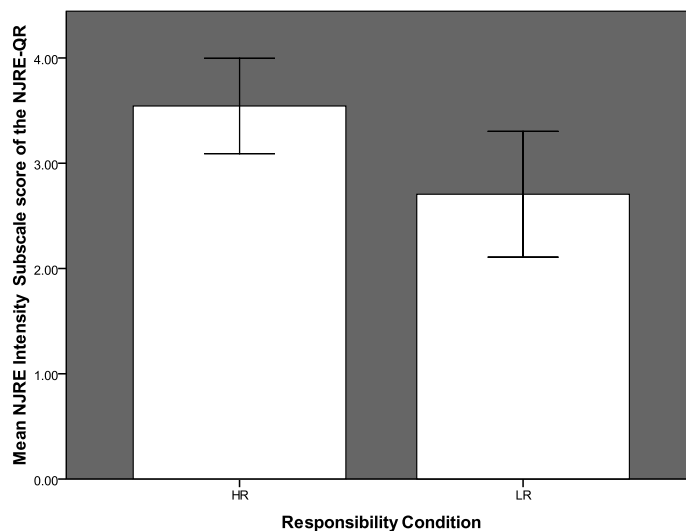
NJRE Occurrence: A composite NJRE occurrence score was created by combining the means of the three questions measuring NJRE occurrence used in the short questionnaire. The HR group scored higher on this composite NJRE occurrence measure than the LR group, but this difference was not significant, $t(61) = .42, p = .34$. The effect size of the manipulation on this composite NJRE occurrence measure, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.108$).

This composite VAS measure of NJRE occurrence was significantly correlated with the full NJRE occurrence measure, Spearman's $\rho(63) = .69, p < .001$, suggesting that the 3-item measure possessed convergent validity with the full measure in the NJRE-QR.

The LR group scored higher on the full NJRE occurrence measure than the HR group, but this difference again did not reach significance, $t(61) = -.16, p = .44$. The effect size of the manipulation on the NJRE occurrence full score, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = -0.041$).

NJRE Intensity: The HR group scored significantly higher on the full NJRE intensity measure than the LR group, $t(61) = 2.27, p = .01$ (see figure 27). The effect size of the manipulation on the NJRE intensity score, according to Cohen's (1988) criteria, was moderate (Cohen's $d = 0.581$).

Figure 27: Mean score of HR and LR groups on the NJRE intensity subscale of the NJRE-QR.



Error bars indicate 95% confidence interval of the mean

7.4 Discussion

In the present study inflated responsibility was manipulated to see what the effect of doing so would have on the four remaining constructs being focused on in this thesis. The HR group scored significantly higher on measures of sadness, anxiety, negativity, general negative mood, IU and NJRE intensity than participants in the LR group. Participants in the LR group scored significantly higher on the happiness measure than participants in the HR group. There were no differences between the groups in terms of arousal, stop rule use and NJRE occurrence.

The finding that increasing inflated responsibility increases negative mood is consistent with Salkovskis's (1985, 1989) cognitive model of OCD which proposes that when an individual experiences an intrusive cognition his or her response to the intrusion will initially be affected by the individual's level of inflated responsibility and this in turn may lead to an increase in negative mood (e.g. anxiety and depression). The model also proposes that this negative mood arising from the initial appraisal may then go on to increase feelings of responsibility. If increasing negative mood increases responsibility will be examined in a separate experimental chapter in this thesis.

The finding that the HR group scored significantly higher on the NJRE intensity measure than the LR group supports Wahl *et al*'s (2008) prediction that increasing inflated responsibility should lead to an increase in NJRE by raising an individual's EER. Future research may wish to examine if inflated responsibility leads directly to an increase in NJRE or if EER are a necessary mediating variable between increases in inflated responsibility and subsequent increases in NJRE. The finding, however, does not support the proposal by Summerfeldt (2004, 2007) that harm avoidance (as characterised by inflated responsibility) and incompleteness (as characterised by NJRE) are two separate, orthogonal dimensions related to OC symptoms. As noted in chapter 1, Summerfeldt's (2004, 2007) model suggests symptoms brought on by these two dimensions have separable motivations: whilst symptoms brought on by harm avoidance are motivated by a desire to remove the anxiety associated with some potential harmful outcome, symptoms brought about by incompleteness, or NJREs, are motivated solely by the desire to reduce the distress caused by the sense of incompleteness. However, the results of the present study suggest that increasing harm avoidance (or inflated responsibility) will subsequently heighten the intensity with which NJREs are experienced, suggesting that these two dimensions are at least somewhat interconnected. One may wish to ask why increasing responsibility increased NJRE intensity but not NJRE occurrence? As noted in chapter 2, Coles *et al* (2003) found that most people (95% of their student sample in the past week) report the

occurrence of NJRE. Given that such a large percentage of people seem to experience the occurrence of NJRE, it may be the case that such experiences are “normal” and if this is the case we would not necessarily expect NJRE occurrence to be affected by clinical constructs such as inflated responsibility. There is evidence to suggest that it is NJRE intensity, as opposed to NJRE occurrence, which is of importance to OC symptoms. For example, Coles *et al* (2005) found that NJRE occurrence showed a weaker relation to OC symptoms than the NJRE intensity in correlational analyses. It may be the case, therefore, that whilst most people experience the occurrence of NJRE these experiences only become problematic and lead to OC symptoms when they are experienced intensely. The finding that the manipulation of inflated responsibility effects NJRE intensity is probably therefore of more clinical relevance than any effect the manipulation may have had on NJRE occurrence.

The finding that increasing inflated responsibility increases IU supports Lind and Boschen (2009) proposal that heightened beliefs about the power to cause harm associated with inflated responsibility will lead to an individual finding doubt or uncertainty about an event or outcome more aversive and less tolerable (i.e. it will heighten IU). The findings are not inconsistent with Lind and Boschen (2009) finding that the relationship between inflated responsibility and compulsive checking was fully mediated by IU in that inflated responsibility appears to have a casual affect on IU and so therefore it is *possible* that the effects of inflated responsibility on OC symptoms occur primarily due to the effect inflated responsibility has on IU. Of course, the results of this study would also suggest that inflated responsibility may also be affecting OC symptoms through its effects on other constructs (negative mood and NJRE intensity) as well as potentially having a direct effect on OC symptoms as a construct in its own right.

Finally, the finding that increasing inflated responsibility did not increase the use of AMAC stop rule use may be seen as somewhat surprising. As noted in the introduction, one might have expected that beliefs about the power to cause harm associated with inflated responsibility might have motivated an individual to ensure that they have successfully completed a task as best they can (i.e. use AMAC stop rules) rather than terminating a task when they simply feel like doing so (i.e. use FLC stop rules). One may wish to ask why increasing inflated responsibility did not subsequently lead to an increase in AMAC stop rule endorsement? A possible explanation maybe that rather than motivating individuals to *objectively* ensure that they have successfully completed a task, inflated responsibility may motivate individuals to ensure a task *subjectively* feels like it has been completed. As noted in the introduction, Wahl

et al (2008) suggest that inflated responsibility has its affects on checking through motivating an individual to:

“...achieve a particular subjective or emotional state as a way of deciding that they have completed an activity. This includes the deliberate seeking of a particular mood state, a sense of satisfaction or completeness and “just right” feelings as a way of deciding that it is appropriate to stop behaviour.”

(Wahl *et al*, 2008, p.144)

In support of Wahl *et al*'s (2008) predictions, in the current experiment increasing inflated responsibility lead to increases in NJRE intensity. Whilst the use of AMAC stop rules is likely to encourage the individual to ensure that a task has objectively been completed there is no reason to assume it will help the individual achieve an internal *subjective* feeling that the task has been completed. It may be the case that inflated responsibility influences checking behaviours purely through motivating an individual to search for such internal subjective states and from this perspective we would not necessarily expected increasing responsibility to increase the use of AMAC stop rules.

Discussion of the results of this experiment in light of the results of the other four experimental chapters will be left until the general discussion section of the thesis.

8. Chapter 6: IU Manipulation

8.1 Introduction

The fourth experiment was designed to investigate what effect manipulating IU would have on the other four constructs focused on in this thesis. IU was manipulated in such a way that participants either fell into a high or a low IU group and the effects of this manipulation on mood, AMAC/FLC stop rules, inflated responsibility and NJRE were examined. Although several definitions of IU exist (for a review see Birrell *et al*, In press) the definition preferred for this thesis defines the construct as, “a cognitive bias that affects how a person perceives, interprets, and responds to uncertain situations on a cognitive, emotional, and behavioural level” (Dugas *et al*, 2004, p.835).

To the author’s knowledge 3 separate attempts to manipulate IU have been described in the literature. As the studies in which these manipulations were used did not concern OCD they were not described in chapter 1 of the current thesis and so are briefly summarised here. Ladouceur, Gosselin, and Dugas (2000) designed a computerised roulette game where IU was increased or decreased by manipulating whether the uncertainty of winning the game was made acceptable or unacceptable to the participant. Grenier and Ladouceur (2004) manipulated IU by having participants imagine ingesting a medication and then reading out loud a paragraph consisting of statements designed to either increase (e.g., “c’est difficile de ne pas savoir ce qui va arriver” [it is difficult not to know what will happen]) or decrease (e.g., “je dois vivre avec les différentes possibilités” [I have to live with the different possibilities]) IU. Finally, Rosen and Knäuper (2009, see also Rosen, Knäuper & Sammut, 2009) had participants fill in the IUS and then gave participants pre-prepared, written false feedback telling participants they tolerated uncertainty well (if they were in the low IU group) or that they tolerated uncertainty poorly (if they were in the high IU group).

In the current study a novel manipulation of IU was used and this manipulation was not based on manipulations used in previous experiments. There are two reasons for this. Firstly, although the above studies did include manipulation checks of IU, how valid these checks were of a change in IU in its broadest sense is questionable. For example, Ladouceur *et al*’s (2000) manipulation check asked participants specifically about their IU regarding the gambling task (rather than generally) whereas Rosen and Knäuper (2009), rather than ask participants specifically about different aspects of IU, instead only asked how accurate the participant felt the false feedback they had received was about their attitudes towards uncertainty in general.

Given the limitations of these manipulation checks, the author had little *a priori* reason to expect that these manipulations would work any more successfully than a more novel IU manipulation. Secondly, the author wanted to ensure that any experimentally-induced changes in IU complied with definitions of the IU construct. It can be argued that whilst the above manipulations may have been successful at manipulating IU at a general level it is hard to see how these general manipulations might affect some of the specific types of beliefs associated with IU (e.g. being uncertain reflects badly on a person). In this study a manipulation is used which targets specific features of IU as identified by definitions of the construct (e.g. Freeston *et al*, 1994).

What affect might we expect the manipulation of IU to have on the four other constructs? There is experimental evidence to suggest that increasing IU will subsequently increase negative mood (although note none of this evidence directly involved the manipulation of IU). For example, Miranda *et al* (2008) found that IU predicted increases in depression over a 6 week period whilst Kirby and Yardley (2009) found IU seemed to be associated with increased anxiety in Meniere's disease. Further, individuals high on IU are thought to find uncertainty both stressful and upsetting (see Freeston *et al*, 1994) further suggesting that increasing IU may lead to a subsequent increase in negative mood.

There are conceptual reasons to suggest that increasing IU may also lead to an increase in AMAC stop rule use. As outlined in chapter 1, it has been suggested that when engaged in compulsive behaviours the OC individual becomes doubtful about whether they have performed the task they are engaged in successfully or adequately. Subsequently, the individual's high level of IU leaves them unable to cope with this uncertainty (doubt) about their performance and as a consequence the individual feels compelled to continue with the compulsive or checking behaviour to ensure it has been done successfully or adequately (Beech & Liddell, 1974). One mechanism which may mediate this relationship between IU and increased checking behaviours are AMAC stop rules. Specifically, when the individual with a high level of IU experiences doubt about whether a check has been performed they may well adopt AMAC stop rules in an attempt to ensure that future checks are successful.

One could also conceptually see how high IU could lead to an increase in inflated responsibility. Specifically, if an individual with high IU is unable to cope with uncertainty (doubt) about whether they have performed a compulsive check successfully this is likely to result in the belief that a perceived threat has not been sufficiently reduced or removed which in turn may increase the individual's sense of inflated responsibility.

Finally, one can conceptually see how increasing IU may lead to a subsequent increase in NJRE. Given that individuals high in IU appear to require more *objective* evidence before reaching a conclusion (Ladouceur, Talbot & Dugas, 1997) it is plausible individuals will also use subjective states to decide when to terminate an action, which would be indicative of a possible rise in NJRE.

Based on the above evidence and possible theoretical links as well as the fact all four dependent constructs in this experiment are positively correlated with IU to at least a moderate degree (chapter 2), it is predicted that increasing IU will subsequently lead to an increase in the negative mood, the endorsement of AMAC stop rules, inflated responsibility and NJRE occurrence and intensity.

8.2.1 Method

8.2.2 Participants

Participants were 61 undergraduates from the University of Sussex (men: 16; women: 45). Aged ranged from 18 to 33 years ($M = 20.26$, $SD = 2.82$). All of the participants were volunteers who received partial fulfilment of a course requirement or received a small monetary fee for taking part in the experiment.

8.2.3 Measures

VAS measures (given in the short questionnaire)

IU: IU was measured using the same five questions as were used in experiment three. The 5 items had acceptable internal consistency ($\alpha = .75$).

Mood: Mood was measured using the same five questions as were used in experiment three. The 3 items measuring negative mood had mediocre internal consistency ($\alpha = .66$).

Stop rules: AMAC stop rules were measured using the same two questions used in experiment three as were FLC stop rules. The 2 AMAC items had mediocre internal consistency ($\alpha = .61$) whilst the 2 FLC items also had mediocre internal consistency ($\alpha = .65$).

Responsibility: Responsibility was measured using the same four questions as were used in experiment three. These 4 items had mediocre internal consistency ($\alpha = .63$).

NJRE Occurrence: NJRE occurrence was measured using the same three items used in experiment three. The 3 items had mediocre internal consistency ($\alpha = .63$). (*Note:* NJRE intensity was measured only through the NJRE-QR).

Full measures (given in the full questionnaire booklet)

Responsibility: Responsibility was measured in the full questionnaire using the RAS (Salkovskis *et al*, 2000, see chapter 2 for details). In the present study the scale had excellent internal consistency ($\alpha = .91$).

Stop Rules: AMAC and FLC stop rules were measured in the full questionnaire using the SRQ (see appendix 1 for details). In the present study the AMAC subscale had excellent internal consistency ($\alpha = .92$) whilst the FLC subscale also had excellent internal consistency ($\alpha = .90$).

IU: IU was measured in the full questionnaire using the IUS (Freeston *et al*, 1994, see chapter 2 for details). In the present study the scale had excellent internal consistency ($\alpha = .90$).

NJRE: NJRE occurrence and intensity were measured in the full questionnaire using the NJRE-QR (Coles *et al*, 2003, see chapter 2 for details). In the present study the NJRE occurrence subscale showed acceptable internal consistency ($\alpha = .74$) whilst the NJRE intensity scale showed excellent internal consistency ($\alpha = .91$).

8.2.4 Procedure

Stage 1. IU manipulation: Participants were randomly assigned to one of two groups, the high IU group ($n = 30$) and the low IU group ($n = 31$). Participants were then given one of two stories to read, dependent on the group to which they had been assigned. Both pieces were written from an autobiographical perspective by a character called Kayla. Participants were told that Kayla was a 25 year old woman. Although participants were told they were reading a true story the stories were in fact fictitious and were created for the experiment. Both stories were printed on A4 paper and were of a similar length (about two sides of A4).

In the story given to the high IU group Kayla is a person who has very little or no reaction to uncertainty. In the story she discusses her inability to react to uncertainty and gives descriptions of uncertain situations she has had little or no reaction to. She describes how her failure to respond to the uncertainty surrounding these situations (and others) has led to negative consequences for herself and others (e.g. losing money by making an investment surrounded in uncertainty; having a bad holiday because of booking a hotel despite uncertainty surrounding whether the hotel would be fully built before the date of the holiday).

Throughout the story she expresses regret about her inability to react to uncertainty and towards the end of the story states that she wants to become someone who reacts when faced with uncertain situations as this may prevent her from making risky decisions, but states that she needs some help in doing this. Participants in the high IU group are asked to write down advice to help Kayla react better to uncertainty. Five pieces of “example advice” are given after the story to give participants some idea of the sort of advice they may want to offer (see appendix six for full story and example advice).

In the story given to the low IU group Kayla is a person who finds uncertainty very difficult to cope with as it causes her a lot of stress and anxiety. In the story she describes how uncertain situations worry her and gives descriptions of uncertain situations which have paralysed her and prevented her from reacting. She describes how her failure to act in these situations (and others) due to her fear of uncertainty has led to negative consequences for herself and others (e.g. not investing in what turned out to be an extremely profitable company due to uncertainty about getting a return on her money; losing friends by not going on holiday with them due to uncertainty about travel arrangements and accommodation). Throughout the story she displays an awareness regarding the negative effect her anxiety surrounding uncertainty is having on her life and towards the end of the story states that she wants to become a person who is able to relax when faced with a uncertain situation and that she does not want to be paralyzed by uncertainty, but that she feels she needs some help in doing this. Participants in the low IU group are asked to write down advice to help Kayla become less anxious and paralyzed by uncertainty. Five pieces of “example advice” are given after the story to give participants some idea of the sort of advice they may want to offer (see appendix seven for full story and example advice).

To ensure that any experimentally-induced changes in IU complied with definitions of the IU construct, five specific features of IU were defined and explicitly referred to in the advice vignettes given to participants. These features were: 1, uncertainty leads to the inability to act, 2, uncertainty is stressful and upsetting, 3, unexpected events are negative and should be avoided, 4, being uncertain is unfair, and 5, being uncertain reflects badly on a person (see Freeston *et al*, 1994).

In the story given to the low IU group Kayla displays all of these beliefs about uncertainty whilst the “example advice” offered to Kayla is aimed at advising her about how to minimise or eliminate these kinds of beliefs about uncertainty. In the story given to the high IU group Kayla does not display any of these beliefs about uncertainty and in fact displays a range of opposing

beliefs. The “example advice” offered to Kayla is aimed at advising her about how she can, and should, bring these kinds of beliefs about uncertainty into her life.

The IU manipulation is based on Bem’s self-perception theory that proposes that an individual will infer his or her attitude based on information derived from his or her behaviour (Bem, 1972). Salancik and Conway (1975) proposed that the individual will infer his or her attitude through a process of generating and assessing relevant information from the past and present, and that the individual will be especially likely to use information made most conspicuous to them at the time. Therefore, when an individual describes an attitude or behaviour positively or negatively he or she will generate cognitions consistent with their endorsement.

After reading their respective vignettes, participants in both groups were asked to write their advice on A4 paper. The experimenter left the room whilst the participant read the story and wrote down their advice and the participant was asked to get the experimenter when they had finished. Participants were given no set time limit to complete this task.

Stage 2. Ten minute break and short questionnaire: Participants were told in the informed consent form that after reading and commenting on the story there would be a ten minute break before they would be given follow up questionnaires. The experimenter re-entered the room immediately after participants had finished writing down their advice. The experimenter then asked the participant if they would mind filling in a questionnaire unrelated to the experiment during the ten minute break. As with Experiment 1, participants were told the questionnaire was related to a separate questionnaire study being conducted by the experimenter’s supervisor and that the questionnaire would take just over five minutes to complete. All participants agreed to fill in the questionnaire. The experimenter left the room for ten minutes whilst the participant filled in the questionnaire. As in Experiment 1, the data collected in this questionnaire was actually to be used in the analysis of the present study. The questionnaire contained 21 questions which were the visual analogue scale (VAS) measures of the five constructs (see measures section).

Stage 3. Full questionnaires. The experimenter re-entered the room after the 10 minute “break” had finished. The experimenter thanked the participant for filling in the previous questionnaire and then gave the participant another questionnaire booklet. The experimenter asked the participant to inform the experimenter when they had finished the questionnaire booklet. The experimenter then left the room until the participant had finished the questionnaire booklet. This questionnaire booklet contained full measures of 4 of the

constructs (there was no full measure of mood). Full measures of each construct were given to participants in order to validate the VAS measures.

Stage 4. Debrief: After completing the questionnaire booklet, participants were thanked and debriefed.

8.3 Results

IU Manipulation Check: Table 10 shows the ratings on the VAS measures and full questionnaire measures of the five constructs for the high IU and low IU groups. Each measure was subjected to an independent measures sample t-test.

Table 10. *Mean (standard deviation) on VAS measures and full questionnaire measures of the 5 constructs for the high IU and low IU groups.*

<u>Group</u>	<u>High IU</u>	<u>Low IU</u>
IU VAS	33.93*** (14.55)	16.89*** (11.49)
IU FQ	2.06*** (.49)	1.61*** (.31)
Sadness	23.80 (19.30)	19.39 (15.99)
Happiness	62.67 (14.82)	62.42 (17.98)
Anxiety	36.63* (24.90)	23.13* (22.63)
Arousal	43.83 (17.48)	48.48 (20.38)

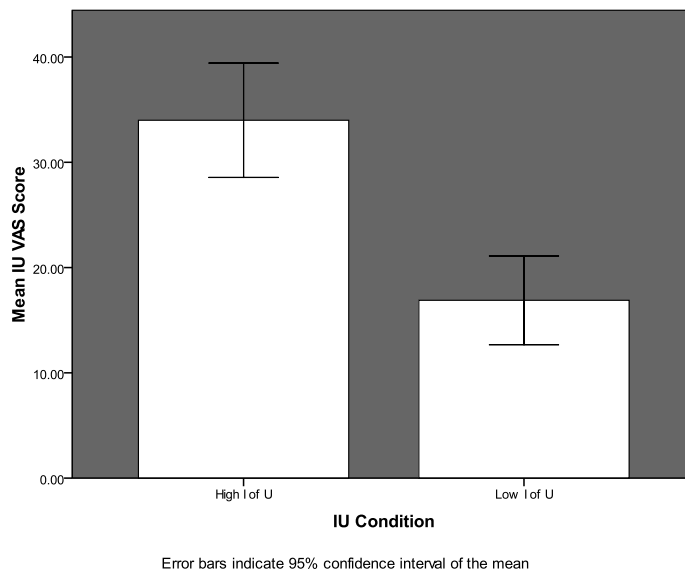
Negativity	34.20	24.36
	(21.64)	(21.01)
Comp Neg	31.54*	22.29*
	(15.82)	(16.27)
AMAC VAS	65.30**	49.98**
	(17.95)	(21.13)
AMAC FQ	2.87*	2.44*
	(.87)	(.85)
FLC VAS	41.18**	54.68**
	(19.31)	(20.70)
FLC FQ	2.79	3.06
	(.89)	(.94)
R VAS	38.05	32.35
	(16.57)	(17.77)
R FQ	4.01	3.64
	(.84)	(.81)
NJRE Occ VAS	32.59	26.08
	(16.96)	(16.69)
NJRE Occ FQ	.36	.25
	(.27)	(.20)
NJRE Inten	2.70	2.14
	(1.63)	(1.31)

Note: FQ = full questionnaire. AMAC= As many as can FLC = Feel like continuing. Comp Neg: Composite Negative Mood. R = Inflated responsibility. IU = Intolerance of Uncertainty. NJRE Occ

= NJRE occurrence. NJRE Inten = NJRE intensity. * = $p < .05$ ** = $p < .01$, *** = $p < .001$. If a difference on a measure was significant at $p < .05$ but the associated effect size was not equal to or greater than $d = 0.5$ then this difference it is not noted as significant.

A composite IU score was created by combining the means of the five questions measuring IU used in the short questionnaire. The high IU group scored significantly higher on this composite IU measure than the low IU group (figure 28), $t(59) = 5.10$, $p < .001$. The effect size of the manipulation on this composite IU measure, according to Cohen's (1988) criteria, was large (Cohen's $d = 1.300$).

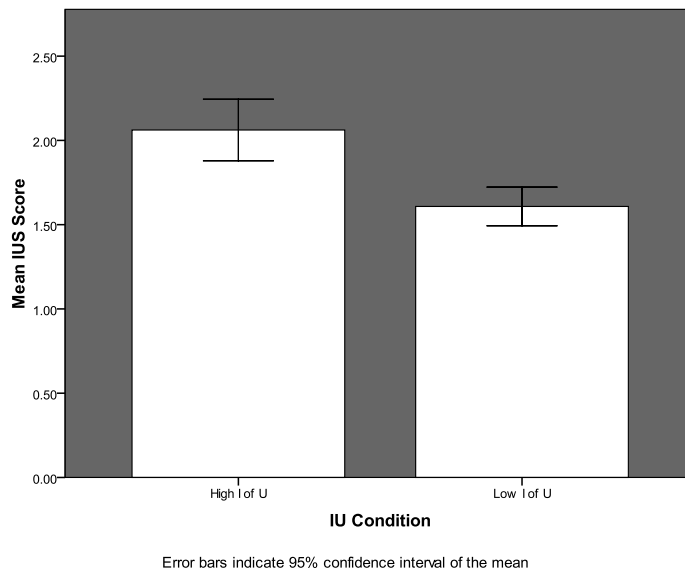
Figure 28: Mean score of high and low IU groups on the IU VAS measure.



This composite VAS measure of IU was significantly correlated with the full IUS, Spearman's $\rho(61) = .77$, $p < .001$, suggesting that the 5-item measure possessed convergent validity with the full IUS.

The high IU group scored significantly higher on the full IUS than the low IU group, $t(49.08) = 4.33$, $p < .001$ (see figure 29). The effect size of the manipulation on the IUS score, according to Cohen's (1988) criteria, was large (Cohen's $d = 1.098$).

Figure 29: Mean score of high and low IU groups on the IUS.



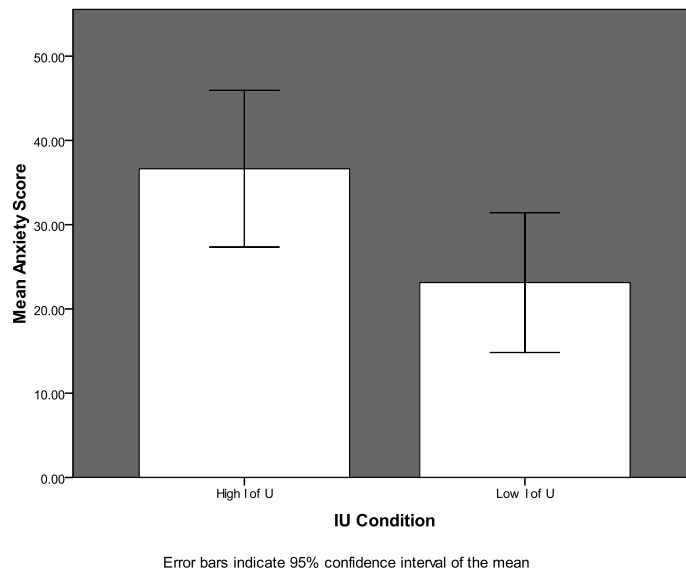
Mood Measures: The high IU group scored higher on the sadness measure than the low IU group, but this difference was not significant, $t(59) = .97$, $p = .17$. The effect size of the manipulation on sadness, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.249$).

The high IU group scored higher on the happiness measure than the low IU group, but this difference did not reach significance, $t(59) = .06$, $p = .48$. The effect size of the manipulation on happiness, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.015$).

The high IU group scored significantly higher on the anxiety measure than the low IU group (see figure 30), $t(59) = 2.22$, $p = .02$. The effect size of the manipulation on anxiety, according to Cohen's (1988) criteria, was moderate (Cohen's $d = 0.567$).

The low IU group scored higher on the arousal measure than the high IU group, but this difference did not reach significance, $t(59) = -.96$, $p = .17$. The effect size of the manipulation on arousal, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.245$).

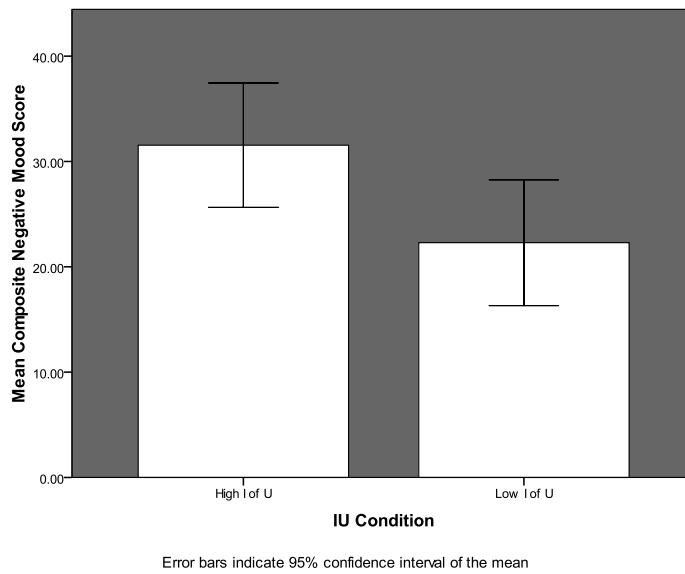
Figure 30: Mean score of high and low IU groups on anxiety measure.



The high IU group scored significantly higher on the negativity measure than the low IU group, $t(59) = 1.80, p = .04$. The effect size of the manipulation on negativity, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.461$). As this effect size failed to reach the criteria for a moderate effect size this effect is considered non-significant (see "Justification of the statistical analyses used in experimental chapters and justification of choice of measures used to decide if two groups differ on a given construct" section of thesis).

A composite negative mood score was created by combining the means of the three questions measuring negative mood used in the short questionnaire. The high IU group scored significantly higher on this composite measure of negative mood than the low IU group (see figure 31), $t(59) = 2.25, p = .01$. The effect size of the manipulation on composite negative mood score, according to Cohen's (1988) criteria, was moderate (Cohen's $d = 0.576$).

Figure 31: Mean score of high and low IU groups on the composite negative mood measure.

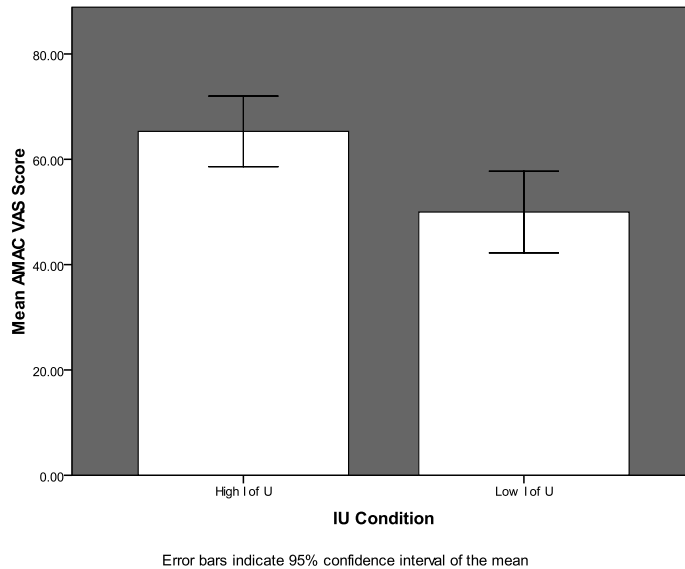


In summary, the high IU group scored significantly higher in terms of anxiety and general negative mood (as measured by the negative mood composite measure) than the low IU group. In order to assess whether the two differing vignettes may have directly affected mood by containing differential levels of negative material, nine independent participants (men: 1; women: 8; age: $M = 23.46$, $SD = 3.49$) were asked to read each vignette (only the story part without the subsequent advice examples) and to report on a 100-point VAS scale how the vignette made them feel (where 0 = extremely positive, 50 = neither positive or negative, and 100 = extremely negative). A repeated measures t-test indicated that the low IU vignette created more negativity ($M = 61.89$, $SD = 13.74$) than the high IU vignette ($M = 54.44$, $SD = 17.61$), $t(8) = 1.01$, $p = .34$, two tailed) but this difference was not significant. The effect size, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.472$). This suggests that the facilitated negative mood in participants receiving the full high IU manipulation is not simply due to that story having a direct negative effect, but in accordance with Bem's self-perception theory, participants are probably inferring their IU feelings by generating cognitions which are consistent with the advice they provide after reading the vignettes, and it is these cognitions that cause facilitated negative mood.

Stop Rules Measures: A composite AMAC score was created by combining the means of the two questions measuring AMAC stop rules used in the short questionnaire. The high IU group scored significantly higher on the composite AMAC measure than the low IU group (see figure

32), $t(59) = 3.05$, $p = .002$. The effect size of the manipulation on this composite AMAC measure, according to Cohen's (1988) criteria, was moderate (Cohen's $d = 0.781$).

Figure 32: Mean score of high and low IU groups on AMAC VAS measure.



This AMAC composite measure was significantly correlated with the full AMAC subscale of the SRQ, Spearman's $\rho(61) = .49$, $p < .001$, suggesting the AMAC composite measure possessed convergent validity with the full AMAC measure.

The high IU group also scored significantly higher on the full AMAC subscale of the SRQ than the low IU group (see figure 33), $t(59) = 1.95$, $p = .03$. The effect size of the manipulation on the full AMAC score, according to Cohen's (1988) criteria, was moderate (Cohen's $d = 0.500$).

A composite FLC score was created by combining the means of the two questions measuring FLC stop rules used in the short questionnaire. The low IU group scored significantly higher on the composite FLC measure than the high IU group (see figure 34), $t(59) = -2.63$, $p = .006$. The effect size of the manipulation on the composite FLC measure, according to Cohen's (1988) criteria, was moderate (Cohen's $d = 0.674$).

Figure 33: Mean score of high and low IU groups on AMAC subscale of the SRQ.

