An Experimental Investigation of Reassurance and Responsibility

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ABSTRACT

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Repeated reassurance-seeking is a common phenomenon in obsessive-compulsive disorder (OCD). This behaviour may exacerbate compulsive urges (e.g., to check, to seek additional reassurance) by undermining confidence (Dar, 2004; Hout & Kindt, 2004), and preventing the disconfirmation of irrational threat-relevant thoughts and beliefs. The current investigation examined the effects of repeated reassurance and perceived responsibility/threat on anxiety, checking behaviour, memory and confidence. Volunteer undergraduate participants were randomly assigned to one of four conditions: high responsibility–high reassurance, high responsibility–low reassurance, low responsibility–high reassurance, or low responsibility–low reassurance, and were asked to perform several trials of a sorting task. On two separate occasions (i.e., before and after a critical trial, in which only members of the high reassurance groups received reassurance regarding their performance), participants were asked to rate their current anxiety, their urges to check their performance, their urges to be reassured that they had sorted correctly, and their confidence in the accuracy of their performance. They also completed a test to assess their memory accuracy (i.e., their ability to recall details of the experimental task). Results revealed that higher levels of perceived responsibility were associated with the maintenance of compulsive urges (to check and to seek reassurance) and performance-related doubt. Manipulations of reassurance did not significantly affect participants' ratings of the above-listed variables. The results of this study are discussed

in terms of cognitive and behavioural models of OCD, and methodological issues are examined. Directions for future research are also suggested.

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Obsessive-compulsive disorder (OCD) is characterized by recurrent obsessions and/or compulsions that are time-consuming (lasting at least one hour per day) and that cause marked distress or significant impairment in functioning (American Psychiatric Association, 2000). The lifetime prevalence of OCD has been estimated at 2.5% in community samples (APA, 2000), indicating that a significant percentage of the population is affected by this complex and potentially disabling disorder.

The Obsessive Compulsive Cognitions Working Group (OCCWG; in press) has demonstrated that three broad cognitive domains are especially relevant to OCD: (i) perceived responsibility for harm and over-estimation of threat, (ii) perfectionism and intolerance for uncertainty, and (iii) importance and control of thoughts. Despite the commonalities that exist in OCD with respect to underlying cognitive constructs, it is a remarkably heterogeneous disorder (APA, 2000, McKay et al., 2004, Rachman & Hodgson, 1980). Individuals diagnosed with OCD may experience unwanted intrusive thoughts (e.g., aggressive, sexual, blasphemous, etc.), and may display a wide variety of behavioural symptoms, including (but not limited to) compulsive checking, washing, counting, ordering and arranging, compulsive hoarding, and/or mental ritualization. Accordingly, a number of distinct OCD "subtypes" have been proposed in relation to the diverse symptom patterns that characterize this disorder (Calamari, Wiegartz, and Janeck, 1999; McKay et al., 2004; Oppen, Hoekstra, & Emmelkamp, 1995; Rachman & Hodgson, 1977, 1980; Radomsky & Taylor, in press; Summerfeldt, Richter, Antony, & Swinson, 1999). However, a review of the relevant literature reveals that compulsive checking, washing, and obsessional phenomena are especially robust manifestations of

OCD (McKay et al., 2004), indicating that these symptom categories could be particularly useful for establishing valid OCD subtypes.

A number of authors (e.g., McKay et al., 2004; Radomsky & Taylor, in press) have recently emphasized the utility of performing "subtype-specific investigations" of OCD, in which the function(s) of specific symptoms, as well as the processes that underlie them, are examined. Advocates of this approach highlight its potential for increasing our understanding of the unique factors that contribute to the onset and maintenance of various manifestations of OCD symptomatology. This increased understanding concerning subtype-specific patterns of thoughts and behaviour in OCD should, in turn, enable researchers and clinicians to develop more specific and effective treatments for this disorder. Therefore, it is important to examine the functional relationships between different, yet potentially related, forms of compulsive behaviour that are commonly observed within each symptom-based subtype (Radomsky & Taylor, in press).

This approach may be particularly useful for examining compulsive behaviour in OCD patients who experience pathological doubt and harm-related obsessions. Clinical observation reveals that these individuals frequently engage in both compulsive checking and excessive reassurance seeking, which may be functionally related. Consistent with this notion, cognitive-behavioural theories posit that both of these compulsive acts are intended to alleviate anxiety caused by obsessive concerns and to reduce responsibility for potential harm (Rachman, 2002; Salkovskis, 1985, 1999). A great deal of research has been conducted to elucidate the mechanisms through which compulsive checking is initiated and maintained in OCD (e.g., Hout & Kindt, 2004; Rachman, 2002; Radomsky,

Gilchrist, & Dussault, in press; Radomsky, Rachman, & Hammond, 2001; Tolin, Abramowitz, Brigidi, & Foa, 2003). However, empirical investigations of reassurance seeking behaviour in this population are scarce, despite the fact that several authors (e.g., Rachman & Hodgson, 1980; Salkovskis, 1985; Salkovskis & Warwick, 1985, 1986; Tolin, 2001) have noted its paradoxical and potentially disabling effects.

Prior studies have demonstrated a number of long-term detrimental effects associated with excessive reassurance seeking in other emotional disorders, such as health anxiety (i.e., hypochondriasis) (Hadjistavropoulos, Craig, & Hadjistavropoulos, 1998; Salkovskis & Warwick, 1986) and depression (Joiner & Schmidt, 1998; Joiner, Alfano, & Metalsky, 1992). Among individuals with health anxiety, requests for reassurance tend to focus on health status (e.g., "Do I have a disease?", "Is this spot cancerous?"), whereas depressed individuals tend to seek reassurance regarding issues related to self-worth (e.g., "Do you really care about me?"). In these contexts, excessive reassurance seeking has been shown to contribute to interpersonal difficulties (e.g., causing others to become frustrated with repeated demands for reassurance; Joiner et al., 1992), unnecessary health costs (e.g., due to increased and unnecessary medical consultation in the case of health anxiety; Salkovskis & Warwick, 1986), and the long-term exacerbation of compulsive behaviour (e.g., increased demands for additional reassurance; Hadjistavropoulos et al., 1998; Salkovskis & Warwick, 1986). Indeed, the detrimental effects of excessive reassurance-seeking are likely to be numerous and far-reaching. Furthermore, the manner in which other individuals respond to repeated requests for reassurance seems to be an important factor in determining the long-term consequences of this behaviour. In fact, the repeated provision of reassurance has been

shown to be counter-productive, leading to subsequent and further increases in reassurance-seeking (Hallam, 1974; Salkovskis & Warwick, 1985, 1986; Tolin, 2001). It is reasonable to hypothesize that similar counter-productive effects might occur as a result of reassurance seeking in OCD, especially among individuals with checking compulsions, as a common underlying purpose for soliciting reassurance in each of the above-described circumstances may be to achieve rapid (albeit temporary) reductions in anxiety. However, reassurance-seeking behaviour has not yet been adequately studied in OCD. Therefore, an investigation of this behaviour, particularly in the context of compulsive checking, is warranted.

For the purposes of this thesis, the term "reassurance seeking" will be defined as a particular form of checking in which information is requested from others regarding a specific concern (e.g., "Are you sure I locked the door?"), in order to alleviate feelings of anxiety. The suggestion that reassurance seeking is a form of "checking by proxy" (Rachman, 2002) is important, as one ought to consider precisely *why* this potentially maladaptive behaviour occurs in order to compare its functional utility to that of compulsive checking in OCD.

According to Rachman (2002), excessive reassurance-seeking, compulsive checking, and other forms of OCD-related neutralization behaviour can all be construed as anxiety-reduction techniques that are aimed at exerting influence over negative outcomes. Specifically, it is proposed that these behaviours are motivated by a desire to reduce the likelihood and/or severity of potentially harmful events, as well as to reduce one's perceived responsibility for such events should they occur (Rachman, 2002), by distributing responsibility for harm to others (Salkovskis, 1985, 1999). However, similar

to effects observed in compulsive checking, the hypothesized reductions in anxiety and perceived responsibility that follow repeated reassurance are thought to be temporary (Hout & Kindt, 2003; Rachman, 2002; Rachman & Hodgson, 1980). Thus, both the functions and outcomes of reassurance seeking and compulsive checking in OCD are purported to be similar.

Prolonged and recurrent checking (e.g., of stoves, locks, windows, etc.) has long been recognized as one of the most prevalent forms of compulsive behaviour among individuals diagnosed with OCD (Rachman & Hodgson, 1980). Rachman's (2002) recent model of compulsive checking provides a succinct outline of the mechanisms purported to be involved in the onset and maintenance of this maladaptive behaviour. According to this model, repeated checking is precipitated by an increase in urges to check, which results from the presence of three "cognitive multipliers"; namely, perceived responsibility for harm, perceived probability of harm, and perceived seriousness of harm. Thus, an increase in the subjective perception of threat in conjunction with an exaggerated sense of responsibility for preventing harm serves to increase feelings of anxiety/discomfort, thereby increasing the likelihood of preventative checking. It is also suggested that compulsive checking is often aimed at eliminating a specific perceived threat that is predicted to culminate in future disaster. Given the hypothetical nature of such threats, checking has no natural terminus, and individuals are compelled to continue their maladaptive behaviour in an effort to temporarily alleviate their relentless feelings of anxiety that arise from uncertainty. In addition, because compulsive checking can prevent the disconfirmation of negative beliefs (e.g., "If I do not check, disaster is certain to occur"), it serves to maintain these beliefs, thereby

increasing the likelihood of further compulsions and safety behaviours. Lastly, Rachman's (2002) theory stipulates that a "self-perpetuating mechanism" acts to maintain compulsive checking once it has begun. The act of repeated checking itself is purported to paradoxically increase one's sense of personal responsibility for harm, as well as one's estimation of threat, while also impairing meta-memory (i.e., memory confidence) (Hout & Kindt, 2004; McNally & Kohlbeck, 1993; Tolin, 2001).

Notably, Rachman's (2002) model does not implicate memory deficits in the development of compulsive checking. This may seem counter-intuitive at first, as one might expect that memory problems would be a primary source of pathological doubt in OCD. However, mnestic deficit theories fail to explain why OCD sufferers do not have trouble recalling neutral (i.e., non-threatening) stimuli or events. Also, several recent studies have examined memory functioning in OCD (for a comprehensive review, see Muller & Roberts, 2005), and findings generally suggest that checking compulsions are not caused by memory deficits per se. Instead, it is proposed that any apparent memory difficulties observed in association with OCD might be best explained by organizational problems inherent in this population (Greisberg & McKay, 2003). Therefore, it seems unlikely that the pathological doubt commonly observed in OCD occurs solely as a function of insufficient memory functioning. In fact, some findings suggest that memory may actually be enhanced in OCD patients when the information to be remembered is perceived as potentially threatening (Radomsky & Rachman, 1999; Radomsky, Rachman, & Hammond, 2001). It is important to note that increases in perceived responsibility appear to amplify this memory bias (Radomsky et al., 2001). The question therefore arises: "How can pathological doubt co-exist with increased memory functioning in

OCD?" The answer to this apparent paradox appears to lie in the presumption that perhaps it is not deficits in memory per se, but rather, decreases in confidence (e.g., in outcome) and memory confidence, that act to sustain high levels of uncertainty in OCD sufferers. Support for this hypothesis can be derived from a number of recent studies, which have consistently demonstrated decreases in confidence and/or memory confidence (and thus, an increase in doubt) as a result of repeated checking, despite the absence of objective memory impairments (Dar, 2004; Hout & Kindt, 2004; Radomsky et al., 2001, in press; Tolin et al., 2001).

A particularly informative set of experiments conducted by Hout and Kindt (2004) examined some of the specific mechanisms that contribute to metamemory deficits in compulsive checkers. In each of their studies, the same experimental method was used: two groups of non-clinical participants were asked to perform repeated trials of a simulated checking ritual on either a "virtual stove", or a set of "virtual light bulbs". The use of repeated trials in these experiments served as an analogue for repeated checking, and is in accordance with recommendations made by Tolin et al. (2001). All participants checked the virtual stove during the first and last trials of the experiment, but only one group performed repeated checks of the stove (relevant checking condition), while the other group repeatedly checked the light bulbs in between stove checks (irrelevant checking condition). At the end of the study, participants' memory confidence and accuracy was assessed for the final stove check. Memory accuracy for the details of this check (i.e., which gas rings were actually checked) remained stable over time in both groups. However, individuals in the relevant checking group reported significant decreases in memory confidence (e.g., they doubted the accuracy of their recall), whereas

participants in the irrelevant checking group did not show this effect. Thus, the repetition of an activity may be sufficient to cause memory distrust, despite its apparent lack of influence on memory accuracy. The authors of this study attributed decreases in memory confidence in the relevant checking group to reductions in the vividness and detail of episodic memory – a result of increased familiarity with the to-be-remembered event (i.e., the final stove check). This interpretation is consistent with ideas introduced by Tulving (1985) in his descriptions of conceptual *vs.* perceptual processing (i.e., "knowing" *vs.* "remembering", respectively). Results similar to those described above were obtained by Radomsky et al. (in press) in a study of checking that used ecologically valid stimuli (i.e., a real stove), indicating that the effects of repetition on memory confidence are robust, even under conditions of real perceived threat and responsibility. Taken together, these results help to explain the persistence of compulsive checking in OCD, and provide a more detailed explanation of some of the processes involved in Rachman's (2002) "self-perpetuating mechanism".

To summarize, an exaggerated sense of responsibility for preventing harm (in conjunction with a tendency to overestimate the likelihood and seriousness of harm) is purported to increase anxiety/discomfort when a threat is perceived, predisposing individuals to engage in checking behaviour. It is also proposed that checking behaviour triggers a vicious cycle that serves to maintain this continued checking by: (i) temporarily reducing anxiety, (ii) preventing the disconfirmation of negative beliefs, (iii) increasing perceived responsibility and threat estimation, and (iv) increasing doubt (i.e., memory distrust). In addition, perceived responsibility has been shown to moderate the effects of repeated checking, such that higher levels of perceived responsibility during an anxiety-

provoking task were associated with significantly greater subjective discomfort, urges to check, perceived likelihood of harm, and perceived severity of harm (Lopatka & Rachman, 1995; Shafran, 1997). Thus, prior research has helped to clarify a number of mechanisms involved in compulsive checking, and has provided a framework for understanding this complex behaviour.

In a similar fashion, the current investigation was designed to inform current conceptualizations of compulsive reassurance seeking, as well as to determine its relation to factors associated with compulsive checking. It was hypothesized that excessive reassurance seeking, like repeated checking, might exacerbate compulsive urges (e.g., to repeatedly check and/or seek further reassurance) by temporarily reducing anxiety (Rachman, 2002; Salkovskis, 1999), preventing the disconfirmation of irrational threat-relevant beliefs (Tolin, 2001), and undermining confidence in outcome and/or memory (Dar, 2004; Hout & Kindt, 2004; Radomsky et al., in press; Tolin et al., 2001). Also, it was proposed that the intensity and duration of reassurance-seeking may be partially determined by the same cognitive "multipliers" as those described above for compulsive checking (i.e., exaggerated perceptions of threat and responsibility) (Rachman, 2002; Salkovskis, 1999).

Thus, the present investigation was designed to address the following questions:

1) Does the repeated provision of reassurance lead to an increase in anxiety following the performance of a potentially threatening task?

2) Does the repeated provision of reassurance lead to an increase in urges to check following the performance of a potentially threatening task?

3) Does the repeated provision of reassurance lead to an increase in urges to seek additional reassurance following the performance of a potentially threatening task?

4) Does the repeated provision of reassurance lead to a decrease in confidence following the performance of a potentially threatening task (i.e., is there an increase in task-related doubt)?

5) Does the repeated provision of reassurance affect memory accuracy (i.e., does it affect one's ability to recall recently-performed actions)?

6) Are the above-listed phenomena affected by manipulations of perceived responsibility/threat?

One established protocol lends itself particularly well to the current investigation. A study conducted by Ladouceur and colleagues (1995) examined the effects of perceived responsibility on checking behaviour. In this study, non-clinical participants were asked to perform a manual classification task (sorting pills into a row of containers according to their colour) under conditions of either high or low responsibility. In the high responsibility condition, participants were told that the results of their performance would be used to develop a colour-coded system of medication distribution that would be safe for poorly educated inhabitants of a developing country. In the low responsibility condition, participants were told that the purpose of the experiment was to examine colour perception, and they were also told that the sorting trials they completed were only "practice" before the real experiment began. Participants' doubting behaviour (e.g., checking, hesitation, etc.) was recorded during the task and their urges to check their performance were assessed. The results of this study revealed that participants' subjective ratings of perceived responsibility for completing the task correctly were positively and significantly correlated with their checking behaviour.

The current study utilized a similar protocol; however its primary focus was to examine the effects of repeated reassurance and perceived responsibility/threat on

anxiety, compulsive urges (to check and to seek reassurance), confidence in outcome, and memory accuracy.

Hypotheses

It was first hypothesized that participants who received repeated reassurance while performing the experimental task would demonstrate subsequent increases in i) subjective anxiety, ii) urges to check, and iii) urges to seek additional reassurance, relative to those who received less performance-related feedback. Also, in line with recent findings reported by Dar (2004), it was hypothesized that repeated reassurance might act to decrease participants' confidence (i.e., increase doubt) regarding their performance accuracy. In addition, it was hypothesized that these effects would be amplified by increases in perceived responsibility, while lower levels of perceived responsibility were expected to attenuate or eliminate these effects, resulting in several significant interactions. Finally, memory accuracy (i.e., participants' ability to recall specific details of the sorting procedure) was not expected to be influenced by manipulations of reassurance.

Manipulations of perceived responsibility were expected to lead to one of two outcomes in terms of their effect on memory accuracy. Based on prior investigations of memory bias in OCD (e.g., Radomsky & Rachman, 1999; Radomsky et al., 2001), it was speculated that increases in perceived responsibility might lead to an increase in memory accuracy (i.e., a memory bias for threat-relevant stimuli), due to an increased focus of attention on the experimental task. However, given that several other investigations of memory and metamemory in OCD (e.g., Dar, 2004; Hout & Kindt, 2004) failed to demonstrate memory effects in association with this disorder, it was also deemed entirely

possible that manipulations of perceived responsibility would not be sufficient to cause any significant change with respect to memory accuracy.

The current investigation provided a good opportunity to test these predictions, and it was hoped that this study would help to clarify some of the cognitive, social, and environmental factors that might contribute to excessive reassurance seeking.

2. Method

2.1. Participants

One hundred three volunteer undergraduate students from Concordia University participated in this study. In order to preserve the credibility of the study, Psychology majors were not recruited for participation. Individuals not fluent in English were also excluded from participating. Participants' mean age was 22.57 (SD = 4.80, range = 17-43) years, and 73.0% of participants were female. Upon completion of the study, participants' names were either entered into a draw for a cash prize, or they were given course credit for their participation. Participant characteristics are displayed in Table 1.

2.2. Measures

2.2.1. Vancouver Obsessional Compulsive Inventory

The Vancouver Obsessional Compulsive Inventory (VOCI; Thordarson et al., 2004; see Appendix A) is a 55-item self-report measure designed to assess a broad range of OCD symptoms. Items are rated on a 5-point Likert scale, ranging from 0 ("not at all") to 4 ("very much"), and assess participants' agreement with a series of statements related to their experience with obsessions and compulsions (e.g. "I am often very upset by my unwanted impulses to harm other people").

Table 1

Participants' scores on the VOCI, OBQ-44, BAI, and BDI-II

Measure	*M*	*SD*	Min.	Max.	Max. possible
VOCI[a]					
Total	43.10	36.24	0.00	153.00	220.00
HResp-HRsre	37.04	30.90	0.00	104.00	220.00
HResp-LRsre	53.74	42.42	0.00	117.00	220.00
LResp-HRsre	33.04	29.52	0.00	112.00	220.00
LResp-LRsre	49.11	39.04	1.00	153.00	220.00
OBQ-44[a]					
Total	141.96	44.80	56.00	250.00	308.00
HResp-HRsre	137.62	49.00	56.00	250.00	308.00
HResp-LRsre	147.56	44.50	78.00	237.00	308.00
LResp-HRsre	139.02	42.72	57.00	243.00	308.00
LResp-LRsre	143.88	45.04	67.00	244.00	308.00
BAI					
Total	11.92	9.98	0.00	42.00	63.00
HResp-HRsre	9.25	7.60	0.00	28.00	63.00
HResp-LRsre	15.39	11.09	0.00	38.00	63.00
LResp-HRsre	9.42	8.98	0.00	42.00	63.00
LResp-LRsre	13.74	10.95	0.00	37.00	63.00

Table 1 (continued)

Participants' scores on the VOCI, OBQ-44, BAI, and BDI-II

Measure	*M*	*SD*	Min.	Max.	Max. possible
BDI-II					
Total	12.33	9.84	0.00	45.00	63.00
HResp-HRsre	10.71	7.25	0.00	32.00	63.00
HResp-LRsre	13.35	11.23	0.00	34.00	63.00
LResp-HRsre	11.73	10.08	1.00	45.00	63.00
LResp-LRsre	13.48	10.62	1.00	43.00	63.00

Note. Total = total sample *(n = 100)*, HResp-HRsre = high responsibility – high reassurance condition *(n=24)*, HResp-LRsre = high responsibility – low reassurance condition *(n=23)*, LResp-HRsre = low responsibility – high reassurance condition *(n=26)*, LResp-HRsre = low responsibility – high reassurance condition *(n=27)*.

[a] participants' mean scale scores were substituted for missing values.

A factor analysis revealed 6 easily interpretable factors, which comprise the VOCI's 6 component subscales: checking, contamination, obsessions, hoarding, "just right", and indecisiveness. The VOCI possesses good inter-item reliability in student, community, OCD, and clinical control populations (Cronbach's α = .96, .90, .94, and .98 respectively). Test-retest reliability for the VOCI total score is high in clinical populations (Pearson's $r = .96$, $p < 0.001$) (Thordarson et al., 2004), as well as in student samples (Pearson's $r = .91$, $p < 0.001$) (Parrish, Ouimet, Ashbaugh, Radomsky, & O'Conner, 2004).

2.2.2. Obsessional Beliefs Questionnaire – 44

The Obsessional Beliefs Questionnaire – 44 (OBQ; Obsessive-Compulsive Cognitions Working Group [OCCWG], in press; see Appendix B) is a 44-item scale that measures the presence and strength of various beliefs that are common among OCD sufferers. Each item is rated on a 7-point Likert scale, ranging from 1 ("disagree very much") to 7 ("agree very much"), indicating respondents' level of agreement with the listed beliefs (e.g., "Having bad thoughts means I am weird or abnormal", "I should make sure others are protected from any negative consequences of my decisions or actions").

A recent analysis conducted on a previous 87-item version of the OBQ revealed three empirically derived factors that correspond to cognitive constructs hypothesized to be highly relevant to OCD: 1) responsibility and threat estimation, 2) perfectionism and intolerance for uncertainty, and 3) importance and control of thoughts (OCCWG, in press). As a result of this analysis, the shorter, 44-item version of the OBQ was created, which included only items that loaded most highly on each of these factors (i.e., factor loadings of .50 or above). This abbreviated version possesses excellent internal

consistency among OCD patients (Cronbach's $\alpha = .95$), and evidence supports the criterion validity of this measure (OCCWG, in press).

2.2.3. Beck Anxiety Inventory

The Beck Anxiety Inventory (BAI; Beck & Steer, 1990; see Appendix C) is a 21-item self-report measure designed to assess the severity of primarily somatic anxiety symptoms experienced by respondents during the previous week. Items are rated on a 4-point scale, ranging from 0 ("not at all") to 3 ("severely, I could barely stand it"), according to respondents' experience with the symptoms listed, such as difficulty breathing, sweating, and dizziness. The BAI has been shown to be highly reliable and valid (Beck & Steer, 1990).

2.2.4. Beck Depression Inventory-II

The Beck Depression Inventory-II (BDI; Beck, Steer, & Brown, 1996; see Appendix D) is a 21-item self-report measure that assesses the severity of depressive symptoms experienced by respondents over the course of the previous two weeks. For each item, respondents indicate which of four self-evaluative statements regarding the severity of a particular depressive symptom (e.g., sadness, feelings of worthlessness, suicidal intent) best describes their recent experience. The BDI has been shown to be a highly reliable and valid assessment tool (Beck, Steer, & Brown, 1996).

2.2.5. Subjective ratings

Participants were asked to provide several subjective ratings (scale 0 – 100) related to the constructs of interest on two separate occasions (e.g., both before [time 1] and after [time 2] the experimental manipulations were introduced). A description of each of these ratings is provided below.

2.2.5.1. Anxiety (Subjective units of distress scale [SUDS])

To assess participants' subjective level of anxiety at time 1 and time 2, they were asked the following: "Please rate your current level of anxiety on a scale of 0-100, where 0 means not at all anxious, and 100 means extremely anxious".

2.2.5.2. Urge to check

To assess participants' urges to check their performance at time 1 and time 2, they were asked the following: "Please rate your urge to personally check how you sorted the pills on your last trial on a scale of 0-100, where 0 means you have no urge whatsoever, and 100 means you have an extreme urge to check".

2.2.5.3. Urge to seek reassurance

To assess participants' urges to seek additional reassurance at time 1 and time 2, they were asked the following: "On a scale of 0-100, please rate your urge to be reassured that you sorted the pills correctly on your last trial, where 0 means you have no urge whatsoever, and 100 means you have an extreme urge to be reassured".

2.2.5.4. Confidence in outcome

To assess how confident participants were that they had sorted the pills accurately at time 1 and time 2, they were asked the following: "On a scale of 0-100, rate how confident you are that you sorted the pills into the bottles correctly on your last trial, where 0 means not at all confident, and 100 means completely confident".

2.2.6. Memory accuracy

To assess memory accuracy, participants completed a multiple-choice recall test, which measured their ability to remember the pill combinations they had been asked to place in each bottle during the sorting task (see Appendix E).

2.3. Procedure

The present study utilized a 2 (time) x 2 (responsibility condition) x 2 (reassurance condition) mixed design, in which both the provision of reassurance and levels of perceived responsibility were experimentally manipulated. Thus, four conditions (high responsibility-high reassurance [HResp-HRsre], high responsibility-low reassurance [HResp-LRsre], low responsibility-high reassurance [LResp-HRsre], and low responsibility-low reassurance [LResp-LRsre]) across two assessment points comprised the experimental design (see Figure 1). Participants were tested individually, and were given identical task instructions prior to the experimental manipulations, regardless of group membership.