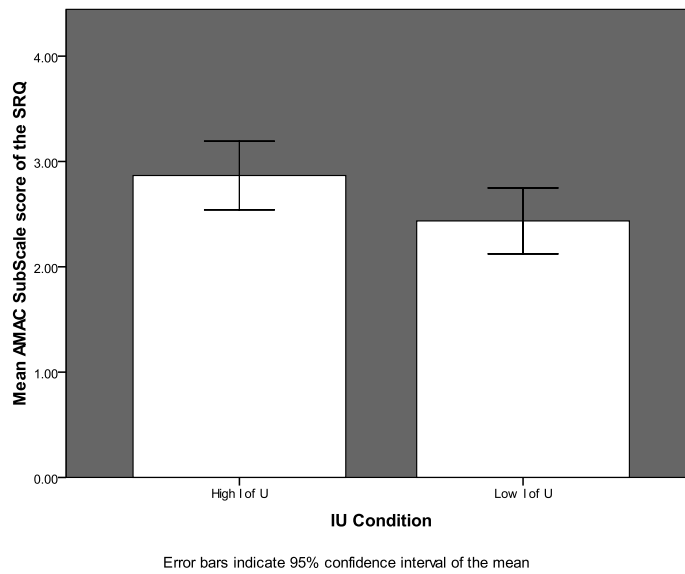
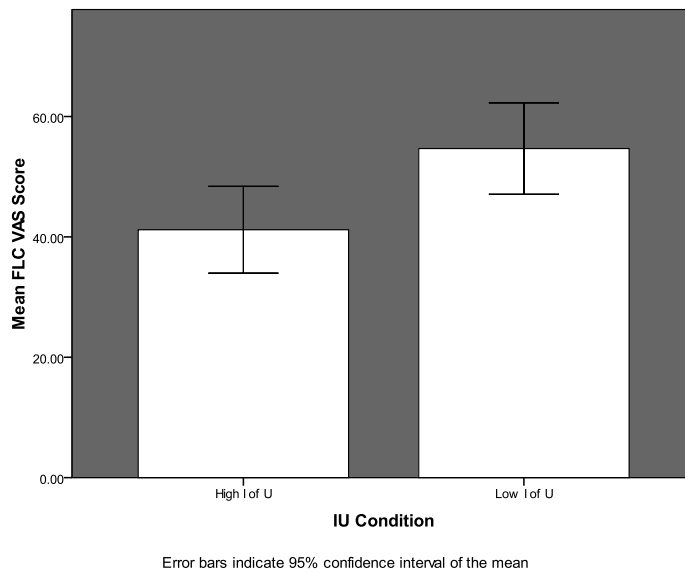


Figure 34: Mean score of high and low IU groups on FLC VAS measure.



This FLC composite measure was significantly correlated with the full FLC subscale of the SRQ, Spearman's $\rho(61) = .63, p < .001$, suggesting the FLC composite measure possessed convergent validity with the full FLC measure.

The low IU group scored higher on the full FLC subscale of the SRQ than the high IU group, but this difference did not reach significance, $t(59) = -1.17, p = .13$. The effect size of the manipulation on the full FLC score, according to Cohen's (1988) criteria, was small (Cohen's $d =$

0.295).

Responsibility Measures: A composite responsibility score was created by combining the means of the four questions measuring responsibility used in the short questionnaire. The high IU group scored higher on this composite responsibility measure than the low IU group, but this difference was not significant, $t(59) = 1.30$, $p = .10$. The effect size of the manipulation on this composite responsibility measure, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.332$).

The composite measure was significantly correlated with the full RAS questionnaire, Spearman's rho (61) = .81, $p < .001$, indicating it is a good measure of the inflated responsibility construct as a whole.

On the RAS itself, the high IU group scored significantly higher than the low IU group, $t(59) = 1.78$, $p = .04$. The effect size of the manipulation on RAS, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.448$). As this effect size failed to reach the criteria for a moderate effect size this effect is considered non-significant (see ""Justification of the statistical analyses used in experimental chapters and justification of choice of measures used to decide if two groups differ on a given construct" section of thesis).

NJRE Occurrence: A composite NJRE occurrence score was created by combining the means of the three questions measuring NJRE occurrence used in the short questionnaire. The high IU group scored higher on this composite NJRE occurrence measure than the low IU group, but this difference was not significant, $t(61) = 1.51$, $p = .07$. The effect size of the manipulation on this composite NJRE occurrence measure, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.387$).

This composite VAS measure of NJRE occurrence was significantly correlated with the full NJRE occurrence measure, Spearman's rho (61) = .57, $p < .001$, suggesting that the 3-item measure possessed convergent validity with the full measure in the NJRE-QR.

The high IU group scored significantly higher on the full NJRE occurrence measure than the low IU group, $t(59) = 1.77$, $p = .04$. The effect size of the manipulation on the NJRE occurrence full score, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.462$). As this effect size failed to reach the criteria for a moderate effect size this effect is considered non-significant (see ""Justification of the statistical analyses used in experimental chapters and justification of choice of measures used to decide if two groups differ on a given construct" section of thesis).

NJRE Intensity: The high IU group scored higher on the full NJRE intensity measure than the low IU group, but this difference was not significant, $t(61) = 1.48$, $p = .07$. The effect size of the manipulation on the NJRE intensity score, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.379$).

8.4 Discussion

In the present study IU was manipulated to see what the effect of doing so would have on the four remaining constructs being focused on in this thesis. The high IU group scored significantly higher on measures of anxiety, general negative mood and AMAC stop rule endorsement than participants in the low IU group. Participants in the low IU group scored significantly higher on measures of FLC stop rule endorsement than participants in the high IU group. Although the high IU group scored significantly higher on the VAS measure of negativity and the full measures of inflated responsibility and NJRE occurrence than the low IU group as the effect sizes associated with these tests did not meet Cohen's (1988) criteria for a moderate effect size they are not accepted here as significant effects (see "Justification of the statistical analyses used in experimental chapters and justification of choice of measures used to decide if two groups differ on a given construct" section of thesis). Finally, the groups did not appear to differ in terms of sadness, happiness, arousal or NJRE intensity.

The finding that the high IU group scored significantly higher than the low IU group in terms of anxiety and general negative mood is in line with previous experimental evidence (e.g. Kirby & Yardley, 2009). As mentioned in the introduction, individuals high on IU are thought to find uncertainty both stressful and upsetting (see Freeston *et al*, 1994) and it may be the case that IU leads to heightened states of negative mood specifically when an individual thinks about something uncertain (e.g. an ambiguous future event). It is interesting to note that the high IU and low IU groups did not differ in terms of sadness and negativity. The results of this study would seem to suggest that whilst IU appears to be an important causal factor in increasing anxiety it may not be a causal factor involved in increasing other specific negative mood states (e.g. depression).

The finding that the high IU group scored significantly higher on the endorsement of AMAC stop rule use than the low IU group would appear to make conceptual sense. Specifically, as outlined in the introduction, when an OC individual experiences doubt about whether they have performed a task (e.g. a checking behaviour) successfully or adequately an individual's high level of IU may leave them unable to cope with this uncertainty about their performance

and as a consequence the individual may be compelled to use AMAC stop rules (e.g. I must check one more time) to ensure a task is subsequently done successfully or adequately. Although not of particular clinical relevance, the finding the low IU group scored higher on the use of FLC stop rules than the high IU group also makes conceptual sense. Given the above example, when an individual low on IU experiences doubt about whether they have performed a task successfully or adequately the individual's low level of IU may leave them better able to cope with (or perhaps even unconcerned with) this uncertainty and as a consequence the individual may be more likely to adopt FLC stop rules (e.g. I'm pretty sure I checked properly, so don't worry about it anymore).

The finding that the high and low IU groups did not differ in terms of NJRE occurrence or NJRE intensity is perhaps not totally surprising. Although the two constructs are moderately positively correlated (see chapter 2) there is no previous experimental or theoretical evidence to suggest that increasing an individual's IU should subsequently lead to a "subjective sense that something isn't just as it should be" (Coles *et al*, 2003), that is, a NJRE. Most theories of OCD based on incompleteness see NJRE as stemming from a problem with matching cues from the external environment to internal standards or references signals. For example, Summerfeldt (2004, 2007) conceptualised NJREs as a sensory-affective dysregulation or deficit in the ability to use emotional experience and sensory feedback to guide behaviour whilst Szechtman and Woody (2004) proposed NJREs stem from an inability to generate the normal "feeling of knowing" that would otherwise signal task completion. Such theories seem to suggest that NJRE may stem from a deep rooted underlying cognitive deficit which perhaps has a biological basis. From this theoretical stand point it is hard to see how the occurrence of NJRE would be affected by IU.

Finally, one might have expected to find that increasing IU would lead to a subsequent increase in inflated responsibility although the high and low IU groups did not differ in terms of inflated responsibility in the present study. Specifically, one may have expected that an individual with high IU would be unable to cope with uncertainty (doubt) about whether they have performed a compulsive check successfully which in turn may have led to a belief that a perceived threat had not been sufficiently reduced or removed which in turn may have led to an increase in the individual's sense of inflated responsibility. Although such a route by which IU may increase inflated responsibility is conceptually plausible it should be noted that increased doubt (and an individual's reaction to this doubt) is not necessarily expected to increase responsibility according to models of OCD based around inflated responsibility (e.g. Rachman, 2002). Whilst Rachman's (2002) model would predict that increased doubt (which in itself

arises from increased responsibility, see e.g. Radomsky *et al*, 2001) would lead to an increase in checking behaviours, the model does not suggest that increased doubt in itself will lead to increased responsibility. Therefore the finding that increasing IU does not lead to an increase in inflated responsibility can be easily accommodated by models of OCD such as Rachman's (2002).

Discussion of the results of this experiment in light of the results of the other four experimental chapters will be left until the general discussion section of the thesis.

9. Chapter 7: NJRE Manipulation

9.1 Introduction

The final experiment was designed to investigate what effect manipulating NJRE would have on the other four constructs focused on in this thesis. NJRE were manipulated in such a way that participants either fell into a high or a low NJRE group and the effects of this manipulation on mood, AMAC/FLC stop rules, inflated responsibility and IU were examined. As discussed in chapter 1, whilst several definitions have been used to recognise the manifestation of OCD first described by Janet in 1903 as “incompleteness”, the term preferred in this thesis is NJRE (Coles *et al*, 2003). NJREs can be defined as, “the subjective sense that something isn’t just as it should be”, an unsettled feeling because something in the individual or in the world around does not feel right (Coles *et al*, 2003).

To the author’s knowledge no previous study has specifically attempted to manipulate NJRE. That is, no study has simultaneously attempted to increase the number of NJRE experienced by one group of participants whilst attempting to also lower the number of NJRE experienced by a second group of participants. This is possibly because reducing the number of NJRE experienced by an individual may be impossible. Two studies, however, have attempted to induce NJRE in an experimental setting. Coles *et al* (2005) had participants enter an office where parts of the experimental room had been arranged to elicit NJRE. Items in the room designed to elicit NJRE included: a dishevelled bookshelf, a dirty sink, a chair with one missing arm rest and a desk with one drawer slightly ajar. Pietrefesa and Coles (2009) had participants complete tasks that were likely to elicit NJREs such as arranging books on a bookshelf, hanging pictures on the wall and sorting the contents of a paper recycle bin. The manipulation of NJRE used in the present study is based partly on the attempt to induce NJREs used by Cole *et al* (2005), with the high NJRE group placed in a room designed to induce NJREs. As lowering the number of NJRE experienced by an individual maybe impossible, the low NJRE group were simply placed in a room which was designed as best as possible not to induce NJREs. Whilst technically this group may be best referred to as a control group, the term low NJRE group is used to describe this group to be consistent with the terminology used to describe groups (as high and low on a construct) in the four previous experimental chapters.

What affect might we expect the manipulation of NJRE to have on the four other constructs? There is experimental evidence to suggest that that increasing NJRE will lead to a subsequent increase in negative mood. Coles *et al* (2005) found that experimentally induced NJREs

produce increased distress in participants who experienced greater NJRE intensity to naturally occurring NJREs compared to participants who experience less NJRE intensity to naturally occurring NJREs. We can thus predict that increasing NJRE intensity should in combination with the occurrence of a NJRE lead to a subsequent increase in negative mood.

One can conceptually see how increasing NJRE could lead to an increase in AMAC stop rules. For example, if an individual were to experience “the subjective feeling that something is not right” whilst performing a task one can easily see how this could be perceived as indicating that a task has been inadequately or incompletely performed. In such a case, the individual might well become motivated to adopt AMAC stop rules in an attempt to ensure that the task is subsequently successfully or completely performed.

One may or may not expect an increase in NJRE to lead to an increase in inflated responsibility. One can conceptually see how such causal link could work. Given that previous experimental evidence suggests that increasing NJRE leads to a subsequent increase in negative mood for those who experience greater NJRE intensity to naturally occurring NJREs compared to participants who experience less NJRE intensity to naturally occurring NJREs (Coles *et al*, 2005), and given that negative mood has been proposed to increase responsibility (Salkovskis’s 1985, 1989) negative mood represents a potential mediator through which NJRE could affect inflated responsibility. In opposition to such a causal link, Summerfeldt (2004, 2007) proposed that two core, continuous, orthogonal dimensions explain the motivational processes important to OCD: harm avoidance (as characterised inflated responsibility) and incompleteness (as characterised by NJRE). There is good empirical evidence to support the separation of OCD characterised by harm avoidance and incompleteness respectively. For example, Coles *et al* (2005) induced NJRE in a undergraduate sample and found these NJRE produced distress and urges to change something but not feared consequences, supporting their separation from harm avoidance (see chapter 1 for a full list of studies supporting this disassociation). From this theoretical perspective one might not expect increasing NJRE to lead to an increase in inflated responsibility.

Finally, one could conceptually also see how increasing NJRE could lead to an increase in IU through negative mood. Given that previous experimental evidence suggests that increasing NJRE leads to a subsequent increase in negative mood for those who experience greater NJRE intensity to naturally occurring NJRE compared to participants who experience less NJRE intensity to naturally occurring NJRE (Coles *et al*, 2005) and given negative mode states such as

anxiety are known to increase the perception of future situations as threatening and problematic (e.g. Clark and Wells, 1995) negative mood represents a potential mediator through which NJRE could affect IU.

Based on the above evidence and possible theoretical links as well as the fact all four dependent constructs in this experiment are positively correlated with NJRE to at least a moderate degree (chapter 2), it is predicted that increasing NJRE will subsequently lead to an increase in the negative mood, the endorsement of AMAC stop rules, inflated responsibility and IU.

9.2.1 Method

9.2.2 Participants

Participants were 54 undergraduates from the University of Sussex (men: 12; women: 42). Aged ranged from 18 to 24 years ($M = 19.91$, $SD = 1.29$). All of the participants were volunteers who received partial fulfilment of a course requirement or received a small monetary fee for taking part in the experiment.

9.2.3 Measures

VAS measures (given in the short questionnaire)

IU: IU was measured using the same five questions as were used in experiment three. The 5 items had moderate internal consistency ($\alpha = .69$).

Mood: Mood was measured using the same five questions as were used in experiment three. The 3 items measuring negative mood had good internal consistency ($\alpha = .85$).

Stop rules: AMAC stop rules were measured using the same two questions used in experiment three as were FLC stop rules. The 2 AMAC items had acceptable internal consistency ($\alpha = .75$) whilst the 2 FLC items also had good internal consistency ($\alpha = .80$).

Responsibility: Responsibility was measured using the same four questions as were used in experiment three. These 4 items had mediocre internal consistency ($\alpha = .59$).

NJRE Occurrence: NJRE occurrence was measured using the same three items used in experiment three. The 3 items had acceptable internal consistency ($\alpha = .81$).

NJRE Intensity: For the current experiment a short form measure of NJRE intensity was developed. Following a description of NJRE taken from the NJRE-QR participants were asked, “Imagine you are experiencing a NJRE right now. How intense is this experience?” and were asked to provide an answer on a 100-point VAS (where 0 = *Not at all intense* and 100 = *Extremely intense*).

Full measures (given in the full questionnaire booklet)

Responsibility: Responsibility was measured in the full questionnaire using the RAS (Salkovskis *et al*, 2000, see chapter 2 for details). In the present study the scale had excellent internal consistency ($\alpha = .90$).

Stop Rules: AMAC and FLC stop rules were measured in the full questionnaire using the SRQ (see appendix 1 for details). In the present study the AMAC subscale had excellent internal consistency ($\alpha = .90$) whilst the FLC subscale also had excellent internal consistency ($\alpha = .92$).

IU: IU was measured in the full questionnaire using the IUS (Freeston *et al*, 1994, see chapter 2 for details). In the present study the scale had excellent internal consistency ($\alpha = .94$).

NJRE: NJRE occurrence and intensity were measured in the full questionnaire using the NJRE-QR (Coles *et al*, 2003, see chapter 2 for details). In the present study the NJRE occurrence subscale showed mediocre internal consistency ($\alpha = .55$) whilst the NJRE intensity scale showed very good internal consistency ($\alpha = .88$).

9.2.4 Procedure

Participants were randomly assigned to one of two groups, the high NJRE group ($n = 28$) and the low NJRE group ($n = 26$).

Upon entering the experimental room participants in both groups were told the experiment was broadly interested in examining the link between personality and perception. Participants in both groups were then told that, firstly, they were going to be asked to take part in a brief visualisation task taking approximately 5-10 minutes. Participants were told there would then be a ten minute break after which they would be asked to fill in some questionnaires. This information was presented in a consent form which participants were asked to sign.

Stage 1. NJRE manipulation: Participants were asked to put on a pair of headphones connected to a PC so they could listen to a short piece of dialogue (referred to from here in as the “visualisation aid” [VA]) to help them with the visualisation task. Additionally participants were

asked to place their seat in a position so it would be easy to look around the experimental room (as they would be instructed to do by the VA). The experimenter left the room whilst participants listened to the VA and took part in the visualisation task.

The VA was a short piece of dialogue read out by a female associate of the experimenter. From beginning to end the VA lasted 5 minutes 20 seconds (including pauses, see appendix eight for the complete VA script). The VA asked participants to attempt to visualise that the experimental room the participant was sat in was their office. The VA instructed participants not to close their eyes during the visualisation task but to try to look around the experimental room as much as possible. Participants were also told to feel free to use their own mental techniques if they wished in order to help them visualise that the room was their office. The VA then told participants that the visualisation task was about to begin. The VA went on to ask participants to look at several different parts of the room (e.g. the walls, the floor) or objects in the room (e.g. books on a book shelf, draws in a filing cabinet, pictures on the walls). Whilst asking participants to look at these objects the VA emphasised strongly the idea that these objects etc belonged to the participant (e.g. I want you to imagine that these are YOUR posters/pictures). Occasionally the VA expanded into more explicit instructions to help participants visualise that the objects etc belonged to them (e.g. imagine what you are keeping in the draws of the filing cabinet). At the end of the VA participants were asked, if they felt they have reached a “point of maximum visualisation”, to go and get the experimenter from outside for the next stage of the experiment. If participants felt they had not reached a “point of maximum visualisation” the VA asked the participant to take a moment to reach this point and then to get the experimenter from outside for the next stage of the experiment. Blinds in the room were shut for participants in both conditions to ensure participants were focused on the room’s content.

The experimental room was set up differently depending on whether participants had been assigned to the high NJRE group or the low NJRE group (see appendix nine for pictures of the experimental room for the high NJRE group and appendix ten for pictures of the experimental room for the low NJRE group). For participants in the high NJRE group the room was set up so that it appeared messy and in a state of total disarray. For participants in the low NJRE group the room was set up so it appeared tidy and organised. A list of the specific similarities and differences between the two rooms for the high and low NJRE groups are provided below. The differences in the state of the experimental room constituted the experimental manipulation in the present study. It was hoped that having participants in the high NJRE group in a messy room would increase participants’ general feeling that something was “not just right” and

possibly elicit specific NJREs. It was additionally hoped that having participants in the low NJRE group in a tidy room would mean they were less likely to have a general feeling that something was “not just right” or to experience specific NJREs. Specific differences in the state of the room for participants in the high NJRE group and the low NJRE group described below were partly based on a previous study which attempted to experimentally induce NJRE (Coles *et al*, 2005).

The experimental room contained two large book shelves. For the high NJRE group, books were scattered randomly at different angles along the shelves with several books sticking out over the edge of the shelves. For the low NJRE group, the same books were stacked neatly on the shelves at the same angle. Participants in both groups were asked to sit on a swivel chair. For the high NJRE group, one of the arms of the chair was removed. Additionally, the support adjuster on the back of the chair was broken meaning that participants could not fix the back of the seat to remain at a constant angle. For the low NJRE group, a normal chair was provided with two arms and with a working back support adjuster. A rug was placed in the experimental room. For the high NJRE group, this rug was dirty and both ends of the rug were rucked up. For the low NJRE group, the rug was clean and laid out normally on the floor. There were two filing cabinets in the experimental room. For the high NJRE group, several of the draws in these filing cabinets were left ajar with paper sticking out of them. For the low NJRE group, the draws on both filing cabinets were shut and had nothing sticking out of them. There was a desk in the experimental room with a PC on it participants were asked to sit at. Some books, paper and stationery items were also placed on the desk. For participants in the high NJRE group, the desk was messy with papers, books and stationery (e.g. staples, pens) scattered randomly over the desk. For participants in the low NJRE group, the desk was tidy with all books and papers neatly stacked and facing in the same direction and the stationery placed in boxes. There was a table in the opposite corner of the room to where participants were asked to sit. This table also had books, papers and stationery placed on it and these were set out as they had been on the other desk for the high NJRE group and low NJRE group respectively. Several pictures/posters were placed on one of the walls of the experimental room. For high NJRE group, some of these pictures were hung up in a crooked fashion (i.e. not straight). Some of the corners of some of the pictures had become unattached to the wall. For the low NJRE, the pictures were hung up straight and all of the corners of the pictures were attached to the wall. There was a bin on the floor of the experimental room. For the high NJRE group, rubbish was scattered around the bin (e.g. an empty packet of crisps) and the bin was half full. For the low NJRE group, the bin was empty and there was no rubbish scattered around it. Finally, a coat

stand was placed in the experimental room. For the high NJRE group, a few coats were hung on the coat stand but there were also two coats on the floor near the coat stand. For the low NJRE group, all of these coats were hung on the coat stand and none were placed on the floor.

The purpose of the “visualisation task” participants engaged in was two-fold. The first purpose of the task was simply to get participants to look around the room and notice the state the room was in (which was obviously of potential importance in terms of eliciting specific NJREs for participants in the high NJRE group). Secondly, it is possible that NJREs are less likely to be prompted by objects that are neutral in nature as opposed to objects that are personal in nature. It was hoped that by having participants visualise that the experimental room (and the objects in the room) belonged to them (i.e. the participant imagining that the room was their office) that participants would be more likely to form a personal attachment to the experimental room and the objects in the room and that this would mean that the room and the objects in the room would be more likely to prompt participants to experience a NJRE (at least for participants in the high NJRE group).

The experimenter re-entered the experimental room once they had been fetched by the participant and began stage 2 of the experiment.

Stage 2. Ten minute break and short questionnaire: Participants were told in the informed consent form that after the visualisation task there would be a ten minute break before they would be given follow up questionnaires. Upon re-entering the experimental room the experimenter asked the participant if they would mind filling in a questionnaire unrelated to the experiment during the ten minute break. As with Experiment 1, participants were told the questionnaire was related to a separate questionnaire study being conducted by the experimenter’s supervisor and that the questionnaire would take just over five minutes to complete. All participants agreed to fill in the questionnaire. The experimenter left the room for ten minutes whilst the participant filled in the questionnaire. As in Experiment 1, the data collected in this questionnaire was actually to be used in the analysis of the present study. The questionnaire contained 22 questions which were the visual analogue scale (VAS) measures of the five constructs (see measures section).

Stage 3. Full questionnaires. The experimenter re-entered the room after the 10 minute “break” had finished. The experimenter thanked the participant for filling in the previous questionnaire and then gave the participant another questionnaire booklet. The experimenter asked the participant to inform the experimenter when they had finished the questionnaire booklet. The experimenter then left the room until the participant had finished the

questionnaire booklet. This questionnaire booklet contained full measures of 4 of the constructs (there was no full measure of mood). Full measures of each construct were given to participants in order to validate the VAS measures. The questionnaire also contained a measure of personality (The Eysenck Personality Questionnaire Revised Abbreviated; Francis, Brown & Philipchalk, 1992). This questionnaire was not used in the data analysis and was given to participants purely to strengthen the belief that the experiment was related to personality and perception.

Stage 4. Debrief: After completing the questionnaire booklet, participants were thanked and debriefed.

9.3 Results

NJRE Occurrence Manipulation Check: Table 11 shows the ratings on the VAS measures and full questionnaire measures of the five constructs for the high NJRE and low NJRE groups. Each measure was subjected to an independent measures sample t-test.

Table 11. *Mean (standard deviation) on VAS measures and full questionnaire measures of the 5 constructs for the high NJRE and low NJRE groups.*

<u>Group</u>	<u>High</u> <u>NJRE</u>	<u>Low</u> <u>NJRE</u>
NJRE Occ VAS	45.70** (24.88)	23.47** (21.57)
NJRE Occ FQ	.44 (.22)	.36 (.19)
NJRE Inten VAS	36.57* (17.44)	25.68* (21.57)
NJRE Inten FQ	3.53 (1.23)	3.08 (1.30)
Sadness	22.00 (19.37)	21.77 (18.43)
Happiness	65.36	59.85

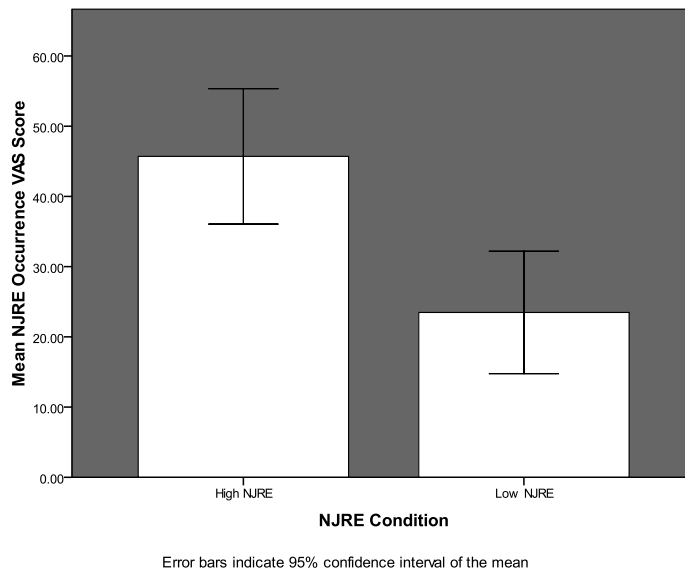
	(15.08)	(16.48)
Anxiety	40.37	30.50
	(24.78)	(25.70)
Arousal	50.96	45.96
	(22.42)	(20.28)
Negativity	31.00	25.27
	(22.48)	(19.04)
Comp Neg	31.01	25.85
	(19.40)	(18.97)
AMAC VAS	60.87	58.07
	(20.62)	(24.75)
AMAC FQ	3.13	3.21
	(.84)	(1.00)
FLC VAS	47.16	47.36
	(18.86)	(28.41)
FLC FQ	2.67	2.68
	(.87)	(.95)
R VAS	42.85	41.15
	(17.49)	(18.96)
R FQ	3.81	3.84
	(.89)	(.70)
IU VAS	37.86	34.92
	(15.62)	(17.35)
IU FQ	2.17	2.10
	(.72)	(.73)

*Note: FQ = full questionnaire. AMAC= As many as can FLC = Feel like continuing. Comp Neg: Composite Negative Mood. R = Inflated responsibility. IU = Intolerance of Uncertainty. NJRE Occ = NJRE occurrence. NJRE Inten = NJRE intensity. * = $p < .05$ ** = $p < .01$. If a difference on a measure was significant at $p < .05$ but the associated effect size was not equal to or greater than $d = 0.5$ then this difference it is not noted as significant.*

A composite NJRE occurrence score was created by combining the means of the three questions measuring NJRE occurrence used in the short questionnaire. The high NJRE group scored significantly higher on this composite NJRE occurrence measure than the low NJRE group (see figure 35), $t(52) = 3.50$, $p = .001$. The effect size of the manipulation on this

composite NJRE occurrence measure, according to Cohen's (1988) criteria, was large (Cohen's $d = 0.954$).

Figure 35: Mean score of high and low NJRE groups on NJRE occurrence VAS measure.



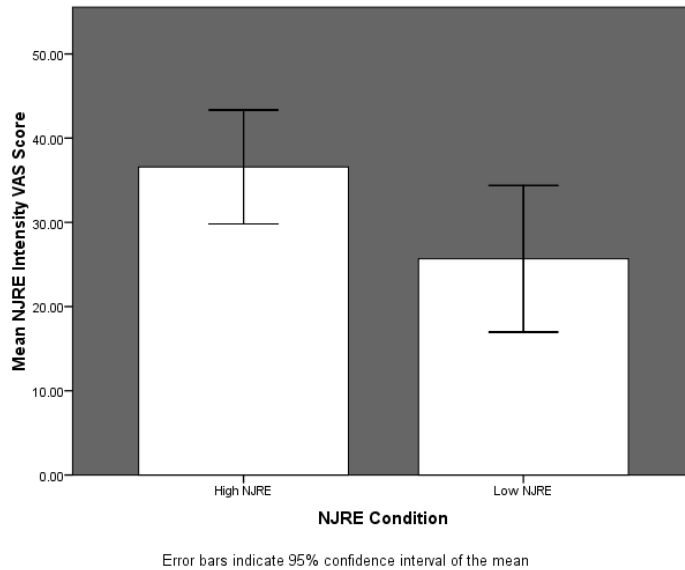
This composite VAS measure of NJRE occurrence was significantly correlated with the full NJRE occurrence measure, Spearman's $\rho(54) = .41, p < .001$, suggesting that the 3-item measure possessed convergent validity with the full measure in the NJRE-QR.

The high NJRE group scored higher on the full NJRE occurrence measure than the low NJRE group, but this difference was not significant, $t(52) = 1.38, p = .09$. The effect size of the manipulation on the NJRE occurrence full score, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.389$).

NJRE Intensity Manipulation Check:

The high NJRE group scored significantly higher on the VAS NJRE intensity measure than the low NJRE group (see figure 36), $t(52) = 2.05, p = .02$. The effect size of the manipulation on the NJRE intensity score, according to Cohen's (1988) criteria, was moderate (Cohen's $d = 0.555$).

Figure 36: Mean score of high and low NJRE groups on NJRE intensity VAS measure.



The VAS measure of NJRE intensity was significantly correlated with the full NJRE intensity measure, Spearman's $\rho(54) = .52, p < .001$, suggesting that this measure possessed convergent validity with the full measure in the NJRE-QR.

The high NJRE group scored higher on the full NJRE intensity measure than the low NJRE group, but this difference was not significant, $t(52) = 1.29, p = .10$. The effect size of the manipulation on the NJRE intensity score, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.355$).

In summary, the high NJRE group scored significantly higher than the low NJRE group on both NJRE occurrence and NJRE intensity.

Mood Measures: The high NJRE group scored higher on the sadness measure than the low NJRE group, but this difference was not significant, $t(52) = .05, p = .48$. The effect size of the manipulation on sadness, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.012$).

The high NJRE group scored higher on the happiness measure than the low NJRE group, but this difference was not significant, $t(52) = 1.28, p = .10$. The effect size of the manipulation on happiness, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.349$).

The high NJRE group scored higher on the anxiety measure than the low NJRE group, but this difference was not significant, $t(52) = 1.39, p = .09$. The effect size of the manipulation on anxiety, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.391$).

The high NJRE group scored higher on the arousal measure than the low NJRE group, but this difference was not significant, $t(52) = .86, p = .20$. The effect size of the manipulation on arousal, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.233$).

The high NJRE group scored higher on the negativity measure than the low NJRE group, but this difference was not significant, $t(52) = 1.01, p = .16$. The effect size of the manipulation on negativity, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.275$).

A composite negative mood score was created by combining the means of the three questions measuring negative mood used in the short questionnaire. The high NJRE group scored higher on this composite measure of negative mood than the low NJRE group, but this difference was not significant, $t(52) = .99, p = .17$. The effect size of the manipulation on composite negative mood score, according to Cohen's (1988) criteria, was small (Cohen's $d = 0.269$).

In summary, the high and low NJRE groups did not differ significantly on any mood measure.

Stop Rules Measures: A composite AMAC score was created by combining the means of the two questions measuring AMAC stop rules used in the short questionnaire. The high NJRE group scored higher on the composite AMAC measure than the low NJRE group, but this difference was not significant, $t(52) = .45, p = .33$. The effect size of the manipulation on this composite AMAC measure, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.123$).

This AMAC composite measure was significantly correlated with the full AMAC subscale of the SRQ, Spearman's rho (54) = .58, $p < .001$, suggesting the AMAC composite measure possessed convergent validity with the full AMAC measure.

The low NJRE group scored higher on the full AMAC subscale of the SRQ than the high NJRE group, but this difference was not significant, $t(52) = -.35, p = .37$. The effect size of the manipulation on the full AMAC score, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.087$).

A composite FLC score was created by combining the means of the two questions measuring FLC stop rules used in the short questionnaire. The low NJRE group scored higher on the composite FLC measure than the high NJRE group, but this difference was not significant, $t(52) = -.03, p = .49$. The effect size of the manipulation on the composite FLC measure, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.008$).

This FLC composite measure was significantly correlated with the full FLC subscale of the SRQ, Spearman's rho (54) = .70, $p < .001$, suggesting the FLC composite measure possessed convergent validity with the full FLC measure.

The low NJRE group scored higher on the full FLC subscale of the SRQ than the high NJRE group, but this difference was again not significant, $t(50.75) = -.04, p = .49$. The effect size of the manipulation on the full FLC score, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.011$).

Responsibility Measures: A composite responsibility score was created by combining the means of the four questions measuring responsibility used in the short questionnaire. The high NJRE group scored higher on this composite responsibility measure than the low NJRE group, but this difference was not significant, $t(52) = .34, p = .37$. The effect size of the manipulation on this composite responsibility measure, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.093$).

The composite measure was significantly correlated with the full RAS questionnaire, Spearman's rho (54) = .63, $p < .001$, indicating it is a good measure of the inflated responsibility construct as a whole.

On the RAS itself, the low NJRE group scored higher than the high NJRE group, but this difference was not significant, $t(52) = -.18, p = .43$. The effect size of the manipulation on RAS, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.037$).

IU Measures: A composite IU score was created by combining the means of the five questions measuring IU used in the short questionnaire. The high NJRE group scored higher on this composite IU measure than the low NJRE group, but this difference was not significant, $t(52) = .66, p = .26$. The effect size of the manipulation on this composite IU measure, according to

Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.178$).

This composite VAS measure of IU was significantly correlated with the full IUS, Spearman's $\rho(54) = .67, p < .001$, suggesting that the 5-item measure possessed convergent validity with the full IUS.

The high NJRE group scored higher on the full IUS than the low NJRE group, but again this difference was not significant, $t(52) = .35, p = .36$. The effect size of the manipulation on the IUS score, according to Cohen's (1988) criteria, did not even meet the criteria for a small effect size (Cohen's $d = 0.097$).

9.4 Discussion

In the present study NJRE were manipulated to see what the effect of doing so would have on the four remaining constructs being focused on in this thesis. In summary, the high and low NJRE groups did not differ on any of the other 4 constructs focused on in this thesis.

The finding that the high NJRE group did not score higher than the low NJRE group on any measure of negative mood could be seen as somewhat surprising given Coles *et al's* (2005) finding that experimentally induced NJREs produce increased distress in participants who experienced greater NJRE intensity to naturally occurring NJREs (high I group) compared to participants who experience less NJRE intensity to naturally occurring NJREs (low I group). What could account for the difference between the findings of Coles *et al* (2005) and the findings of the present study? It is important to note that Coles *et al* (2005) found a difference between two groups in terms of negative mood only for participants who had a *pre-existing* tendency to respond intensely to NJRE. In the present study no attempt was made to split the two groups in terms of how they may naturally respond to NJRE. One possibility is that participants who experience higher intensity responses to naturally occurring NJREs may have simply have a tendency to report or feel more distress *in general* than participants who have low intensity responses to naturally occurring NJREs. In support of this argument, not only did Cole *et al* (2005) find that the high I group report more distress when faced with objects designed to induce NJREs than the low I group, but also that the high I group respond with greater distress than the low I group when faced with objects *not* designed to induce NJRES (e.g. a neatly arranged bookshelf). This would strongly suggest that the high I group have a general tendency to report greater distress than the low I group regardless of if it is in

response to a NJRE or not. Further support for this argument comes from the fact the high I group ($M = 14.13$, $SD = 10.30$) scored significantly higher than the low I group ($M = 7.63$, $SD = 9.48$) in terms of depression (BDI-II, Beck, Steer & Brown, 1996), $t(48) = 2.32$, $p < .05$ (analysis done by author of current thesis using means and SDs reported in the original paper). The findings of Cole *et al* (2005) may therefore simply reflect the fact that the high I group are more distressed and experience greater negative mood in general than the low I group.

Given the above finding that the high and low NJRE groups did not differ in terms of negative mood it is not surprising that the high and low NJRE groups also did not score significantly differently in terms inflated responsibility or IU. As noted in the introduction, previous experimental evidence suggests a path where negative mood may have mediated a path between NJRE, and, inflated responsibility and IU respectively, given that previous research suggests negative mood may have a causal effect on both IU (e.g. Clark and Wells, 1995) and inflated responsibility (e.g. Salkovskis 1985, 1989). If a causal link does not exist between NJRE and negative mood, however, there is little conceptual reason to suspect that increasing NJRE would lead to an increase in either inflated responsibility or IU. With reference to the relationship between NJRE and inflated responsibility, as noted in the introduction, Summerfeldt (2004, 2007) proposed that two core, continuous, orthogonal dimensions explain the motivational processes important to OCD: harm avoidance (as characterised inflated responsibility) and incompleteness (as characterised by NJRE). The findings of the present study support Summerfeldt's (2004, 2007) disassociation between inflated responsibility and NJRE.

Finally, the fact that the high and low NJRE groups did not differ in terms of AMAC stop rule use could also be seen as somewhat surprising. As noted in the introduction, one could conceptually see how increasing NJRE could lead to an increase in the use of AMAC stop rules. If an individual were to experience a NJRE whilst performing a task one could see how this might be perceived as indicating that a task had been inadequately or incompletely performed thus motivating the individual to adopt AMAC stop rules. A possible reason a difference between the high NJRE group and low NJRE group in terms of AMAC use was not found may be explicit in the definition of NJRE as "the *subjective* sense that something isn't just as it should be" (Coles *et al*, 2003). It may be the case that rather than attempting to *objectively* correct for the feeling that something isn't right by adopting AMAC stop rules to ensure that a task is completely or adequately performed in such a situation an individual experiencing an NJRE may, "...actively seek...to achieve a particular subjective or emotional state as a way of

deciding that they have completed an activity. This (may) include the deliberate seeking of a particular mood state, a sense of satisfaction or completeness and “just right” feelings as a way of deciding that it is appropriate to stop behaviour” (Wahl *et al*, 2008, p. 144). Such a state, being subjective in nature, may not be best achieved through the adoption of AMAC rules, which are more associated with achieving goals practical, as opposed to subjective, in nature.

Overall, it may be useful to briefly speculate on why the manipulation of NJRE did not have an effect on the other 4 constructs focused on in this thesis. One possibility is that NJRE are simply unrelated to the other 4 constructs focused on in the current thesis. With respect to inflated responsibility, as discussed in the introduction, Summerfeldt (2004, 2007) proposed that two core, orthogonal dimensions explain the motivational processes important to OCD: harm avoidance (as characterised inflated responsibility) and incompleteness (as characterised by NJRE) and there is good evidence supporting the separation of these two constructs (see chapter 1). Interestingly, recent investigations of OCD heterogeneity have identified large patient subgroups who endorse few of the dysfunctional beliefs measured on the OBQ (Calamari *et al*, 2006; Taylor *et al*, 2006, Chik *et al*, 2010) that is; Responsibility/Overestimation of Threat, Perfectionism/Intolerance of Uncertainty, and Importance/Control of Thoughts. Chick *et al* (2010) attempted to elucidate the concerns of this low belief OCD subgroup and found that NJRE (as opposed to metacognitive beliefs) appeared to motivate symptoms in OCD patients who endorse few of the dysfunctional beliefs as measured by the OBQ. Although this evidence is fairly preliminary and although the OBQ only measures two of the constructs focused on in this thesis (IU and inflated responsibility), this evidence at least offers some indication that the reason why NJRE may not have a casual effect on the other constructs focused on in this thesis is because they may represent a different type of susceptibility to OCD separable from the other 4 constructs.

A second possibility as to why the manipulation of NJRE did not have an effect on the other 4 constructs focused on in this thesis is because, as mentioned briefly in chapter 1, NJRE maybe simple epiphenomena rather than a cause of OC symptoms. Davey (2003) raised the issue of whether NJRE merely redescribe the symptomatology of OCD. If this were the case we would probably expect to see other constructs thought to have a causal influence on OC symptoms effect NJRE but not necessarily for NJRE to have an effect on other causal constructs. If other constructs have a causal effect on NJRE or not will be explored in the other experimental chapters in the current thesis.

Discussion of the results of this experiment in light of the results of the other four experimental chapters will be left until the general discussion section of the thesis.

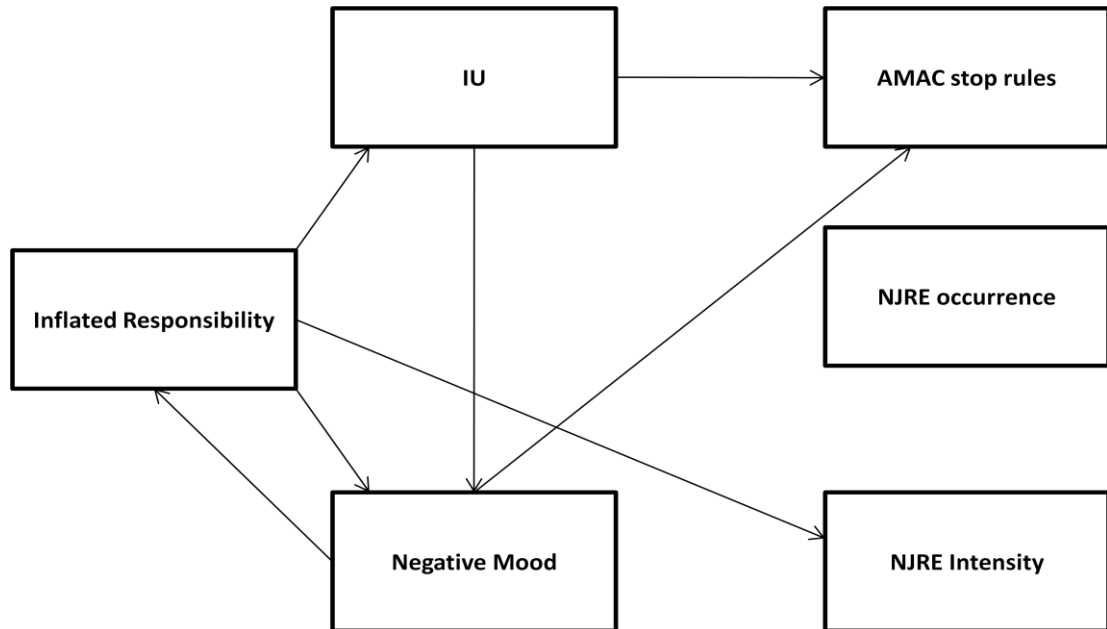
10. Chapter 8: Final Model: Tests of mediation pathways and indirect pathways suggested by the final model and the relation of the five constructs to obsessions and compulsions

In this chapter the final model to emerge from the experimental chapters will be explored. Firstly, any significant effects to emerge from the experimental chapters (e.g. between construct x and construct y) which the model suggests may be mediated by another construct or constructs (e.g. construct w) will be examined to see if the relationship between construct x and y is partially or fully mediated by construct w within the experiment in which the causal effect was found. If the relationship between construct x and y is fully mediated (defined as either having an associated significance value becoming greater than $p < .05$ or an associated effect size becoming lower than the criteria considered a “moderate” effect size according to Cohens [1992] criteria) the pathway between these two constructs will be removed from the model. The significance of any indirect pathway suggested by the final model connecting two constructs not tested in the above mediation analyses will then be tested. Then the final model will be discussed with relation to the regression analyses described in chapter 2 in which the 5 constructs were entered into a regression model simultaneously to see if the five constructs significantly accounted for variance in obsessions and compulsions, respectively, when all the constructs were looked at simultaneously. Any significant relationships between individual constructs and obsessions/compulsions which the final model suggests may be mediated by another construct or constructs (w) will be examined to see if the relationship between the construct and obsessions/compulsions is partially or fully mediated by w . If the relationship between a given construct and obsessions/compulsions is fully mediated (defined as having an associated significance value becoming greater than $p < .05$) by w , the pathway between that construct and obsessions/compulsions will be removed from the model.

10.1 Mediation analyses and tests of the significance of indirect pathways suggested by the final model

The final model to emerge from the experimental chapters is presented in figure 37. If the manipulation of a given construct in a experimental chapter lead to a significant effect on another construct (using the criteria for significance outlined in the “Justification of the statistical analyses used in experimental chapters and justification of choice of measures used to decide if two groups differ on a given construct” section of the thesis) then this is indicated in figure 37 by a causal line joining the two constructs together.

Figure 37: Significant relationships between the 5 constructs to emerge from the experimental chapters.



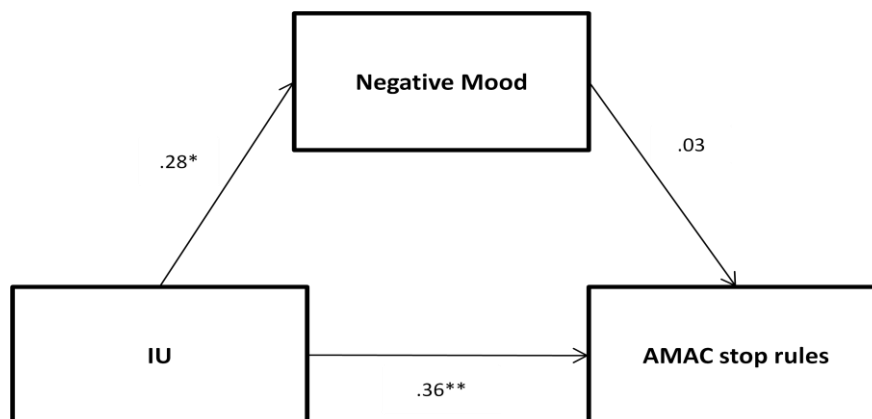
Examination of figure 37 suggests that three of the causal pathways in the final model may be mediated through another construct or constructs. Firstly, the model suggests that the causal relationship between IU (x) and AMAC stop rule use (y) may be mediated by negative mood (m). Secondly, the model suggests that the causal relationship between inflated responsibility (x) and negative mood (y) may be mediated by IU (m). Finally, the model suggests that the causal relationship between negative mood (x) and AMAC stop rule use (y) may be mediated by the indirect pathway which connects negative mood to inflated responsibility, inflated responsibility to IU, and IU to AMAC stop rule use. These three possible mediations were therefore explored using the statistical package Analysis of Moment Structures (AMOS) 17 to see if these three effects were partially or fully mediated by the mediating construct/s. Bootstrapping (1000 samples) was used to evaluate the significance of the indirect pathway/s connecting the relevant x and y constructs. For each of these three analyses, the data was used from the experiment in which the relevant x construct had been manipulated and a significant effect on the relevant y construct had been found. The x variable used in each analysis is the grouping variable used to separate the high and low group on the given x construct in the relevant experiment in which a significant effect of x on y was found (e.g. for the first mediation described below, the x variable is the grouping variable used to distinguish individuals in the high and low IU groups respectively). The m and y variables used in each

analysis were the VAS score (or VAS composite score) for the respective m and y constructs in the relevant experiment in which a significant effect of x on y was found.

Firstly, the possible mediation of the relationship between IU (x) and AMAC stop rules (y) through negative mood (m) was explored. The following analyses were performed using the data from the experiment in which IU was manipulated. Before the effect of the mediator was taken into account, IU significantly predicted AMAC stop rule use (standardised beta value = .39, $p = .001$).

A mediation analysis was then performed in which the relationship between x , y and m was taken into account. The results of this analysis are provided in figure 38. Although the relationship between IU and AMAC stop rules was partially mediated by negative mood this relationship remained significant (standardised beta value = .36, $p = .002$). The effect size associated with this relationship according to Cohen's (1988) criteria is larger than minimum criteria for a moderate effect size (Cohen's $d = 0.772$). Therefore the causal path between IU and AMAC stop rules is retained in the final model. The indirect effect of IU on AMAC stop rules through negative mood was non-significant ($z = .008$, $p = .39$).

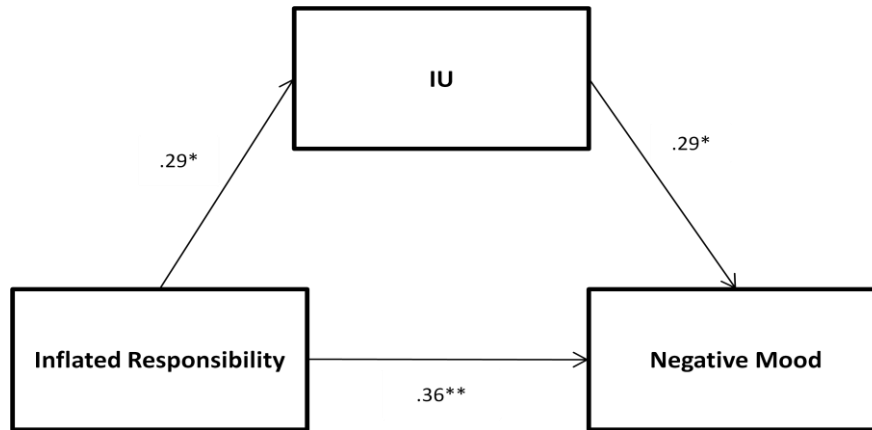
Figure 38: Mediation model showing the relationship (standardised beta weight) between IU and negative mood, negative mood and AMAC stop rules and between IU and AMAC stop rules after controlling for the effect of negative mood.



Note: * = $p < .05$, ** = $p < .01$.

Secondly, the possible mediation of the relationship between inflated responsibility (x) and negative mood (y) through IU (m) was explored. The following analyses were performed using the data from the experiment in which inflated responsibility was manipulated. Before the effect of the mediator was taken into account, inflated responsibility significantly predicted negative mood (standardised beta value = .45, $p < .001$).

Figure 39: Mediation model showing the relationship (standardised beta weight) between inflated responsibility and IU, IU and negative mood and between inflated responsibility and negative mood after controlling for the effect of IU.

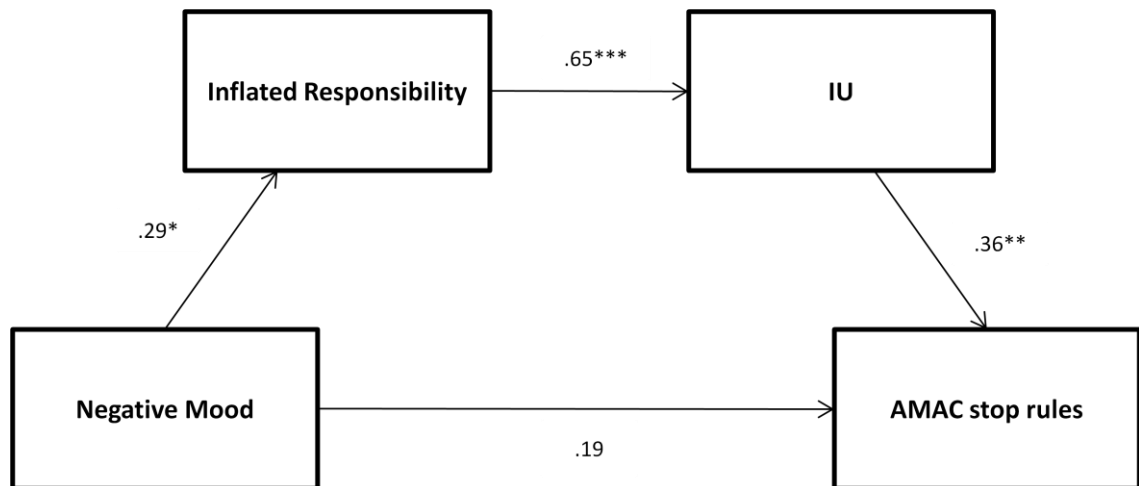


Note: * = $p < .05$, ** = $p < .01$.

A mediation analysis was then performed in which the relationship between x , y and m was taken into account. The results of this analysis are provided in figure 39. Although the relationship between inflated responsibility and negative mood was partially mediated by IU this relationship remained significant (standardised beta value = .36, $p = .001$). The effect size associated with this relationship according to Cohen's (1988) criteria is larger than minimum criteria for a moderate effect size (Cohen's $d = 0.772$). Therefore the causal path between inflated responsibility and negative mood is retained in the final model. The indirect effect of inflated responsibility on negative mood through IU was also significant ($z = .08$, $p = .02$) suggesting inflated responsibility has both a direct and indirect effect on negative mood.

Finally, the possible mediation of the relationship between negative mood (x) and AMAC stop rule use (y) through the indirect pathway which connects negative mood to inflated responsibility, inflated responsibility to IU and IU to AMAC stop rule use was explored. The following analyses were performed using the data from the experiment in which negative mood was manipulated. Before the relationship between x and y through the indirect pathway described above was taken into account, negative mood significantly predicted AMAC stop rule use (standardised beta value = .27, $p = .02$).

Figure 40: Mediation model showing the relationship (standardised beta weight) between negative mood and inflated responsibility, inflated responsibility and IU, IU and AMAC stop rules and between negative mood and AMAC stop rules after controlling for the effect of the indirect pathway through negative mood to inflated responsibility, inflated responsibility to IU, and IU to AMAC stop rules.

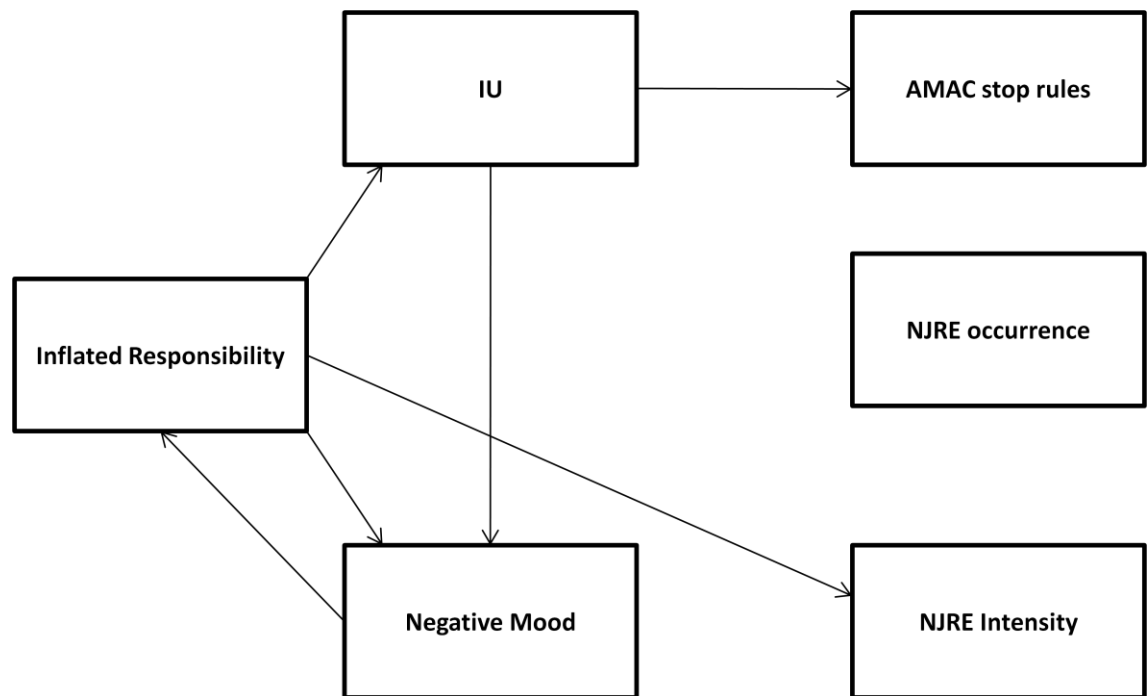


Note: * = $p < .05$, ** = $p < .01$, *** = $p < .001$

A mediation analysis was then performed in which the relationship between x and y was examined when the indirect pathway described in the previous paragraph was taken into account. The results of this analysis are provided in figure 40. When this indirect pathway was taken into account, the relationship between negative mood and AMAC stop rule use was no longer significant (standardised beta value = .19, $p = .06$). In other words, the relationship between negative mood and AMAC stop rule use is fully mediated by the indirect pathway. The effect size associated with this relationship according to Cohen's (1988) criteria is smaller than minimum criteria for a moderate effect size (Cohen's $d = 0.387$). Therefore the causal path between negative mood and AMAC stop rule use is removed from the final model. The indirect effect of negative mood on AMAC stop rule use through the indirect pathway outlined above was significant ($z = .07$, $p = .02$). This pattern of results seems to therefore suggest that whilst negative mood does have a causal effect on AMAC stop rules, this effect is not direct but comes through the indirect pathway described above.

The final model of the causal relationships between the five constructs to emerge after the above mediation analyses is shown in figure 41 (significant indirect paths are not shown due to a wish to not overcomplicate the figure).

Figure 41: *Final model of the relationship between the five constructs after mediation analyses.*



Examination of figure 41 suggests five potential causal indirect pathways connecting constructs which were not examined as part of the above mediation analyses. Firstly, the model suggests that inflated responsibility (x) may have an indirect causal effect on AMAC stop rules (y) through IU (m). Secondly, the model suggests that IU (x) may have an indirect causal effect on inflated responsibility (y) through negative mood (m). Thirdly, the model suggests that negative mood (x) may have an indirect causal effect on IU (y) through inflated responsibility (m). Fourthly, the model suggests that negative mood (x) may have an indirect causal effect on NJRE intensity (y) through inflated responsibility (m). Finally, the model suggests that IU (x) may have an indirect causal effect on NJRE intensity (y) through the path that connects IU to negative mood, negative mood to inflated responsibility, and inflated responsibility to NJRE intensity.

The significance of these five indirect pathways were explored using the statistical package AMOs 17 to see if they were significant. Bootstrapping (1000 samples) was used to evaluate the significance of the indirect pathways. For each of these analyses, the data was used from the experiment in which the relevant x construct had been manipulated. The x variable used in each analysis is the grouping variable used to separate the high and low group on the given x construct in the relevant experiment in which construct x was manipulated. The m and y variables used in each analysis were the VAS score (or VAS composite score) for the respective m and y constructs in the relevant experiment in which construct x was manipulated.

In the first analysis the significance of the indirect path connecting inflated responsibility (x) to AMAC stop rules (y) through IU (m) was tested. This analysis was performed using the data from the experiment in which inflated responsibility was manipulated. The indirect pathway connecting inflated responsibility to AMAC stop rules through IU was non-significant ($z = .02$, $p = .25$, one tailed).

In the second analysis the significance of the indirect path connecting IU (x) to inflated responsibility (y) through negative mood (m) was tested. This analysis was performed using the data from the experiment in which IU was manipulated. The indirect pathway connecting IU to inflated responsibility through negative mood was significant ($z = .11$, $p = .02$, one tailed).

In the third analysis the significance of the indirect path connecting negative mood (x) to IU (y) through inflated responsibility (m) was tested. This analysis was performed using the data from the experiment in which negative mood was manipulated. The indirect pathway connecting negative mood to IU through inflated responsibility was significant ($z = .17$, $p = .02$, one tailed).

In the fourth analysis the significance of the indirect path connecting negative mood (x) to NJRE intensity (y) through inflated responsibility (m) was tested. This analysis was performed using the data from the experiment in which negative mood was manipulated. The indirect pathway connecting negative mood to NJRE intensity through inflated responsibility was significant ($z = .14$, $p = .02$, one tailed).

In the final analysis the significance of the indirect path connecting IU (x) to NJRE intensity (y) through the path that connects IU to negative mood, negative mood to inflated responsibility, and inflated responsibility to NJRE intensity was tested. This analysis was performed using the data from the experiment in which IU was manipulated. The indirect pathway connecting IU to NJRE intensity through the path described in the previous sentence was significant ($z = .03$, $p = .02$, one tailed).

Examination of the results of the above analyses presents an anomaly. The first analysis of reported above (underneath the three mediation analyses) showed the indirect pathway connecting inflated responsibility to AMAC stop rules through IU was *non-significant*. However, the third analysis reported above (underneath the three mediation analyses) showed that negative mood was a *significant* predictor of AMAC stop rules through the indirect pathway which connects negative mood to inflated responsibility, inflated responsibility to IU and IU to AMAC stop rule use. This raises the question, how can negative mood be a significant predictor of the AMAC stop rule use through the path which connects negative mood to inflated

responsibility, inflated responsibility to IU and IU to AMAC stop rule use if inflated responsibility is *not* a significant predictor of AMAC stop rules through IU?

The discrepancy between these two findings appears to come from the fact the analysis in which a significant indirect effect of inflated responsibility on AMAC was *not* found was conducted on the experiment in which inflated responsibility was manipulated whilst the second analysis in which a significant indirect effect of negative mood on AMAC stop rules *was* found was conducted on the experiment in which negative mood was manipulated. Examination of the data from the experiment in which inflated responsibility was manipulated shows that within this experiment, the VAS measures of IU and AMAC stop rules were not significantly correlated ($r = -.04, p = .16$). This appears to be a strange result given that IU was significantly positively correlated with AMAC stop rule use in the large questionnaire study reported in chapter 2 ($r = .48, p < .001$) and in *every* other experimental chapter reported in this thesis. The fact that the VAS measures of IU and AMAC stop rule use were not correlated in the experiment in which inflated responsibility was manipulated seems to explain the reason why in this study inflated responsibility was not a significant indirect predictor of AMAC stop rule use through IU.

Given the discrepancy between these two analyses, and given that the fact inflated responsibility was not a significant predictor of AMAC stop rules through IU appears to be due to the rather odd finding that the VAS measures of IU and AMAC stop rule use were not correlated in the experiment in which inflated responsibility was manipulated, it was decided to re-run these two analyses replacing the VAS measures of the relevant constructs with the full measures of these constructs. The significance of these two indirect pathways were therefore explored again using statistical package AMOs 17 to see if they were significant. Bootstrapping (1000 samples) was again used to evaluate the significance of the indirect pathways. Again, in both of these analyses, the data was used from the experiment in which the relevant x construct had been manipulated. The x variable used in each analysis is the grouping variable used to separate the high and low group on the given x construct in the relevant experiment in which construct x was manipulated. The difference between these analyses and the original analyses is that the m and y variables used in these second analyses were the scores on the *full measures* of the respective m and y constructs in the relevant experiment in which construct x was manipulated (as opposed to the VAS measures).

In the first analysis the significance of the indirect path connecting inflated responsibility (x) to AMAC stop rules (y) through IU (m) was tested. This analysis was performed using the data

from the experiment in which inflated responsibility was manipulated. The indirect pathway connecting inflated responsibility to AMAC stop rules through IU was this time significant ($z = .16, p = .004$, one tailed).

In the second analysis the significance of the indirect path connecting negative mood (x) to AMAC stop rules (y) through the indirect pathway which connects negative mood to inflated responsibility, inflated responsibility to IU, and IU to AMAC stop rules was explored. This analysis was performed using the data from the experiment in which negative mood was manipulated. The indirect pathway connecting negative to AMAC stop rules through the pathway described above was, again, significant ($z = .18, p < .01$, one tailed).

As these second set of analyses, in which full measures of the constructs were used as opposed to VAS measures, suggest that inflated responsibility does have a significant effect on AMAC stop rule use through IU, and given that the fact this effect was not found in the first analyses seems to be down to the strange finding that the VAS measures of IU and AMAC stop rules were not significantly correlated in the study in which inflated responsibility was manipulated, this effect is accepted as significant. That is, it is accepted that inflated responsibility is a significant indirect predictor of AMAC stop rules through IU. Given that the path through which negative mood may have a causal effect on AMAC stop rules through the path connecting negative mood to inflated responsibility, inflated responsibility to IU and IU to AMAC stop rule now appears to be valid, and given that both of the analyses of this indirect pathway (using VAS measures and full measures) were significant, it is also accepted that negative mood has a causal effect on AMAC stop rules through this pathway.

10.2.1 Regression Analyses

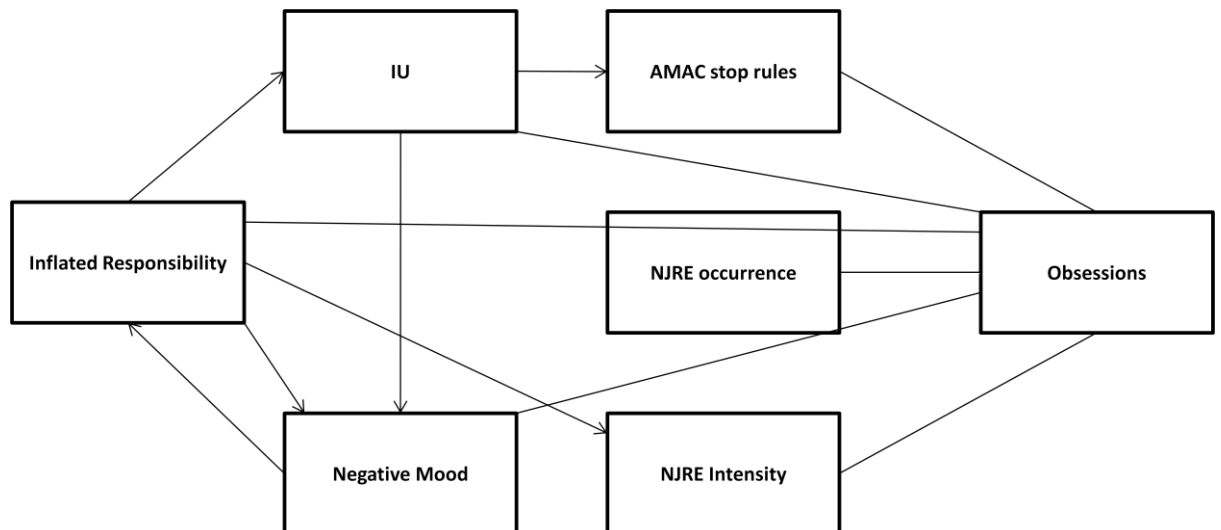
Here the final model is presented in relation to the two regression analyses described in chapter 2 in which the 5 constructs were entered into a regression model simultaneously to see if the five constructs would significantly account for variance in obsessions and compulsions, respectively, when all the constructs were looked at simultaneously. Any significant relationships between individual constructs and obsessions/compulsions which the model suggests may be mediated by another construct or constructs (w) will be examined to see if the relationship between the construct and obsessions/compulsions is partially or fully mediated by w . If the relationship between a given construct and obsessions/compulsions is fully mediated (defined as having an associated significance value becoming greater than $p < .05$) by w , the pathway between that construct and obsessions/compulsions will be removed

from the model. All of the analyses that follow in the rest of the chapter were performed on the data from the large questionnaire study described in detail in chapter 2.

10.2.2 Obsessions

Figure 42 shows the final model in relation to the regression analysis described in chapter 2 where all five casual constructs were entered simultaneously into a regression model with obsessions as the outcome variable. Constructs are connected to obsessions in the figure if they were found to significantly predict obsessions in the first regression analysis in chapter 2. Note that lines between constructs and obsessions are not directional as they are based on correlational, not experimental, evidence.

Figure 42: *Final model in relation to obsessions.*



Note: Relationships between constructs are based on experiment evidence discussed in chapters 3-7. Relationships between constructs and obsessions are based on the first regressions analysis discussed in chapter 2. Constructs are connected to obsessions in the figure if they were found to significantly predict obsessions.

As can be seen from figure 42, all six constructs significantly predicted obsessions in the original analysis. Examination of figure 42 suggests several mediated paths through which IU, inflated responsibility and negative mood may have an effect on obsessions through another construct or constructs.