Upon arrival, participants were given a brief description of the study (see Appendix F), and were asked to read and sign a consent form (see Appendix G) before proceeding with the experiment. Next, participants were seated in a small testing room where they were given verbal instructions (see Appendix H) and a detailed standardized demonstration outlining the pill-sorting task that they would be asked to perform (i.e., sorting an array of vitamin pills into a row of empty, opaque pharmaceutical bottles according to a pre-determined visual display) (see Figure 2). All participants were presented with the same assortment of ten different pill types (including various shapes, colours, and sizes) in two large ceramic bowls, and were asked to perform five sorting trials during the experiment. Each trial involved sorting the pills into a row of seven separate opaque pharmaceutical bottles, one pill at a time; using seven different four-pill combinations (see Appendix I). The pharmaceutical bottles were placed next to one another in a cardboard tray, and participants were asked not to look into the bottles while

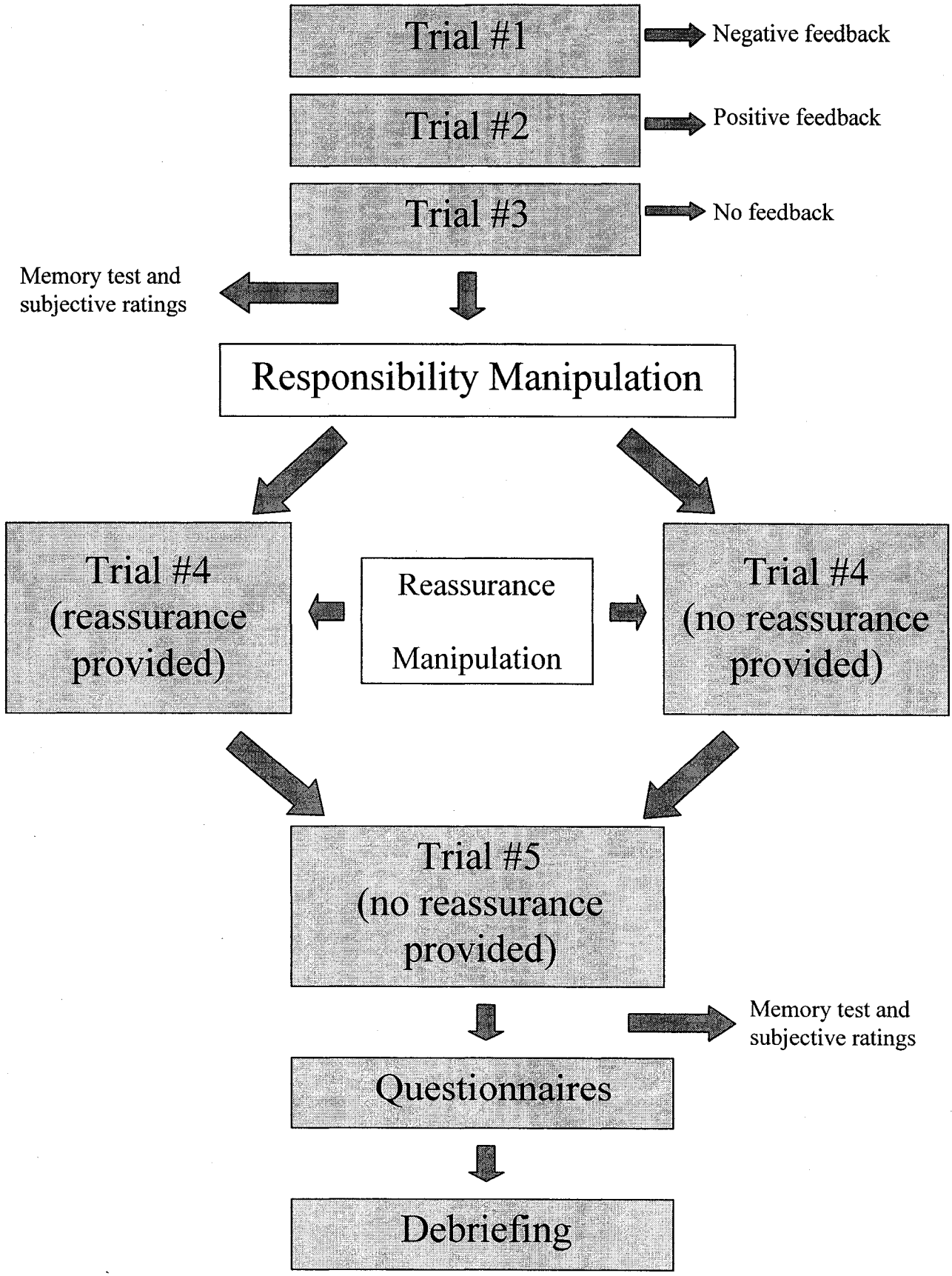


Figure 1. Experimental procedure

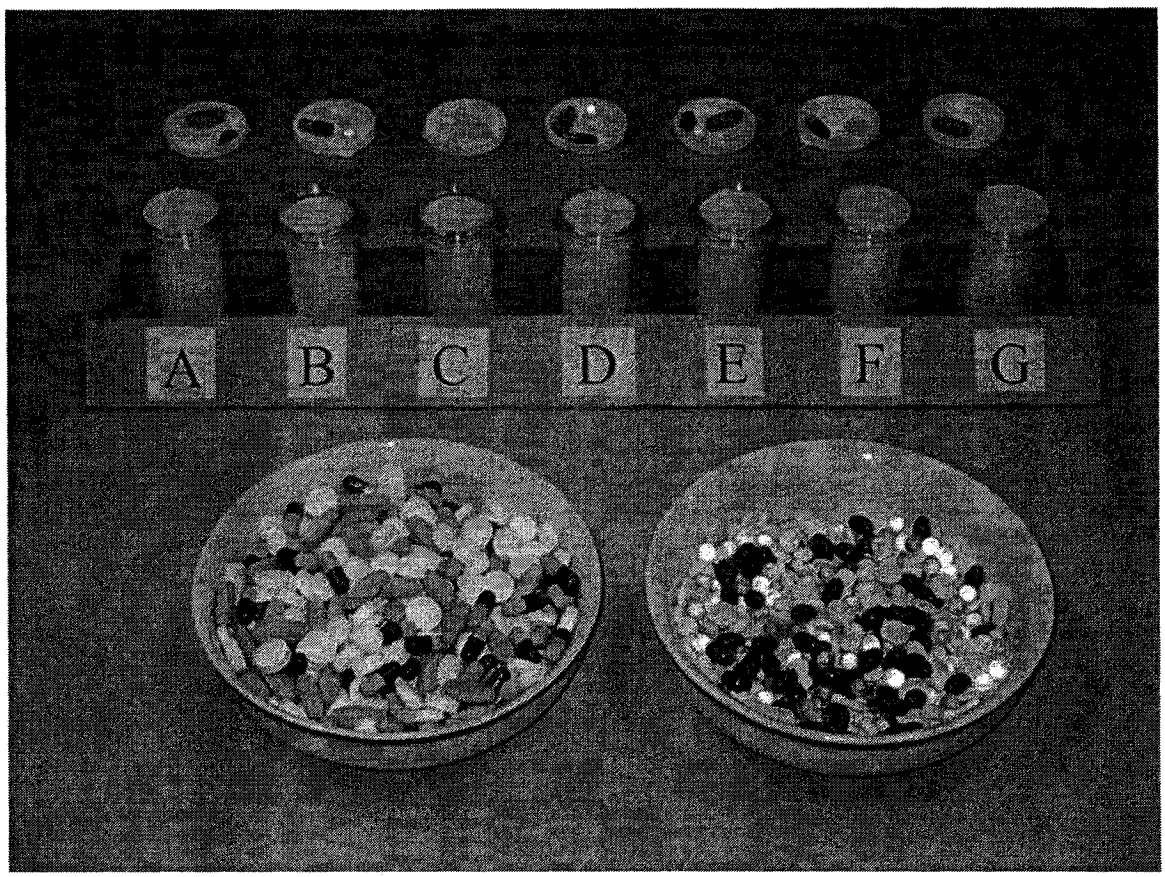


Figure 2. Experimental apparatus

sorting. Participants were not initially informed of the purpose of the sorting task; however, they were instructed to sort the pills as quickly and accurately as possible. In order to increase the credibility of these instructions, participants were asked to wear a pair of latex gloves while sorting the pills, and were informed that the experimenter would record the time taken to complete each trial.

Following each of the first three trials, all participants received identical feedback regarding the accuracy of their performance. After the first trial, each participant was told that they had made a mistake while sorting the pills (regardless of their actual performance). This potentially false feedback was utilized as a means of increasing participants' uncertainty about their ability to perform the sorting task correctly and quickly. The use of such potentially false feedback is consistent with the procedure employed by Hout & Kindt (2004) in their investigations of repeated checking. After the second trial, all participants were assured that they had sorted the pills exactly correctly (again, regardless of their actual performance). This manipulation was designed to ensure that participants believed that they were capable of performing the task accurately. All participants then performed a third trial, after which no feedback was provided. Next, participants were led to a different room in the laboratory where they were asked to provide the subjective ratings outlined above, as well as a test of memory accuracy.

2.3.1. Responsibility manipulation

Participants were led back to the testing room after providing the first set of ratings, and were given a rationale for the study which comprised the major component of the responsibility manipulation. In the high responsibility condition, participants were told that our laboratory had been asked by a local charitable organization to determine

whether pills of various shapes, sizes and colours could be sorted quickly and accurately by hand. Participants were also told that the results of their *individual* performance would be important for developing a safe and efficient means of sorting and distributing vitamins and medications in a 3rd-world country (for a full description, see Appendix J). In an effort to maximize the credibility of this manipulation, and to increase participants' perceived sense of responsibility and threat in this condition, the experimenter wore a lab coat throughout the session, and a poster provided by a charitable organization that showed children from a 3rd-world country was displayed on the wall of the testing room. Conversely, participants in the low responsibility condition were told that the present study had been designed to investigate colour and shape perception, and that our laboratory was interested in determining how quickly and accurately people were able to sort pills according to their colour and shape (for a full description, see Appendix K). In this low responsibility condition, the experimenter did not wear a lab coat, nor were any additional props (e.g., posters) included. All participants (regardless of responsibility condition) were told that we were also interested in assessing the effects of repetitive task completion on mood.

2.3.2. Reassurance manipulation

Following the responsibility manipulation, each participant performed two more sorting trials (trials #4 and #5). In between these trials, a brief series of task-irrelevant questionnaires was administered to participants in an adjacent laboratory room (see Appendix L for a list of these questionnaires). Members of the "low reassurance" groups received no further feedback regarding their performance for the remainder of the trials, while members of the "high-reassurance" groups were provided with three standardized

bouts of reassurance following the fourth trial. These reassurances involved three discrete statements of positive performance-related feedback (see Appendix L), which were spread out over a 15-minute time period, during which the above-mentioned questionnaires were completed. Participants did not receive any performance-related feedback following the fifth trial, regardless of reassurance condition.

Next, participants were asked to provide a second set of subjective ratings (i.e., anxiety, urge to check, urge to seek reassurance, confidence in outcome). They were also asked to complete the multiple-choice (i.e., memory accuracy) test once more. In addition, as a manipulation check, participants were asked to rate (scale 0 – 100) the level of perceived responsibility/threat that they associated with the experimental task (see Appendix M). Finally, participants completed a small questionnaire package, which included the BAI, the BDI, the OBQ, and the VOCI. After completing the questionnaires, participants were debriefed about the real purpose of the study (see Appendix N), and were given a second consent form to indicate their continued approval concerning the use of their data (see Appendix O).

3. Results

Analyses were conducted excluding data from participants ($n = 3$) for whom the manipulation check data was missing. As a result, the overall sample size was reduced from 103 to 100 participants (HResp-HRsre group: $n = 24$, HResp-LRsre group: $n = 23$, LResp-HRsre group: $n = 26$, LResp-LRsre group: $n = 27$). An alpha level of .05 was used for all statistical tests.

3.1. Participant characteristics

Participants in the four experimental groups did not differ with respect to age, $F(3,96) = 1.75, p = .16$, nor did they differ in terms of their mean total scores on the BDI, $F(3,96) = .45, p = .72$, the VOCI, $F(3,96) = 1.85, p = .14$, or the OBQ, $F(3,96) = .24, p = .87$. However, there was a trend towards group differences in terms of their mean total scores on the BAI, $F(3,96) = 2.44, p = .07$, such that participants in the "low reassurance" groups tended to score higher on this measure (see Table 1 for descriptive statistics).

3.2. Sex comparisons

A chi-squared analysis revealed that sex was not equally distributed across the experimental groups (χ^2 [3, N = 100] = 8.37, $p = .04$). There were fewer males in the "high responsibility" groups than in the "low responsibility" groups (19.1% *vs.* 34.0%, respectively), and fewer males in the HResp-HRsre group compared to the other three groups (4.2% *vs.* 34.8%, 34.6%, and 33.3% respectively). However, independent samples t-tests revealed that males and females did not differ with respect to the number of error-free sorting trials they performed, $t(98) = 1.65, p = .10$ ($M = 2.59$[$SD = 1.37$] *vs.* 3.10[$SD = 1.34$] error-free trials for males and females, respectively). Furthermore, there were no significant differences between males and females on pre-manipulation ratings of anxiety, $t(98) = .35, p = .73$, urges to check, $t(98) = .34, p = .73$, urges to seek reassurance, $t(98) = -.45, p = .65$, or confidence in outcome, $t(98) = -.63, p = .53$. Likewise, there were no significant sex differences on post-manipulation ratings of anxiety, $t(98) = .48, p = .63$, urges to check, $t(98) = -.30, p = .77$, urges to seek reassurance, $t(98) = .15, p = .88$, or confidence in outcome, $t(98) = -.53, p = .60$. Males

and females also did not differ in terms of their memory accuracy prior to, $t(98) = -.27$, $p = .79$, or following, $t(98) = .01$, $p = .99$, the experimental manipulations.

3.2. Manipulation check

Following their completion of the sorting task, participants rated (on a scale from 0 –100) the extent to which they felt their performance would affect the well-being of others (see Appendix M). Participants in the high responsibility groups reported a significantly greater amount of perceived responsibility/threat associated with the experimental task than participants in the low responsibility groups, $F(1,96)= 12.47$, $p < 0.01$ ($M = 46.68$[$SD = 27.32$] *vs.* 27.81[$SD = 26.50$], respectively), indicating that the responsibility manipulation was effective.

3.3. Main dependent variables

Four main dependent variables were analyzed in this study: anxiety, urges to check, urges to seek reassurance, and confidence in outcome. Each of these ratings constituted a separate scale for the purposes of statistical analyses. Participants provided both pre- and post-manipulation ratings (scale 0 –100) for each scale, allowing the comparison of ratings according to group membership (responsibility and reassurance conditions) and time of measurement (pre- and post-manipulation). In addition, data reflecting memory accuracy were collected both pre- and post-manipulation (immediately following the solicitation of subjective ratings) to assess participants' memory for the details of the sorting procedure. Participants' mean subjective ratings and memory accuracy scores are presented in Table 2.