In the case of inflated responsibility, as well as having a direct effect on obsessions, the model suggests that inflated responsibility may also have an influence on obsessions through negative mood, NJRE intensity and IU respectively, as well as through two indirect pathway

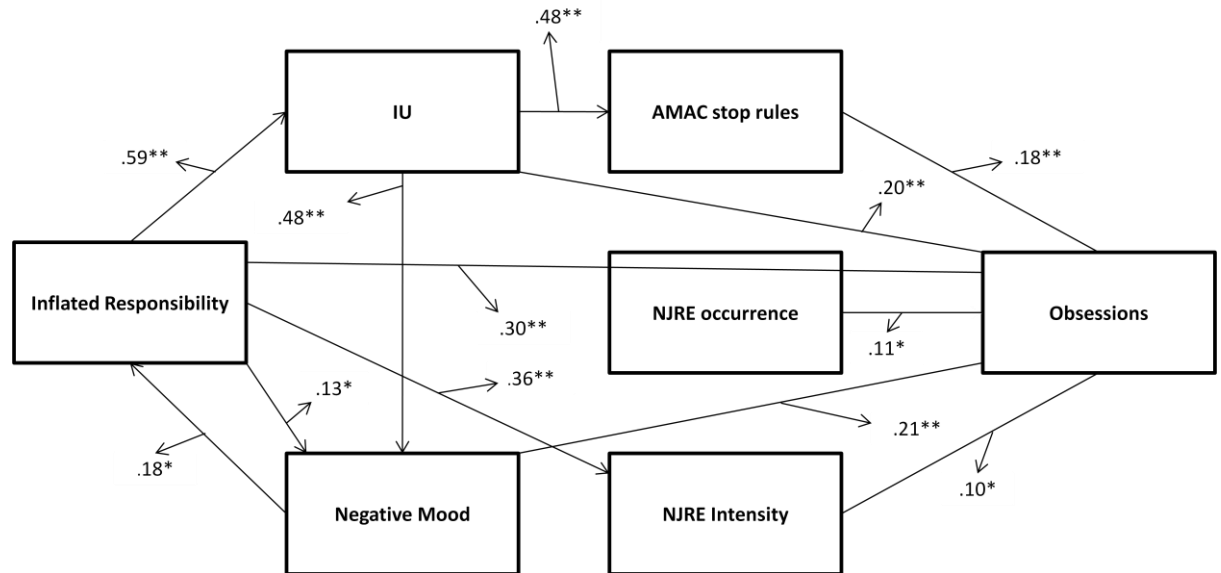
(firstly, the pathway that links inflated responsibility to IU, IU to AMAC stop rule use and AMAC stop rule use to obsessions and, secondly, the path that links inflated responsibility to IU, IU to negative mood and negative mood to obsessions).

In the case of negative mood, as well as having a direct effect on obsessions, the model suggests that negative mood may have an effect on obsessions through inflated responsibility and three indirect pathways (firstly, through the indirect path which connects negative mood to inflated responsibility, inflated responsibility to NJRE intensity and NJRE intensity to obsessions, secondly, through the indirect path that connects negative mood to inflated responsibility, inflated responsibility to IU and IU to obsessions and, thirdly, through the indirect path that connects negative mood to inflated responsibility, inflated responsibility to IU, IU to AMAC stop rule use, and AMAC stop rule use to obsessions).

In the case of IU, as well as having a direct effect on obsessions, the model suggests that IU may also have an influence on obsessions through negative mood and AMAC stop rule use respectively, as well as through two indirect pathways (firstly, the pathway that links IU to negative mood, negative mood to inflated responsibility and inflated responsibility to obsessions and, secondly, the pathway that links IU to negative mood, negative mood to inflated responsibility, inflated responsibility to NJRE intensity and NJRE intensity to obsessions).

In order to see if the relationship between negative mood, inflated responsibility and IU, respectively, with obsessions were partially or fully mediated by the pathways described above, these mediation pathways were explored using the statistical package AMOs 17. Bootstrapping (1000 samples) was used to evaluate the significance of the indirect pathways connecting the relevant constructs with obsessions. The analysis was performed on the data from the large questionnaire study described in chapter 2. The constructs are represented in this analysis by the total score on the questionnaire (or questionnaire subscale) used in the questionnaire study to measure the construct (see chapter 2). Obsessions are represented by the total score on the obsessions sub-scale of the CBOCI. In order that the relationship between all the constructs and obsessions could be held constant, only one analysis was performed in which all of the possible mediations described above were examined at the same time.

Figure 43: Relationships (standardised beta weight) between the five constructs and obsessions when the relationships between the constructs (as informed by the final model) are taken into account.



*Note: Only relationships between the constructs as suggested by the final model are shown. Although causal arrows are used to display relationships between constructs, the statistics given next to each causal line represent the standardised beta weight between the two constructs. * = $p < .01$, ** = $p < .001$. One tailed significance reported.*

Figure 43 shows the relationships between the five constructs and obsessions when the relationships between the constructs (as informed by the final model) are taken into account. Overall the constructs explained 52% of the variance in obsessions. Examination of figure 43 shows that AMAC stop rules, NJRE occurrence and NJRE intensity remained significant predictors of obsessions in this analysis (as one would have expected given the final model does not suggest any mediated paths between each of these individual constructs and obsessions).

Whether the relationships between inflated responsibility, IU and negative mood, respectively, and obsessions were partially or fully mediated by the indirect pathways described earlier was then examined.

Before the indirect pathways outlined above connecting inflated responsibility to obsessions were taken into account, the direct pathway between inflated responsibility and obsessions was significant (standardised beta value = .62, $p < .001$). Although the direct pathway between inflated responsibility and obsessions was partially mediated when the indirect paths

connecting inflated responsibility to obsessions were taken into account, the direct pathway remained significant (standardised beta value = .30, $p < .001$, see figure 43). Therefore the direct path between inflated responsibility and obsessions is retained in the final model. The total indirect effect of inflated responsibility on obsession through the indirect pathways outlined above was significant ($z = .30$, $p = .001$, one tailed). This pattern of results seems to therefore suggest that inflated responsibility has both a direct relationship with obsessions as well as an indirect relationship mediated through the pathways outlined earlier (note that AMOs does not provide estimates of the significance of individual indirect pathways when multiple indirect pathways connecting two variables are being considered simultaneously and so the significance of individual indirect pathways could not be explored in any of the analyses that follow).

Before the indirect pathways outlined above connecting negative mood to obsessions were taken into account, the direct pathway between negative mood and obsessions was significant (standardised beta value = .56, $p < .001$). Although the direct pathway between negative mood and obsessions was partially mediated when the indirect paths connecting negative mood to obsessions were taken into account, the direct pathway remained significant (standardised beta value = .21, $p < .001$, see figure 43). Therefore the direct path between negative mood and obsessions is retained in the final model. The total indirect effect of negative mood on obsessions through the indirect pathways outlined above was significant ($z = .10$, $p = .01$, one tailed). This pattern of results seems to therefore suggest that negative mood has both a direct relationship with obsessions as well as an indirect relationship mediated through the pathways outlined earlier.

Before the indirect pathways outlined above connecting IU to obsessions were taken into account, the direct pathway between IU and obsessions was significant (standardised beta value = .63, $p < .001$). Although the direct pathway between IU and obsessions was partially mediated when the indirect paths connecting IU to obsessions were taken into account, the direct pathway remained significant (standardised beta value = .20, $p < .001$, see figure 43). Therefore the direct path between IU and obsessions is retained in the final model. The total indirect effect of IU on obsession through the indirect pathways outlined above was significant ($z = .11$, $p = .001$, one tailed). This pattern of results seems to therefore suggest that IU has both a direct relationship with obsessions as well as an indirect relationship mediated through the pathways outlined earlier.

In summary, after indirect paths connecting inflated responsibility, IU and negative mood, respectively, to obsessions had been taken into account, all three direct paths connecting the three constructs to obsessions remained significant and so all three paths are retained in the model. AMAC stop rules, NJRE intensity and NJRE occurrence were also significant direct predictors of obsessions. The relationship between the 5 constructs and obsessions is thus unchanged from the pattern of relationships depicted earlier in figure 42. Inflated responsibility, negative mood and IU additionally have a significant relationship with obsessions through the indirect pathways connecting the given constructs to obsessions. Discussion of this model from a theoretical perspective is left to the general discussion section of the thesis.

10.2.3 Total effects

To compare the overall strength of each constructs relationship with obsessions when considering both direct and indirect paths between each construct and obsessions, standardised total effects were examined. Total effects are the sum of all direct and indirect effects of one variable on another. Table 12 gives the standardised total effect of each construct with obsessions and the significance value associated with this total relationship. The table is ordered hierarchically with the construct with strongest overall relationship with obsessions placed at the top of the table and the construct with the weakest overall relationship with obsessions placed at the bottom of the table.

Table 12: The standardised total effect of each constructs relationship with obsessions and associated significance of relationship.

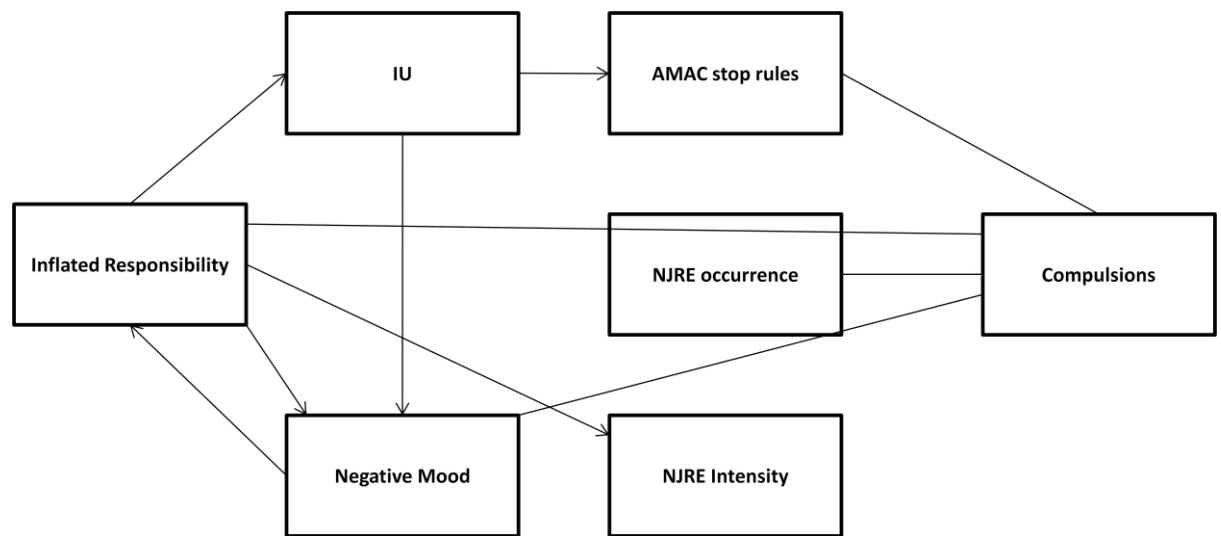
Construct	Standardised Total Effect	Significance
Inflated Responsibility	.59	$p < .01$
IU	.39	$p < .01$
Negative Mood	.31	$p < .01$
AMAC	.18	$p < .01$
NJRE Occurrence	.11	$p < .05$
NJRE Intensity	.10	$p < .05$

Note: One tailed significance reported.

10.2.4 Compulsions

Figure 44 shows the final model in relation to the regression analysis described in chapter 2 where all five casual constructs were entered simultaneously into a regression model with compulsions as the outcome variable. Constructs are connected to compulsions in the figure if they were found to significantly predict compulsions in the second regression analysis described in chapter 2. Note that lines between constructs and obsessions are not directional as they are based on correlational, not experimental, evidence.

Figure 44: Final model in relation to compulsions.



Note: Relationships between constructs are based on experiment evidence discussed in chapters 3-7. Relationships between constructs and compulsions are based on the second regressions analysis discussed in chapter 2. Constructs are connected to compulsions in the figure if they were found to significantly predict compulsions.

As can be seen from figure 44, three of the constructs and one sub-construct (NJRE occurrence) significantly predicted compulsions in the original analysis. IU and NJRE intensity were not significant predictors of compulsions. Examination of figure 44 suggests several indirect paths through which inflated responsibility, negative mood and IU may have an effect on compulsions through another construct or constructs.

In the case of inflated responsibility, as well as having a direct effect on compulsions, the model suggests that inflated responsibility may have an effect on compulsions through negative mood as well as through two indirect pathways (firstly, the pathway that links inflated responsibility to IU, IU to AMAC stop rule use, and AMAC stop rule use to compulsions and,

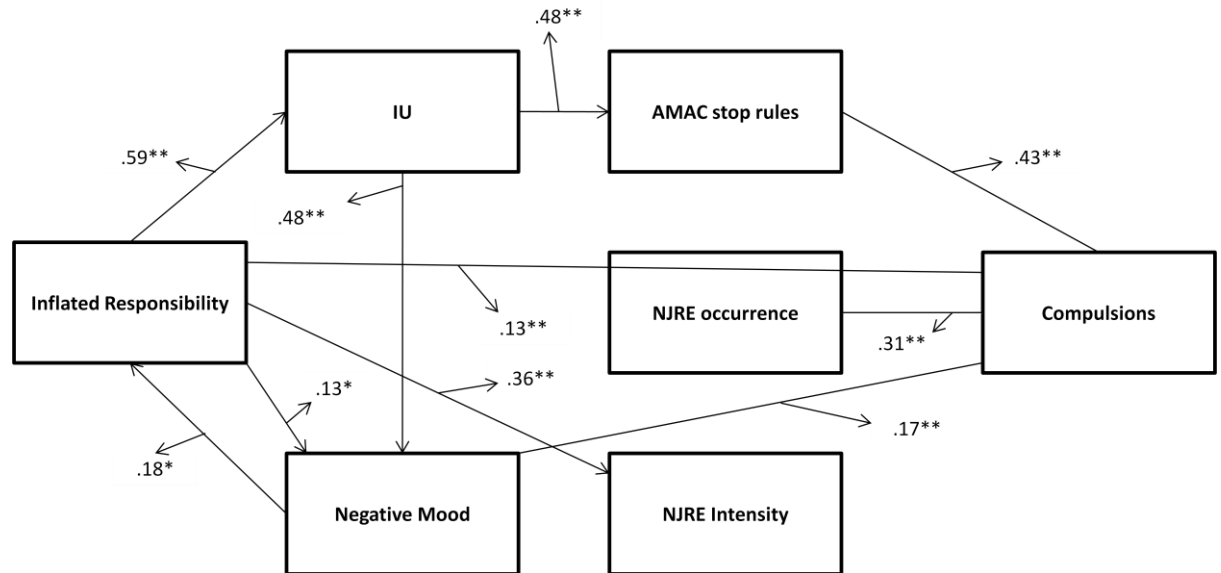
secondly, the path that links inflated responsibility to IU, IU to negative mood and negative mood to compulsions).

In the case of negative mood, as well as having a direct effect on compulsions, the model suggests that negative mood may have an effect on compulsions through inflated responsibility and the indirect pathway which connects negative mood to inflated responsibility, inflated responsibility to IU, IU to AMAC stop rule use, and AMAC stop rule use to compulsions.

In the case of IU, whilst this construct does not have a direct effect on compulsions, the model suggests it may have an indirect effect on compulsions through AMAC stop rule and negative mood respectively, as well as the path that connects IU to negative mood, negative mood to inflated responsibility and inflated responsibility to compulsions.

In order to see if the relationship between negative mood and inflated responsibility, respectively, with compulsions were partially or fully mediated by the indirect pathways described above, as well as to see if IU has an indirect effect on compulsions through the pathways described above, these indirect pathways were explored using the statistical package AMOs 17. Bootstrapping (1000 samples) was used to evaluate the significance of the indirect pathways connecting the relevant constructs with compulsions. The analysis was performed on the data from the large questionnaire study described in chapter 2. The constructs are represented in this analysis by the total score on the questionnaire (or questionnaire subscale) used in the questionnaire study to measure the construct (see chapter 2). Compulsions are represented by the total score on the compulsions sub-scale of the CBOCI. In order that the relationship between all the constructs and compulsions could be held constant, only one analysis was performed in which all of the possible indirect pathways described above were examined at the same time.

Figure 45: Relationships (standardised beta weight) between the five constructs and compulsions when the relationships between the constructs (as informed by the final model) are taken into account.



*Note: Only relationships between the constructs as suggested by the final model are shown. Although causal arrows are used to display relationships between constructs, the statistics given next to each causal line represent the standardised beta weight between the two constructs. * = $p < .01$, ** = $p < \text{or} = .001$. One tailed significance reported.*

Figure 45 shows the relationships between the five constructs and compulsions when the relationships between the constructs (as informed by the final model) are taken into account. Overall the constructs explained 43% of the variance in compulsions. Examination of figure 45 shows that AMAC stop rules and NJRE occurrence remained significant predictors of compulsions in this analysis (as one would have expected given the final model does not suggest any mediated paths between each of these individual constructs and compulsions). The direct paths between IU and NJRE intensity, respectively, and compulsions remained non-significant (paths not shown).

Whether the relationships between inflated responsibility and negative mood, respectively, and compulsions were partially or fully mediated by the indirect pathways described earlier was then examined.

Before the indirect pathways outlined above connecting inflated responsibility to compulsions were taken into account, the direct pathway between inflated responsibility and compulsions was significant (standardised beta value = .48, $p < .001$). Although the direct pathway between

inflated responsibility and compulsions was partially mediated when the indirect paths connecting inflated responsibility to compulsions were taken into account, the direct pathway remained significant (standardised beta value = .13, $p = .001$, see figure 45). Therefore the direct path between inflated responsibility and compulsions is retained in the final model. The total indirect effect of inflated responsibility on compulsions through the indirect pathways outlined above was significant ($z = .20$, $p = .001$, one tailed). This pattern of results seems to therefore suggest that inflated responsibility has both a direct link to compulsions as well as a link mediated through the pathways outlined earlier.

Before the indirect pathways outlined above connecting negative mood to compulsions were taken into account, the direct pathway between negative mood and compulsions was significant (standardised beta value = .57, $p < .001$). Although the direct pathway between negative mood and compulsions was partially mediated when the indirect paths connecting negative mood to compulsions were taken into account, the direct pathway remained significant (standardised beta value = .17, $p < .001$, see figure 45). Therefore the direct path between negative mood and compulsions is retained in the final model. The total indirect effect of negative mood on compulsions through the indirect pathways outlined above was significant ($z = .05$, $p = .01$, one tailed). This pattern of results seems to therefore suggest that negative mood has both a direct link to compulsions as well as a link mediated through the pathways outlined earlier.

Although IU is not a significant direct predictor of compulsions when all the 5 constructs are entered into a regression model simultaneously, 3 indirect paths are suggested through which IU could be related to compulsions (outlined above). The total indirect effect of IU on compulsions through the indirect pathways outlined was significant ($z = .28$, $p = .001$, one tailed). This pattern of results suggests that whilst IU does not have a direct relationship with compulsions it does predict compulsions through the indirect paths described earlier.

In summary, after indirect paths connecting inflated responsibility and negative mood, respectively, to compulsions had been taken into account, both direct paths connecting the constructs to compulsions remained significant and so both are retained in the model. AMAC stop rules and NJRE occurrence were also significant direct predictors of compulsions but NJRE intensity and IU were not. The relationship between the 5 constructs and compulsions is thus unchanged from the pattern of relationships depicted earlier in figure 44, however, IU predicts compulsions through the indirect pathways outlined earlier (not depicted in the model). Additionally, negative mood and inflated responsibility also have an indirect effect on

compulsions through the indirect paths outlined earlier. Discussion of this model from a theoretical perspective is left to the general discussion section of the thesis.

10.2.5 Total effects

To compare the overall strength of each constructs relationship with compulsions when considering both direct and indirect paths between each construct and compulsions, standardised total effects were examined. Total effects are the sum of all direct and indirect effects of one variable on another. Table 13 gives the standardised total effect of each construct with compulsions and the significance value associated with this total relationship. The table is ordered hierarchically with the construct with strongest overall relationship with compulsions placed at the top of the table and the construct with the weakest overall relationship with compulsions placed at the bottom of the table.

Table 13: The standardised total effect of each constructs relationship with compulsions and associated significance of relationship.

Construct	Standardised Total Effect	Significance
AMAC	.43	$p < .01$
Inflated Responsibility	.33	$p < .01$
IU	.33	$p < .01$
NJRE Occurrence	.31	$p < .01$
Negative Mood	.21	$p < .01$
NJRE Intensity	-.02	$p = .38$

Note: One tailed significance reported.

11. Chapter 9: General Discussion

11.1 Introduction

Although a plethora of clinical constructs have been proposed which are thought to have a causal influence on OC symptoms these constructs are usually discussed in isolation from each other in the literature. Extremely little research exists examining how these constructs are related to each other. The primary aim of this thesis was to examine how five clinical constructs which have been proposed to have a causal influence on OC symptoms are related to each other. These five constructs were inflated responsibility, IU, NJRE, negative mood and AMAC stop rules. A secondary aim of this thesis was to examine the relationship between each construct and obsessions and compulsions, respectively, when the relationships between the constructs to emerge from the experimental chapters were taken into account. At the broadest level it is hoped that the results to emerge from this thesis will have implications for current theoretical models of OCD by beginning to address how some of the many constructs proposed to have a causal relationship with OC symptoms are related to one another. It could be argued that for research in this area to progress theorists and researchers need to move beyond simply focusing on their own preferred construct/s and the endeavour of attempting to show that construct x is a “better” predictor of OC symptoms than construct y and begin to look at how these constructs are related to each other and how these constructs may interact to effect OC symptoms. As Lind and Boschen (2009) point out, it may be the case that rather than each of these constructs playing independent roles in the genesis of OC behaviour, others may act in series, with the ability of one construct to influence OC symptoms being controlled by its influence on another intervening construct.

This general discussion section will begin by summarising the results of this thesis and presenting the final model of the relationships between the constructs to emerge from the thesis as well as how the constructs in the final model relate to obsessions and compulsions, respectively. Before drawing general conclusions based on final model to emerge from the thesis the discussion will then turn to focus on the methodological and statistical choices made in this thesis and the possible implications of these choices. The constructs will then be discussed in terms of their relative “importance” in the final model in respect to their relationship with other constructs as well as their importance to obsessions and compulsions, respectively. The implications of the findings from this thesis will then be discussed in four sections. Firstly, implications of the results of this thesis for existing models of OCD will be discussed, secondly, implications for studies examining the relationship between multiple

constructs and OC symptoms will be addressed, thirdly, the broader implications of the finding that three of the constructs focused on in this thesis; inflated responsibility, IU and negative mood, all causally influence each other will be discussed before, finally, implications of the results of this thesis for the treatment of OCD are briefly considered. The relevance of the final model to constructs not included in thesis will then be examined before, finally, some of the limitations of the work carried out in this thesis are addressed.

11.2 Summary of empirical work in thesis

The purpose of chapter 2 was to address the possibility that the five constructs focused on in this thesis are separable constructs and not indicators of one (or more) core underlying factors and to explore the relative power of each construct in predicting OC symptoms when all five constructs were examined simultaneously. A questionnaire containing measures of the 5 constructs and obsessive and compulsive symptoms was completed by 370 participants. All constructs were at least moderately correlated with one another and with obsessive and compulsive symptoms. Exploratory factor analysis suggested that either a one or five factor solution best described the data set. Confirmatory factor analysis revealed that the resulting five factor solution was a significantly better fit to the data than the one factor solution. It was therefore concluded that the five constructs being focused upon in this thesis are best seen as distinct and separate entities rather than as being indicators of some core underlying factor or factors. Two regression analyses were performed to see which of the five “causal” OCD constructs would significantly account for variance in obsessions and compulsions when all were examined simultaneously. All constructs were significant predictors of obsessions, however, IU and NJRE intensity did not emerge as significant predictors of compulsions.

In the first experimental chapter mood was manipulated to create two groups: a positive and a negative mood group. The manipulation checks indicated that the manipulation was successful. The negative mood group scored significantly higher on measures of inflated responsibility and AMAC stop rule endorsement than participants in the positive mood group. Participants in the positive mood group scored significantly higher on measures of FLC stop rule endorsement than participants in the negative mood group. There were no other significant effects on any dependent constructs.

In the second experimental chapter stop rules were manipulated to create two groups: a AMAC group and a FLC group. The manipulation checks indicated that the manipulation was successful. The AMAC and FLC groups did not differ significantly on any of the dependent constructs.

In the third experimental chapter inflated responsibility was manipulated to create two groups: a high inflated responsibility group and a low inflated responsibility group. The manipulation checks indicated that the manipulation was successful. The high inflated responsibility group scored significantly higher on measures of sadness, anxiety, negativity, general negative mood, IU and NJRE intensity than participants in the low inflated responsibility group. Participants in the low inflated responsibility group scored significantly higher on the happiness measure than participants in the high inflated responsibility group. There were no other significant effects.

In the fourth experimental chapter IU was manipulated to create two groups: a high IU group and a low IU group. The manipulation checks indicated that the manipulation was successful. The high IU group scored significantly higher on measures of anxiety, general negative mood and AMAC stop rule endorsement than participants in the low IU group. Participants in the low IU group scored significantly higher on measures of FLC stop rule endorsement than participants in the high IU group. There were no other significant effects.

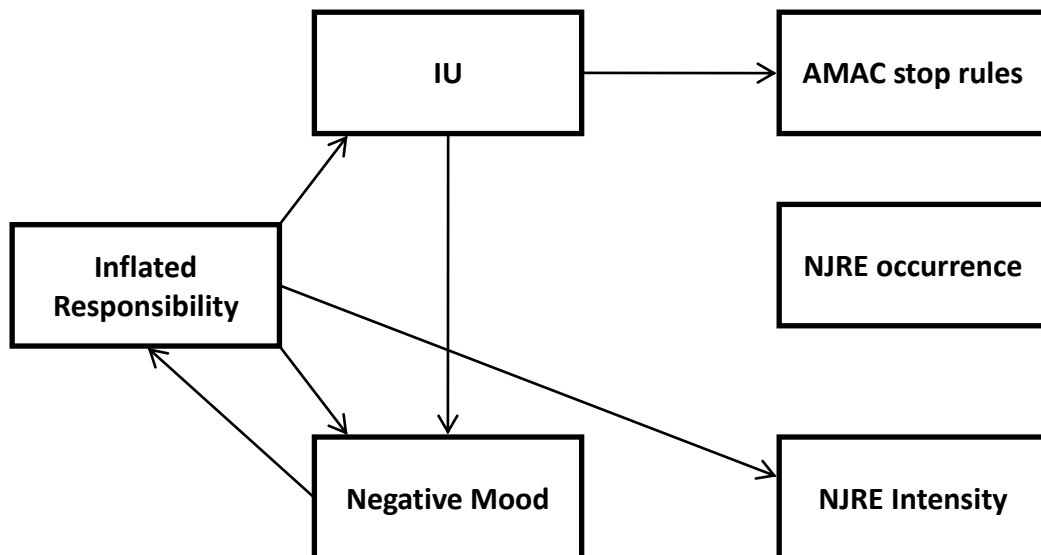
In the final experimental chapter NJRE were manipulated to create two groups: a high NJRE group and a low NJRE group. The manipulation checks indicated that the manipulation was successful. The high NJRE and low NJRE groups did not differ significantly on any of the dependent constructs.

In chapter 8, any significant causal effects to emerge from the experimental chapters (e.g. between construct x and y) which the final model to emerge from the experimental chapters suggested may be mediated by another construct or constructs (e.g. construct w) were examined to see if the relationship between construct x and y was partially or fully mediated by construct w within the experiment in which the causal effect was found. Three possible mediations were tested. As a result of these analyses the direct causal path between negative mood and AMAC stop rule use was removed from the final model as this pathway was fully mediated by the indirect causal path which connects negative mood to inflated responsibility, inflated responsibility to IU and IU to AMAC stop rule use.

Within chapter 8 the significance of several indirect pathways were examined to see if they were significant. The final model of the causal relationships between the five constructs to emerge from the experimental chapters and after the mediation analyses described in chapter 8 are shown in figure 46. In addition to the paths depicted there are seven significant indirect pathways which are not shown (note these are not depicted in figure 46 simply due to a wish not to over complicate the figure). Firstly, inflated responsibility has a significant indirect effect

on negative mood through IU. Secondly, inflated responsibility has a significant indirect effect on AMAC stop rule use through IU. Thirdly, IU has a significant indirect effect on inflated responsibility through negative mood. Fourthly, negative mood has a significant indirect effect on IU through inflated responsibility. Fifth, negative mood has a significant indirect effect on NJRE intensity through inflated responsibility. Sixth, IU has a significant indirect effect on NJRE intensity through the path that connects IU to negative mood, negative mood to inflated responsibility, and inflated responsibility to NJRE intensity. Finally, negative mood has a significant indirect effect on the AMAC stop rule use through the path which connects negative mood to inflated responsibility, inflated responsibility to IU and IU to AMAC stop rule use.

Figure 46: Final model of the relationships between the 5 constructs to emerge from the experimental chapters and after the mediation analyses described in chapter 8.



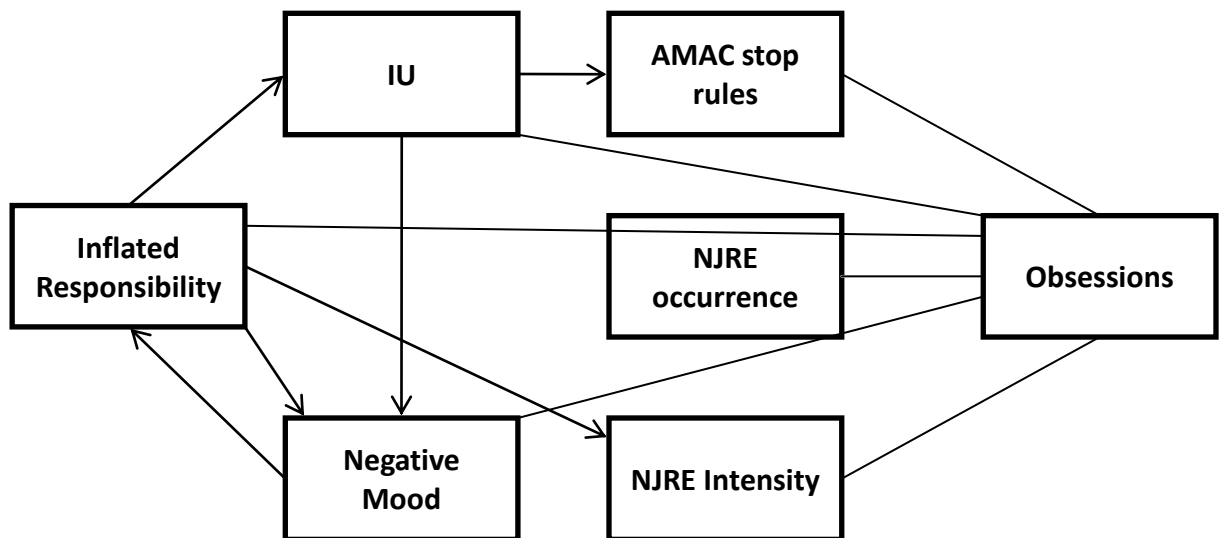
Note: Relationships between constructs are based on experiment evidence discussed in this thesis (chapters 3-7) with paths between constructs indicating a causal effect of one construct on another.

In chapter 8 two regression analyses were performed to see which of the constructs would significantly account for variance in obsessions and compulsions respectively (using the questionnaire data from chapter 2) when the relationships between the constructs were specified as informed by the results of the experimental chapters and the mediation analyses described in the previous paragraphs.

Figure 47 presents the final model and the relationship between each construct and obsessions after the regression analyses described in chapter 8. Although the final model

suggested several indirect pathways through which the relationship between IU, negative mood and inflated responsibility, respectively, with obsessions may have been mediated, all five constructs remained direct significant predictors of obsessions. In addition, inflated responsibility, negative mood and IU had a significant relationship with obsessions through the indirect pathways connecting the given constructs to obsessions.

Figure 47: The final model and the relationship of each construct with obsessions after the regression analyses described in chapter 8.

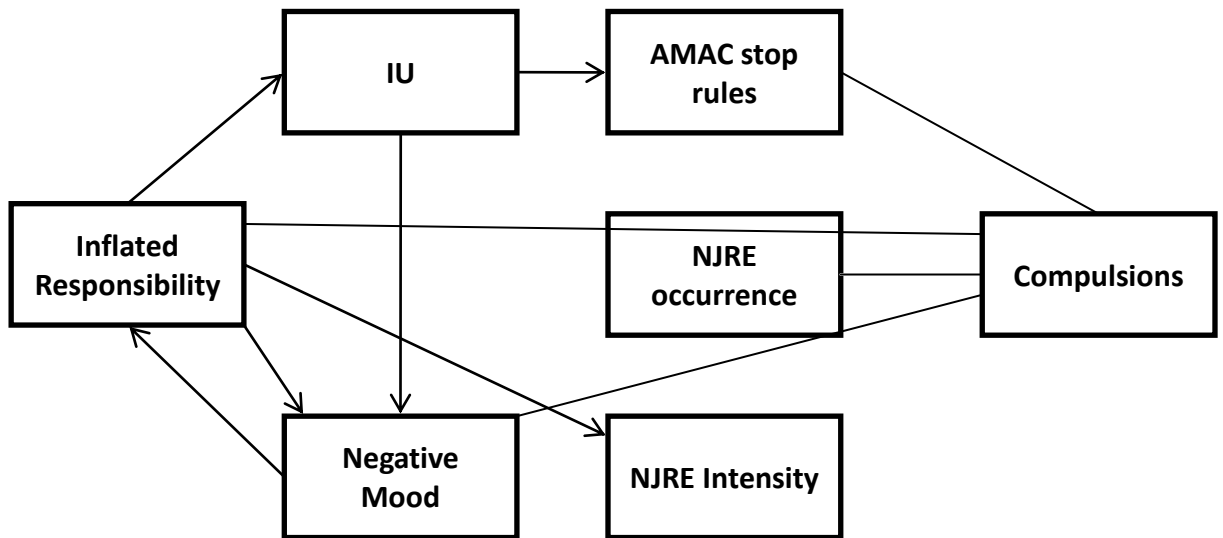


Note: Relationships between constructs are based on experiment evidence discussed in this thesis with paths between constructs indicating a causal effect of one construct on another. Relationships between constructs and obsessions are based on the results of the regression analysis described in chapter 8 with relation to obsessions (using the questionnaire data outlined in chapter 2). Constructs are connected to obsessions in the figure if they were found to significantly predict obsessions. Lines between constructs and obsessions are, therefore, correlational in nature and do not represent causal relationships.

Figure 48 presents the final model and the relationship of each construct with compulsions after the regression analyses described in chapter 8. With respect to compulsions, although the final model suggested several indirect pathways through which the relationship between negative mood and inflated responsibility, respectively, with compulsions may have been mediated, both constructs, in addition to NJRE occurrence and AMAC stop rules, remained significant direct predictors of compulsions. In addition inflated responsibility and negative mood had a significant relationship with compulsions through the indirect pathways connecting the given constructs to compulsions. Whilst both NJRE intensity and IU remained

non-significant direct predictors of compulsions, IU significantly predicted compulsions through several indirect pathways connecting IU to compulsions.

Figure 48: The final model and the relationship of each construct with compulsions after the regression analyses described in chapter 8.



Note: Relationships between constructs are based on experiment evidence discussed in this thesis with paths between constructs indicating a causal effect of one construct on another. Relationships between constructs and compulsions are based on the results of the regression analysis described in chapter 8 with relation to compulsions (using the questionnaire data outlined in chapter 2). Constructs are connected to compulsions in the figure if they were found to significantly predict compulsions. Lines between constructs and compulsions are, therefore, correlational in nature and do not represent causal relationships.

This discussion now moves onto discuss the methodological and statistical choices made in this thesis and the possible implications of these choices.

11.3.1 Methodological and statistical choices

Before drawing general conclusions based on final model to emerge from the thesis, the discussion will now turn to focus on the methodological and statistical choices made in this thesis and the possible implications of these choices.

11.3.2 Experimental informed versus correlation informed model building approach

The final model of the relationship between the constructs to emerge from this thesis (see figure 46) was built using a two stage approach. Firstly, each construct was manipulated to see the effect of doing so on the other four constructs. If the manipulation of a given construct lead to a significant effect on another construct (using the criteria for significance outlined in the “Justification of the statistical analyses used in experimental chapters and justification of choice of measures used to decide if two groups differ on a given construct” section of the thesis) this was shown in the model by a causal line leading from the manipulated construct to the other construct. Secondly, any significant effects to emerge from the experimental chapters (e.g. between construct x and construct y) which the model suggested maybe mediated by another construct or constructs (e.g. construct w) were examined to see if the relationship between construct x and y was fully mediated by construct w within the experiment in which the causal effect was found. If the relationship between construct x and y was fully mediated (defined as either having an associated significance value becoming greater than $p < .05$ or an associated effect size becoming lower than the criteria considered a “moderate” effect size according to Cohen’s [1992] criteria) the pathway between these two constructs was removed from the model. The approach towards model building used in this thesis can therefore be described as being experimentally informed.

An alternative approach to model building is to build a model of the relationship between constructs based on correlational evidence, a technique often referred to as structural equation modeling (SEM). SEM is usually informed by questionnaire data, such as the questionnaire data presented in chapter 2 of this thesis. Whilst a detailed explanation of SEM is beyond the scope of this thesis (see Kline, 2005), at a broad level, constructs are represented in an analysis by latent variables. These latent variables are informed by the questionnaire items measuring a construct in a given study. So, for example, in the questionnaire study in chapter 2 of this thesis, the construct inflated responsibility would be represented by a latent variable informed by the 26 items from the RAS (Salkovskis *et al*, 2000). The relationships between these latent variables can be examined. If two latent variables are significantly correlated, usually a direct path connecting these two latent variables should be added to the model to signify this in order to improve model fit (Kline, 2005). If two variables are not significantly correlated, usually these two latent variables should not be connected by a direct path in the model, as specification of such a path will not improve model fit (Kline, 2005). The fit of various models can be compared using fit indices, with the best fitting model usually the model chosen as the final model representing the relationship constructs. Whilst the

relationship between two latent variables is often depicted as causal in direction in SEM, a direct path connecting two latent variables in a given SEM will always be statistically equivalent in terms of model fit regardless of the direction of the casual effect specified as this relationship is informed by correlational data (Kline, 2005). SEM is being increasingly used in social sciences research for the purpose of model building (Kline, 2005) and has the benefit over the approach used in this thesis of being able to examine the relationship between two constructs whilst also being able to take into account statistically the relationship of these two constructs with the remaining three constructs.

The approach to model building taken in this thesis was preferred to a model building approach based on SEM in the first instance due to the almost universally recognised principle that states that causal effects cannot be implied from correlational data. As noted by Wilkinson and APA Task Force on Statistical Inference (1999, p.600) SEM, “rarely yields any results that have any interpretation as causal effects”. Causation can of course be implied with appropriate experimental evidence, and the final model of the relationship between the constructs examined in this thesis (see figure 46) is informed by such evidence (Kline, 2005). It may have been possible to examine the final model represented in figure 46 to emerge from the experiments and subsequent mediation analysis using SEM software to see if the model was a good fit to the data, using the correlation data outlined in chapter 2 of this thesis. However, it is rarely advisable to examine a model informed by experimental data subsequently using SEM (Kline, 2005). This would seem to be applicable to the final model to emerge from the experiments in this thesis. Given that all five constructs focused on in this thesis are significantly correlated with each other (see table 1 of this thesis) in order to achieve a “best fit” model using SEM, all 5 constructs would need to be directly connected to each other within this model, despite the fact we know from the experiments in this thesis that some of the five constructs focused on within the thesis (e.g. AMAC stop rules and NJRE) are not causally related.

11.3.3 Measurement issues

Post manipulation measurement vs pre and post manipulation measurement

In the 5 experiments within this thesis a choice was made to only measure the construct being manipulated within a given experiment (from here in referred to as the target construct) *after* the manipulation of that construct. The scores of the two groups within each experiment on the target construct were then directly compared to see if they significantly differed using the criteria laid out in the “Justification of the statistical analyses used in experimental chapters

and justification of choice of measures used to decide if two groups differ on a given construct” section of this thesis and thus to see if the manipulation of the target construct had been successful.

An alternative approach to the one laid out above would have been to measure the target construct *before* the manipulation of the target construct (pre-manipulation) and to again to measure the target construct *after* the manipulation (post-manipulation). Within the two groups in a given experiment, pre-manipulation scores could then be compared to post-manipulation scores on the target construct. If the manipulation has been successful in manipulating the target construct, we would expect the scores of the “high group” on the target construct (e.g. the high inflated responsibility group) to increase significantly when comparing pre vs post manipulation scores. Furthermore, we would expect the scores of the “low group” on the target construct (e.g. the low inflated responsibility group) to decrease significantly when comparing pre vs post manipulation scores. This approach has the advantage over the approach used in this thesis of having the capacity to show an increase or decrease in scores on the target construct after the manipulation compared to baseline levels. It is thus arguably a better approach to measurement than the one used in this thesis if one wishes to observe the direct effect of a manipulation on a target construct, especially at an individual level. Indeed, this pre vs post measurement approach is used fairly regularly, for example, in studies which manipulate mood (e.g. MacDonald & Davey, 2005b).

The primary reason for not using this approach in the experiments in this thesis was due to a wish to reduce any potential demand characteristics. Specifically, it was thought that asking participants questions about the target construct prior to the manipulation of that construct had the potential of making participants aware of the manipulation’s purpose which could have led to demand effects. This was particularly a concern in the three experiments in which vignette based manipulations were used given these vignettes contain written discussions of individuals either high or low on the target construct. As noted in the 5 individual experiments in this thesis, in a further attempt to reduce demand characteristics, in each experiment initial post-manipulation measures (VAS measure) were collected under the pretence of being for a different study. This pretence would not have worked had pre-manipulation measures also been taken. It was therefore decided only to measure the target construct post-manipulation in each of the five experiments in this thesis.

It should be noted that whilst the measurement approach used in this thesis does not have the capacity to show an increase or decrease in scores on the target construct after the

manipulation compared to baseline levels, all participants taking part in the 5 experiments within this thesis were allocated to experimental conditions using a random sampling assignment process that permits the assumption of equality across experimental groups even though pre-manipulation measures were not taken and allows post-manipulation inference of effects of the experimental manipulation on subsequent post-manipulation measures (Campbell, 1957). Moreover, the measurement approach adopted in this thesis is also widely used, for example, in studies which have manipulated inflated responsibility (Ladouceur *et al*, 1995; Bouchard *et al*, 1999; Arntz *et al*, 2007) and mood (Scott & Cervone, 2002).

The use of both VAS and full measures of constructs in experimental chapters

In the five experimental chapters in this thesis every construct (apart from mood and NJRE intensity) were measured using two instruments. Firstly, short VAS item/s derived to measure specifically how the person scored on a given construct at that *precise moment in time* were given to participants. These VAS questions were given to participants in a questionnaire participants were told was unrelated to the study they were taking part in (i.e. participants were told the data was being collected for a different study). Secondly, longer form trait measures of each construct were given to participants.

In order to decide if two groups differed on a given construct in each experimental chapter the following criteria was used: Two groups were consider to differ on a given construct if the VAS measure of that construct (if more than one question was used, then a composite of these VAS measures) reached the level of $p < .05$ *and* if the associated effect size reached the criteria for a medium effect size *and* if the VAS measure of the construct correlated significantly with the trait measure of the construct.

It was decided to base the decision about whether two groups differ on a given construct primarily on VAS measures as these types of measures were thought to be more sensitive to experimental manipulations and a better measure of how the participant feels *at that moment in time* as opposed to broader trait measures of constructs which were thought to be less likely to be influenced by experimental manipulations and instead be more reflective of a participant's position on the spectrum of a given trait in general. In order to ensure the VAS measure of a construct possessed convergent validity with the full trait measure, significant differences between groups on VAS measures were only accepted as valid if the VAS measure was significantly positively correlated with the full trait measure. Full measures of constructs were used throughout the experiments in this thesis therefore primarily for the purpose of establishing convergent validity with the associated VAS measure of that construct.

The use of VAS measures and long form measures in each experiment in this thesis gives rise to two issues: firstly, the reliability of the composite VAS scales used in this thesis and, secondly, the possible influence of completing VAS measures of construct X on subsequent responses given to the full measure of construct X in a given experiment. These issues are addressed below.

The reliability of the composite VAS scales used in this thesis fell between mediocre to good (with values ranging from $\alpha = .52$ to $\alpha = .86$). In about 40% of cases, the reliability of the composite VAS scales used in this thesis fell below the range of internal consistency generally regarded as “acceptable” in the social sciences: $\alpha = .70$ (Field, 2009). The author would suggest that this should not drastically reduce confidence in the conclusions reached in this thesis for four reasons. Firstly, the reliability of a scale generally increases as items are added to that scale and scales measuring a construct which do not contain many items (as is the case with the composite VAS scales used in this thesis) are likely to have poorer reliability than larger scales with more items which measure the same construct (Field, 2009). Secondly, whilst the reliability of some the composite VAS scales used in this thesis did not conform to what is generally regarded in the social science as “acceptable”, none of the scales had a reliability statistic which fell below the range of mediocre. Thirdly, all composite VAS scales measuring constructs used in this thesis possessed convergent validity with the associated full scale measure that construct. These full scales generally had reliability which ranged from good to excellent. Finally, within the individual experiments in this thesis, any significant differences between two groups on the composite VAS measure of a construct were accompanied by a significant difference on the associated *full measure* of that construct in all but three cases, where the difference on the associated full measure of the construct fell just short of significance: the FLC VAS measure and full FLC measure in the IU experiment, the NJRE occurrence VAS measure and the NJRE occurrence full measure in the NJRE experiment and, finally, the NJRE intensity VAS measure and the NJRE intensity full measure in the NJRE experiment. Given that these full measures of constructs are trait measures which are thought to be difficult to influence by experimental manipulation, the fact the significant differences found on the VAS measures of constructs are generally reflected by significant differences on their associated full measures within the experiments in this thesis provides a good deal of confidence in the validity of these findings (Adrian Wells, personal communication, 2010). Note that had the final relationship of the constructs presented in figure 46 been based on significant differences between groups on full measures of constructs, rather than on VAS measures of these constructs, the figure would be unchanged.

It is possible that participant's responses to VAS measures of construct X may have influenced the participant's subsequent responses given to the full measure of construct X in a given experiment. For example, if participants rated VAS items of IU highly in a given experiment they may subsequently have been biased to rate items in the full measure of IU highly in order to appear consistent. If this is in fact true is difficult to test. A participant may equally rate both VAS items of IU highly and then rate items in the full measure of IU highly because the participant feels, at least in the confines of a given experiment, a high sense of IU. The author would suggest that, given that the findings in this thesis are primarily based on VAS measures of constructs as opposed to full measures, this is a fairly minor issue. To the author's knowledge in *all* previous studies in which one of the five constructs examined in this thesis have been manipulated only VAS measures of constructs (including manipulation checks) have been subsequently taken. None of these studies used full measures of constructs. Looked at from this perspective, the fact that full measures of constructs were used in the current thesis alongside VAS measures can be seen as a step forward in terms of ensuring the convergent validity of VAS measures with associated full measures.

11.3.4 The use of unadjusted p-values and the risk of type 1 error

Usually when making comparisons across several dependent variables within a given experiment one would adjust the level of significance required in order for an effect to be considered significant to take into account the number of comparisons being made. For example, the Bonferroni correction adjusts the criterion for significance by dividing the criterion for significance by the number of comparisons being made to ensure the cumulative type 1 error is below .05 (Field, 2009). However, within the experiments in this thesis and the mediations/tests of indirect effects which follow, an unadjusted p-value of $p < .05$ was used, in part, in order to decide if an effect was significant. The primary justification for using unadjusted p-values in this thesis is that, given the large number of comparisons made in each experimental chapter and across the thesis as a whole, it was felt that using Bonferroni corrections would be overly stringent and could dilute power of detecting real differences between groups.

It should be noted that most statistics books (e.g. Field, 2009) argue strongly that the level significance required in order for an effect to be considered significant should be adjusted in order to take into account the number of comparisons being made in order to decrease the risk of making a type 1 error. Whilst the use of unadjusted p-values has the advantage of being highly powered to detect group differences this increased power is accompanied by a higher

probability of making a type 1 error/s. This is reflected in the family-wise error rate across the experimental chapters in this thesis, the mediation analyses/tests of indirect effects which follow, and across the thesis as a whole. The family-wise error rate can be defined as the probability of making a type one error in any family of tests when the null hypothesis is true in each case (Field, 2009). The family wise error rate for the experimental chapters in this thesis are as follows: Negative mood manipulation = 62%, stop rule manipulation, inflated responsibility manipulation and IU manipulation, respectively = 58%, NJRE manipulation = 61%, mediation analyses/tests of indirect effects = 52%. The family wise error rate for the number of comparisons made across the thesis as a whole is extremely high: 95.95%. In other words, there would be a 95.95% chance that at least one type 1 error had been made in this thesis if unadjusted p-values were the only criteria used to judge if an effect was significant.

Given the very liberal use of unadjusted p-values in this thesis it seems justified to explore what difference using conservative Bonferroni corrections in this thesis would have made to the final model of the relationship between the constructs presented in figure 46.

Had Bonferroni corrections been used to take into account the number of comparisons made in each experiment separately, ignoring comparisons made in other experiments (that is $.05 \div$ the number of comparisons made in experiment X), only two causal paths, firstly, the path connecting inflated responsibility to negative mood and, secondly, the path connecting IU to AMAC stop rule use, would remain in figure 46. All other causal paths would be removed. Had Bonferroni corrections been used to take into account the number of comparisons across all five experiments (that is $.05 \div$ the number of comparisons made in experiments 1-5), only one causal path, the path connecting inflated responsibility to negative mood, would remain in figure 46. All other causal paths would be removed.

Whilst using unadjusted p-values in this thesis increases the risk of making a type 1 error the author would argue that the above demonstrates that had Bonferroni corrections been used instead important and interesting group differences would have been likely to have been missed. For example, using either of the Bonferroni correction methods outlined above, a significant causal effect of IU on negative mood would not have been found. This is despite the fact the effect size associated with this effect is in the range of moderate to large and this is a fairly well established effect which has previously been shown in other studies (e.g. Miranda *et al*, 2008).

With respect to significance testing, striking a balance between on the one hand protecting against a type 1 error and on the other hand not wishing to make a type 2 error, when

deciding what criteria must be reached for an effect to be considered significant, is notoriously difficult (Field, 2009). Furthermore, the chances of a given effect reaching a desired level of significance in any given study is strongly influenced by the sample size used in that study (Field, 2009). As noted elsewhere in this thesis, the APA is increasingly recognising the arbitrariness of $p < .05$ and the fact that this kind of dichotomous significant/non-significant distinction is outdated, and is increasingly encouraging the reporting of and interpretation of effect sizes (see e.g. Wilkinson and APA Task Force on Statistical Inference, 1999).

Within this thesis, an effect was only considered to be significant if the associated significance test reached the unadjusted level of $p < .05$ *and* if the associated effect size was equal to or bigger than Cohen's (1992) criteria for a medium effect size. Whilst deciding on what constitutes a "meaningful" effect size when examining 5 constructs in the same series of experiments, and therefore deciding what size an effect size should reach in order for it to be considered a "significant" effect, is a difficult task, it is important to note that an effect was not considered significant within this thesis purely on the basis of having an associated significance test reach the unadjusted level of $p < .05$. Indeed, several effects in this thesis which reached a level of significance of $p < .05$ were not interpreted as significant effects as the associated effect size fell below the criteria for a medium effect size.

11.3.5 The use of one-tailed as opposed to two-tailed significance

Throughout the experimental chapters in this thesis and the mediation analyses/tests of indirect effects that followed, one-tailed as opposed to two-tailed hypotheses were used. As noted elsewhere in this thesis, there are two justifications for using one-tailed hypotheses. Firstly, although few studies had manipulated any of the constructs looked at in this thesis prior to this thesis and subsequently examined the effects of doing so on the other constructs, those which have show an increase in scores on the construct not being manipulated (e.g. Lopatka & Rachman, 1995; Shafran, 1997; Arntz *et al*, 2007; Mancini *et al*, 2008; Coles *et al*, 2005; Miranda *et al*, 2008; Kirby & Yardley, 2009). Secondly, all of the constructs being focused on in this thesis are significantly positively correlated with one another (see chapter 2) and it was therefore predicted that any influence of manipulating one construct on another would be in a positive direction: a one-tailed hypothesis.

It should be noted that some authors argue that other criteria, beyond having a prior evidence to suggest that an effect will go in one direction as opposed to another, need to be met in order for the use of a one-tailed hypothesis testing to be justified (for a good recent discussion see Ruxton & Neuhäuser, 2010). By the authors own admission, it would be difficult to argue

the case for using one-tailed hypothesis testing throughout this thesis if one were to follow such strict criteria. For example, Kimmel (1957) suggests that in psychological research one-tailed hypothesis testing should only be used when a difference in the unpredicted direction would be psychologically meaningless. It is hard to argue that a difference in the unpredicted direction in relation to many of the hypotheses examined in this thesis would be psychologically meaningless (e.g. could one consider a causal effect of positive mood on AMAC stop rules or NJRE intensity meaningless?).

Given that many of the hypotheses examined in this thesis fall short of at least the stricter criteria for the “justified” use of one-tailed hypothesis testing as outlined above, it seems justified to ask what difference using two-tailed hypothesis testing as opposed to one-tailed hypothesis testing would have made to the final model of the relationship between the constructs presented in figure 46.

Had two-tailed instead of one-tailed hypothesis testing been used in the experimental chapters in this thesis and the mediation analyses/tests of indirect effects that followed none the t-tests, mediations or test of indirect effects that appear in these chapters would change from being significant to non-significant. Therefore the final model presented in figure 46 would remain the same.

Thus, while one can argue if the use of one-tailed hypothesis testing is or isn’t justified in relation to the hypotheses tested in this thesis, at a practical level, using either one-tailed or two-tailed hypothesis testing makes no difference to the final models or conclusions reached in this thesis.

This discussion now moves onto discuss each constructs relative “importance” in the model in terms of each constructs relationship with other constructs in the model as well as each constructs relationship with obsessions and compulsions, respectively.

11.4.1 The relative importance of each construct in terms of each constructs relationship with other constructs

Inflated responsibility, IU and negative mood appear to be the most “important” constructs examined in this thesis in terms of their effects on other constructs. All three constructs have a significant causal effect, either directly or indirectly, on every other construct focused on in this thesis.

Inflated responsibility has a direct causal influence on three of the four other constructs focused on in this thesis: negative mood, IU and NJRE intensity. Inflated responsibility also has a significant indirect effect on AMAC stop rules through IU. As well as having a direct influence on negative mood, inflated responsibility also has an indirect influence on negative mood through its effect on IU.

IU has a direct causal influence on two of the four other constructs focused on in this thesis: negative mood and AMAC stop rules. IU also has a significant indirect effect on inflated responsibility through negative mood and a significant effect on NJRE intensity through the path that connects IU to negative mood, negative mood to inflated responsibility, and inflated responsibility to NJRE intensity.

Negative mood has a direct causal influence on inflated responsibility. Negative mood also has a significant indirect effect on IU and NJRE intensity through inflated responsibility and a significant indirect effect on AMAC stop rule use through the path which connects negative mood to inflated responsibility, inflated responsibility to IU and IU to AMAC stop rule use.

AMAC stop rules appear to be an “outcome” construct in the model in terms of its relationship with other constructs. The construct did not significantly have a direct or indirect causal effect on any of the other constructs focused on in this thesis. Whilst the manipulation of AMAC stop rules did not have a significant effect on any of the other constructs focused on in this thesis, three of these constructs had a significant direct or indirect causal effect on AMAC stop rule use: IU, inflated responsibility and negative mood. The finding that AMAC stop rules appear to be an “outcome” construct is not entirely unexpected. From a more theoretical stand point there is little reason to have expected that increasing AMAC stop rule use would lead to an increase in the other constructs focused on in this thesis. Most of the constructs focused on in this thesis either represent dispositional traits (IU, inflated responsibility) or mood states which are thought to be stable over time (anxiety and depression, Lovibond, 1998) whilst the deployment of AMAC stop rules, on the other hand, appears to be situationally specific. As noted in chapter 1, AMAC stop rules are intrinsically tied to task motivation, specifically, with performance focused motivation (Vaughn *et al*, 2006). Whilst performance focused motivation may play an important part in promoting behaviours (e.g. checking) in certain situations, it is unlikely to have a profound effect on more dispositional type traits or stable mood states. Consistent with this reasoning, AMAC stop rule use did not effect the dispositional traits or stable mood states focused on in this thesis. From a theoretical and intuitive perspective, however, dispositional traits and stable mood states *are* likely to effect the deployment of

AMAC stop rules in a given situation as AMAC stop rules can be seen as reflecting performance factors that are “deployed” in response to certain cognitive processes or mood states. For example, with respect to IU, one can conceptually see how an individual with high IU may be unable to cope with the uncertainty surrounding a given task/event and this uncertainty may lead to the individual using AMAC stop rules in an attempt to ensure that a task has been done successfully or adequately or that an event goes well (Beech & Liddell, 1974). The results of the current thesis suggests the use of AMAC stop rules can be caused by two dispositional traits, IU and inflated responsibility, in addition to negative mood.

NJRE intensity appears to be an “outcome” construct in the model in terms of its relationship with other constructs. The manipulation of NJRE (note NJRE occurrence and intensity were manipulated simultaneously, see chapter 7) did not effect any other construct being focused on in this thesis and so NJRE intensity did not significantly have a direct or indirect casual effect on any of the other constructs focused on in this thesis. Whilst the manipulation of NJRE did not have a significant effect on any of the other constructs focused on in this thesis, three of these constructs had a significant direct or indirect causal effect on NJRE intensity: inflated responsibility, negative mood and IU. The implications of the finding that NJRE intensity appears to be an “outcome” construct in the model is addressed in a later section of this discussion.

NJRE occurrence appears to be unrelated to any of the other constructs focused on in this thesis. The manipulation of NJRE (note NJRE occurrence and intensity were manipulated simultaneously, see chapter 7) did not affect any other construct being focused on in this thesis and so NJRE occurrence did not significantly have a direct or indirect casual effect on any of the other constructs focused on in this thesis. The sub-construct NJRE occurrence was additionally not affected by the manipulation of any of the other constructs focused on in this thesis. One may wish ask why the sub-construct NJRE occurrence was not connected to any other construct in this thesis. Given that NJRE intensity is connected to other constructs focused on in this thesis, the author would suggest that the mere occurrence of NJRE is not connected with susceptibility to OC symptoms unless it is experienced with high intensity (as characterised by the sub-construct NJRE intensity). In support of this argument, Coles *et al* (2003) found that most people (95% of their student sample in the past week) report the occurrence of NJRE, whilst Coles *et al* (2005) found that experimentally induced NJRE produced distress and urges to change something *only* for those participants who experience greater NJRE intensity to naturally occurring NJRE. If most people experience the occurrence of NJRE and these experiences only become problematic for individuals who have a

predisposition to respond intensely to them, it may be the case that NJRE occurrence represents a fairly “normal” experience in which case we would not expect NJRE occurrence to necessarily be linked to the other clinical constructs focused on in this thesis.

11.4.2 The relative importance of each construct in terms of each constructs relationship with obsessions

Figure 47 shows that all five constructs examined in this thesis have a direct relationship with obsessions even when the relationships between the constructs themselves are taken into account. In terms of the size of these direct relationships, inflated responsibility has the strongest direct relationship with obsessions, followed by IU, negative mood, AMAC stop rules, NJRE occurrence and finally NJRE intensity.

The strong direct relationship between inflated responsibility and obsessions is consistent with Salkovskis’s (1985, 1989) cognitive model of OCD, which sees the relationship between inflated responsibility and obsessions as the key relationship in bringing about OC symptoms.

Salkovskis (1985, 1989) argued that the most fundamental mechanism in bring about OC symptoms is the way intrusions are *appraised* and that this appraisal is heavily influenced by inflated responsibility. Specifically, when experiencing an intrusive thought the individual with elevated inflated responsibility will appraise the occurrence of this intrusive thought as a sign that they may be responsible for harm to themselves or to others unless they move to prevent it. This appraisal turns the intrusion into an obsession and leads to a cycle of other events such as an increase in negative mood, attempts to suppress the intrusive thought and neutralising strategies such as compulsive behaviours. It is the initial dysfunctional appraisal of the intrusive thought, due largely to an elevated sense of inflated responsibility, however, which is central and most fundamental to the model, with all the other factors stemming from this initial appraisal.

The finding that negative mood has a direct relationship with obsessions is consistent with evidence suggesting that increasing negative mood will lead to an increase in the number of intrusive thoughts experienced by an individual and the intensity of these thoughts (see chapter 1). It is also consistent with theories which suggest that increasing negative mood will subsequently increase the number of intrusive thoughts experienced by an individual. For example, Rachman (1997) highlighted the role of anxiety in bringing about obsessions, suggesting that negative mood may have its influence on obsessions by reducing the OC sufferer’s level of mental control.

Whilst the finding that IU, AMAC stop rules, NJRE occurrence and NJRE intensity were significant direct predictors of obsessions is not surprising given that all these constructs are moderately positively correlated with obsessions before taking into account their respective relationships with other constructs (chapter 2) to the author's knowledge no theories exist which have attempted to explain how increasing any of these constructs would lead to a subsequent increase in obsessive thoughts.

It is important to remember that the direct paths between constructs and obsessions are correlational in nature and it is thus equally plausible that they are indicative of a causal effect of obsessions on a given construct as they are indicative of a causal effect of a given construct on obsessions. It has been suggested that at least some of the constructs focused on in this thesis maybe themselves casually influenced by OC symptoms. For example, it has been argued that negative mood states such as anxiety and depression may themselves be products of, as well as causes of, OC symptoms (e.g. Besiroglu *et al*, 2007). With specific reference to NJRE occurrence, it is hard to see how NJRE occurrence *alone* could lead to an increase in obsessions, given that 95% of people regularly experience the occurrence (Coles *et al*, 2003) of a NJRE yet only 2-4% of the population regularly experience obsessive thoughts (Rasmussen & Eisen, 1992). It may therefore be the case that the direct relationship between NJRE occurrence and obsessions is indicative of a causal effect of obsessions on the occurrence of NJRE. A variable which could mediate a causal influence of obsessions on NJRE occurrence is compulsions. We know that the occurrence of intrusive thoughts can lead to an increase in compulsive behaviour (Salkovskis, 1985, 1989) and we also know that the more someone engages in a compulsive behaviour, like checking, the more doubt they will experience about if they have performed the compulsive behaviour correctly (e.g. Coles *et al*, 2006). This doubt could easily manifest in the occurrence of a NJRE. If this is the case it would support the idea that NJRE may be simply epiphenomena rather than a cause of OC symptoms (Davey, 2003). Future research may wish to specifically address how the direct relationship between the constructs focused on in this thesis and obsessions operates.

As well as having a direct relationship with obsessions, inflated responsibility, IU and negative mood also had a significant indirect relationship with obsessions through other constructs. 49% of inflated responsibility's total relationship with obsessions, 49% of IU's total relationship with obsessions and 32% of negative mood's total relationship with obsessions is indirect and dependent on other constructs in the model. Whilst five specific indirect paths connect inflated responsibility to obsessions and four specific indirect paths connect IU and negative mood, respectively, to obsessions, unfortunately, it was not possible to break down the

significance of each individual pathway due to the limitations of the computer package used to perform the regression analyses in chapter 8 (see chapter 8 for details). Discussion of the relative importance of the specific indirect pathways which connect inflated responsibility, IU and negative mood, respectively, to obsessions are thus somewhat precluded due to this limitation. Future research may wish to specifically explore these indirect pathways. When the indirect as well as the direct pathways connecting constructs to obsessions are taken into account, inflated responsibility still has the strongest overall relationship with obsessions, followed by IU, negative mood, AMAC stop rules, NJRE occurrence and finally NJRE intensity.

The finding that the total relationship between inflated responsibility and obsessions (.59) is almost 6 times bigger than the total relationship between NJRE occurrence (.11) and NJRE intensity (.10) and obsessions is consistent with the prediction made in chapter 1 that inflated responsibility would be a better predictor of obsessions than NJRE. This prediction was based on past empirical suggesting that inflated responsibility has a unique relationship with obsessions whilst NJRE have a unique relationship with other symptoms such as ordering (Ecker & Gonner, 2008; Pietrefesa & Coles, 2008).

11.4.3 The relative importance of each construct in terms of each constructs relationship with compulsions

Figure 48 shows that 3 constructs and one sub-construct have a significant direct relationship with compulsions even when the relationships between the constructs themselves are taken into account. In terms of the size of these direct relationships, AMAC stop rules has the strongest direct relationship with compulsions, followed by NJRE occurrence, negative mood, and finally inflated responsibility. IU and NJRE intensity did not have a significant direct relationship with compulsions.

The direct relationship between inflated responsibility and compulsions is consistent with Salkovskis's (1985, 1989) model of OCD which would suggest that the dysfunctional appraisal of an intrusive thought, as influenced by inflated responsibility, will lead to compulsive behaviour (see chapter 1). The direct path between negative mood and AMAC stop rule use, respectively, with compulsions is consistent with the MAI hypothesis (Martin & Davies, 1998; Martin *et al*, 1993) which states that perseveration at a task such as compulsive checking should be greatest when an individual is in a negative mood and uses AMAC stop rules. Finally, the finding that NJRE occurrence has a significant direct relationship with compulsions is consistent with the idea that experiencing a feeling that "something isn't subjectively right"

(Coles *et al*, 2003) whilst engaged in a compulsive behaviour is likely to encourage an individual to persevere with that compulsive behaviour.

Again, it is important to remember that the direct paths between constructs and compulsions are correlational in nature and it is thus equally plausible that they are indicative of a causal effect of compulsions on a given construct as they are indicative of a causal effect of a given construct on compulsions. As noted in the previous section, it has been suggested that at least some of the constructs focused on in this thesis maybe themselves casually influenced by OC symptoms (e.g. negative mood: Besiroglu *et al*, 2007). With specific reference to NJRE occurrence, it is hard to see how NJRE occurrence *alone* could lead to an increase in compulsions as past research has shown that NJRE occurrence alone (without high NJRE intensity) is insufficient to lead to compulsive behaviour (Coles *et al*, 2005). Further, we know that 95% of the population regularly experience the occurrence of NJREs (Coles *et al*, 2003) but most of these people do not engage in compulsive behaviour. It seems unlikely, therefore, that NJRE occurrence *alone* leads to an increase in compulsive behaviour. It may therefore be the case that the direct relationship between NJRE occurrence and compulsions is indicative of a causal effect of compulsions on the occurrence of NJRE. As noted earlier, we know that the more someone engages in a compulsive behaviour, like checking, the more doubt they will experience about if they have performed the compulsive behaviour correctly (e.g. Coles *et al*, 2006). This doubt could easily manifest in the occurrence of a NJRE. If this is the case this would again support the idea that NJRE may be simply epiphenomena rather than a cause of OC symptoms (Davey, 2003). Future research may wish to specifically address how the direct relationship between the constructs focused on in this thesis and compulsions operates.

Whilst IU did *not* have a significant direct relationship with compulsions IU *did* have a significant relationship with compulsions through the various indirect paths connecting IU to compulsions through other constructs. As well as having a direct relationship with compulsions inflated responsibility and negative mood also had a significant indirect relationship with compulsions through other constructs. 61% of inflated responsibility's total relationship with compulsions and 19% of negative mood's total relationship with compulsions is indirect and dependent on other constructs in the model. Whilst three specific indirect paths connect inflated responsibility and IU, respectively, to compulsions and two specific indirect paths connect negative mood to compulsions, unfortunately, it was not possible to break down the significance of each individual pathway due to the limitations of the computer package used to perform the regression analyses in chapter 8 (see chapter 8 for details). Discussion of the relative importance of the specific indirect pathways which connect inflated responsibility, IU

and negative mood, respectively, to compulsions are thus somewhat precluded due to this limitation. Future research may wish to specifically explore these indirect pathways. When the indirect as well as the direct pathways connecting constructs to compulsions are taken into account, AMAC stop rules still have the strongest overall relationship with obsessions, followed by inflated responsibility, IU, NJRE occurrence and finally negative mood. The total relationship between NJRE intensity and compulsions was non-significant.

11.5.1 Implications of results of thesis for existing models of OCD

This discussion now moves onto examine the implications of the results of this thesis, starting with a discussion of the implications of the findings for existing models of OCD.