A repeated-measures ANOVA was conducted, in which time and scale were treated as within-participants factors, while responsibility and reassurance conditions

Table 2

Participants' subjective ratings (scale 0-100) and memory accuracy scores (between 0-10) at time1 and time2.

Group	Time 1		Time 2	
Rating / Score	*M*	*(SD)*	*M*	*(SD)*
HResp-HRsre				
Anxiety	34.71	(26.33)	26.25	(23.32)
Urge to check	43.38	(29.00)	44.58	(34.83)
Urge to seek reassurance	40.83	(31.02)	42.29	(34.36)
Confidence	68.54	(25.52)	75.38	(24.89)
Memory accuracy	4.62	(1.34)	5.08	(1.89)
HResp-LRsre				
Anxiety	32.91	(25.06)	31.00	(26.46)
Urge to check	41.04	(36.08)	37.26	(34.60)
Urge to seek reassurance	39.65	(34.47)	36.83	(33.42)
Confidence	75.87	(20.15)	66.87	(33.57)
Memory accuracy	4.74	(1.48)	4.52	(1.86)
LResp-HRsre				
Anxiety	27.35	(25.20)	22.88	(26.76)
Urge to check	41.65	(30.64)	30.27	(34.67)
Urge to seek reassurance	35.81	(29.66)	26.12	(26.81)
Confidence	70.58	(30.41)	77.77	(26.83)
Memory accuracy	4.92	(1.16)	4.65	(2.00)

Table 2 (continued)

Participants' subjective ratings (scale 0-100) and memory accuracy scores (between 0-10) at time1 and time2.

Group	Time 1		Time 2	
Rating / Score	*M*	*(SD)*	*M*	*(SD)*
LResp-LRsre				
Anxiety	43.70	(25.70)	37.04	(21.98)
Urge to check	58.70	(34.57)	46.96	(32.88)
Urge to seek reassurance	62.19	(29.54)	52.19	(32.25)
Confidence	68.11	(26.71)	76.59	(22.84)
Memory accuracy	4.78	(1.91)	5.52	(1.74)

Note. HResp-HRsre = high responsibility – high reassurance condition *(n=24)*, HResp-LRsre = high responsibility – low reassurance condition *(n=23)*, LResp-HRsre = low responsibility – high reassurance condition *(n=26)*, LResp-HRsre = low responsibility – high reassurance condition *(n=27)*.

served as between-participants factors. Significant main effects of time, $F(1,288) = 6.90$, $p = .01$ (Cohen's $d = .31$) and scale, $F(3,288) = 57.53$, $p < .001$ (Cohen's $d = .89$) were found, indicating that participants' ratings differed according to the scale being measured and the time of measurement. In addition, results revealed a significant 3-way (time x scale x responsibility condition) interaction, $F(3,288) = 3.23$, $p = .02$ (Cohen's $d = .21$), indicating that participants' ratings for each of the above-mentioned scales were differentially influenced by manipulations of perceived responsibility across time. In contrast, the interaction between time, scale, and reassurance condition was not statistically significant, $F(3,288) = .60$, $p = .61$, nor was the 4-way interaction between time, scale, responsibility condition, and reassurance condition, $F(3,288) = 1.13$, $p = .34$.

To determine which scales were affected by the interaction between time of measurement and responsibility condition, four separate 2 x 2 x 2 repeated measures ANOVAs were conducted (one for each scale) using the pooled error term from the original analysis (see Howell, 1987). Subsequent to these analyses, the simple effects of time were examined at both levels of responsibility for each scale, and pairwise comparisons were conducted to clarify significant results.

Anxiety

The interaction between time and responsibility condition was not significant with respect to participants' anxiety ratings, $F(1,288) = .01$, $p = .94$. Furthermore, simple effects tests revealed that participants' anxiety ratings did not differ significantly from time 1 to time 2 in either the high responsibility groups, $F(1,288) = 2.11$, $p = .15$, or the low responsibility groups, $F(1,288) = 2.69$, $p = .10$ (see Figure 3).

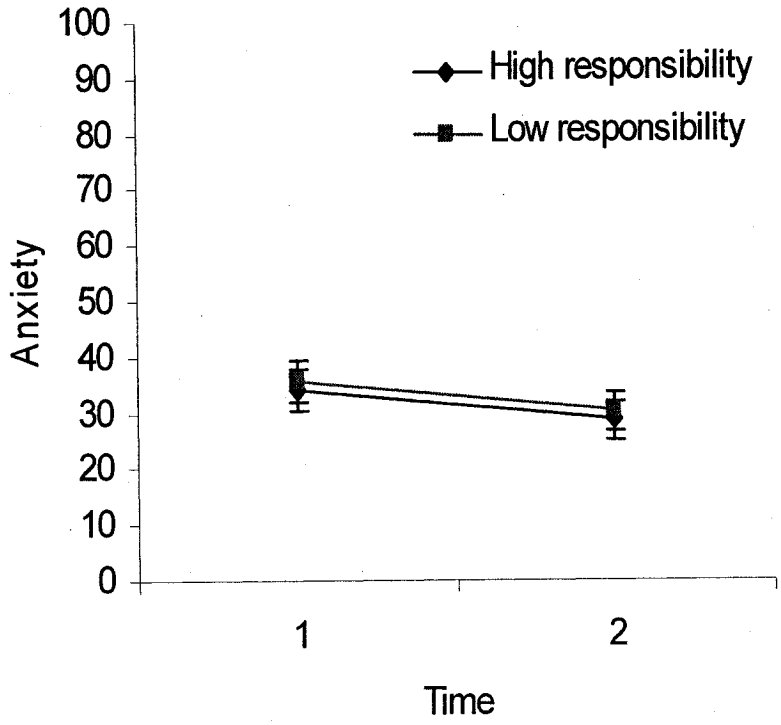


Figure 3. Subjective anxiety ratings in high *vs.* low responsibility groups at time 1 and time 2.

Urges to check

The interaction between time and responsibility condition was statistically significant for participants' "urge to check" ratings, $F(1,288) = 4.27, p = .04$, (Cohen's $d = .24$). Participants in the low responsibility conditions demonstrated a decrease in urges to check following the responsibility manipulation, $F(1, 288) = 11.52, p < .001$ (Cohen's $d = .40$), whereas participants in the high responsibility conditions did not demonstrate this decrease in urges to check, $F(1,288) = .12, p = .73$ (see figure 4).

Urges to seek reassurance

With respect to participants' "urge to seek reassurance" ratings, a marginally significant trend was found for the interaction between time and responsibility condition, $F(1,288) = 3.40, p = .07$ (Cohen's $d = .22$). Under conditions of low responsibility, participants' urges to seek reassurance decreased following the responsibility manipulation, $F(1, 288) = 8.36, p < .01$ (Cohen's $d = .34$), while participants in the high responsibility conditions did not demonstrate this decrease, $F(1,288) = .03, p = .86$ (see Figure 5).

Confidence in outcome

A trend was found for the interaction between time and responsibility condition when examining participants' ratings of confidence in outcome, $F(1,288) = 3.22, p = .07$ (Cohen's $d = .21$). For participants in the low responsibility conditions, confidence significantly increased following the responsibility manipulation, $F(1,288) = 5.30, p = .02$, whereas participants in the high responsibility conditions did not demonstrate this post-manipulation increase in confidence, $F(1,288) = .06, p = .80$ (see Figure 6).

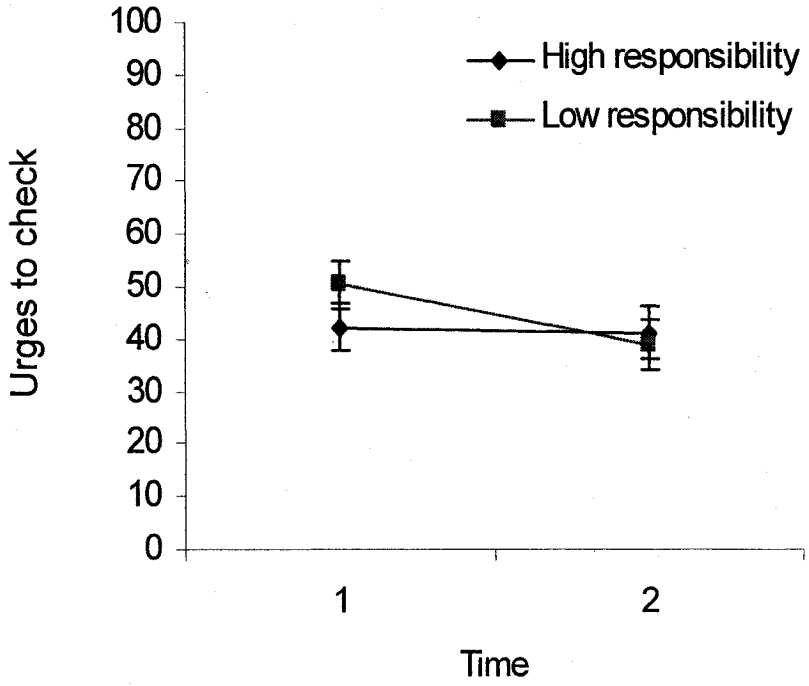


Figure 4. Subjective "urge to check" ratings in high *vs.* low responsibility groups at time 1 and time 2.

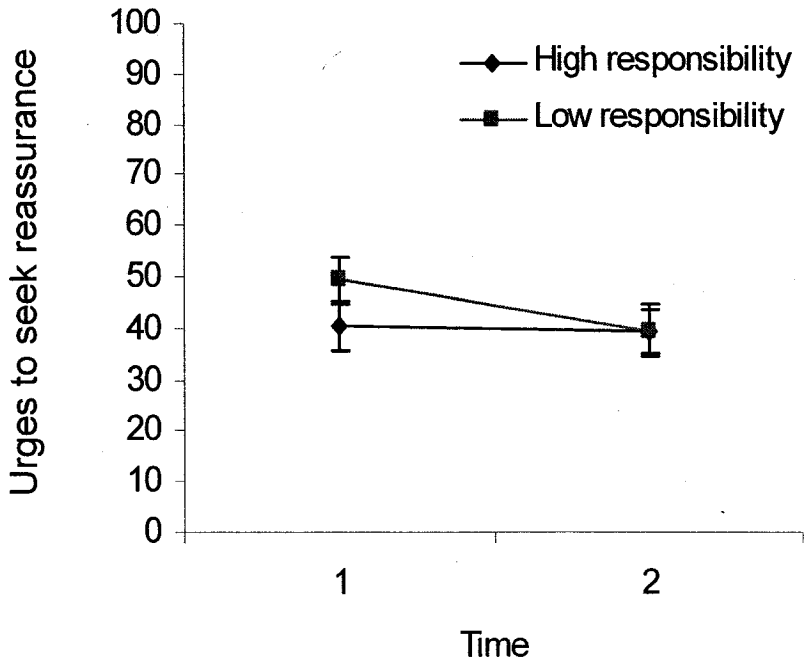


Figure 5. Subjective "urge to seek reassurance" ratings in high *vs.* low responsibility groups at time 1 and time 2.

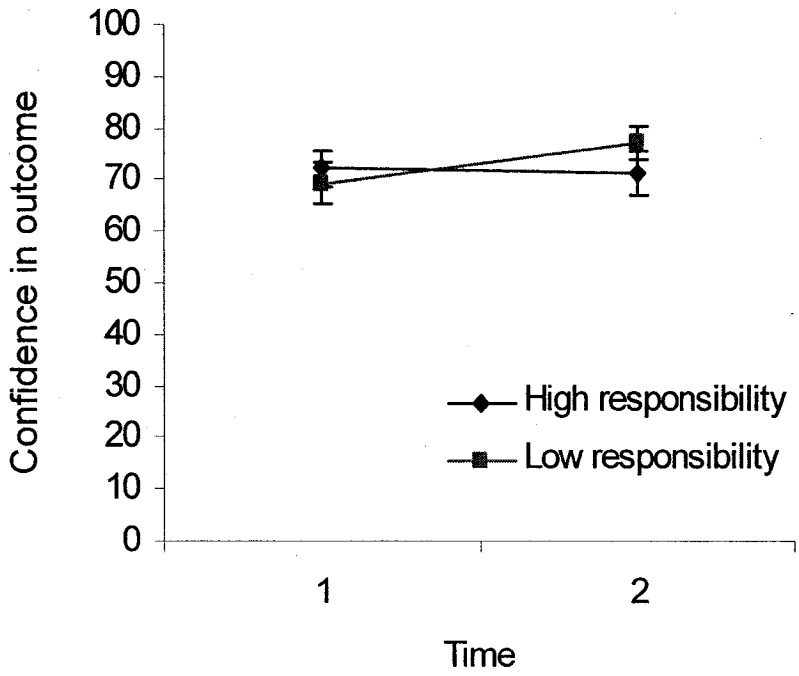


Figure 6. Subjective outcome confidence ratings in high *vs.* low responsibility groups at time 1 and time 2.

It was important to assess whether these findings might have resulted from greater accuracy of performance among participants in the low responsibility conditions. To determine whether participants in each responsibility condition differed in terms of their actual performance, an independent samples t-test was performed, in which the number of incorrect trials served as the dependent variable. The difference between responsibility groups with respect to the number of trials performed incorrectly was not statistically significant, $t(98) = -.569$, $p = .571$ ($M = 1.96$[$SD = 1.40$] *vs.* 2.11[$SD = 1.34$] for high *vs.* low responsibility groups, respectively).