Salkovskis's (1985, 1989) cognitive model of OCD and other models based around the inflated responsibility construct (e.g. Rachman, 2002)

The final model of the relationships between the constructs focused on in this thesis (see figure 46) suggests a reciprocal relationship between inflated responsibility and negative mood. The finding that the negative mood has a causal influence on inflated responsibility has implications for models of OCD based around this construct (e.g. Salkovskis, 1985, 1989). In Salkovskis's cognitive model inflated responsibility is seen as a cause of negative mood. Salkovskis *et al* (1995, p.296) state that, "...The cognitive hypothesis is predicated on the assumption that inflated responsibility appraisals can focus on both the occurrence and the content of intrusive cognitions, which then acquire emotional significance as a result of the particular idiosyncratic pattern of appraisal". Thus, when an individual experiences an intrusive cognition his or her response to the intrusion will initially be affected by the individual's level of inflated responsibility, which then in turn may affect mood (as well as subsequently generating OC symptoms such as compulsive checking). Although, as outlined in chapter 1, such models give negative affect a maintenance role in compulsive behaviour and even suggest that mood may influence the level of responsibility experienced by an individual when making subsequent appraisals, negative affect is still seen by the theory as being brought about by an initial appraisal, which is affected by an individual's level of inflated responsibility and not, initially, by an individual's emotional state. Whilst the findings of this thesis are supportive of the notion that negative mood arising from dysfunctional appraisals may affect subsequent feelings of responsibility, the findings also suggests that the negative mood states commonly experienced by OCD sufferers, which are not necessarily related to appraisals, may be a direct causal factor in elevating inflated responsibility beliefs and that this negative mood

is not simply a consequence of cognitions associated with inflated responsibility such as dysfunctional appraisals. Theories of OCD that adopt inflated responsibility as a central explanatory construct need to account for the bidirectional nature of this construct's relationship with negative mood.

A variable which may potentially mediate the bi-directional relationship between inflated responsibility and negative mood are intrusive thoughts. Experimentally-induced negative mood has been shown to increase the subsequent occurrence of intrusive thoughts (Horowitz, 1985; Parkinson & Rachman, 1981) and the experience of such thoughts is likely to lead to a negative mood state (Rasmussen & Eisen, 1992). Similarly, inflated responsibility is likely to increase the number of intrusive thoughts experienced by an individual (Fritzler *et al*, 2008) and the increased frequency of these thoughts has been hypothesised to increase the accessibility of negative assumptions that may give rise to cognitions typical of inflated responsibility or to thought-action fusion beliefs (e.g. "If I think bad things, this is as bad as doing bad things" or "To me, not acting where disaster is a slight possibility is as bad as making that disaster") (Salkovskis & Freeston, 2001). It may thus be the case that negative mood increases inflated responsibility by increasing the number of intrusive thoughts experienced by the individual and that inflated responsibility may increase negative mood via the same mechanism. Other potential mediators of the bidirectional relationship between inflated responsibility and negative mood are addressed later in this general discussion section.

As noted earlier in this chapter, 49% of inflated responsibility's total relationship with obsessions and 61% of inflated responsibility's total relationship with compulsions are dependent on inflated responsibilities causal effect on other constructs focused on in this thesis. Salkovskis's (1985, 1989) model of OCD suggests that inflated responsibility heightens negative mood and attention and reasoning biases (i.e. looking out for trouble) and that these in turn may lead to an increase in OC symptoms. The results of this thesis would suggest that some of inflated responsibilities relationship with OC symptoms is dependent, also, on the constructs causal influence on AMAC stop rule use, IU and NJRE intensity. Theories of OCD that adopt inflated responsibility as a central explanatory construct need to account for the fact that inflated responsibility's relationship with OC symptoms seems to be largely dependent on its effects on these additional constructs and explain how these relationships work.

MAI (Martin & Davies, 1998) and theories which suggest negative mood plays a causal role in OC symptoms (e.g. Rachman, 1997)

The fact negative mood has a significant indirect effect on AMAC stop rules whilst AMAC stop rules do not have a direct or indirect effect on negative mood has implications for the MAI hypothesis (Martin & Davies, 1998; Martin *et al*, 1993). Briefly, this theory states that perseveration at a task such as compulsive checking should be greatest when an individual is in a negative mood and uses AMAC stop rules (see chapter one for more details). Prior to the work done in this thesis, research had yet to examine if being in negative mood may precede the use of AMAC use or if the use of AMAC stop rules may precede negative mood. The results of this thesis would seem to suggest that negative mood precedes the use of AMAC stop rules. Given that we know that compulsive checkers generally report high levels of negative mood (Frost *et al*, 1986) it may be the case that compulsive checkers endemic negative mood leads to them adopting AMAC stop rules and the combination of these two elements leads to checking behaviour. Given that negative mood doesn't have a significant direct causal relationship with AMAC stop rules but an indirect causal effect on AMAC stop rules through the path which connects negative mood to inflated responsibility, inflated responsibility to IU and IU to AMAC stop rule use, it is clear any theory wishing to explain how negative mood and AMAC stop rules interact will need to take into account this pathway when addressing negative moods effect on AMAC stop rules.

As noted earlier in this chapter, 32% of negative mood's total relationship with obsessions and 19% of negative mood's total relationship with compulsions are dependent on negative moods effect on other constructs focused on in this thesis. According to Rachman (1997) negative mood may influence obsessions by reducing the OC sufferer's level of mental control. The results of the current thesis would suggest negative mood may also effect obsessions by increasing inflated responsibility, IU, NJRE intensity and AMAC stop rules. The results of this thesis also suggest that negative mood may influence compulsions through increasing inflated responsibility, IU and AMAC stop rule use. It is clear that theories which adopt negative mood as a central explanatory construct to explain obsessions (Rachman, 1997) or compulsions (Martin & Davies, 1998) need to account for the fact that negative moods relationship with OC symptoms seems to be at least partly dependent on its effects on these additional constructs and explain how these relationships work.

Theories suggesting that IU plays a specific role in compulsive behaviours such as checking (e.g. Beech & Liddell, 1974)

As noted in chapter 1, some theories have suggested that IU plays a specific role in the maintenance of compulsive behaviours such as checking (e.g. Beech & Liddell, 1974). Briefly, these theories are based on the idea that when engaged in compulsive behaviours the OC individual will be doubtful about whether they have performed the task they are engaged in successfully or adequately (e.g. Coles *et al*, 2006). According to this theoretical perspective, the OC individual's high level of IU leaves them unable to cope with this doubt about their performance and as a consequence the individual feels compelled to continue with the compulsive or checking behaviour to ensure it has been done successfully or adequately (Beech & Liddell, 1974). There is good support for the idea that IU plays a specific role in compulsive behaviours such as checking (e.g. Tolin, Abramowitz, Brigidi & Foa, 2003).

Whilst not totally inconsistent with the idea that IU may play a specific role in compulsive checking, the results of this thesis suggest that IU does not have a *direct* relationship with compulsions but an *indirect* relationship through its effect on other constructs in the model, specifically AMAC stop rules, negative mood and inflated responsibility. Thus, whilst IU may play an important role in compulsive behaviour such as checking, IU does not appear to do so by having a direct influence on compulsions, as is suggested by certain theories (e.g. Beech & Liddell, 1974). Theories wishing to explain how IU effects compulsive behaviour clearly need to take into account the fact this influence is indirect and involves other explanatory constructs.

Summerfeldt's (2004, 2007) model of OCD based around the idea of incompleteness (i.e. NJRE).

The finding from the current thesis that inflated responsibility has a causal influence NJRE intensity is worthy of discussion as this goes against both theory and empirical evidence. Summerfeldt (2004, 2007) proposed that two core, continuous, orthogonal dimensions explain the motivational processes important to OCD: harm avoidance (as characterised inflated responsibility) and incompleteness (as characterised by NJRE). Summerfeldt's (2004, 2007) model suggests symptoms bought on by these two dimensions have separable motivations: whilst symptoms bought on by harm avoidance are motivated by a desire to remove the anxiety associated with some potential harmful outcome, symptoms brought about by incompleteness, or NJREs, are motivated solely by the desire to reduce the distress caused by a sense of incompleteness. There is good empirical evidence to support the separation of OCD

characterised by harm avoidance and incompleteness respectively (see chapter 1). However, given that inflated responsibility has a direct causal effect on NJRE intensity (see chapter 5) it is difficult to see how this would not in turn have an influence on NJRE's relationship with OC symptoms. Indeed, figure 47 suggests that inflated responsibilities indirect relationship with obsessions may be controlled partly by its relationship with NJRE intensity. This goes against Summerfeldt's (2004, 2007) suggestion that symptoms brought on by these two dimensions have separable motivations. Models which claim that inflated responsibility and NJRE are orthogonal dimensions will need to explain why inflated responsibility was found to have an effect on NJRE intensity in the current thesis and what this means for NJRE's relationship with OC symptoms. In terms of past research supporting this disassociation, it is worth noting that most of these studies are correlational in nature and so did not examine the influence of manipulating either inflated responsibility, or alternatively NJRE intensity, on the other construct. The two studies supporting this dissociation which were not correlational in nature (Coles *et al*, 2005; Pietrefesa & Coles, 2009) both involved experimentally inducing NJRE and then asking participants, among other things, if they felt an increase in inflated responsibility after experiencing the NJRE. Both studies found that the occurrence of a NJRE did not lead to a subsequent increase in inflated responsibility. These results are entirely consistent with the findings of this thesis as the manipulation of NJRE (chapter 7) did not lead to an increase in inflated responsibility. The finding of interest from the current thesis which goes against this disassociation is that increasing inflated responsibility increases NJRE intensity a causal effect which, to the author's knowledge, has not been examined in past research.

Implications for all models of OCD which adopt NJRE as a central explanatory construct (e.g. Coles *et al*, 2003)

If one accepts the argument that the occurrence of NJRE are a fairly "normal experience" and it is thus the intensity with which NJRE are experienced which is of potential importance to OC symptoms, the results of this thesis can be seen as raising doubts about the usefulness of the NJRE construct in general in explaining OC symptoms when the influence of other constructs in the final model are taken into account.

There are good reasons to suspect that the occurrence of NJREs represent a fairly "normal" experience and therefore that their mere occurrence does not play a causal role in OCD. Coles *et al* (2003) reported that 95% of people regularly experience NJRE. Coles *et al* (2005) found that the occurrence of a NJRE only resulted in distress and an urge to change something for those who have a predisposition to experience NJRE intensely, further supporting the idea that

the occurrence of a NJRE alone does not play a causal role in OC symptoms. The finding from the current thesis that NJRE occurrence did not influence, and was not influenced by, any other construct focused on in this thesis also supports this idea. If the occurrence of a NJRE is a fairly “normal” experience we would not expect NJRE occurrence to be linked to any of the clinical constructs focused on in this thesis. Whilst NJRE occurrence were directly related to obsessions and compulsions, for reasons outlined earlier in this discussion, it is more likely that these relationships represent a causal effect of obsessions and compulsions, respectively, on the occurrence of NJRE rather than a causal effect of the occurrence of NJRE on obsessions and compulsions (as most people experience the occurrence of NJRE but do not experience obsessions and compulsions, whilst people who experience obsessions and compulsions frequently experience the occurrence of NJRE, e.g. Miguel *et al*, 2000).

Both past research and the result of this thesis are therefore consistent with the idea that it appears to be the intensity with which a NJRE is experienced as opposed to the mere occurrence of NJRE which is of potential importance to OC symptoms. The findings of the current thesis would seem to suggest that once other constructs relationship with OC symptoms is taken into account, NJRE intensity has little to no relationship with OC symptoms.

Whilst NJRE intensity had a significant relationship with obsessions this relationship was extremely small (.10), smaller than the relationship between any other construct or sub-construct with obsessions and 6 times smaller than the relationship between inflated responsibility and obsessions. The finding that NJRE intensity is not strongly related to obsession is consistent with past research suggesting that NJRE are not strongly related to obsessions (Ecker & Gonner, 2008; Pietrefesa & Coles, 2008). The fact that the relationship between NJRE intensity and obsessions was significant is largely a product of the fact such a large sample size was used in the questionnaire study outlined in chapter 2. Moreover, the small relationship which does exist may be a sign of a causal effect of obsessions on NJRE intensity rather than a causal effect of NJRE intensity on obsessions. No theory has attempted to explain how NJRE may lead to obsessions, and there is intuitively little reason to suspect they should.

The finding that NJRE intensity was not related to compulsions is surprising as it is compulsive behaviour rather than obsessions the construct is thought to influence. Both past theory (e.g. Pitman, 1987a) and research (e.g. Miguel *et al*, 2000) link NJRE to compulsions. One may wish to therefore ask why NJRE intensity appears to be unrelated to compulsions. Given that NJRE intensity appears to be an “outcome” construct in terms of its relationship to other constructs

it may simply be the case that once the variance in compulsive behaviour explained by the constructs which have a casual influence on NJRE intensity are taken into account, NJRE intensity no longer has a significant relationship with compulsions. Past research would have been unlikely to find such a result as this past research has not examined NJRE intensity's relationship with compulsions whilst simultaneously examining other constructs.

Given that NJRE intensity appears to be largely dependent on other constructs in the model and has a small relationship with obsessions and no relationship with compulsions, and given that, to the author's knowledge, no study has attempted to examine the effect of NJRE intensity on OC symptoms simultaneously with a large number of other constructs before, future research may wish to further explore exactly what, if anything, the concept of NJRE adds to our knowledge about vulnerability to OC symptoms when other constructs like inflated responsibility are taken into account.

This discussion now moves onto examine the implications of the results of this thesis for studies examining the relationship between of multiple constructs and OC symptoms.

11.5.2 Implications for studies examining the relationship between multiple constructs and OC symptoms

The fact that IU is not a significant direct predictor of compulsions but is a significant predictor of compulsions through the 3 indirect paths connecting IU to compulsions highlights the need for studies examining how multiple constructs are related to OC symptoms to understand how these constructs are related to each other and the need to take this into consideration before attempting the examine how these constructs are related to OC symptoms. Traditional regression based approaches, wherein different constructs are pitted against one another in an attempt to find the one that best explains OC symptoms, do not take into account how constructs are related to each other or how they may interact to affect OC symptoms. The majority of studies which have attempted to examine the relationship of various constructs simultaneously with OC symptoms have used such traditional regression based approaches (e.g. Steketee *et al* 1998; Fergus & Wu, 2010). Using such an approach here, IU would be dismissed as a non-significant predictor of compulsions despite the fact the construct is a strong predictor of compulsions through the indirect pathways connecting the construct with compulsions. The finding that IU is a significant predictor of compulsions not directly, but indirectly, highlights both the limitations of traditional regression based approaches and the importance of understanding how constructs are related to one another before attempting to examine how they are related to OC symptoms.

As noted in chapter 1, one way of addressing the problem of whether a given construct is exerting an influence on OC symptoms partially or fully through its relationship with another construct or construct is through mediation analysis. An example of a study which adopted such an approach is a study by Lind and Boschen (2009) who showed that IU fully mediated the relationship between inflated responsibility and compulsive checking. Whilst such studies represent a step forward from more traditional regression approaches in terms of addressing the relationships between constructs themselves, there is an issue with regard to how one goes about specifying mediation models. This is usually done based on theory or intuition, as was the case with the mediation model tested by Lind and Boschen (2009). According to the model presented in figure 48, whilst the mediation model tested by Lind and Boschen (2009) is plausible it is equally plausible that inflated responsibility may mediate the effects of IU on compulsions. Again, this stresses the importance of understanding how constructs are related to one another before attempting to examine how they are related to OC symptoms.

11.5.3 Bidirectional relationships between constructs

The finding that inflated responsibility, IU and negative mood all casually influence one another, either directly or indirectly, is worthy of further discussion. Although previous studies have indicated that inflated responsibility (e.g. Shafran, 1997) and IU (e.g. Miranda *et al*, 2008) have a causal influence on negative mood, the finding that negative mood has a causal influence on inflated responsibility and IU, and the finding that inflated responsibility and IU have a causal influence on each other are, to the author's knowledge, unique findings involving casual relationships which have not been explored prior to this thesis. The finding that these three constructs all causally influence one another is likely to be indicative of one of four possibilities.

The first possibility is that although inflated responsibility, IU and negative mood are unique and separable entities (as indicated by the factor analysis described in chapter 2) they are entities which to some extent overlap with one another, as indicated by the fact that all three constructs are moderately correlated with one another (see chapter 2). As such, the manipulation of one of these three constructs will have a causal influence on the other two constructs, due to the overlapping relationship between the constructs.

The second possibility is that, whilst inflated responsibility, IU and negative mood represent unique and separable entities, these constructs are all connected to a third variable/construct not depicted in the model which mediates the relationship between these three constructs.

One potential candidate for mediating the relationship between inflated responsibility, IU and negative mood is that all three constructs affect information processing style, and in particular trigger systematic processing of information. Systematic processing is a bottom-up, data-driven and comprehensively analytic style in which perceivers access and scrutinize all informational input for its relevance and importance to their judgement, and integrate all information in forming their judgement (Chaiken *et al*, 1989). Negative mood has been shown experimentally to facilitate systematic processing (Ambady & Gray, 2002; Batra & Stayman, 1990; Tiedens & Linton, 2001) as have a range of situational and dispositional factors including responsibility, accountability, desire for control, personal relevance and task importance (Chaiken *et al*, 1989; Maheswaran & Chaiken, 1991; Lee, Herr, Kardes & Kim, 1999; Ambady & Gray, 2002; Batra & Stayman, 1990; Tiedens & Linton, 2001; Sorrentino, Bobocel, Gitta, Olson & Hewitt, 1988) and many of these factors are likely to be enhanced by feelings of inflated responsibility and IU. For example, feelings of IU have been linked to increases in desire for control (Krohne, 1993) whilst increases in inflated responsibility would almost certainly lead to increases in more general feelings of responsibility (Salkovskis, 1985). Negative mood in particular provides information that characterises a situation as problematic and fosters the spontaneous adoption of a systematic, detail-oriented, bottom-up processing style (Schwarz, 2002). Increasing feelings of responsibility will also signal a situation as problematic and foster systematic processing (Chaiken *et al*, 1989) – but only if the outcomes for which the individual feels responsible are appraised as having potentially harmful or threatening outcomes, a characteristic typical of the OCD explanatory construct of inflated responsibility (Salkovskis, 1985). An increase in IU will increase the desire for control (Krohne, 1993) and this in turn will also foster systematic processing (Maheswaran & Chaiken, 1991). Thus, inflated responsibility, IU and negative mood are all factors that have an integrated relationship with a specific information processing style. Activation of that common processing style through increases in either inflated responsibility, IU or negative mood, respectively, is likely to lead to an increase in scores on the other two constructs, as all three constructs are associated with increases in systematic processing.

The third possibility is that whilst inflated responsibility, IU and negative mood represent unique and separable entities the manipulations used in the thesis to specifically target one construct, for example inflated responsibility, may have lead to *direct* increases in scores on measures of the other two constructs or to significant indirect effects by directly effecting the relevant mediating construct in the case of IU's indirect effect on inflated responsibility through negative mood and negative mood's indirect effect on IU through inflated

responsibility. Sticking with the example of inflated responsibility, if the manipulation of inflated responsibility used in this thesis *directly* affected IU and negative mood then the causal paths in the final model connecting inflated responsibility to IU and negative mood, respectively, may be simply an artefact of the specific inflated responsibility manipulation used in this thesis *directly* effecting IU and negative mood (rather than indicative of a causal effect of inflated responsibility on IU and negative mood). Thus, rather than showing bidirectional relationships between inflated responsibility and IU, IU and negative mood and finally, negative mood and inflated responsibility, the results of this thesis may simply reflect the fact the manipulations of the three constructs of interest used in this thesis were not specific enough to only *directly* influence the specific construct a given manipulation was targeted at. A discussion of the ability of the manipulations used in this thesis to only *directly* influence the specific construct they were intended to influence can be found in the limitations section of this general discussion.

The fourth and final possibility is that rather than representing unique and separable entities, inflated responsibility, IU and negative mood are actually merely different expressions of one underlying core variable. If inflated responsibility, IU and negative mood are simply different expressions of one variable it follows that it would be impossible to manipulate inflated responsibility, IU or negative mood without also directly influencing the other two “constructs” as all three “constructs” are just different expressions of the same variable. This would explain why all three constructs were found to influence one another in the current thesis.

Of course, the idea that these three constructs are merely different expressions of the same variable goes against the final conclusion in chapter 2 that the five constructs being focused on in this thesis are unique and separable entities. To briefly recap the results of this chapter, an exploratory factor analysis suggested that a one factor or five factor solution best described the relationship between the five constructs focused on in this thesis with a subsequent confirmatory factor analysis leading to the conclusion that the five factor solution was a better solution than the one factor solution. Nevertheless, given the fact that one factor explained a good deal of shared variance in the five constructs, one should at least be open to the possibility that inflated responsibility, IU and negative mood, and perhaps even AMAC stop rules and NJRE, are merely different expressions of one underlying core variable. The fact that inflated responsibility, IU and negative mood all influence AMAC stop rule use and NJRE intensity in the final model is consistent with the idea that all *five* constructs focused on in this thesis may be different expressions of the same variable. However, the fact that the manipulation of AMAC stop rules and NJRE experience did not casually effect any other

construct in this thesis is inconsistent with this idea, as if all five constructs are essentially one variable we would expect the successful manipulation of any of the five constructs separately to influence the remaining four constructs as all five are in fact just different expressions of the same variable. It may be the case that while inflated responsibility, IU and negative mood are all different expressions of the same variable, AMAC stop rules and NJRE intensity are separable and unique entities which are causally affected by whatever the one core underlying variable is which inflated responsibility, IU and negative mood represent. This would be consistent with the argument made earlier in this discussion that AMAC stop rules can be seen as reflecting performance factors that are “deployed” in response to the influence of other constructs (or in this case, in response to the influence of the one variable) whilst it seems plausible that, rather than being largely dependent on inflated responsibility as was argued earlier, how intensely one experiences an NJRE is instead largely dependent on this one variable.

If inflated responsibility, IU and negative mood are just different expressions of one core underlying variable this leads to the question of what this variable maybe? One possibility is that rather than being separable “causes” of OC symptoms, inflated responsibility, IU and negative mood may merely be different expressions of a conceptually-based “OCD” experience which OC symptoms themselves are also an expression of.

In the study of emotion, there are a number of evolving approaches to understanding the experience of emotion, some of which attempt to define what makes up a mental representation of emotional experience, such as the constructivist approach (Barrett, Mesquita, Ochsner & Gross, 2007; Barrett, 2009). In the constructivist approach discrete emotions (such as anxiety) are viewed as conceptually distinct and representing an integrated motivational system containing behavioural, cognitive and affective components (Barrett, 2009). The constructivist approach argues that emotional experience emerges from the interaction of more basic psychological ingredients. To this extent, the experience of a specific emotion is seen as the end product of the individual’s need to categorize emotional experiences and emotional knowledge (e.g. Barrett, 2009). When a person is feeling anxious, he or she will automatically and preconsciously categorise sensations from both their body and the world outside using their own learnt conceptual knowledge of the category “anxiety” (Smith & DeCoster, 2000; Barrett, Tugade & Engle, 2004) and as a result will experience an unpleasant state as evidence that something is threatening (Öhman & Mineka, 2003). Note that in such constructionist views experiencing the world as threatening does not *cause* the experience of anxiety – it *is* the experience of anxiety. It is part of the conceptual criteria by

which the category of “anxiety” is defined. So the experience of anxiety would be the entirety of the perceptions (internal and external), cognitions and actions that trigger that learnt emotional category and give rise to an internal simulation of previous experiences of that category.

Let us conceive OCD as a similarly conceptually-based experience which consists of behavioural, cognitive and affective elements. Behavioural elements may include compulsive behaviours, cognitive elements may include cognitions characteristic of IU and inflated responsibility and affective elements may include negative emotions such as depression. According to the constructivist approach, activation of one or a combination of these elements will give rise to the learnt conceptual knowledge of the category “OCD experience” which in turn will give rise an internal simulation of previous experiences of that category. So if one experiences cognitions characteristic of inflated responsibility, for example, this will activate the learnt category of “OCD experience” and give rise to previous experiences of that category which are likely to contain behavioural (e.g. compulsive behaviour) cognitive (e.g. cognitions characteristic of IU) and affective (e.g. negative mood) elements of that category. This would explain why inflated responsibility, IU and negative mood were all found to influence each other in the current thesis as activation of one of these elements of the “OCD experience” will automatically activate the other two elements (as long as they form part of an individual’s previous experiences of the category). From this perspective then, the core underlying variable which inflated responsibility, IU and negative mood are different expression of is the “experience” of OCD itself. They are no more of a “cause” of the OCD experience than symptoms themselves.

Is it reasonable to view inflated responsibility, IU and negative mood as part of the “experience” of OCD rather than as separable causes of OC symptoms? Given that negative mood states are highly comorbid with OC symptoms (LaSalle *et al*, 2004) and there is little consensus with regard to if negative mood is a cause of (e.g. Salkovskis & Freeston, 2001) or outcome of (Besiroglu *et al*, 2007) OC symptoms it seems plausible that negative mood may represent part of the “OCD” experience rather than a separable cause of OC symptoms. However, why might one think of inflated responsibility and IU as representations of, as opposed to causes of, OC symptoms? Both inflated responsibility (e.g. Salkovskis, 1985) and IU (e.g. Dugas, Gagnon, Ladouceur & Freeston, 1998) were developed during research on the aetiology and maintenance of anxiety disorders and are largely inferred states or processes derived from the clinical experience of researchers or clinicians in their interactions with patients (Davey, 2003). Whilst researchers looking at patient’s accounts of inflated

responsibility and IU have inferred that these states or processes are “causes” of OC symptoms, it could be inferred that patient’s accounts of inflated responsibility and IU represent the “experience” of OCD rather than its cause. If inflated responsibility and IU are simply different expressions of the OCD “experience”, we would expect them to correlate with other “expressions” of the experience, such as obsessions and compulsions, which they do (see chapter 2). It would also make sense that the manipulation of one expression of the OC experience of (e.g. inflated responsibility) would lead to increases in other expressions of the experience, which indeed is the case (e.g. compulsions, see e.g. Ladouceur *et al*, 1995; IU, this thesis; negative mood; this thesis).

Future research may wish to further explore, firstly, if inflated responsibility, IU and negative mood are simply different representations of one core underlying variable and, secondly, if they are, what this variable is.

11.5.4 Implications for treatment

What are the implications of the findings of this thesis for the treatment of OCD? Despite the fact all of the constructs focused on in this thesis were significantly related to both obsessions and compulsions (with the exception of the sub-construct NJRE intensity with compulsions), the results of this thesis would seem to suggest that, if one were to aim an intervention at only one construct focused on in this thesis, one would be best advised to aim this intervention at either inflated responsibility, IU or negative mood. Given that these three constructs significantly influence every other construct in the model, by targeting an intervention specifically at one of these constructs one is likely to not only reduce the impact of that individual construct on OC symptoms, but also the impact of every other construct in the model on OC symptoms. Whilst it is difficult to suggest if it would be best to tailor an intervention specifically to target either inflated responsibility, IU or negative mood, as all are significantly related to obsessions and compulsions, given that the total effect of inflated responsibility on obsessions was substantially larger than any other constructs total effect on obsessions, targeting inflated responsibility maybe of particular use for treating obsessions. Of course if these three constructs are actually mediated by a fourth variable (see discussion in previous section), it may be preferable to tailor an intervention aimed at targeting this fourth variable as opposed to either of the three constructs individually. If these three constructs are actually different representations of the same thing as opposed to separate entities (again see previous section) it would presumably not matter which construct an intervention is tailored

towards. However, let us continue this discussion assuming that the five constructs focused on in this thesis are separable entities.

Whilst tailoring an intervention at AMAC stop rule use may lead to a reduction in OC symptoms as the construct is related to both obsessions and compulsions, given that AMAC stop rules are an “outcome” construct in the model in relation other constructs, such an intervention is unlikely to reduce the impact of other constructs on OC symptoms, thus somewhat limiting the effectiveness of such an intervention. AMAC stop rule use is influenced by IU, inflated responsibility and negative mood. Therefore, even if an intervention is successful at lowering an individual’s AMAC stop rule use, if this individual has a high level of inflated responsibility, IU or regularly experiences negative mood states, these constructs may reduce the effectiveness of the intervention by raising an individual’s use of AMAC stop rules. These constructs themselves would be unaffected by the intervention, as reducing an individual’s use of AMAC stop rules will, in theory, have no effect on their level of inflated responsibility, IU or mood state.

Similarly, tailoring an intervention aimed at reducing the occurrence of NJRE would be unlikely to reduce the impact of other constructs on OC symptoms given that NJRE occurrence does not significantly influence any of the other constructs focused on in this thesis. Moreover, the fact 95% of people experience the occurrence of NJRE (Cole *et al*, 2003) would suggest that the mere occurrence of an NJRE is a “normal experience” and so one would not necessarily expect that an intervention tailored towards reducing NJRE occurrence alone would lead to a reduction in OC symptoms. It is the intensity with which an NJRE is experienced, as opposed to the occurrence of NJRE, which is thought to be a causal factor in OC symptoms (Coles *et al*, 2005).

Tailoring an intervention aimed at NJRE intensity in preference of tailoring an intervention aimed at one of the other constructs focused on in this thesis would seem inadvisable as the construct had the smallest relationship of any construct with obsessions in terms of size and no relationship with compulsions. Moreover, such an intervention would also be unlikely to reduce the impact of other constructs on OC symptoms given that NJRE intensity does not significantly influence any of the other constructs focused on in this thesis. NJRE intensity is influenced by IU, inflated responsibility and negative mood. Therefore, even if an intervention is successful at reducing NJRE intensity, if this individual has a high level of inflated responsibility, IU or regularly experiences negative mood states, these constructs may reduce the effectiveness of the intervention by increasing how intensely someone experiences a NJRE.

These constructs themselves would be unaffected by such an intervention as reducing an individual's NJRE intensity will, in theory, have no effect on their level of inflated responsibility, IU or mood state.

The results of the current thesis therefore suggest if one were to aim an intervention at only one construct focused on in this thesis one would be best advised to aim this intervention at either inflated responsibility, IU or negative mood rather than AMAC stop rule use or NJRE. Cognitive behavioural therapy which specifically targets reducing inflated responsibility beliefs is widely used in the treatment of OC symptoms and its effectiveness has been supported (e.g. Ladoceur, Leger, Rheume, & Dube, 1996). Antidepressant medications which aim to improve mood, such as serotonin reuptake inhibitors, are also widely used in the treatment of OC symptoms with support for their efficacy (for a review see Bandelow, 2008). Although to the author's knowledge there is no specific treatment aimed at OC symptoms based around reducing intolerance of uncertainty it has been suggested that cognitive behavioural therapy for individuals with OCD should address IU (Tolin, Abramowitz, Brigidi, & Foa, 2003). Overton and Menzies (2005) found that IU correlated significantly with improvement in OCD symptoms and that changes in IU occurred prior to, or concurrent with, symptom improvement during exposure and response prevention.

Whilst this discussion has been limited to the hypothetical situation where one can only tailor a treatment towards addressing one specific construct there is of course no reason in reality why a treatment could not be tailored towards addressing two or more constructs focused on in this thesis or, alternatively, why an individual with OCD could not receive two separate treatments simultaneously which are aimed at addressing different constructs. Indeed, such an approach may prove more efficacious as illustrated by the fact that it is recommended that cognitive behavioural therapy (which is often targeted at reducing inflated responsibility beliefs) for individuals with OCD should preferably be used in combination with drug treatment such as serotonin reuptake inhibitors which target improving mood (Bandelow, 2008).

11.6 Relevance of model to other constructs not included in thesis

Several constructs which have been linked to OC symptoms in the literature were excluded from this thesis, some of which were mentioned in chapter 1 along with the reasons why these constructs were excluded. Here we shall briefly speculate on how some of these constructs may be related to the final model presented in figure 46. This discussion will be limited to those excluded constructs mentioned in chapter 1.

Perhaps the most prominent theory of OCD not focused on in this thesis is the metacognitive model of OCD (Wells, 1997). The metacognitive model of OCD argues that symptoms are a product of three types of metacognitive knowledge: thought-fusion beliefs, beliefs about the need to perform rituals, and stop signals or criteria for terminating rituals (Wells, 1997). According to the metacognitive model cognitions related to inflated responsibility and IU are viewed as by-products of metacognitive beliefs (Solem *et al*, 2010; Myers *et al*, 2009a). For example, if thought-fusion beliefs are particularly strong or prominent, intrusive thoughts are more likely to be appraised as significant and possibly dangerous. This will in turn generate cognitions related to inflated feelings of responsibility and to IU. There is some support for the conceptualisation of inflated responsibility and IU as by-products of metacognitive beliefs in this way from studies which have shown that thought-fusion beliefs are a better predictor of OCD symptoms than cognitive constructs such as inflated responsibility, IU and other cognitive constructs not focused on in this thesis such as perfectionism (e.g. Solem *et al*, 2010; Myers *et al*, 2009a, Myers *et al*, 2009b). Whilst to the author's knowledge the metacognitive model has not specifically addressed how negative mood, NJRE and AMAC stop rules are related to metacognitive beliefs, given that all three of these constructs are influenced by inflated responsibility and IU in the final model, one could make an argument that *all* of the constructs focused on in this thesis maybe by-products of metacognitive beliefs.

Another prominent construct proposed to have a causal influence on OC symptoms is thought-action fusion (TAF, Rachman, 1993). As discussed in chapter 1, there has been some debate about if inflated responsibility and TAF, as originally defined by Rachman (1993), should be treated as separate constructs (see Berle & Starcevic, 2005, for a review). For the purposes of this thesis the definition of inflated responsibility used took into account those characteristics attributed to TAF beliefs as originally defined by Rachman (1993). This was primarily due to a wish to incorporate inflated responsibility in its broadest sense and not to exclude from the definition conceptual ideas connected to TAF which also form part of at least some inflated responsibility definitions (Salkovskis *et al*, 1999). The story/advice based manipulation of inflated responsibility described in chapter 5 incorporated elements of TAF as did the measures of inflated responsibility used throughout this thesis.

It is of course possible that inflated responsibility and TAF (Rachman, 1993) are separable constructs and there are proponents of this view point (e.g. Amir *et al*, 2001). If this is the case, how TAF and inflated responsibility are casually related to one another, as well as how TAF and inflated responsibility as separate constructs may be related to the other constructs focused

on in this thesis is open to debate. Given that TAF beliefs, as originally defined by Rachman (1993), form part of Well's (1997) metacognitive model under the slightly broader concept thought-fusion beliefs, one might suggest that inflated responsibility and other constructs in the model are by-products of TAF, in a similar way to how the metacognitive model argues that inflated responsibility and other cognitive constructs are by-products of metacognitive beliefs more generally (e.g. Solem *et al*, 2010).

Whilst it is difficult to speculate on how some of the less prominent constructs excluded from this thesis may relate to the final model as a whole, some suggestion has been made about how some of these excluded constructs may relate to individual constructs in the final model. For example, it has been speculated that perfectionism may be influenced by IU, specifically, that the pursuit of perfection may be an attempt to increase certainty about future outcomes experienced as uncertain and distressing (OCCWG, 1997). Wahl *et al* (2008) proposed that individuals high in inflated responsibility will subsequently display elevated evidence requirements, "...“stop criteria”, where the person actively seeks to achieve a particular subjective or emotional state as a way of deciding that they have completed an activity" (Wahl *et al*, 2008, p.144).

Whilst some speculation has been offered here as to how some of the constructs excluded from this thesis might relate to the final model and the constructs within that model based on the suggestions of others, it is important to note that to the author's knowledge none of these suggestions have been solidly backed up with experimental evidence. In order to determine how these constructs are related to the constructs included in the model and indeed to constructs not included in the model it would be preferable to manipulate these constructs experimentally to see what effect they have on other constructs and what effect the manipulation of other constructs has on them, as has been done with respect to the 5 constructs focused on in this thesis.

11.7.1 Limitations

Finally, some of the potential limitations of the work carried out in this thesis are considered here.

11.7.2 Manipulation specificity

Although the factor analyses described in chapter 2 suggested that the five constructs focused on in this thesis are best seen as separate entities and that it should thus be possible to

manipulate each construct separately without a manipulation *directly* effecting other constructs, the possibility that a given manipulation targeted at one construct (e.g. inflated responsibility) may have directly influenced another construct (e.g. IU) cannot be completely discounted. This would be problematic for the results of the current thesis. For example, if the manipulation of inflated responsibility directly affected IU, the causal path in the final model connecting inflated responsibility to IU may be simply an artefact of the specific inflated responsibility manipulation used in this thesis directly effecting IU rather than indicative of a causal effect of inflated responsibility on IU. We shall briefly discuss the possibility that the manipulations used in this thesis which were intended to *directly* influence only one specific construct may have directly influenced other constructs.

We can be sure that the manipulations used in this thesis to manipulate stop rule use and NJRE, respectively, did not directly influence other constructs they were not intended to influence as in both of the studies in which these constructs were manipulated no significant differences were found on any of the relevant “dependent” constructs. In the experiment in which mood was manipulated significant differences were found between the negative and positive mood groups on measures of inflated responsibility, AMAC stop rule use and FLC stop rule use. Mood was manipulated in this experiment through a music mood induction procedure. It is difficult to imagine how listening to music would directly affect someone’s motivation to engage in a given task (stop rule use) or someone’s cognitions related to responsibility (e.g. If I think bad things, this is as bad as DOING bad things) without this effect being mediated through the music’s effect on mood. We can be fairly sure, therefore, that the significant effects on the “dependent” constructs in this experiment represent direct causal effects of mood rather than a direct effect of the manipulation used to manipulate mood on inflated responsibility or stop rule use.

The manipulations of inflated responsibility and IU used in this thesis both involved participants reading a story about someone high or low on the relevant construct and then advising the person to act like, or become someone, who is high or low on the relevant construct (e.g. act like someone who has an inflated sense of responsibility *or* act like someone who thinks and behaves in the opposite way to someone who has an inflated sense of responsibility). In the experiments in which inflated responsibility and IU were manipulated a significant difference was found between the relevant experimental groups in terms of mood. As outlined in the experimental chapters in which inflated responsibility and IU were manipulated, to ensure that the two stories used in the manipulation of either construct did not have a direct effect on mood due to containing differing amounts of negative material,

independent raters were asked to rate the two stories to ensure the stories themselves did not differ in terms of negative content. They didn't in either case. We can be fairly sure, therefore, that the effects on mood in these studies were influenced by changes in inflated responsibility and IU, respectively, rather than being indicative of a direct effect of the relevant manipulations on mood.

In the experiment in which inflated responsibility was manipulated significant differences were also found between the high and low responsibility groups on measures of IU and NJRE intensity. It is difficult to see how the vignettes used to manipulate inflated responsibility could have *directly* influenced IU. By its very definition, IU is a bias which affects how people perceive, interpret and respond to uncertain *future* situations (e.g. Grenier, Barette & Ladouceur, 2005). The vignettes used to manipulate inflated responsibility in this thesis focus on negative events which have occurred in the *past* and on how the character in the vignette had either felt extreme responsibility in relation to these events or no responsibility in relation to these events. At no point do these vignettes address uncertainty over future situations or how the individual character feels about or reacts to uncertainty. It is difficult to see, therefore, why the manipulation of inflated responsibility would have lead *directly* to changes in IU. It is also difficult to see how the vignettes used to manipulate inflated responsibility could have lead to direct changes in NJRE intensity. At no point do these vignettes discuss or mention feelings of NJRE. Whilst the vignettes do briefly touch upon hypervigilance (that is, being on the "look out" for possible ways one could harm oneself or others) these discussions are very much couched in terms of inflated responsibility rather than the sense of "incompleteness" characteristic of NJRE (Coles *et al*, 2003). It is again difficult to see, therefore, why the manipulation of inflated responsibility would have lead *directly* to changes in NJRE intensity. It is easy to imagine how feeling a sense of inflated responsible, however, may lead to increases in how intensely one experiences a NJRE (i.e. if one interprets the occurrence of a NJRE as in someway indicative that the individual may be responsible for harm to oneself or others).

Finally, in the experiment in which IU was manipulated, significant differences were also found between the high and low IU groups on measures of AMAC and FLC stop rule use. These vignettes are very much focused on discussing uncertain future situations and how the relevant character perceives, interprets and responds to these situations (Dugas *et al*, 2004). The vignettes do not mention stop rules or the types of task motivation one would consider characteristic of AMAC and FLC stop rules respectively more generally (see chapter 1). Again it is difficult to see why the vignettes used to manipulate IU would have *directly* influenced stop

rule use. It is easy to imagine how a general sense of IU, however, could lead to the adoption of AMAC stop rules, for reasons outlined elsewhere in this discussion.

In conclusion, whilst one cannot be 100% certain that the manipulations used in the current thesis did not *directly* influence constructs they were not intended to directly influence, it seems unlikely that the significant findings which were found in this thesis would have come about from a direct effect of a manipulation on a construct it was not intended to influence for the reasons discussed above.

11.7.3 Relative strength of each manipulation

Even if the manipulations used in this thesis were successful in manipulating *directly* only the specific construct they were intended to manipulate, these manipulations may have differed in terms of how strongly they influenced the specific construct they were intended to effect. If the various manipulations used in this thesis to manipulate specific constructs differed dramatically in terms of their power to manipulate the specific construct they were intended to manipulate, this would be problematic for the results of the current thesis.

Take a hypothetical example where we want to manipulate construct x (happiness) to see if this significantly effects construct y (excitement), and then manipulate y to see if this significantly effects x. In this example let's say that, in reality, x has a causal effect on y and y has a causal effect on x, although we don't know this. Let us also say that for x to cause a "significant" change in y, the manipulation of x has to be strong enough so that the two groups used in this experiment differ by 20 units on construct x (20 units of happiness). Likewise for y to cause a "significant" change in x, the manipulation of y has to be strong enough so that the two groups used in this experiment differ by 20 units on construct y (20 units of excitement). We are of course unaware of the required unit change needed in x and y respectively to show an effect on the other construct. Continuing with the example, firstly we manipulate x (happiness) and the manipulation is successful in causing a difference between the two groups used in this experiment of 22 units on construct x. A significant effect is therefore found on construct y (excitement). We then manipulate construct y (excitement), however, this manipulation only causes a difference between the two groups used in this experiment of 10 units on construct y. Subsequently a significant effect on construct x (happiness) is not found. We thus conclude that happiness causes excitement, but excitement does not cause happiness, when in reality both happiness and excitement causally influence one another. Hopefully this example has been illustrative of the need for manipulations of specific constructs to be approximately equal in terms of their power to affect the construct they are intended to manipulate so that

erroneous conclusions are not drawn about causal influences between those constructs. Were the manipulations used in the current thesis approximately equivalent in terms of their power to affect the construct they were intended to influence?

In the experiments in which negative mood, inflated responsibility and IU were manipulated, the two groups in each respective experiment differed significantly on both the VAS measure and the full measure of the manipulated construct and, moreover, the effect sizes associated with these differences all reached Cohens (1992) criteria for a large effect size. In the experiment in which stop rules were manipulated, the two groups differed significantly on both the VAS measures and full measures AMAC stop rule use and FLC stop rule use. The effect sizes associated with these differences all reached Cohens (1992) criteria for a large effect size except for the effect size associated with the VAS measure of AMAC stop rules, which only reached the criteria for a moderate effect size. However, given that the effect size associated with the more reliable full measure of AMAC stop rule use was large, we can assume that the difference between the two groups on AMAC stop rule use in this experiment was “large” (in effect size terms). We can thus conclude that the manipulations of negative mood, inflated responsibility, IU and stop rules used in this thesis were all approximately equivalent in terms of how strongly they influenced the construct they were intended to manipulate.

In the experiment in which NJRE were manipulated, the two groups significantly differed on the VAS measures of NJRE occurrence and NJRE intensity. The effect sizes associated with these differences were large and moderate respectively. The two groups did not differ significantly on the full measures of either NJRE occurrence or NJRE intensity and the effect sizes associated with these differences were small according to Cohens (1992) criteria. It thus appears that the manipulation of NJRE used in the current thesis may not have influenced the construct it was intended to manipulate as strongly as the manipulations used in this thesis to manipulate the other constructs.

Given that the manipulation of NJRE did not appear to have as strong an influence on the construct it was intended to manipulate as the other manipulations used in this thesis, the fact the manipulation of NJRE did not influence any dependent constructs maybe due to the fact that the groups did not differ sufficiently in terms of NJRE occurrence and intensity. It is therefore possible that NJRE *may* have a causal influence on other constructs in this model. However, two things would suggest this isn't the case. Firstly, the fact that the two groups differed on the VAS measures of NJRE occurrence and NJRE intensity, with associated large and moderate effect sizes respectively, suggests the manipulation was fairly successful at

manipulating NJRE. These measures were significantly correlated with the respective full measures of NJRE occurrence and NJRE intensity. Secondly, none of the differences on the dependent constructs between the high and low groups in the experiment in which NJRE were manipulated were anywhere near even approaching significance (see chapter 7). It would seem unlikely that a slightly stronger manipulation of NJRE would have resulted in any of these differences reaching significance. Future research may wish to use a stronger manipulation of NJRE to see if a significant effect on any of the other constructs focused on in this thesis is found.

11.7.4 Analogue VS Clinical Populations

Finally, we shall briefly discuss the possible limitations of using analogue as opposed to clinical samples throughout this thesis. The issue of using analogue populations to explore constructs related to psychopathology is always going to be a controversial one. Initially using such a population could be viewed as having obvious limitations, can it be salient to use a non-clinical population when researching a disorder? However, since Lang and Lazovik (1963) took the unusual step of using a non-clinical population to assess the efficacy of systematic desensitisation for snake fear, many studies have used non-clinical populations and their findings have both informed models and treatments for anxiety disorders. Today, the use of nonclinical populations within research on OCD is a common practice.

In support of using analogue populations in OC research, Rachman & de Silva (1978) found that analogue populations experience similar intrusive thoughts to clinical populations, although with lesser frequency and resulting distress. Analogue participants have reported engaging in compulsive behaviours in order to remove distress or prevent feared outcomes, as do clinical populations, in numerous studies (reviewed in Gibbs, 1996). Burns, Keortge, Formea, and Sternberger (1996) showed that in student samples, students scoring the highest on Padua Inventory generally meet the diagnostic criteria for OCD. It could be argued that analogue studies only have value if OC symptoms can be seen as a continuum, ranging from individuals with no symptoms to individuals who are clinically diagnosed with OCD. Two taxometric studies have suggested that OC symptoms are generally best considered as dimensional rather than categorical (Haslam, Williams, Kyrios, McKay, & Taylor 2005; Olatunji, Williams, Haslam, Abramowitz, & Tolin, 2008). These results are consistent with cognitive models of OCD, which follow a dimensional model (e.g. Frost & Steketee, 2002) and support the appropriateness of studying OCD related phenomena in analogue samples.

It should also be noted that, as with much psychological research involving student samples, the samples used throughout this thesis consisted pre-dominantly (although far from exclusively) of white females, in their early 20's, studying psychology, and therefore do not easily correspond to the demographics of individuals with OCD in the general population, given that OCD affects all cultural and ethnic groups (APA, 2000; Rasmussen & Eisen, 1992) and both males and females in roughly equal proportion (Bebbington, 1998). To the author's knowledge no research currently exists examining the validity of extending conclusions based on research involving non-representative samples to the general population in the case of OC symptomatology. However, one is advised to bear in mind the lack of representativeness of the samples used in this thesis when extending the conclusions of this thesis to the general population, as is the case when extending any conclusions based on a non-representative sample to the general population.

11.8 Final Conclusions

In this thesis the causal relationship between five constructs which have been proposed to have a casual effect on OC symptoms: inflated responsibility, IU, NJRE, negative mood and AMAC stop rules, were examined. Additionally, the relationship between these constructs and obsessions and compulsions, respectively, when the relationship between these constructs were taken into account was explored. Whilst the thesis has produced many results of interest which will not be summarised again here, it is hoped the implications of the results of this thesis can be summarised in four points.

Firstly, the results of this thesis have implications for existing models of OCD. Some results of the current thesis give new insights into how the mechanisms proposed to be important to OC symptoms by certain models of OCD relate to each other casually. For example, the finding the negative mood influences AMAC stop rule use but that AMAC stop rule use does not influence negative mood has implications for the MAI hypothesis (Martin & Davies, 1998). Some of the results of the current thesis suggest that certain models of OCD need to be adjusted to take into account the relationships between certain constructs. For example, Salkovskis's (1985, 1989) model of OCD needs to take into account the bidirectional relationship between inflated responsibility and negative mood as well as the fact over 50% of inflated responsibility's relationship with OC symptoms are dependent on the construct's influence on the four other construct focused on in this thesis. Finally, some of the results of the current thesis directly contradict the basic assumptions of existing models of OCD. For example, the finding the

inflated responsibility influences NJRE intensity contradicts Summerfeldt's (2004, 2007) assumption that inflated responsibility and NJRE are orthogonal dimensions.

Secondly, the results of this thesis show that one needs to understand the relationship between constructs and take this into account *before* examining how various constructs are related to OC symptoms. The importance of this point is illustrated best by the fact IU only had a significant relationship with compulsions through its relationship with other constructs. As noted earlier, traditional regression based approaches, wherein different constructs are pitted against one another in an attempt to find the one that best explains OC symptoms, do not take into account how constructs are related to each other or how they may interact to affect OC symptoms. Using such an approach here, IU would have been dismissed as a non-significant predictor of compulsions despite the fact the construct is a strong predictor of compulsions through the indirect pathways connecting the construct with compulsions. Only through mapping out the relationship between the various constructs focused on in this thesis and *then* examining their relationship with OC symptoms was it possible to find this result.

Thirdly, the finding that inflated responsibility, IU and negative mood all influence each other in the final model suggests that all three constructs may be mediated by a third variable or construct not depicted in the final model or, more radically, that these three constructs are not separable entities but are in fact different representations of the same thing.

Finally, whilst two of the constructs focused on in this thesis, namely AMAC stop rule use and NJRE, are related to OC symptoms (apart from NJRE intensity and compulsions) they are heavily influenced by the three other constructs in the model. These two constructs themselves have no influence on other constructs focused on in this thesis. For this reason if one were to aim an intervention at only one construct focused on in this thesis one would be best advised to aim this intervention at either inflated responsibility, IU or negative mood rather than AMAC stop rule use or NJRE.

Whilst the models presented in chapter 8 and this chapter have been referred to as "final" models, they are of course anything but "final". Much work still needs to be done in determining how constructs not focused on in this thesis relate to the model. It is hoped the work presented in this thesis represents the first steps in such an endeavour.

12. References

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13. Appendix 1: The Stop Rule Questionnaire (SRQ)

This appendix describes the content, reliability and factor structure of a questionnaire not seen in the published literature before, the Stop Rule Questionnaire (SRQ). A study is also described which attempted to provide initial validation of the measure.

Stop Rule Questionnaire (SRQ)

Although not created for specific use in this thesis the SRQ has not been described before in the published literature. Therefore the content of the questionnaire is briefly described here as well as the scale's internal consistency and factor structure. As part of a larger study described in the chapter 2 the SRQ was distributed to 370 participants. The reliability analysis and factor analysis described here were conducted on that data (see chapter 2 for details).

Content of the SRQ

The SRQ contains 20 statements, 10 intended to measure endorsement of AMAC stop rules and 10 used to measure endorsement of FLC stop rules. Each statement refers to checking. An example of a statement reflective of AMAC stop rules is, *I think I've checked everything, but I may not have done it properly, so better keep checking*, whilst a statement reflective of FLC stop rules is, *I should stop checking because once is enough, and doing it any more will make no difference*. These statements are preceded by instructions asking participants to think back to times they have checked something and indicate to what extent each statement describes the kind of thing the individual might think when deciding whether or not to stop checking on 5-point scale (ranging from "not the kind of thing I think of at all" (1) to "I think of this kind of thing a lot" (5)). Table 14 gives a full list of AMAC and FLC statements.

Table 14: Full list of AMAC and FLC statements
AMAC 1: I think I've checked everything, but I may not have done it properly, so better keep checking.
AMAC 2: I had better check again because I want everything to be perfect.
AMAC 3: I have probably forgotten something obvious, so I had better have one last check.
AMAC 4: I must double check that I have done everything.
AMAC 5: I must check things one more time – just to be on the safe side.
AMAC 6: Perhaps I didn't check properly, I had better check again.
AMAC 7: I must think of all the things I've done wrong, and then check them.
AMAC 8: I may think I've checked everything properly, but in reality perhaps I haven't.

<i>AMAC 9:</i> I had better check everything to make sure nothing bad happens.
<i>AMAC 10:</i> I wasn't concentrating the last time I checked, so I had better do it again.
<i>FLC 1:</i> I'm pretty sure I checked properly, so don't worry about it anymore.
<i>FLC 2:</i> I can't be bothered to keep checking.
<i>FLC 3:</i> I should stop checking because once is enough, and doing it any more will make no difference.
<i>FLC 4:</i> Nothing bad will happen if I decide to stop checking things now.
<i>FLC 5:</i> Everything is probably fine, so stop checking.
<i>FLC 6:</i> I can't be bothered to keep checking things anymore.
<i>FLC 7:</i> Continually checking something won't make any difference.
<i>FLC 8:</i> Even if I haven't checked everything properly, it won't matter.
<i>FLC 9:</i> I'm sure everything is fine, so stop checking.
<i>FLC 10:</i> I can't spend all day checking things, so I may as well stop.

Correlations between items and factor structure of SRQ

A preliminary analysis was conducted to examine the Pearson correlation between, firstly, the 10 AMAC statements and, secondly, the 10 FLC statements. Indicating that the AMAC statements are representative of one underlying construct all of the AMAC statements were significantly positively correlated (correlations ranging from .34 to .71, all correlations significant at $p < .001$, one tailed). Indicating that the FLC statements are representative of one underlying construct, all of the FLC statements were significantly positively correlated (correlations ranging from .22 to .70, all correlations significant at $p < .001$, one tailed).

A factor analysis was performed in order to examine the factor structure of the SRQ. An exploratory factor analysis was performed on the 10 AMAC and 10 FLC statements with principle component analysis. Given that we expected two factors to emerge (AMAC stop rules and FLC stop rules) representing two opposing ends of the stop rule "continuum", varimax rotation was used. Communalities ranged from .32 to .70. Two components had eigenvalues over 1: 6.21 and 4.54. The scree plot (Cattell, 1966) was used to determine the optimum number of factors. The scree plot strongly indicated a two factor solution. Examination of the rotated component matrix revealed that the first factor represented AMAC stop rules with all questions specified to measure this construct loading onto the factor at least to a moderate level (.40 or above, Field, 2009). Examination of the rotated component matrix also revealed that the second factor represented FLC stop rules with all questions specified to measure this

construct loading onto the factor at least to a moderate level (items and factor loadings given in table 15). It thus appears the SRQ measures to separate factors, AMAC stop rules and FLC stop rules.

Table 15: Factor Loadings for AMAC and FLC items from 2 factor Principle Component Analysis (n = 370).

Factor Loadings

Items	1	2
<i>AMAC stop rules</i>		
Perhaps I didn't check everything properly, I had better check again.	.82	
I must check things one more time – just to be on the safe side.	.79	
I may think I've checked everything properly, but in reality perhaps I haven't.	.74	
I had better check again because I want everything to be perfect.	.73	
I wasn't concentrating the last time I checked, so I had better do it again.	.72	
I think I've checked everything, but I may not have done it properly, so better keep checking.	.72	
I have probably forgotten something obvious, so I had better have one last check.	.72	
I must just double check that I have done everything.	.72	
I had better check everything to make sure nothing bad happens.	.70	
I must think of all the things I might have done wrong, and then check them.	.65	
<i>FLC stop rules</i>		
Everything is probably fine, so stop checking.		.83
I can't be bothered to keep checking things anymore.		.82
I'm sure everything is fine, so stop checking.		.81
Continually checking something won't make any difference.		.74
Even if I haven't checked everything properly, it won't matter.		.71
Nothing bad will happen if I decide to stop checking things now.		.69
I can't spend all day checking things, so I may as well stop.		.65
I can't be bothered to keep checking everything again.		.65

I should stop checking because once is enough, and doing it any more will make no difference.		.65
I'm pretty sure I've checked properly, so don't worry about it anymore.		.55

Note: factor loadings below <.4 not displayed. Correlation between AMAC and FLC factors = -.16, $p < .001$, one tailed. AMAC scale, $m = 2.47$, $SD = .90$. FLC scale, $m = 2.83$, $SD = .96$.

Internal consistency of SRQ

As the SRQ has not been discussed in the published literature its internal consistency was explored in some detail. Firstly, the ten AMAC items were subject to a reliability analysis. The AMAC scale has excellent internal consistency ($\alpha = .91$). All items were correlated with the total scale to an acceptable degree ($r = .57$ or above for all items). Removal of any individual item would have lead to a decrease in overall α .

Secondly, the ten FLC items were subject to a reliability analysis. The FLC scale has excellent internal consistency ($\alpha = .89$). All items were correlated with the total scale to an acceptable degree ($r = .47$ or above for all items). Removal of any individual item would have lead to a decrease in overall α .

Is the AMAC scale of the SRQ simply measuring checking?

One can see from examination of table 14 that many of the questions measuring AMAC stop rules in the SRQ refer to checking. This raises the concern that rather than measuring AMAC stop rules, the AMAC questions in the SRQ may simply measure an individual's tendency to check.

In order to explore this possibility the correlation between the AMAC subscale of the SRQ and the checking subscale of the MOCI (Hodgson & Rachman, 1977, see chapter 2 for details) was examined. In addition, the correlation between the full measures of the other four constructs (see chapter 2 for relevant measures) with the checking subscale of the MOCI was also explored. This analysis was conducted on the data from the large scale questionnaire study described in chapter 2 ($n = 370$). One-tailed significance is reported.

The checking sub-scale of the MOCI was significantly positively correlated with the full measures of negative mood ($r = .27$, $p < .001$), inflated responsibility ($r = .26$, $p < .001$), AMAC stop rules ($r = .24$, $p < .001$), IU ($r = .21$, $p < .001$), NJRE occurrence ($r = .17$, $p < .001$) and NJRE intensity ($r = .12$, $p < .05$).

Given that the positive correlation between AMAC stop rule subscale of the SRQ and checking is small, although significant, and given that the measures of inflated responsibility and negative mood (measures which do not contain questions which refer to checking) are more highly correlated with checking than the AMAC sub-scale, it seems highly unlikely that the AMAC sub-scale of the SRQ is simply measuring checking. Rather, it appears to be measuring something positively related to yet separable from checking, such as AMAC stop rules.

Validation of the SRQ

As the SRQ is a measure not previously reported in the published literature a study was conducted in an initial attempt to validate the scale.

SRQ Validation

Perfectionism is defined as, “a propensity for being displeased with anything that is not perfect or does not meet extremely high standards” (www.thefreedictionary.com/perfectionist). Perfectionism has been associated with the aetiology and maintenance of a number of psychopathological states (see e.g. Clark and Coker, 2009). Shafran, Cooper, and Fairburn (2002) proposed that the psychopathology of perfectionism is a dysfunctional schema for self-evaluation that is over-reliant on the achievement of personally demanding standards. Given that perfectionism is associated with meeting high personal standards it would seem likely that individuals high in perfectionism would be likely to use AMAC stop rules when engaging in a task and would be unlikely to use FLC stop rules. It was therefore predicted that, if the SRQ is measuring stop rules, the AMAC scale should correlate positively with perfectionism and FLC scale should correlate negatively with perfectionism.

Systematic processing is a bottom-up, data-driven and comprehensive analytic style in which perceivers access and scrutinize all informational input for its relevance and importance to their judgement of a task and integrate all information in forming their judgement (Chaiken *et al*, 1989) and is often contrasted with heuristic processing which is a more top-down processing mode that demands much less cognitive effort and capacity than systematic processing (Chaiken *et al*, 1989). It seem would likely that individuals engaged in systematic processing (a data-driven and comprehensive analytic style, Chaiken *et al*, 1989) would be likely to use AMAC stop rules when performing a task and individuals engaged in heuristic processing (a top-down processing mode that demands much less cognitive effort and capacity than systematic processing, Chaiken *et al*, 1989) would be likely to use FLC stop rules. It was therefore predicted that if the SRQ is measuring stop rules the AMAC scale should correlate

positively with systematic processing and negatively with heuristic processing whilst the FLC scale should correlate positively with heuristic processing and negatively with systematic processing.

Participants

The questionnaire was completed by 97 participants (men: 17; women: 80). Aged ranged from 18 to 23 years ($M = 19.56$, $SD = 1.59$). All participants were psychology undergraduates at the University of Sussex who received partial fulfilment of a course requirement by taking part in the experiment.

Procedure

Participants were provided with questionnaire-batteries, with every second questionnaire package reverse ordered. Participants could take the questionnaire away with them to fill out but all were given the same specific date for when the questionnaire needed to be returned. Participants were asked to supply some very basic demographic information and to provide informed consent before completing the questionnaire.

Materials

Note: the SRQ was contained in the questionnaire package but is not described here in detail as it has already been described in this chapter. Alpha values for the two subscales in the current study were AMAC scale, $\alpha = .91$ and FLC scale, $\alpha = .88$.

The Multidimensional Perfectionism Scale

The Multidimensional Perfectionism Scale (MPS, Frost, Marten, Lahart, & Rosenblate, 1990) is a 35-item self-report measure, which asks participants to rate statements on a 5-point scale (strongly agree to strongly disagree). It comprises six subscales assessing the six dimensions of perfectionism proposed by Frost *et al* (1990); Concern over Mistakes, Doubts about Actions, Personal Standards, Parental Expectations, Parental Criticism and Organisation. The 'Concern over Mistakes' and 'Doubts about Actions' subscales load onto the same factor (Stöber, 1998) and provide a measure of dysfunctional perfectionism (Bieling, Israeli, & Antony, 2004). This Concerns/Doubts subscale comprises 13 items of the MPS. All subscales have an internal consistency greater than $\alpha = .77$ (Frost *et al*, 1990) in a non-clinical samples of adults. As we were interested in perfectionism in its broadest sense in this study the scales total score was

used in all analysis (rather than sub-scale scores). The internal consistency of the whole scale in the current study was excellent ($\alpha = .91$).

Systematic and Heuristic Processing Questionnaire

The Systematic and Heuristic Processing Scale (SHPQ, Griffin, Neuwirth, Giese & Dunwoody, 2002) is a 9 item self-report measure, which asks participants to rate statements on a 5-point scale (strongly agree to strongly disagree). 5 items measure systematic processing and 4 items measure heuristic processing. SHPQ has 2 sub-scales, heuristic processing and systematic processing (Griffin *et al*, 2002). Both scales correlate in the expected direction with relevant variables (Griffin *et al*, 2002). Original alpha values for the scales were not reported in the paper in which the questionnaire was developed (i.e. Griffin *et al*, 2002).

The internal consistency of the systematic processing scale in the current study was mediocre although this value may reflect the lack of items in the scale ($\alpha = .59$). The internal consistency of the heuristic processing scale in the current study was also mediocre although again this value may reflect the lack of items in the scale ($\alpha = .65$).

Results

Note: one tailed significance values reported for all results.

As predicted, total scores on the AMAC sub-scale were significantly positively correlated with perfectionism (.34, $p < .001$).

Also as predicted, total scores on the AMAC sub-scale were significantly positively correlated with systematic processing (.23, $p < .05$) and significantly negatively correlated with heuristic processing (-.31, $p = .001$).

As predicted, total scores on the FLC sub-scale were significantly negatively correlated with perfectionism (-.30, $p = .001$).

Also as predicted, total scores on the FLC sub-scale were significantly positively correlated with heuristic processing (.39, $p < .001$) and significantly negatively correlated with systematic processing (-.25, $p < .01$).

These results therefore provide preliminary support of the validation of both the AMAC and FLC sub-scales of the SRQ.

Appendix Summary

This chapter examined the psychometric properties of the SRQ, a measure which has not been discussed previously in the published literature. The correlations and factor analysis suggest that the items in the SRQ thought to measure two separate constructs, AMAC stop rules and FLC stop rules, do just this. The reliability of both scales is excellent. An initial attempt to validate the questionnaire produced significant correlations in the expected directions with perfectionism, systematic processing and heuristic processing for both the AMAC and FLC sub-scales. It is therefore concluded that the scale seems to be an adequate measure of the stop rules and so will be used to measure stop rules throughout this thesis.

14. Appendix 2: AMAC Stop rule Manipulation

Below is a true story about a young women who is extremely sloppy and careless in many aspects of her life.

Please read the following script carefully.

Hi,

My name is LORA and I am 25 years old. I am extremely sloppy and inattentive especially when it comes to checking things or making sure that things have been done correctly. The worst thing that has happened due to this was when I didn't check that my front door was locked once at university, despite someone asking me to check that it was. The burglars simply walked straight into our house while we were asleep and stole our television, DVD player and a lot of other things.

I have been a careless person for as long as I can remember. I just can't seem to motivate myself to check up on things, even when the thought to do so enters my mind. I always tell myself things like, "Oh it will be fine, don't worry about it", or "I checked it yesterday, I can't be bothered to again". It's this attitude that causes me to forget to do things or to leave things not done properly. This often has negative consequences both for me and people I care about. My carelessness has caused me a lot of anxiety and grief over the years.

My attitude towards checking things seems lax no matter what it is I should be checking; dates of important events on my calendar, checking to make sure I have filled out a form correctly or simply checking to make sure that I have switched my oven off, my attitude is always the same. My carelessness doesn't stem from the fact that I don't care about the consequences of my inaction but rather from the fact that I just always assume that everything is fine and will be ok and so I don't check things. Even though my failure to check things can often lead to bad outcomes for myself and other people, I never seem to learn from my past mistakes. As soon as the next thing that needs checking comes along my attitude will be the same as it has always been.

My careless attitude means I'll often end up lying to people. People will ask me if I have checked this or if I have checked that and I will often just say "yes, I have checked", even though I haven't. Of course if something then goes wrong as a result of the fact I haven't checked, the person I have lied to will often be twice as upset with me as they otherwise would have been. Not only have they had to deal with the consequences of me not checking but, on top of that, I have lied to them.

I have no control over my life. My carelessness seems to have interfered with just about every aspect of me life. At university I would always lose marks for not reading over and checking my essays. At work I am often getting into trouble for not checking that things add up correctly. I have upset my friends by not checking my diary and then missing social engagements and birthdays.

I basically see my careless and sloppy attitude towards checking as something that has caused me a lot of anxiety down the years and sometimes has even caused me to feel depressed.

My husband and family have told me they are worried about how careless I am and how it can affect them both at a practical level and emotionally. I have tried asking people to remind me to check things but it really doesn't help, I think the change has to come from inside me. I have a young daughter now and I don't want her to be affected in anyway by my carelessness and by me not checking things. I need to change my life around and to stop being so careless. This is going to be hard, and I think I need some more help.

Having read this script, I now want you to try and write down any possible advice you can think of in order to convince LORA to be more careful, to convince her that she needs to check things and persevere with her checking. The idea is that we want you to make LORA seriously believe that checking things is a positive thing, that she needs to start checking things and that she needs to check things regularly. I want you to give LORA practical advice rather than worldly advice. Specifically, what types of things should she think about when she is about to not checking on something? What types of things should she tell herself to make sure she checks things at that moment? I have written some of my advice which I believe that LORA should think about when she is thinking about checking on something (just to help you when writing yours):

- You may have checked once but are you sure you were concentrating? You may not have checked properly, so you better check again.

- You may have forgotten something really important and you will regret it if you have, so you better check again.
- Don't automatically assume that everything is fine, think of the things you may have done wrong and check them.
- You know that in the past when you haven't checked things properly it has had negative consequences for you and others, so better be safe and double check everything.
- Checking things again may seem like a hassle but it's a lot easier to check now than have to deal with the consequences of not checking later, better to be safe than sorry.

Please write your advice now (please write as much advice as you can think of):

.....

15. Appendix 3: FLC Stop rule Manipulation

Below is a true story about a young women who checks things compulsively.

Please read the following script carefully.