Memory accuracy

A separate 2 x 2 x 2 repeated measures ANOVA was performed to assess whether participants' ability to recall the details of the sorting procedure differed according to time or group membership. The effects of time, $F(1,96) = .75$, $p = .39$, responsibility group, $F(1,96) = .69$, $p = .41$, and reassurance group $F(1,96) = .06$, $p = .80$, were not statistically significant. Similarly, the responsibility x reassurance group interaction, $F(1,96) = 1.16$, $p = .28$, the time x responsibility group interaction, $F(1,96) = .08$, $p = .78$, and the time x reassurance group interaction $F(1,96) = .16$, $p = .69$, were not significant. In contrast, a significant 3-way interaction was found between time, responsibility condition and reassurance condition, $F(1,96) = 4.18$, $p = .04$ (Cohen's $d = .42$). However, simple effects tests revealed that participants' memory accuracy did not differ significantly as a function of time in the high responsibility groups, $F(1,46) = .18$, $p = .68$, the low responsibility groups, $F(1,52) = .74$, $p = .39$, the high reassurance groups, $F(1,49) = .07$, $p = .79$, or the low reassurance groups, $F(1,49) = 1.07$, $p = .31$. Notwithstanding this result, pairwise comparisons revealed a trend towards increased

memory accuracy in the LResp-LRsre group, $F(1,96) = 3.50, p = .06$, whereas none of the other experimental groups demonstrated a significant change in memory accuracy following the experimental manipulations.

Trial completion time

To assess whether the experimental manipulations of reassurance and responsibility affected the amount of time participants spent performing the final sorting trial, a two-way ANOVA was conducted. The amount of time spent sorting on the final trial did not differ significantly between responsibility groups, $F(1,96) = .02, p = .90$, or reassurance groups, $F(1,96) = .02, p = .87$. Also, the responsibility group x reassurance group interaction was not statistically significant, $F(1,96) = .19, p = .66$.

Covariate analyses

Given the near-significant differences in BAI scores between the experimental groups, each of the above-described analyses were re-run using BAI scores as covariates. Results of the overall repeated measures ANCOVAs were comparable to the analyses reported above. However, simple effects tests in this analysis revealed that participants in the low responsibility groups demonstrated a significant decrease in anxiety following the responsibility manipulation, $F(1,288) = 4.52, p = .03$ (Cohen's $d = .25$), whereas participants in the high responsibility conditions did not demonstrate this decrease, $F(1,288) = .16, p = .69$. In addition, the trend towards a near-significant effect of time on participants' confidence ratings in the low responsibility groups was not robust when controlling for BAI scores, $F(1,288) = 2.69, p = .10$. All other findings from the simple effects analyses remained stable.

4. Discussion

The results of the current study provided mixed support for the hypotheses that were originally formulated. As predicted, manipulations of perceived responsibility/threat had a significant impact upon participants' urges to check, their urges to seek reassurance, and their confidence in outcome. Specifically, participants in the low responsibility groups reported significant decreases in their urges to check and to seek reassurance, as well as an increase in confidence, subsequent to this manipulation. In contrast, participants in the high responsibility groups did not demonstrate these changes. Thus, greater levels of perceived responsibility/threat were associated with the maintenance of compulsive urges and performance-related doubt, following the completion of a complex experimental task. These findings are consistent with previous research in this domain (e.g., Ladouceur et al., 1995; Lopatka & Rachman, 1995; Shafran, 1997), and they provide additional support for leading cognitive-behavioural models of OCD (e.g., Rachman, 2002; Rachman & Hodgson, 1980; Salkovskis, 1985).

Notwithstanding these results, manipulations of perceived responsibility/threat did not affect participants' reported levels of anxiety in the current study. In fact, neither the high nor the low responsibility groups reported a significant change in their anxiety over time, despite the fact that participants in the low responsibility group displayed a decrease in compulsive urges (to check and to seek further reassurance) subsequent to the manipulation. Contrary to predictions set forth by anxiety-reduction theories of compulsive behaviour (e.g., see Rachman, de Silva, & Roper, 1976; Rachman & Hodgson, 1980; Salkovskis, 1999), these results suggest that reductions in compulsive urges might occur independently of reductions in anxiety. However, it is possible that the

"type" of anxiety assessed in the current study led to this finding, as participants were asked to indicate their *general* level of anxiety following the two experimental trials, rather than their *specific* (i.e., performance-related) anxiety. Therefore, the present findings must be interpreted with caution, as the "type" of anxiety that was measured in this study might not have been a valid indicator of urge-related distress. Accordingly, future investigations would benefit from the inclusion of several, perhaps differently focused, measures of anxiety, in addition to other potentially distressing emotions (e.g., worry, guilt, etc.).

As reported earlier, participants' memory for the sorting procedure was not affected by manipulations of reassurance or responsibility/threat. While the repeated provision of reassurance was not expected to influence participants' memory, it was predicted that increases in perceived responsibility/threat might lead to significantly better recall of recently-performed actions (i.e., the sorting procedure), due to enhanced processing of this potentially threatening information (Radomsky et al., 2001). Contrary to this hypothesis, higher levels of perceived responsibility/threat were not associated with superior recall. Equally important, conditions of high perceived responsibility/threat did not lead to poorer recall of the sorting task either. Given that experimental manipulations of responsibility/threat have been demonstrated to be a reliable and effective means of inducing obsessive-compulsive symptomatology in a non-clinical population (e.g., Lopatka & Rachman, 1995; see also Shafran, 1997), these findings suggest that memory effects might not be as essential to OCD as previously thought. In fact, Radomsky and colleagues (2001) recently noted that an inflated sense of responsibility, typically experienced by individuals diagnosed with OCD, may have a

greater impact upon memory confidence than memory accuracy. Interestingly, the current study showed that confidence in outcome (which may serve as an indicator of memory confidence) was lower under conditions of high responsibility than under low responsibility conditions, providing indirect support for this hypothesis.

Hypotheses regarding the effects of repeated reassurance on anxiety, compulsive urges (to check and to seek reassurance), and confidence in outcome were not supported by the current investigation. Unlike previous studies (e.g., Hout & Kindt, 2004, Tolin et al., 2001), in which repeated exposure to experimental stimuli (i.e., an analogue to checking behaviour) was sufficient to evoke memory distrust, the reassurance manipulation employed in the current investigation did not appear to promote any maladaptive OCD-related cognitions. To account for this pattern of results, one is led to consider two distinct possibilities: (i) reassurance seeking and compulsive checking might not be functionally equivalent (and/or might involve different cognitive-behavioural processes), (ii) methodological issues may have compromised the ecological validity of the study.

Although compulsive checking and excessive reassurance seeking are purported to share several functional characteristics (e.g., temporary anxiety reduction, alleviation of doubt/uncertainty, etc.), one might hypothesize that the specific purpose of each of these behaviours could be slightly different. For example, it could be argued that compulsive checking may primarily serve to reduce anxiety provoked by increased perceptions of threat, whereas the primary function of excessive reassurance seeking might be to disperse one's perceived responsibility for preventing harm. Likewise, one might contend that the main factors involved in the maintenance of compulsive checking

and reassurance seeking could differ. For instance, it is possible that compulsive checking might persist primarily because of metamemory deficits that occur subsequent to the onset of repeated checking, whereas reassurance seeking might instead persist because its excessive use prevents the disconfirmation of automatic negative beliefs. Each of these possible scenarios might help to explain the null findings described above, as the present investigation employed experimental methods that had been established in examinations of compulsive checking. However, as mentioned previously, reassurance seeking and compulsive checking can both be construed as anxiety-neutralizing techniques (which implies their functional equivalence), and prior research (e.g., Rachman, Shafran, Mitchell, Trant, & Teachman, 1996) has indicated that different forms of "neutralization behaviour" have similar long-term counter-productive effects. Thus, it is unlikely that any differences that may exist between reassurance seeking and compulsive checking (such as those proposed above) would be sufficient to account for the present findings. Furthermore, findings from a single preliminary study that are inconsistent with previous theory, such as those described above, must be interpreted with caution until further investigations can clarify these results. Thus, it is reasonable to suspect that a number of issues related to the experimental protocol may have compromised our ability to test a valid and reliable analogue of real-life reassurance-seeking behaviour, thereby limiting our results.

Firstly, efforts to standardize the provision of reassurance in the present experiment might have reduced the credibility of this feedback. As mentioned previously, all participants were given identical feedback following their first two sorting trials, regardless of their actual performance. As such, a number of participants received

false feedback during these initial trials (i.e., some were told they had sorted the pills correctly when they had in fact made a mistake and vice versa). While very few participants exhibited any signs of disbelief as a result of this potentially false information, the use of such deception may have raised suspicion in a number of participants, thereby reducing the impact of subsequent provisions of reassurance. Moreover, as a result of standardization, the repeated provision of reassurance may have been perceived as somewhat "artificial" and stereotypic. In fact, more than one participant remarked at the end of the study that they suspected "something weird was going on", due to the atypical manner in which feedback was presented to them. Thus, there is reason to believe that the ecological validity of our reassurance manipulation may have been compromised by the standardization of this procedure.

Second, the amount of reassurance provided to participants in the "high reassurance" groups may not have been sufficient to elicit the proposed counterproductive effects. Whereas previous studies of compulsive behaviour (e.g., Hout & Kindt, 2004; Radomsky et al., in press; Tolin et al., 2001) have tended to incorporate a fairly large number of stimulus exposures (i.e., "repetitions") in their experimental design, the current investigation used a limited number of sorting trials (5) and reassurance provisions (1 *vs.* 4 in the low *vs.* high reassurance groups, respectively) to examine the constructs of interest. Given that many repeated exposures to stimuli (e.g., between 5 and 10) may be required to diminish memory confidence (Coles, Radomsky, & Horng, in press), the design employed in the current protocol (with its limited number of exposures) may have precluded the occurrence of similar counter-productive effects.

Third, it is possible that the lack of counter-productive effects reported above may have simply resulted from the limited number and/or timing of experimental observations that were collected in this study. The main dependent variables in this study included a series of subjective ratings, as well as objective memory accuracy scores, that were collected at two points in time (pre- and post-manipulation). Pre-manipulation ratings served as a baseline, while the second set of ratings was designed to assess post-manipulation change. Because post-manipulation ratings were collected only once (approximately 1 to 2 minutes following the final trial), it is possible that the current protocol did not allow sufficient time for the proposed counter-productive effects (e.g., increased anxiety, compulsive urges, and doubt) to occur. Indeed, the specific timeline for these proposed changes is not well understood, and it is reasonable to hypothesize that the counter-productive effects of repeated reassurance (which are likely to result from the actions of a "self-perpetuating mechanism") might take relatively longer to emerge than the near-immediate effects of increasing perceived responsibility (e.g., increased anxiety and/or compulsive urges). In fact, the active provision of performance-related reassurance may have prevented participants' anxiety and compulsive urges from increasing to distressing levels, at least within the short-term context of the experiment. Having stated this, results from studies of analogue checking (e.g., Hout & Kindt, 2004; Radomsky et al., in press) were inconsistent with this hypothesis, suggesting that this interpretation should be made cautiously.

Finally, efforts to mimic real-life reassurance seeking behaviour may have been compromised by the fact that participants did not actively seek reassurance in the present study. Given that a number of previous studies (e.g., Hout & Kindt, 2004; Radomsky et

al., in press; Tolin et al., 2001) were able to successfully use forced task repetition as an analogue for real-life checking behaviour, it was theorized that both solicited and unsolicited reassurance provision might activate similar cognitive and behavioural processes among its recipients. As such, participants in the current investigation were repeatedly provided with unsolicited feedback regarding their task-related performance, in an attempt to simulate the excessive reassurance provided to OCD sufferers who compulsively seek this feedback to diminish their anxiety. However, prior success in using experimentally induced task repetition to elicit effects similar to those observed in real-life checking does not guarantee similar results when using unsolicited feedback as an analogue for real-life reassurance-seeking behaviour. While repeated exposure to stimuli in a research context might sufficiently mimic real-life checking behaviour to increase participants' doubt (due to decreased perceptual processing of relevant information), the counter-productive effects of repeated reassurance seeking might be more difficult to induce experimentally. For instance, contrary to investigations of compulsive checking, one might expect that metamemory deficits would be absent following multiple bouts of unsolicited reassurance, as the act that is repeated in this circumstance (i.e., reassurance provision) does not match the act that the individual is trying to recall (i.e., an anxiety-provoking situation or event, such as checking stove burners), thereby precluding "familiarization effects". Thus, while involuntary repetition on experimental tasks has proven successful as an analogue for checking rituals in previous research (e.g., Hout & Kindt, 2004, Tolin et al., 2001), it is reasonable to suppose that this method might not apply equally to investigations of reassurance seeking.

Similarly, the repeated provision of unsolicited feedback in a research context may differ entirely from repeatedly granting *active* requests for reassurance, in terms of their consequences for maladaptive cognitions and behaviours. In fact, many of the cognitive-behavioural processes that are purported to exacerbate reassurance-seeking behaviour in OCD may remain relatively inactive until, or unless, the individual feels compelled to actively solicit reassurance. For example, it is presumed that negative obsessional beliefs are common among individuals who actively seek reassurance (e.g., "I have to make sure that I've done everything I can to prevent disaster, or something bad will surely happen"), and that repeatedly granting an individual's requests for reassurance prevents them from disconfirming these beliefs. As described above, this process serves to maintain compulsive behaviour in the long run, and is considered one of the primary components of Rachman's (2002) "self-perpetuating mechanism". However, such processes might not become activated as a result of unsolicited feedback, as the individual receiving this reassurance may have never endorsed these negative beliefs. Of course, this is an empirical question, and would benefit from future investigation.

Lastly, individuals who actively solicit reassurance are hypothesized to experience short-term benefits (e.g., temporary reductions in anxiety and compulsive urges) as a result of this feedback, thereby activating a vicious cycle of compulsive behaviour that is maintained by symptom reinforcement. However, it is reasonable to suspect that this self-perpetuating mechanism might not become activated in individuals who receive unsolicited feedback, and that such processes might only occur following the repeated reinforcement of active requests for reassurance. Indeed, in the absence of clear evidence of urge-related distress (e.g., *active* checking and/or reassurance seeking), it is difficult to

ascertain whether or not any of the above-described counter-productive processes were activated among participants in this study.