Hi,

My name is LORA and I am 25 years old. Since the age of 9 I have compulsively and excessively checked things. One of my lowest points came at university when one night before an exam I was so worried that I had left my front door unlocked I got up and checked it about 300 times. I didn't sleep at all that night. The following day during the exam I fell asleep. I ended up failing the exam and having to retake the whole course.

I always feel an urge check things over and over again. I am extremely obsessed with checking things and spend half my life doing so. I just hate the thought that I may have forgotten something or that I may have left something not just right. I spend a lot of my time worrying that I need to check something again. This worry causes me a lot of anxiety and is a source of depression.

It's not just one thing I need to check but a lot of things. It could be checking that my alarm clock is set correctly, that I have switched off my cooker or that I have remembered to put something in my handbag, the list goes on and on. Once I have checked something it usually relieves my anxiety for a short period of time. It is never long before the anxiety returns, though, often stronger, and so does the feeling that I need to check again. I think things like, "I better check again just in case I forgot something" or "I must check things one more time – just to be on the safe side". Of course it never works out that I check things one more time. I will often check things 10, a hundred or 500 times. In that way my checking is like a vicious circle, a constant cycle of worry followed by relief followed by worry and so on. This cycle can seem never ending.

Another lowest point was the night my grandmother was called to hospital. She had been ill for a long time and I knew it might be the last time I would get a chance to see her. As I left for the hospital I decided to check to see if my back window was locked. "I'll check it once just to be sure," I remember thinking to myself. Of course I didn't just check once. I checked about 300 hundred times. The urge to check "one more time" was just too great. I never got to the hospital that night and my grandmother died. I'll never stop regretting not saying goodbye to her.

A similar thing happened at my sister's wedding a few years ago. I was her maid of honour but when I went to leave the house I felt a sudden urge to check I had switched my gas off. As usual I remember thinking to myself, "I'll just check to be on the safe side". I was there checking for the rest of the day. I missed my own sister's wedding, she was devastated. I still don't think she has forgiven me to this day

Sometimes the feeling I need to check something is so powerful I have to lie to people because of it. My Mum worries about how much I check things and sometimes she'll sit me down and tell me to relax. The feeling I need to check on something or another soon gets to much for me though, so I lie to her about where I am going or what I am doing and secretly go and check on whatever it was that was worrying me.

I have no control over my life. My obsession with checking things seems to have interfered with just about every aspect of my life. I often find it impossible to concentrate at work because my mind is preoccupied with checking something. This has resulted in me being sacked before. I often turn up late or not at all to social engagements because I can't leave my house on time because I'm stuck there, repeatedly checking on something over and over again. I find it impossible to even relax alone, a thought that I need to be checking on something will inevitably pop into my head within minutes of me sitting down.

I basically see my obsession with checking things as something that causes me to feel in an almost constant state of anxiety and sometimes even depressed. It affects me, my family and friends deeply.

My husband and family have told me how worried they are about my compulsive checking and how it affects them both in a practical sense and emotionally. I have a young daughter now and I really don't want her to see how I am and to pick up on my behaviours. And I really don't want my checking to affect her. I'm often late picking her up from school as I can't get away from checking on something "one last time". Sometimes I can't even leave the house and she ends up walking home. I need to change my life around now and to stop being so obsessed with checking things. This is going to be hard, and I think I need some more help.

Having read this script, I now want you to try and write down any possible advice you can think of in order to convince LORA to stop her obsessive checking. The idea is that we want you to make LORA seriously believe that she no longer needs to compulsively check things and that she should stop compulsively checking on things as of today. I want you to give LORA practical advice rather than worldly advice. Specifically, what types of things should she think about when she is about to check on something? What types of things should she tell herself to make sure she does not compulsively check on something? I have written some of my advice which I believe that LORA should think about when she is thinking about checking on something (just to help you when writing yours):

- You know in reality that nothing bad is going to happen if you don't check again, so relax and leave it.
- You have more pleasurable things you could be doing today than checking on this one thing, so stop checking and have an enjoyable day.
- You know that continually checking makes you feel anxious and sad, so be nice to yourself and don't worry about checking.
- Constantly checking on things takes up your mental energy and will make you feel tired, so give yourself a break and don't bother.
- You have already checked once and things were fine, if you go back and check now it won't make any difference, things will be fine either way. You don't need to go and check "one last time".

Please write your advice now (please write as much advice as you can think of):

.....

16. Appendix 4: High Inflated Responsibility Manipulation

Below is a true story about a young women who severely lacks any sense of responsibility.

Please read the following script carefully.

Hi,

My name is CLARA and I am 25 years old. For as long as I can remember people have told me I have a total lack of responsibility. I have been told I have I lack perception in terms of recognizing when I have caused problems and no sense of how what I do affects other people. One of the worst consequences arising from this was when I was about 13 and I left my roller skates sitting inside the front door and ran upstairs to my room to talk to a friend on the phone. My Dad walked in from work a few minutes later, fell over the roller skates and broke his arm. My family were angry with me afterwards but I couldn't see why. I obviously felt some sympathy for my Dad but I was not going to be blamed for what had happened. I remember thinking, "it was his fault, he should have been looking where he was going, it's not my job to be his eyes". I think my attitude angered my parents even more than the fact I had left my roller skates next to the door in the first place. I ended up being grounded for 4 months. I'll always regret not even apologising at the time as maybe I wouldn't have been grounded.

Beyond my lack of feeling responsible for things that I have done, I also fail to think about the consequences of my actions and the affects my actions may have on other people. When I am doing things and going about my daily life it just doesn't occur to me to think about how what I might be doing may affect other people. My general attitude is that it is not my job to worry about other people. That's their job. It's their look out. At times this attitude has led to me upsetting people who have been harmed as a consequence of me failing to consider the consequences of my actions. People have perceived me to be arrogant or selfish because of this attitude. I have even lost friends because of it. In general I think it's fair to say my lack of responsibility and failure to consider my actions has had negative consequences for both me and the people I care about. As well as causing me a lot of anxiety, it has also caused me a lot of grief over the years.

A time when my lack responsibility affected others was a few years ago when I was involved in a car accident. My husband and myself were driving back from a weekend away and our young daughter was in the back seat. My husband was driving. We were having quite a heated argument and he crashed into another car. Although my husband and I were fine our young daughter cracked her skull and was quite badly bruised. After the accident I refused to take any responsibility for what had happened. I told my husband it was his fault, I

remember thinking, “after all he was behind the wheel, he should have been more careful for our safety”. Although our daughter was fine a few weeks afterwards my husband was not. He took total responsibility for what had happened and it started eating him up inside. The guilt was just too much for him. I didn’t feel any guilt. I was back in a car a few days after the event but my husband has only recently been able to get in a car. He has been through counselling to help him get over what happened and is only just returning to normal. I just wish I could go back and take on some of the responsibility for what have happened. Maybe if I had been more supportive rather than failing to accept any blame for what happened he would have been ok and we could have got through things together.

People have also told me I also lack responsibility in terms of preventing negative things from occurring to others. That is, I lack responsibility for my inaction as well as for my actions. As I said earlier, my attitude is usually “other people should look out for themselves, that’s their job, not mine”. This has upset people in the past. I remember a few months ago I noticed that my next door neighbour had left the lights on in her car on my way home from work. I knew she had a job interview the next day and her battery would probably die if the lights on her car were left on all night but I just thought “that’s careless of her” but assumed she would notice and didn’t tell her. Sure enough her car didn’t start the next day, she missed her interview and someone else got the job. A few days later she told me the story and I mentioned that I had noticed the lights switched on in her car the night before. She asked why I didn’t tell her we got into a massive argument when I told her it wasn’t my job to look out for her. We haven’t spoken since. Although I don’t feel any guilt as it was her responsibility, I wish I could go back in time so I could have just have told her. She was a good friend and I do miss her. This is yet another example of how my lack of responsibility can affect people’s views of me. I have even been told a few times by other people I should have felt responsible or guilty for things I have thought. I think some people have thought negatively about me for not feeling any guilt over thinking these things. However, to me thinking about causing harm or about negative things just does not equate to doing them and so is something I find it hard to feel bad about. Perhaps I should feel some sense of guilt.

My lack of responsibility has affected just about every aspect of my life. At school and university I used to get in trouble for doing things that would affect other people, like distracting them, as I was not responsible enough to worry about how my actions may have affected other people. I have had problems at work for failing to take responsibility for problems other people perceived as being caused by me. Even at home, I don’t really pay great attention to the possible consequences of my actions or take responsibility on for a lot of things that go wrong and this places a great strain my husband.

I basically see my lack of responsibility as something which has ended up causing me to feel a lot of anxiety down the years and sometimes has even caused me to feel depressed.

My husband and family have told me they are worried about my lack of responsibility and how this can affect them both at a practical level and emotionally. I want to change and to start to feel more responsible. I want to be able to take on responsibility for harm I have actually been responsible for causing and I want to be able to monitor my behaviour to ensure my actions do not harm others. People always tell me I need to be more responsible but this has little effect, I think this change has to come from inside me. I have a young daughter and I don't want her picking up these traits off me. I need to change my life around and to start feeling more responsible. This is going to be hard, and I think I need some more help.

Having read this script, I now want you to try and write down any possible advice you can think of in order to convince CLARA to start feeling more responsible for things, to convince her that she needs to start taking responsibility for things she has done and that she needs to start being more aware of her actions and how they may affect others. The idea is that we want you to make CLARA seriously believe that feeling more responsible will be a positive thing, as will being aware of her actions. I want you to give CLARA practical advice rather than worldly advice. Specifically, what types of things should she think about when she is told she has done something she should feel responsible for or when she is going about her day to day life to ensure her actions do not cause others harm? What types of things should she tell herself to ensure she takes on responsibility for things she has done or to ensure that she is aware and ensures her actions to not bring about harm to others? I have written some of my advice which I believe that CLARA should think about when she is given a certain piece of information (just to help you when writing yours):

- Ask yourself truly whether what has happened was influenced by you in anyway? If you did influence what happened you should feel responsible, this is only how most people would feel and by taking accountability others will feel less angry at you.
- Thinking about negative or harmful things is something you should attempt not to do. Just imagine how bad it would be if you did one of these things or if one of these things occurred. Ask yourself, is it healthy to be thinking about these things?
- Try to monitor your behaviour. Your actions will almost certainly lead to harm if you are not more aware of your actions than you have been in the past. Monitoring your actions is a natural thing to do and others will appreciate it.

- Failing to prevent harm occurring can be as bad as causing harm. If you can prevent harm from occurring you should do it. Not only will others appreciate it greatly, but wouldn't you hope others would do the same for you?
- When you have not monitored your actions in the past it has led to negative consequences for others. This in turn has led to them being angry at you. You don't want this to happen again so always ask yourself if what you're doing could in some way have harmful consequences for other people.

Please write your advice now (please write as much advice as you can think of):

.....

17. Appendix 5: Low Inflated Responsibility Manipulation

Below is a true story about a young women who has an inflated sense of responsibility.

Please read the following script carefully.

Hi,

My name is CLARA and I am 25 years old. For as long as I can remember I have felt responsible for things when they go wrong. People tell me I have an inflated sense of responsibility. That is, I often feel responsible when I shouldn't and the sense of responsibility I feel is exaggerated and sometimes unhealthy. One of the worst consequences arising from this was when I was about 13 and my Dad broke his arm while trying to change my light bulb. I wasn't in the room at the time but I could have done it by myself rather than asking him to do it. I felt so bad after, the guilt was immense. I found it hard to talk to him for weeks, until his arm was fully healed in fact. I felt so bad every time I saw his arm in the cast. I just remember thinking, "Why did I put him in that situation? Why wasn't I more careful to avoid harming someone I love?". My family told me it wasn't my fault but it did not stop me feeling terribly guilty. I felt horrible for months.

My tendency to feel responsible for things takes up a lot of my life. It doesn't only affect me when something bad has actually happened. The feelings are so intense I am constantly looking out to make sure I do not cause others harm or cause things to go wrong. I worry a great deal about the affects of things that I do or the things that I don't do. However, my actions don't cause others harm and people have pointed this out to me. I spend half of my life worrying about causing harm in ways that in reality would never happen. My hyper vigilance is not healthy. The worrying puts me in an almost a constant state of anxiety. I think it's fair to say my inflated sense of responsibility has had negative consequences for both me and the people I care about. As well as causing me a lot of anxiety, it has also caused me a lot of grief over the years.

A time when my inflated sense of responsibility affected others, my husband especially, was a few years ago when my daughter had an accident. I took my eye off her for a few minutes when I was washing up and she slipped and cracked her skull. I was mortified. My daughter was fine quite soon after but I could not forgive myself. I remember thinking, "How could I have left her like that? How did I not foresee the danger". I was so horrified with myself I couldn't be alone with my daughter for months. I didn't feel I could be trusted to look after her or make sure she was safe. My husband was amazing, he would stay at home from work as he knew how I felt. Occasionally my Mum would come around and stay with us but most of the time it was my husband. Eventually he lost his job for missing so much time off work.

As much as I appreciate what he did I know the aggravation and difficulty I put him through must have been hell. I just wish I could have been a stronger person and have come to terms with what happened sooner and started looking after my daughter again. God only knows the affect of her mother being so distant from her for so long at such an early age must have had on my daughter.

I don't only feel responsible for things I do but often for things I don't do. To me not acting to prevent something harmful from happening is as bad as causing it to happen. I remember a few months ago I noticed my next door neighbour had left the lights on in her car over night but I forgot to mention it to her. She generally doesn't use her car much. A few days later she had a job interview but when she tried to start the car it wouldn't start as the battery was dead. She missed the interview and someone else got the job. I was so angry at myself for not telling her, I felt terrible for days. I had trouble even looking at her in the eye. This is another example of how down and frustrated at myself my sense of responsibility can make me feel. I also feel guilty about things I think about. To me thinking bad things is as bad as doing bad things. I spend a lot of time trying to ensure that I don't think about causing or doing harmful things. This takes up a lot of mental energy and also causes me a lot of anxiety. At times my inflated sense of responsibility affects my thinking so much it is hard to think about anything apart preventing harm or feeling guilty.

My inflated sense of responsibility has affected just about every aspect of my life. At school and university I was constantly on edge as I didn't want to distract people in class or because I was feeling bad as I felt I had distracted them. I have found work difficult in the past as I am constantly stressed about how my actions may affect people. This stress became so much I had to leave my last job. I spend so much time at home making sure I don't bring any harm to my daughter or husband I can become very cold and isolating and not give them the love and attention they both need. I can't even relax when I'm alone as I'm usually trying to block out thoughts about causing or doing others harm.

I basically see my inflated sense of responsibility as something which has ended up causing me to feel a lot of anxiety down the years and sometimes has even caused me to feel depressed.

My husband and family have told me they are worried about my inflated sense of responsibility and how this can affect them both at a practical level and emotionally. I want to change and to learn how to feel less responsible. I want to have a healthy sense of responsibility like most people and not to feel constantly guilty and on edge. People always tell me I should stop feeling so responsible but this has little effect, I think this change has to come from inside me. I have a young daughter and I don't want her picking up these traits

off me. I need to change my life around and to start feeling less responsible. This is going to be hard, and I think I need some more help.

Having read this script, I now want you to try and write down any possible advice you can think of in order to convince CLARA to start feeling less responsible for things, to convince her that she needs to stop blaming herself for things she cannot control and that she needs to stop constantly worrying about causing others harm through her actions. The idea is that we want you to make CLARA seriously believe that feeling less responsible will be a positive thing as will allowing herself to go about her life without constantly monitoring her behaviour to protect others. I want you to give CLARA practical advice rather than worldly advice. Specifically, what types of things should she think about when she begins to feel responsible or starts to monitor her behaviour? What types of things should she tell herself to allow her to get on with what she is doing without feeling guilty or without worrying about the possibility of her actions causing others harm? I have written some of my advice which I believe that CLARA should think about when she is given a certain piece of information (just to help you when writing yours):

- Whatever happened wasn't your fault so why should you feel responsible for it? The guilt you will feel is only going to make you feel down and anxious, it is not going to change what has happened.
- Thinking about negative or harmful things is not as bad as doing negative or harmful things. Trying to suppress these thoughts will only make them occur more frequently so don't worry about them and relax.
- Try not to constantly monitor your behaviour. Your actions will not lead to harm to others and if they do lead to harm it would be by accident, you cannot foresee everything that will happen and shouldn't feel bad about this.
- Failing to prevent harm occurring is not as bad or the same as causing harm. You cannot prevent or stop every negative or harmful thing that occurs to other people, you are only human. Accept that sometimes things just happen and are not your fault.

- Your actions are no more likely to bring about harm to people than anybody else's actions. Other people do not constantly monitor and worry about their behaviour so why should you? Your actions will not bring about negative consequences for others.

Please write your advice now (please write as much advice as you can think of):

.....

18. Appendix 6: High IU Manipulation

Below is a true story about a young women who does not react to uncertainty.

Please read the following script carefully.

Hi,

My name is KAYLA and I am 25 years old. For as long as I can remember I have had very little or no reaction to uncertainty. That is, when I am faced with a situation with an uncertain or unpredictable outcome this has no affect on me emotionally or in terms of my choice of actions. When I am faced with an uncertain situation, although I am aware that uncertainty may exist, the uncertainty will have no affect on what I decide to do. One of the worst consequences arising from this was a few years ago when I had a small windfall of money. At the time a few friends of mine had invested money into shares and so I decided to do the same and began looking into investing in a company who had just started out. My friends also looked into the company and, despite admitting that the company had some promise, urged me not to invest stressing that it was a high risk investment and that there was no guarantee I would get my investment back and, in fact, I could make a substantial loss. Although I was aware of the uncertainty surrounding the investment I felt comfortable and relaxed about this and within a few days had gone against my friends' advice and invested. Within a few weeks of making my investment the company went bust and I lost all my money. I will always regret not reacting to the uncertainties my friends had made so apparent to me.

My lack of reaction to uncertainty has had negative consequences not only for me, but also for others in the past. I remember a time when a group of friends and I had decided to go on holiday to a Greek island for a week and it was left to me to book the accommodation. There were a lot of deals available but one stuck out at me as it was cheaper than all the other hotels in our price range even though it had the same number of stars. The deal came with a warning, however, that the hotel was still being constructed and there was a chance it would not be finished by the time we would be going on holiday. The travel agent reinforced this point to me several times. As usual however, when I am faced with an uncertain situation, the uncertainty did not bother me and I purchased the ticket there and then. When we got to the resort the place was like a building site. It made the holiday very uncomfortable and the group of friends became very annoyed with me. In fact I rarely speak to them now. Generally, my inability to react to uncertainty makes people view me as someone who doesn't think or care, when really I do, I just don't feel the normal reactive emotions other people do when they are faced with uncertain situations. I hate that some people view me like this. In fact, my inability to respond to uncertainty can at times make life feel intolerable.

I guess part of the reason I do not respond to uncertainty is that I do not really fear surprising or unpredictable events. This is a bad thing as often these events can be negative and sometimes even dangerous. My lack of fear of uncertainty has led me to put myself and others into some quite risky and, to be honest, stupid situations over the years. This has also led others to think that I am idiotic or that I don't care about them in some way. With the way I act sometimes I can't really blame them for having these feelings about me. I wish I could be more sensitive and avoid surprising or unpredictable events so I don't put myself or other people in danger.

It is not just uncertainty in the external world which I am unresponsive to but I'm also unresponsive to my own uncertainties. I am fairly uncertain about where I am going in life and about my future but this doesn't really concern me. I don't try to make plans for the future and am not bothered about doing so. Other people have said that I should be concerned about these uncertainties, that they are there for a reason; to help me to plan for the future for me and my family. They have told me the fact I seem to care so little about the uncertainties ahead of me makes me seem like a fairly shallow and even a selfish person, given I have a husband and a child now. I guess they're right, I should worry more about where me and my family are going in the future.

My inability to react to uncertainty has affected just about every aspect of my life. At school I was always getting into trouble for doing risky things that the other children wouldn't as the uncertainties surrounding what I was doing would never stop my behaviour. At work I often get in trouble with my boss for making risky decisions about uncertain issues and not "thinking through" the possible consequences. This has made it very difficult to progress in my job. I have even annoyed my husband by taking risks and making decisions to do things when I can't be sure of what the outcome will be, like the time I invested our money in the company that went bust.

I basically see my inability to react to uncertainty as something which has ended up causing me to feel a lot of grief and anxiety down the years and sometimes has even caused me to feel depressed.

My husband and family have told me they are worried about my inability to react to uncertainty and how this can affect them both at a practical level and emotionally. I want to change and to learn how to react better to uncertainty. I want to become emotionally aware when I'm faced with an uncertain situation and to let this emotion stop me from making risky decisions. People always tell me I need to let uncertain situations have an effect on my emotions and behaviour but this has little effect on me. I think this change has to come from

inside me. I have a young daughter and I don't want her picking up these traits off me. I need to change my life around and to start to be more reactive to uncertainty. This is going to be hard, and I think I need some more help.

Having read this script I now want you to try and write down any possible advice you can think of in order to help KAYLA react better to uncertainty, to convince her that she needs to start to worry about situations which are uncertain and unpredictable and that she needs to be let these emotions guide her to sensible decisions. The idea is that we want you to make KAYLA seriously believe that uncertainty and unpredictability are there to make us feel certain emotions, like worry and concern, and that these emotions should be used to guide our decisions. I want you to give KAYLA practical advice rather than worldly advice. Specifically, what types of things should she think about when she is faced with an uncertain situation? What types of things should she tell herself to allow her feel the emotions that uncertainty brings up in most people, like worry and concern? How can she let these emotions guide her behaviour? I have written some of my advice which I believe that KAYLA should think about (just to help you when writing yours):

- Uncertainty about a situation is an important thing that is there to prompt an emotional response from you. It is there to make you aware about the possible dangers of a situation. You need to let yourself feel anxiety, stress and worry when you are confronted with uncertainty.
- When you are faced with a decision which has an element of uncertainty attached to it rather than simply jumping in and making a decision allow yourself some time to explore the uncertain aspect of the decision. Why is there uncertainty involved? Does the uncertainty contain any element of danger in it? Would you be better off waiting until a less uncertain alternative presents itself?
- Often, as you know, unpredictable and surprising events can be dangerous and negative. It is healthy to feel some fear over surprising and unpredictable events and this fear can be used to help to guide you away from risky situations.

- You need to worry more about your future. Other people do and so should you. You need to be bothered about feeling uncertain about your future for you and for your families' sake.
- Uncertainty is there to make you feel suspicious about a situation, to make you feel worried and to get you to think about the situation. It is important you do this to keep not just yourself safe, but also the people you love.

Please write your advice now (please write as much advice as you can think of):

.....

19. Appendix 7: Low IU Manipulation

Below is a true story about a young women who finds uncertainty extremely difficult to cope with.

Please read the following script carefully.

Hi,

My name is KAYLA and I am 25 years old. For as long as I can remember I have found uncertainty very difficult to cope with. That is, when I don't know what the outcome of a situation will be it concerns me greatly and causes me stress and anxiety. As well as causing me distress, often my inability to cope with uncertainty will prevent me from acting. One of the worst consequences arising from this was a few years ago when I had a small windfall of money. At the time a lot of my friends and relatives were investing in shares in a promising new company and encouraged me to do the same. When I looked into investing, however, it became clear that although the company was promising, there was no guarantee I would get my investment back and this uncertainty caused me great distress. After looking into investing for a few days I became more and more stressed and the uncertainty surrounding the investment was enough to persuade me ultimately not to invest. The company went on to be massively successful and all my friends and family made substantial profits. I will always regret not being able to overcome my uncertainty and for not investing at the time.

My inability to cope with uncertainty and to become unable to act because of it has made me come across in a bad light to others in the past. I remember a time back at university when a group of friends were talking about going to the Far East for a few months after we had finished our course. They all agreed that they really wanted to go in principle but I couldn't say I wanted to join them, even though I really did. Although the trip and the idea of spending time with my friends sounded great the uncertainty about the travel arrangements and where we would stay kept rushing through my head and really stressed me out. So I said I wouldn't go. They never went in the end but the fact I didn't agree to join them created a lasting distance between me and the group. In fact I rarely speak to them now. The stress and hesitation to act that comes from my intolerance to uncertainty has resulted in many situations like that over the years. In fact, uncertainty can at times make life feel intolerable.

I have always preferred life when it is predictable and I can tell what is going to happen. As soon as an element of uncertainty comes into a situation I start to become stressed. I like to know how a situation will turn out and what will happen. If I don't know what will happen in a given situation, I start to become preoccupied with it and distressed. I hate to be taken by surprise. I almost always react negatively to being surprised, sometimes even if the surprise

ends up being or leading to something positive. Some people have said this makes me boring. They're probably right. I wish I could deal better with surprises and unpredictability.

It is not just uncertainty in the external world which causes me stress but also my own uncertainties. I feel like an extremely uncertain person and this really frustrates me. Everyone I know, like my friends and people at work, seem to know exactly where they are going in their lives, what they are doing and how to go about getting there. I don't and I hate it. I feel it is unfair that I have so much uncertainty about my future. I wish I was like my friends and knew where I was going. Generally, I feel my uncertainties mean I am not as good as other people.

My inability to cope with uncertainty has affected just about every aspect of my life. At school and university I would never talk to the boys I liked as I couldn't deal with the uncertainty of whether they would like me or ask me out. At work I never take risks or do anything unpredictable because I start to get stressed about the uncertainty of what will happen if I do. This has made it very difficult to progress in my job. I have annoyed my husband by constantly getting stressed and harassing him because I am uncertain about what he is doing, like not knowing where he is when he is coming home from work.

I basically see my inability to cope with uncertainty as something which has ended up causing me to feel a lot of anxiety down the years and sometimes has even caused me to feel depressed.

My husband and family have told me they are worried about my inability to cope with uncertainty and how this can affect them both at a practical level and emotionally. I want to change and to learn how to cope with uncertainty better. I want to be able to be relaxed when I'm faced with a uncertain situation and not become paralyzed by it. People always tell me I should stop reacting so extremely to uncertainty but this has had little effect, I think this change has to come from inside me. I have a young daughter and I don't want her picking up these traits off me. I need to change my life around and to start to be able to deal with uncertainty better. This is going to be hard, and I think I need some more help.

Having read this script, I now want you to try and write down any possible advice you can think of in order to help KAYLA cope better with uncertainty, to convince and that she needs to stop constantly worrying about situations which are uncertain and unpredictable and that she needs to be able to react positively in such situations rather than becoming frozen by uncertainty. The idea is that we want you to make KAYLA seriously believe that uncertainty and unpredictability can be positive things and not things that she has to get distressed about and become paralyzed by. I want you to give KAYLA practical advice rather than worldly advice. Specifically, what types of things should she think about when she is faced with an uncertain situation? What types of things should she tell herself to allow her to make positive decisions instead of becoming immobilized by uncertainty? I have written some of my advice which I believe that KAYLA should think about (just to help you when writing yours):

- You may not know what the outcome of a given situation will be but that's fine, don't let it worry you. Sometimes uncertainty can be a good thing and makes life more interesting. Try to relax and let what will be happen.
- It is ok to feel uncertain about an action or a decision but to still go ahead and make a positive decision anyway. You need to allow yourself to feel uncertainty but still to push on with decisions and do what you want to do. There is an element of uncertainty attached to most things in life but you can't let that stand in your way of making decisions that may make you successful and happy.
- Sometimes life can be unpredictable but this can be a good thing. It would be boring if we always knew exactly what was going to happen around every corner. Unpredictability makes life more exciting and fun. The next time you are surprised by something or something unpredictable happens try to embrace the situation and go with the flow, it may well end up leading to a positive end result.
- It's absolutely fine to feel some uncertainty about your future. Others may seem to have their future planned out but everyone feels uncertainty about their future to a certain degree, it's a normal feeling. You have lots of time to decide what you want your future to be like so relax and enjoy the journey that takes you there.
- Uncertainty is a normal feeling that everyone experiences and everyone deals with. The fact you experience uncertainty does not make you a lesser person in comparison to others.

Please write your advice now (please write as much advice as you can think of):

.....

20. Appendix 8: Visualisation Aid Script

I am now going to ask you to visualise a scenario. The scenario I would like you to visualise is that this room is your office. As the scenario involves this room I would like you to look around the room as much as possible during the visualisation process. Please do not close your eyes. I want you to imagine that this is YOUR room. It could be an area you study in at home or it could be somewhere where you work, the important thing is that I want you to imagine that this is YOUR room. I am going to say a few things whilst you try to visualise that this is your room, in order to help you with this process. Although you will hear my voice please feel free to use your own mental techniques if these help you to visualise that this room is yours. The important thing is that you are able to achieve this visualisation...(long pause)...

I would now like you to begin the visualisation process (pause)...I want you to try and imagine that this is your room (pause)...your space. You can come here to do what you like, to work (pause)...to think (pause)...to rest (pause)...because this is your space (pause)...You already know this space well as it is yours, but take some time to explore it anyway...explore the lay out of your room, take a look at the ceiling (pause)...the walls (pause)...the floor (pause)...I'd like you to picture yourself here, alone (pause)...you could be doing work (pause)...you could be thinking (pause)...you could be resting (pause)...but you are in your space (pause)...notice how your chair feels...notice where you are in relation to the other objects in the room (pause)...the walls (pause)...the floor (pause)...the ceiling (pause)...get a real feel of your space.

Lets take sometime to explore some of your possessions within your room (pause)...take a look at your shelf/book shelf, notice the books on the shelf (pause)...I want you to imagine that these are your books (pause)...they could be books you read for pleasure or they could be for work (pause)... they could be books you have read 100 times or have yet to read (pause)...the important thing is that these are your books (pause)...sitting on your shelves/bookshelf... (pause) in your room (pause)...

...take a look at your draws/filing cabinet to your (*direction the draw/filing cabinet is in*), (pause)...I want you to imagine these are your draws/filing cabinet and that inside the draws are your possessions (pause)...you may be keeping work in these draws (pause)... you may be keeping jewellery in them (pause)...you may be keeping something of a more sentimental nature inside...the important thing is that these are your possessions (pause)...held inside your draws (pause)...in your room (pause)...

...take a look at the pictures/posters on the walls (pause)... I want you to imagine these are your pictures/posters (pause)...pictures/posters that you chose (pause)...that you bought (pause)...pictures/posters that you hung them up (pause)...look at them closely (pause)...what

images do you see? (pause)...the important thing is that these are your images
(pause)...displayed in your pictures/posters (pictures)...in your room (pause)...

...now take a look at the desk area (*in front of you or whatever direction the participant will be facing*)...I want you to imagine that this is your desk (pause)...take a look at your desk
(pause)...your pens (pause)...your work (pause)... your stapler (pause)...sometimes you may
chose to work at your desk...sometimes you may just chose to relax here (pause)...the
important thing is that this is your desk (pause)... in your room (pause...

...take another look around the whole of your room (pause)...at your floor (pause)... your walls
(pause)... your ceiling (your)...breath in and feel your space... I am going to stop talking now. If
you feel you have achieved a point of maximum visualization please get the experimenter from
outside your room to move onto the next stage of the experiment. Otherwise, please take a
moment to try to reach this state and then get the experimenter

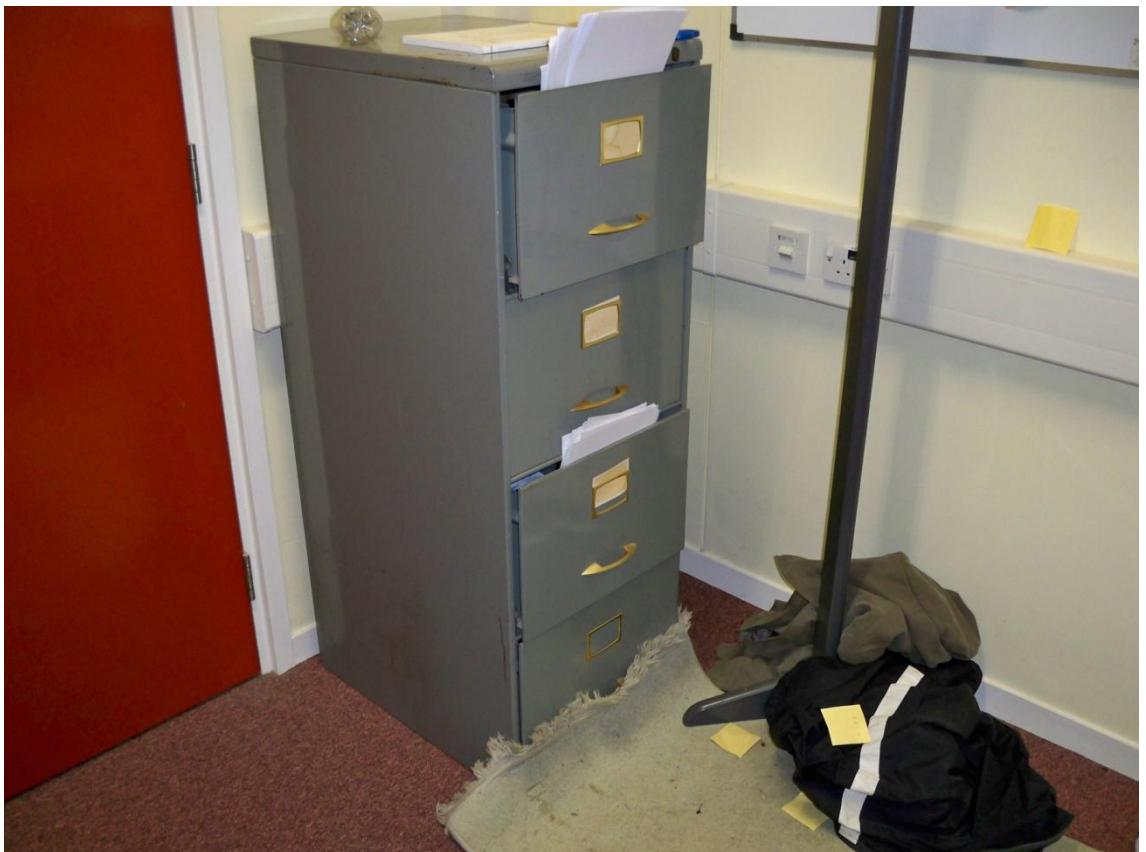
FINISH.

21. Appendix 9: Pictures of experimental room for participants in high NJRE condition









22. Appendix 10: Pictures of experimental room for participants in low NJRE condition