To summarize, there are a number of possible explanations for the results obtained in this study. While it is possible that functional differences between compulsive checking and reassurance seeking contributed to the null findings described above, it seems more likely that methodological issues were the main source of these results. This highlights the value of establishing methods of scientific study that are reliable and ecologically valid in terms of the manipulations employed. Indeed, as noted by Radomsky and Rachman (2004), the "importance of importance" should not be underestimated when designing empirical investigations of obsessive-compulsive behaviour. That is, researchers in this field would benefit from drawing on previous related research and well-established theory when designing experiments, as well as utilizing extensive pilot testing, in order to maximize the likelihood of obtaining meaningful and reliable results through ecologically valid methodologies. Yet, the results from the current study suggest that even when such precautions are taken, scientific "trial and error" might sometimes be required to devise reliable and valid methods of measuring various constructs of interest, especially when examining novel and complex issues.

Thus, in order to increase our understanding of the mechanisms involved in excessive reassurance seeking, further efforts must be made to develop ecologically valid methods of examining this potentially distressing behaviour through empirical means. A preliminary step in this process might involve building on knowledge gained from the current investigation to design methods of inquiry in which methodological problems from the current study are addressed. This will likely include the development of an

experimental protocol in which participants are able to actively solicit reassurance under different conditions of perceived responsibility/threat.

Once researchers can establish reliable and effective methods of studying reassurance-seeking behaviour, they can begin to make significant progress in examining issues that are relevant to this behaviour. For example, future investigations might examine the apparent inability/unwillingness of some individuals diagnosed with OCD to inhibit their compulsive urge to seek reassurance, as well as to determine whether a link exists between an intolerance of uncertainty and excessive reassurance seeking. It is expected that such investigations will provide a great deal of insight for researchers and clinicians who are attempting to better understand (and treat) this potentially distressing and complex aspect of compulsive behaviour.

REFERENCES

American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders (4th ed: Text Revision).* Washington, DC: American Psychiatric Press.

Beck, A.T., & Steer, R.A. (1990). *Beck anxiety inventory manual.* Toronto: Psychological Corporation.

Beck, A.T., Steer, R.A., & Brown, G.K. (1996). *Manual for the Beck Depression Inventory-II.* San Antonio, TX: Psychological Corp.

Burns, G.L, Keortge, S.G., Formea, G.M., & Sternberger, L.G. (1996). Revision of the Padua Inventory of Obsessive Compulsive Disorder Symptoms: Distinctions between worry, obsessions, and compulsions. *Behaviour Research and Therapy, 34*(2), 163-173.

Calamari, J.E., Wiegartz, P.S., & Janeck, A.S. (1999). Obsessive-compulsive disorder subgroups: A symptom-based clustering approach. *Behaviour Research and Therapy, 37,* 113-125.

Coles, M.E., Radomsky, A.S., & Horng, B. (in press). Exploring the boundaries of memory distrust from repeated checking: Increasing external validity and examining thresholds. *Behaviour Research and Therapy.*

Dar, R. (2004). Elucidating the mechanism of uncertainty and doubt in obsessive-compulsive checkers. *Journal of Behaviour Therapy and Experimental Psychiatry, 35,* 153-163.

Greisberg, S. & McKay, D. (2003). Neuropsychology of obsessive-compulsive disorder: a review and treatment implications. *Clinical Psychology Review, 23,* 95-117.

Hadjistavropoulos, H.D., Craig, K.D., & Hadjistavropoulos, T. (1998). Cognitive and behavioural responses to illness information: The role of health anxiety. *Behaviour Research and Therapy, 36,* 149-164.

Hallam, R.S. (1974). Extinction of ruminations: a case study. *Behavior Therapy, 5,* 565-568.

Hout, M. van den, & Kindt, M. (2004). Obsessive-compulsive disorder and the paradoxical effects of perseverative behaviour on experienced uncertainty. *Journal of Behaviour Therapy and Experimental Psychiatry, 35,* 165-181.

Howell, D.C. (1987). *Statistical methods for psychology* (2nd ed.). Boston: PWS-KENT.

Joiner, T.E., & Schmidt, N.B. (1998). Excessive reassurance-seeking predicts depressive but not anxious reactions to acute stress. *Journal of Abnormal Psychology, 107*(3), 533-537.

Joiner, T.E., Alfano, M.S., & Metalsky, G.I. (1992). When depression breeds contempt: Reassurance seeking, self-esteem, and rejection of depressed college students by their roommates. *Journal of Abnormal Psychology, 101*(1), 165-173.

Ladouceur, R., Rheaume, J., Freeston, M.H., Aublet, F., Jean, K., Lachance, S., Langlois, F., & de Pokomandy-Morin, K. (1995). Experimental manipulations of responsibility: an analogue test for models of obsessive-compulsive disorder. *Behaviour Research and Therapy, 33*(8), 937-946.

Lopatka, C., & Rachman, S. (1995). Perceived responsibility and compulsive checking: an experimental analysis. *Behaviour Research and Therapy, 33*(6), 673-684.

McKay, D., Abramowitz, J.S., Calamari, J.E., Kyrios, M., Radomsky, A.S., Sookman, D., Taylor, S., & Wilhelm, S. (2004). A critical evaluation of obsessive-compulsive

disorder subtypes: Symptoms versus mechanisms. *Clinical Psychology Review, 24,* 283-313.

McNally, R.J., & Kohlbeck, P.A. (1993). Reality monitoring in obsessive-compulsive disorder. *Behaviour Research and Therapy, 31,* 249-253.

Muller, J., & Roberts, J.E. (2005). Memory and attention in obsessive-compulsive disorder: a review. *Journal of Anxiety Disorders, 19,* 1-28.

Obsessive Compulsive Cognitions Working Group (OCCWG) (in press). Psychometric validation of the Obsessive Belief Questionnaire and Interpretation of Intrusions Inventory: Part 2, Factor analyses and testing of a brief version. *Behaviour Research and Therapy.*

Oppen, P. van, Hoekstra, R.J., & Emmelkamp, P.M.G. (1995). The structure of obsessive-compulsive symptoms. *Behaviour Research and Therapy, 33,* 379-390.

Parrish, C.L., Ouimet, A.J., Ashbaugh, A.R., Radomsky, A.S., & O'Connor, K.P. (2004, September). *Psychometric properties of the Vancouver Obsessional-Compulsive Inventory and the Symmetry, Ordering, and Arranging Questionnaire: French translations.* Poster presented at the European & British Associations of Behavioural and Cognitive Psychotherapies Joint Conference, Manchester, UK.

Rachman, S. (2002). A cognitive theory of compulsive checking. *Behaviour Research and Therapy, 40,* 625-639.

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

Rachman, S., & Hodgson, R. (1977). Obsessional-compulsive complaints. *Behaviour Research and Therapy, 15*(5), 389-395.

Rachman, S., & Hodgson, R. (1980). *Obsessions and compulsions.* Englewood Cliffs, NJ: Prentice Hall.

Rachman, S., Shafran, R., Mitchell, D., Trant, J., & Teachman, B. (1996). How to remain neutral: an experimental analysis of neutralization. *Behaviour Research and Therapy, 34*(11/12), 889-898.

Radomsky, A.S., Gilchrist, P.T., & Dussault, D.D. (in press). Repeated checking really does cause memory distrust. *Behaviour Research and Therapy.*

Radomsky, A.S., & Rachman, S. (1999). Memory bias in obsessive-compulsive disorder (OCD). *Behaviour Research and Therapy, 37,* 605-618.

Radomsky, A.S., & Rachman, S. (2004). The Importance of importance in OCD memory research. *Journal of Behavior Therapy and Experimental Psychiatry, 35*(2), 137-151.

Radomsky, A.S., & Taylor, S. (in press). Subtyping OCD: Prospects and problems. *Behavior Therapy.*

Radomsky, A.S., Rachman, S., & Hammond, D. (2001). Memory bias, confidence and responsibility in compulsive checking. *Behaviour Research and Therapy, 39,* 813-822.

Salkovskis, P.M. (1985). Obsessional-compulsive problems: A cognitive-behavioural analysis. *Behaviour Research and Therapy, 23*(5), 571-583.

Salkovskis, P.M. (1999). Understanding and treating obsessive-compulsive disorder. *Behaviour Research and Therapy, 37,* S29-S52.

Salkovskis, P.M., & Warwick, H.M.C. (1985). Cognitive therapy of obsessive-compulsive disorder: treating treatment failures. *Behavioural Psychotherapy, 13*(3), 243-255.

Salkovskis, P.M., & Warwick, H.M.C. (1986). Morbid preoccupations, health anxiety and reassurance: a cognitive-behavioural approach to hypochondriasis. *Behaviour Research and Therapy, 24*(5), 597-602.

Shafran, R. (1997). The manipulation of responsibility in obsessive-compulsive disorder. *British Journal of Clinical Psychology, 36*(3), 397-407.

Summerfeldt, L.J., Richter, M.A., Antony, M.M., & Swinson, R.P. (1999). Symptom structure in obsessive-compulsive disorder: A confirmatory factor-analytic study. *Behaviour Research and Therapy, 37,* 297-311.

Thordarson, D., Radomsky, A.S., Rachman, S., Shafran, R., Sawchuk, C.N., & Hakstian, H.R. (2004). The Vancouver Obsessional Compulsive Inventory (VOCI). *Behaviour Research and Therapy, 42*(11), 1289-1314.

Tolin, D.F. (2001). Bibliotherapy and extinction treatment of obsessive-compulsive disorder in a 5-year-old boy. *Journal of the American Academy of Child and Adolescent Psychiatry, 40*(9), 1111-1114.

Tolin, D.F., Abramowitz, J.S., Brigidi, B.D., Amir, N., Street, G.P., & Foa, E.B. (2001). Memory and memory confidence in obsessive-compulsive disorder. *Behaviour Research and Therapy, 39,* 913-927.

Tulving, E. (1985). Memory and consciousness. *Canadian Psychology, 26*(1), 1-12.

Appendix A

VOCI

Please rate each statement by putting a circle around the number that best describes how much the statement is true of you. Please answer every item, without spending too much time on any particular item.

How much is each of the following statements true of you?	**Not at all**	**A little**	**Some**	**Much**	**Very Much**
1. I feel compelled to check letters over and over before mailing them.	0	1	2	3	4
2. I am often upset by my unwanted thoughts of using a sharp weapon.	0	1	2	3	4
3. I feel very dirty after touching money.	0	1	2	3	4
4. I find it very difficult to make even trivial decisions.	0	1	2	3	4
5. I feel compelled to be absolutely perfect.	0	1	2	3	4
6. I repeatedly experience the same unwanted thought or image about an accident.	0	1	2	3	4
7. I repeatedly check and recheck things like taps and switches after turning them off.	0	1	2	3	4
8. I use an excessive amount of disinfectants to keep my home or myself safe from germs.	0	1	2	3	4
9. I often feel compelled to memorize trivial things (e.g., licence plate numbers, instructions on labels).	0	1	2	3	4
10. I have trouble carrying out normal household activities because my home is so cluttered with things I have collected.	0	1	2	3	4
11. After I have decided something, I usually worry about my decision for a long time.	0	1	2	3	4
12. I find that almost every day I am upset by unpleasant thoughts that come into my mind against my will.	0	1	2	3	4
13. I spend far too much time washing my hands.	0	1	2	3	4
14. I often have trouble getting things done because I try to do everything exactly right.	0	1	2	3	4
15. Touching the bottom of my shoes makes me very anxious.	0	1	2	3	4
16. I am often upset by my unwanted thoughts or images of sexual acts.	0	1	2	3	4
17. I become very anxious when I have to make even a minor decision.	0	1	2	3	4
18. I feel compelled to follow a very strict routine when doing ordinary things.	0	1	2	3	4

How much is each of the following statements true of you?	Not at all	A little	Some	Much	Very Much
19. I feel upset if my furniture or other possessions are not always in exactly the same position.	0	1	2	3	4
20. I repeatedly check that my doors or windows are locked, even though I try to resist the urge to do so.	0	1	2	3	4
21. I find it very difficult to touch garbage or garbage bins.	0	1	2	3	4
22. I become very tense or upset when I think about throwing anything away.	0	1	2	3	4
23. I am excessively concerned about germs and disease.	0	1	2	3	4
24. I am often very late because I can't get through ordinary tasks on time.	0	1	2	3	4
25. I avoid using public telephones because of possible contamination.	0	1	2	3	4
26. I am embarrassed to invite people to my home because it is full of piles of worthless things I have saved.	0	1	2	3	4
27. I repeatedly experience the same upsetting thought or image about death.	0	1	2	3	4
28. I am often upset by unwanted thoughts or images of blurting out obscenities or insults in public.	0	1	2	3	4
29. I worry far too much that I might upset other people.	0	1	2	3	4
30. I am often frightened by unwanted urges to drive or run into oncoming traffic.	0	1	2	3	4
31. I almost always count when doing a routine task.	0	1	2	3	4
32. I feel very contaminated if I touch an animal.	0	1	2	3	4
33. One of my major problems is repeated checking.	0	1	2	3	4
34. I often experience upsetting and unwanted thoughts about losing control.	0	1	2	3	4
35. I find it almost impossible to decide what to keep and what to throw away.	0	1	2	3	4
36. I am strongly compelled to count things.	0	1	2	3	4

How much is each of the following statements true of you?	Not at all	A little	Some	Much	Very Much
37. I repeatedly check that my stove is turned off, even though I resist the urge to do so.	0	1	2	3	4
38. I get very upset if I can't complete my bedtime routine in exactly the same way every night.	0	1	2	3	4
39. I am very afraid of having even slight contact with bodily secretions (blood, urine, sweat, etc.).	0	1	2	3	4
40. I am often very upset by my unwanted impulses to harm other people.	0	1	2	3	4
41. I spend a lot of time every day checking things over and over again.	0	1	2	3	4
42. I have great trouble throwing anything away because I am very afraid of being wasteful.	0	1	2	3	4
43. I frequently have to check things like switches, faucets, appliances and doors several times.	0	1	2	3	4
44. One of my major problems is that I am excessively concerned about cleanliness.	0	1	2	3	4
45. I feel compelled to keep far too many things like old magazines, newspapers, and receipts because I am afraid I might need them in the future.	0	1	2	3	4
46. I repeatedly experience upsetting and unacceptable thoughts of a religious nature.	0	1	2	3	4
47. I tend to get behind in my work because I repeat the same thing over and over again.	0	1	2	3	4
48. I try to put off making decisions because I'm so afraid of making a mistake.	0	1	2	3	4
49. I often experience upsetting and unwanted thoughts about illness.	0	1	2	3	4
50. I am afraid to use even well-kept public toilets because I am so concerned about germs.	0	1	2	3	4
51. Although I try to resist, I feel compelled to collect a large quantity of things I never actually use.	0	1	2	3	4
52. I repeatedly experience upsetting and unwanted immoral thoughts.	0	1	2	3	4
53. One of my major problems is that I pay far too much attention to detail.	0	1	2	3	4
54. I am often upset by unwanted urges to harm myself.	0	1	2	3	4
55. I spend far too long getting ready to leave home each day because I have to do everything exactly right.	0	1	2	3	4

Appendix B

Obsessional Beliefs Questionnaire (OBQ-44)

This inventory lists different attitudes or beliefs that people sometimes hold. Read each statement carefully and decide how much you agree or disagree with it.

For each of the statements, choose the number matching the answer that *best describes how you think.* Because people are different, there are no right or wrong answers.

To decide whether a given statement is typical of your way of looking at things, simply keep in mind what you are like *most of the time.*

Use the following scale:

1	2	3	4	5	6	7
disagree very much	disagree moderately	disagree a little	neither agree nor disagree	agree a little	agree moderately	disagree very much

In making your ratings, try to avoid using the middle point of the scale (4), but rather indicate whether you usually disagree or agree with the statements about your own beliefs and attitudes.

1. I often think things around me are unsafe.	1 2 3 4 5 6 7
2. If I'm not absolutely sure of something, I'm bound to make a mistake.	1 2 3 4 5 6 7
3. Things should be perfect according to my own standards.	1 2 3 4 5 6 7
4. In order to be a worthwhile person, I must be perfect at everything I do.	1 2 3 4 5 6 7
5. When I see any opportunity to do so, I must act to prevent bad things from happening.	1 2 3 4 5 6 7
6. Even if harm is very unlikely, I should try to prevent it at any cost.	1 2 3 4 5 6 7
7. For me, having bad urges is as bad as actually carrying them out.	1 2 3 4 5 6 7
8. If I don't act when I foresee danger, then I am to blame for any consequences.	1 2 3 4 5 6 7
9. If I can't do something perfectly, I shouldn't do it at all.	1 2 3 4 5 6 7
10. I must work to my full potential at all times.	1 2 3 4 5 6 7
11. It is essential for me to consider all possible outcomes of a situation.	1 2 3 4 5 6 7
12. Even minor mistakes mean a job is not complete.	1 2 3 4 5 6 7

1	2	3	4	5	6	7
disagree very much	disagree moderately	disagree a little	neither agree nor disagree	agree a little	agree moderately	disagree very much

13. If I have aggressive thoughts or impulses about my loved ones, this means I may secretly want to hurt them.	1 2 3 4 5 6 7
14. I must be certain of my decisions.	1 2 3 4 5 6 7
15. In all kinds of daily situations, failing to prevent harm is just as bad as deliberately causing harm.	1 2 3 4 5 6 7
16. Avoiding serious problems (for example, illness or accidents) requires constant effort on my part.	1 2 3 4 5 6 7
17. For me, not preventing harm is as bad as causing harm.	1 2 3 4 5 6 7
18. I should be upset if I make a mistake.	1 2 3 4 5 6 7
19. I should make sure others are protected from any negative consequences of my decisions or actions	1 2 3 4 5 6 7
20. For me, things are not right if they are not perfect.	1 2 3 4 5 6 7
21. Having nasty thoughts means I am a terrible person.	1 2 3 4 5 6 7
22. If I do not take extra precautions, I am more likely than others to have or cause a serious disaster.	1 2 3 4 5 6 7
23. In order to feel safe, I have to be as prepared as possible for anything that could go wrong.	1 2 3 4 5 6 7
24. I should not have bizarre or disgusting thoughts.	1 2 3 4 5 6 7
25. For me, making a mistake is as bad as failing completely.	1 2 3 4 5 6 7
26. It is essential for everything to be clear cut, even in minor matters.	1 2 3 4 5 6 7
27. Having a blasphemous thought is as sinful as committing a sacrilegious act.	1 2 3 4 5 6 7
28. I should be able to rid my mind of unwanted thoughts.	1 2 3 4 5 6 7
29. I am more likely than other people to accidentally cause harm to myself or to others.	1 2 3 4 5 6 7
30. Having bad thoughts means I am weird or abnormal.	1 2 3 4 5 6 7
31. I must be the best at things that are important to me.	1 2 3 4 5 6 7
32. Having an unwanted sexual thought or image means I really want to do it.	1 2 3 4 5 6 7

1	2	3	4	5	6	7
disagree very much	disagree moderately	disagree a little	neither agree nor disagree	agree a little	agree moderately	disagree very much

33. If my actions could have even a small effect on a potential misfortune, I am responsible for the outcome.	1 2 3 4 5 6 7
34. Even when I am careful, I often think that bad things will happen.	1 2 3 4 5 6 7
35. Having intrusive thoughts means I'm out of control.	1 2 3 4 5 6 7
36. Harmful events will happen unless I am very careful.	1 2 3 4 5 6 7
37. I must keep working at something until it's done exactly right.	1 2 3 4 5 6 7
38. Having violent thoughts means I will lose control and become violent.	1 2 3 4 5 6 7
39. To me, failing to prevent a disaster is as bad as causing it.	1 2 3 4 5 6 7
40. If I don't do a job perfectly, people won't respect me.	1 2 3 4 5 6 7
41. Even ordinary experiences in my life are full of risk.	1 2 3 4 5 6 7
42. Having a bad thought is morally no different than doing a bad deed.	1 2 3 4 5 6 7
43. No matter what I do, it won't be good enough.	1 2 3 4 5 6 7
4. If I don't control my thoughts, I'll be punished.	1 2 3 4 5 6 7

Appendix C

B.A.I.

Below is a list of common symptoms of anxiety. Please read each item in the list carefully. Indicate how much you have been bothered by each symptom during the PAST WEEK, INCLUDING TODAY by placing an X in the corresponding space in the column next to each symptom.

		Not at all	Mildly. It did not bother me much	Moderately. It was very unpleasant but I could stand it	Severely I could barely stand it
1	Numbness or tingling				
2	Feeling hot				
3	Wobbliness in legs				
4	Unable to relax				
5	Fear of worst happening				
6	Dizzy or lightheaded				
7	Heart pounding or racing				
8	Unsteady				
9	Terrified				
10	Nervous				
11	Feelings of choking				
12	Hands trembling				
13	Shaky				
14	Fear of losing control				
15	Difficulty breathing				
16	Fear of dying				
17	Scared				
18	Indigestion or discomfort in abdomen				
19	Faint				
20	Face flushed				
21	Sweating (not due to heat)				

Appendix D

BDI-II

This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the one statement in each group that best describes the way you have been feeling during the past two weeks, including today. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for each group.

1) Sadness	
0	I do not feel sad.
1	I feel sad much of the time.
2	I am sad all the time.
3	I am so sad or unhappy that I can't stand it.

2) Pessimism	
0	I am not discouraged about my future.
1	I feel more discouraged about my future than I used to be.
2	I do not expect things to work out for me.
3	I feel my future is hopeless and will only get worse.

3) Past Failure	
0	I do not feel like a failure.
1	I have failed more than I should have.
2	As I look back, I see a lot of failures.
3	I feel I am a total failure as a person.

4) Loss of Pleasure	
0	I get as much pleasure as I ever did from the things I enjoy.
1	I don't enjoy things as much as I used to.
2	I get very little pleasure from the things I used to enjoy.
3	I can't get any pleasure from the things I used to enjoy.

5) Guilty Feelings	
0	I don't feel particularly guilty.
1	I feel guilty over many things I have done or should have done.
2	I feel quite guilty most of the time.
3	I feel guilty all the time.

6) Punishment Feelings	
0	I don't feel I am being punished.
1	I feel I may be punished.
2	I expect to be punished.
3	I feel I am being punished.

7) Self-Dislike	
0	I feel the same about myself as ever.
1	I have lost confidence in myself.
2	I am disappointed in myself.
3	I dislike myself.

8) Self-Criticalness	
0	I don't criticize or blame myself more than usual.
1	I am more critical of myself than I used to be.
2	I criticize myself for all the faults.
3	I blame myself for everything bad that happens.

9) Suicidal Thoughts or Wishes	
0	I don't have any thoughts of killing myself.
1	I have thoughts of killing myself, but I would not carry them out.
2	I would like to kill myself.
3	I would kill myself if I had the chance.

10) Crying	
0	I don't cry any more than I used to.
1	I cry more now than I used to.
2	I cry over every little thing.
3	I feel like crying but I can't.

11) Agitation	
0	I am no more restless or wound up than usual.
1	I feel more restless or wound up than usual.
2	I am so restless or agitated that it's hard to stay stil
3	I am so restless or agitated that I have to keep moving or doing something.

12) Loss of Interest	
0	I have not lost interest in people or activities.
1	I am less interested in other people or things than before.
2	I have lost most of my interest in other people or things.
3	It's hard to get interested in anything.

13) Indecisiveness

0	I make decisions about as well as ever.
1	I find it more difficult to make decisions than usual.
2	I have much greater difficulty in making decisions than I used to.
3	I have trouble making any decision.

14) Worthlessness

0	I do not feel I am worthless.
1	I don't consider myself as worthwhile and useful as I used to.
2	I feel more worthless as compared to other people.
3	I feel utterly worthless.

15) Loss of Energy

0	I have as much energy as ever.
1	I have less energy than I used to have.
2	I don't have enough energy to do very much.
3	I don't have enough energy to do anything.

16) Changes in Sleeping Pattern

0	I have not experienced any changes in my sleeping pattern.
1a	I sleep somewhat more than usual.
1b	I sleep somewhat less than usual.
2a	I sleep a lot more than usual.
2b	I sleep a lot less than usual.
3a	I sleep most of the day.
3b	I wake up 1-2 hours early and can't get back to sleep.

17) Irritability

0	I am no more irritable than usual.
1	I am more irritable than usual.
2	I am much more irritable than usual.
3	I am irritable all the time.

18) Changes in Appetite

0	I have not experienced any changes in my appetit
1a	My appetite is somewhat less than usual.
1b	My appetite is somewhat greater than usual.
2a	My appetite is much less than usual.
2b	My appetite is much greater than usual.
3a	I have no appetite at all.
3a	I crave food all the time.

19) Concentration Difficulty

0	I can concentrate as well as usual.
1	I can't concentrate as well as usual.
2	It's hard to keep my mind on anything for very long.
3	I find I can't concentrate on anything.

20) Tiredness or Fatigue

0	I am no more tired or fatigued than usual.
1	I get more tired or fatigued more easily than usua
2	I am too tired or fatigued to do a lot of the things used to do.
3	I am too tired or fatigued to do most of the things used to do.

21) Loss of Interest in Sex

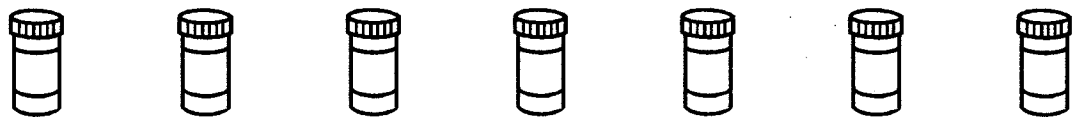
0	I have not noticed any recent change in my intere in sex.
1	I am less interested in sex than I used to be.
2	I am much less interested in sex now.
3	I have lost interest in sex completely.

Appendix E

1 / 2

Version A **ID#_____**

Please circle the best answer for each of the following. Do not spend too much time on any one item; if unsure of an answer, simply put your best guess.



A B C D E F G

1. In which bottles did pill # 1 go?:
   a) A, D, and E
   b) B, and G
   c) A, B, and D

2. In which bottles did pill # 2 go?:
   a) C, F, and G
   b) C, D, and F
   c) B, F, and G

3. In which bottles did pill # 3 go?:
   a) A, D, E, and G
   b) A, E, and G
   c) B, C, D, and E

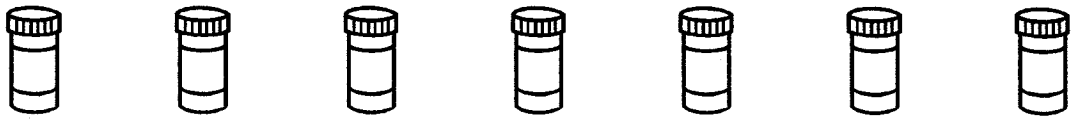
4. In which bottles did pill # 4 go?:
   a) A, D, and F
   b) A, C, and G
   c) B, C, and F

5. In which bottles did pill # 5 go?:
   a) A, and E
   b) B, and F
   d) B, and E

*** please continue with questions on next page***

...continued

Please circle the best answer for each of the following. Do not spend too much time on any one item; if unsure of an answer, simply put your best guess.



6. In which bottles did pill # 6 go?:
   a) A, B, and G
   b) B, D, and F
   c) B, F, and G

7. In which bottles did pill # 7 go?:
   a) D, E, and G
   b) B, D, and E
   c) B, D, and G

8. In which bottles did pill # 8 go?:
   a) B, E, and G
   b) C, and E
   c) B and F

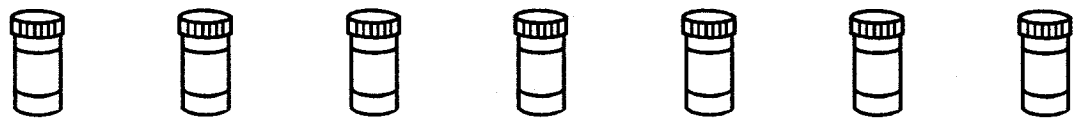
9. In which bottles did pill # 9 go?:
   a) B, C, and E
   b) A, D, and G
   c) B, D, and F

10. In which bottles did pill # 10 go?:
    a) C, and F
    b) E, and F
    c) C, E, and F

1 / 2

Version B **ID#_____**

Please circle the best answer for each of the following. Do not spend too much time on any one item; if unsure of an answer, simply put your best guess.



1. In which bottles did pill # 1 go?:
   a) Mon., Wed., and Thurs.
   b) Mon., and Sat.
   c) Sun., Mon., and Wed.

2. In which bottles did pill # 2 go?:
   a) Tues., Fri., and Sat.
   b) Tues., Wed., and Fri.
   c) Mon., Fri., and Sat.

3. In which bottles did pill # 3 go?:
   a) Sun., Wed., Thurs., and Sat.
   b) Sun., Thurs., and Sat.
   c) Mon., Tues., Wed., and Thurs.

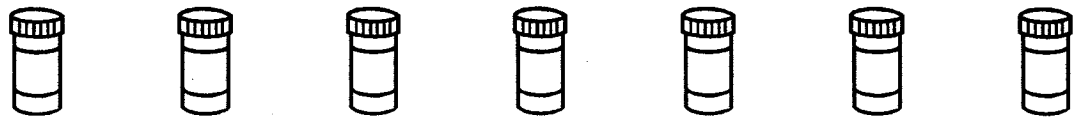
4. In which bottles did pill # 4 go?:
   a) Sun., Wed., and Fri.
   b) Sun., Tues., and Sat.
   c) Mon., Tues., and Fri.

5. In which bottles did pill # 5 go?:
   a) Sun., and Thurs.
   b) Mon., and Fri.
   d) Mon., and Thurs.

*** please continue with questions on next page***

...continued

Please circle the best answer for each of the following. Do not spend too much time on any one item; if unsure of an answer, simply put your best guess.



6. In which bottles did pill # 6 go?:
   a) Sun., Mon., and Sat.
   b) Mon., Wed., and Fri.
   c) Mon., Fri., and Sat.

7. In which bottles did pill # 7 go?:
   a) Wed., Thurs., and Sat.
   b) Mon., Wed., and Thurs.
   c) Mon., Wed., and Sat.

8. In which bottles did pill # 8 go?:
   a) Mon., Thurs., and Sat.
   b) Tues., and Thurs.
   c) Mon. and Fri.

9. In which bottles did pill # 9 go?:
   a) Mon., Tues., and Thurs.
   b) Sun., Wed., and Sat.
   c) Mon., Wed., and Fri.

10. In which bottles did pill # 10 go?:
    a) Tues., and Fri.
    b) Thurs., and Fri.
    c) Tues., Thurs., and Fri.

Appendix F

Brief Study Description

Hi, thank you for coming! My name is _____, and I will be conducting the study with you today. First, just let me tell you a bit about the experiment you'll be participating in:

Briefly, we will have you complete several trials of a manual sorting task, followed by some ratings directly and indirectly related to the task, such as ratings about how you are feeling. Lastly, we will have you complete a brief questionnaire package.

The whole process should take about 60-80 minutes to complete, and you will (earn course credit / have your name entered in a draw for a cash prize) for your participation.

It is important to remember that you have the right to withdraw from participating at any time, without any negative consequences. All information obtained from you is completely confidential, and will be stored under lock and key for a period of seven years after which point it will be shredded.

Also, we keep identifying information stored separately from all other information collected in our research. If you have any questions, please feel free to ask me at any time. If you agree with all the conditions, please read and sign this consent form at the bottom.

If you have any questions concerning the study, please feel free to ask the experimenter now. If other questions or concerns come up following the study, please feel free to contact our lab at (514) 848-2424, extension 2199.

Adam S. Radomsky, Ph.D., Assistant Professor

Chris Parrish, B.A., Graduate Student

I HAVE CAREFULLY STUDIED THE ABOVE AND UNDERSTAND THIS AGREEMENT. I FREELY CONSENT AND VOLUNTARILY AGREE TO PARTICIPATE IN THIS STUDY.

NAME (please print) _____

SIGNATURE _____

Sex: M / F (please circle) AGE: _____

WITNESS SIGNATURE _____

DATE _____

If at any time you have questions about your rights as a research participant, please contact Adela Reid, Research Ethics and Compliance Officer, Concordia University, at 514.848.2424, x.7481 or by email at Adela.Reid@Concordia.ca.

Appendix H

Initial Instructions for Participants

As you can see, there are 7 empty pill bottles lined up here *(point to bottles)* and a number of pills of various shapes and colours in front of you. There are also 7 lids lined up behind the row of pill bottles, with a selection of pills in each one. The pills displayed in each lid correspond with the pills that go into each bottle.

So, for instance, the first bottle gets a single green oval-shaped pill, one thick round white pill, one small round white pill and one red oval-shaped pill *(point)*. The second bottle gets a single clear yellow spherical pill, one small beige pill, on multi-coloured capsule, and one thick white pill.

Today, you will be sorting the pills in these two bowls *(point)* into these pill bottles *(point)* as shown in this display.

Watch while I demonstrate the sorting procedure for the first two bottles.

See, in the first bottle I place one green oval-shaped pill, one thick round white pill, one small round white pill and one red oval-shaped pill. *(demonstrate)*

In the second bottle I place one multi-coloured capsule, one thick white round pill, one small round beige pill, and one small transluscent yellow pill. *(demonstrate)*

Please note that there are several different types of pills in the two bowls. For example, there is a large, thick white pill, and a medium-sized thinner white pill. *(point)*

Ask if participant has a latex allergy.

For sanitary reasons, we ask that you put on a pair of surgical gloves while performing this task. Please ensure that the gloves are well fitted, as this will help you with your accuracy in sorting.

Now, I would like you to sort the pills into the 7 pill bottles exactly as shown in the display as quickly and accurately as you can. Note that each bottle gets a maximum of 4 pills.

Feel free to use both hands to sort if you wish, but please refrain from looking into the bottles while sorting.

To ensure your accuracy, only place one pill in the bottles at a time. Also, fill the bottles in order, placing just one of each of the required pills in each bottle before moving onto the next bottle.

If you accidentally drop a pill on the table/floor/etc., just leave it and take another pill from the bowl. Tell me when you are finished this row of bottles, and I will provide you with a fresh tray of bottles for your next trial.

Appendix I

Experimental Apparatus (Pill Combinations)

Sunday / A: green, red, thick white, small white

Monday / B: multi, thick white, beige, fish oil

Tuesday / C: selenium, light blue, small white, med. white

Wednesday / D: green, multi, fish oil, thick white

Thursday / E: green, fish oil, red, light blue

Friday / F: multi, selenium, med white, beige

Saturday / G: green, med white, small white, beige

Appendix J

Instructions for participants in the "high responsibility" conditions

Now that you've met our inclusion criteria for continuing in the study, let me tell you a little more about the purpose of the experiment.

Our purpose here today is to test a method of pill sorting for a Montreal-based charitable organization that provides relief to 3rd-world countries. This organization is currently considering funding a medication and vitamin distribution program for impoverished children.

This organization has asked us to help them determine whether or not vitamins and medications can be quickly and accurately sorted into "daily dose" packages by hand. This is why the trays I've placed before you are labelled Sunday through Saturday.

As part of this study, the organization has asked us to test two different methods of sorting; one in which pills are sorted by type, regardless of the bottle in which they are to be placed, and the other, in which pills are sorted into daily dose packages, or one bottle at a time. As you saw in your practice trials, you will be in the group that is asked to sort the pills one bottle at a time.

Also, research has shown that task repetition can cause personal and emotional distress. For instance, assembly line workers have reported depression, anxiety, and anger symptoms, so we will be asking you a variety of questions related to your mood as well, such as those you have just completed.

"Do you understand what I just explained?"

Further instructions for "high responsibility" group

So, we would like you to continue sorting these medications and vitamin pills into "daily doses" as you had in the previous three trials.

In order for us to accurately determine the efficiency of the different sorting methods we are testing, it is important that you try to sort the pills as quickly and accurately as possible. I am obliged to tell you that your results will directly influence whether or not we can recommend the adoption of this medication and vitamin distribution program, so again, please try to sort the pills as quickly and accurately as possible.

Appendix K

Instructions for participants in the "low responsibility" conditions

Now that you've met our inclusion criteria for continuing in the study, let me tell you a little more about our study.

This is a study of shape and colour perception. Our purpose here today is to see how quickly and accurately people can sort pills by colour and shape.

We will be testing two methods of sorting in this study; one in which pills are sorted by pill type, and the other, in which pills are sorted according to the bottles they go in. So, in the first method, pills will be sorted one pill type at a time, and in the other method, pills will be sorted one bottle at a time. As you saw in your practice trials, you will be in the group that is asked to sort the pills with the second method, such that pills are sorted into the bottles one bottle at a time.

Also, research has shown that task repetition can cause personal and emotional distress. For instance, assembly line workers have reported depression, anxiety, and anger symptoms, so we will be asking you a variety of questions related to your mood as well, such as those you have just completed.

"Do you understand what I just explained?"

Specific Instructions for "low responsibility" group

So, we would like you to continue sorting these pills into the pill bottles according to the instructions I gave you earlier.

Again, please try to sort the pills as quickly and accurately as possible.

Appendix L

List of Task-Irrelevant Questionnaires

State-Trait Anger Expression Inventory - 2 (STAXI; Spielberger, 1996)

Responsibility Attitude Scale (RAS; Salkovskis et al., 2000)

Responsibility Attitude Scale – Other (RAS-Other; Ashbaugh, Gelfand, & Radomsky, in press)

Responsibility Appraisal Questionnaire (RAQ; Rachman, Thordarson, Shafran, & Woody, 1995)

Responsibility Appraisal Questionnaire – Others (RAQ-Others; Ashbaugh, Gelfand, & Radomsky, unpublished manuscript)

Comparative Beliefs About Responsibility Scale (CBARS; Ashbaugh, Gelfand, & Radomsky, in press)

Distribution of Responsibility Questionnaire (DORQ; Ashbaugh, Gelfand, & Radomsky, in press)

Maudsley Obsessional Compulsive Inventory (MOCI; Hodgson & Rachman, 1977)

Appendix M

Standardized reassurance for members of the "high reassurance" groups

After trial #4, the following reassurance was provided:

"That's great, I've checked every pill in each bottle, and you've sorted them exactly right! Let me reassure you that your performance was satisfactory. However, to be sure, we use a standardized procedure for checking your performance, so I am now going to take this tray of pills to our data entry person for her to check"

While participants were filling out the task-irrelevant questionnaires, the following reassurance was provided:

"Just to let you know, our data entry person has just checked your last trial and also found that you sorted the pills exactly right. She will now enter your last trial into our database which will provide another means of checking your performance."

Once the questionnaires were completed, and participants re-entered the testing room, the following reassurance was provided:

"Thanks for doing those. Our computer database has also verified that you sorted the pills correctly on your last trial. Let's do another trial."

Appendix N

Manipulation Check

ID #_____

On a scale of 0 to 100, please rate the extent to which you feel your performance today will affect the lives of others, where 0 means that you do not feel it will have any affect at all, and 100 means that you feel it will greatly affect the lives of others:

Rating: _____

Appendix O

Debriefing

We're done with the experimental part of these tasks. Thank you very much for your time and cooperation. I will now provide you with some information about the background of this study.

The purpose of this study is not (to help a charitable organization / to investigate colour and shape perception). Rather, the real purpose of this study is to learn more about some of the factors that influence checking behaviour, anxiety and memory.

More specifically, we are trying to determine what effect repeated reassurance (or lack of reassurance) has on checking behaviour, anxiety, and memory. Also, we want to determine how one's perceived level of responsibility for "checking correctly" affects these variables.

In other words, we wanted to see how the level of reassurance you received and the amount of responsibility you felt for completing the sorting task correctly affected your levels of anxiety, your urges to check your performance, your urges to seek reassurance, your memory of the task, and your confidence in your memory for how you completed the task. By comparing your ratings on these measures with those of other individuals who receive the same or different treatment in the experiment, we are able to see how different levels of perceived responsibility and reassurance provision affect the above-mentioned variables. We have hypothesized that increased levels of responsibility and reassurance will increase anxiety and checking behaviour, while decreasing confidence.

The information that we collect from this study should help us to better understand the factors that drive repetitive checking behaviour. This information will give us a better idea of what factors are important to address in treatment for obsessive compulsive disorder and this information will be used in developing a new treatment protocol for compulsive checking specifically.

Are there any other questions that I can answer for you?

As we will likely be testing several other undergraduates for this project, we ask that you please keep this information to yourself, as sharing this information with other potential participants may spoil their results. (i.e., Please don't tell others that we are using deception, or what the task is really about!!!)

Once again, thank you so much for participating in this project. This research is designed to help us develop better treatments for compulsive checking and your participation is helping us to make that happen.

Appendix P

Participant ID ____

CONSENT FORM TO PARTICIPATE IN RESEARCH

As you have just been informed, it was necessary for us to lead you to believe that the purpose of this experiment was (to help a charitable organization decide whether or not pills can be sorted accurately and efficiently by hand / to investigate colour and shape perception), as well as to provide you with potentially false feedback regarding the accuracy with which you sorted the pills.

The use of this deceptive information was essential for us to determine how perceived level of responsibility for performing a task "correctly" affects checking behaviour, anxiety levels, and memory for the task.

By signing below you indicate that you have been informed of this minor deception and allow us to include your results in our analyses.

Signature _____

Witness _____

Date _____

If you have any questions concerning this study, please feel free to ask the researcher or call the lab at 848-2424, ext. 2199.

A. Radomsky, Ph.D., Assistant Professor.
Chris Parrish, B.A., Graduate Student.