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**How do thought suppression attempts impact upon beliefs
about uncontrollability of worry?
and research portfolio**

Part One (Part Two bound separately)

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August 2006

Submitted in partial fulfilment of the requirements for the degree of
Doctorate in Clinical Psychology

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Chapter 1

Small Scale Research Project

**The first two years of a new primary care mental health team:
waiting times and the number of patients discharged
following failure to attend their first appointments**

Abstract

Objectives: This study focused upon the first two working years of a primary care mental health team. The main aims were: 1) to profile average waiting times over the two-year period, 2) to determine the proportion of patients discharged following failure to attend a single appointment, and 3) to analyse the relationship between waiting times and attendance for initial appointments. It was hoped that this information would provide a useful baseline for future evaluation of an opt-in system introduced in April 2004.

Design: Relevant data were collected from the team referral log and patient files. Waiting time was defined as the number of days between receipt of referral and initial appointment. Patients were classified as attendees if they attended at least one session with the team.

Setting: A primary care mental health team in the west of Scotland which caters for adults experiencing mild to moderate mental health problems and which receives the majority of its referrals from eight GP practices in the local area.

Subjects: 374 routine referrals who had received offers of an initial appointment with a member of the team between 1st April 2002 and 31st March 2004.

Results: The mean waiting time for all routine referrals was 53 days. It was shown that waiting times significantly increased between April 2002 and March 2004. Of the cohort, 276 (74%) were classified as attendees and 98 (26%) were non-attendees. A significant association was demonstrated between waiting time and whether patients attended.

Specifically, those who had longer waiting times were less likely to attend.

Conclusions: The current findings were examined in the context of methodological limitations and service recommendations were discussed. In particular, it was stressed that this investigation should provide an important baseline for evaluating a recently introduced opt-in system in a few months time.

Introduction

Waiting lists

The implementation of waiting lists is conventionally viewed as a necessary response to the ubiquitous problem of demand outstripping mental health service capacity [1]. Demand is influenced by a complex set of factors including population density, fluctuations in the prevalence of mental health problems, differences in the efficiency with which disorders are identified, and the degree of stigmatisation associated with seeking help. Treatment capacity is affected by numerous political and economic factors, as well as the rate of mental health service utilisation, treatment length, treatment format, treatment cost, and the efficiency with which treatment is delivered [2].

Within clinical psychology services, growth in waiting lists is a common problem. In 1993, a Division of Clinical Psychology (DCP) survey estimated that 44% of referred patients would wait at least six months for a first appointment. 15% would wait for more than one year, and at any one time, approximately 28,000 people were on psychologists' waiting lists [3]. A more recent review suggested that, on average, patients were waiting 17.5 weeks for a first appointment [4]. Obviously, these figures hide significant variation. The 1993 DCP survey found that only 15.5% of clinical psychologists believed that their service was meeting demand. In addition, some respondents reported that they had had to close their waiting lists and that some referrers had actually stopped referring on account of unsatisfactory waiting times.

Authors have acknowledged potential benefits in using waiting lists. For instance, some have argued that waiting lists may act as a deterrent for those who do not have an urgent or compelling need for treatment [5]. Also, some clients' problems may remit whilst waiting for a first appointment. For example, May [6] showed that one third of individuals no longer expressed a need for treatment after waiting several months for an

appointment at a university counselling service. Nevertheless, most of the literature has tended to focus on the difficulties associated with employment of waiting lists. In particular, mental health patients endure a variety of costs when access to treatment is delayed. These include the prolongation of emotional distress and occupational/social dysfunction, and increased risk of hospitalisation and physical health problems [7, 8]. Furthermore, by the time treatment commences, the original difficulties may have been exacerbated, thereby introducing additional obstacles to the therapeutic process [2, 9]. For example, Hicks and Hickman [10] proposed that if treatment is delayed, individuals are forced into resorting to maladaptive coping strategies, thus increasing the severity of their original problem. Finally, the process of seeking support and being placed on a waiting list may generate a poor image of mental health provision. For instance, it has been shown that client confidence in the service reduces as waiting times grow [11] and that waiting time is the most important factor in determining perceived service quality [12]. As well as the implications for users, researchers have investigated the consequences for mental health professionals in using waiting lists. For example, providers may assume a certain level of ethical responsibility for prolonged waiting times thus leading to reduced morale and diminished satisfaction [13]. As well as promoting staff turnover, these effects may filter through to patients, thereby interfering with the formation of therapeutic alliances and reducing consumer satisfaction [2].

Bearing in mind all these issues, the development of efficient waiting list initiatives is essential in mental health provision. Indeed, the Professional Practice Guidelines [14] state that services must be, “accessible to our clients”, and dictate that, “where a long waiting list develops for a service, psychologists should... make every effort to improve response times”.

Attendance

In services already struggling to meet demand, poor attendance is a major concern. Davies [15] found that 30% of patients failed to attend appointments in general hospital clinics and similar figures have been reported for psychological and psychiatric services [16, 17, 18, 19]. For example, Keen and colleagues [19] found that 33% of patients did not attend for their initial appointments at a clinical psychology service in the East of Scotland. A plethora of studies have attempted to identify factors associated with poor attendance. Some have demonstrated significant relationships between non-attendance and variables such as socio-economic status, age and gender [20, 21].

Investigators have commonly demonstrated an association between waiting times and attendance. For example, Morton [22] found that those who did not attend their first appointments waited significantly longer than those who did attend. In addition, Loumidis and Shropshire [23] showed that waiting times of more than six months were associated with non-attendance, and that non-attendees waited six weeks longer than attendees. Also, it is important to acknowledge that non-attendance results in wasted clinical resources, which in itself may exacerbate waiting times [19, 24]. Therefore, the relationship between waiting times and non-attendance rates is likely to be bi-directional.

Service Context

People experiencing mild to moderate mental health problems have a range of needs crucial to recovery. These include practical supports, work on medication compliance and provision of psychosocial interventions. The satisfaction of this range of needs is especially crucial at a time of crisis and accordingly, an easily accessible and holistic service is required. The establishment of the Primary Care Mental Health Team investigated in this study was based upon this approach. It was conceived as a multi-

disciplinary, cross-agency service which would aim to provide a rapid response to patients requiring assistance during an acute period. The apparent feasibility in offering a rapid response was based upon the assumptions that the team would be offering a new resource in addition to other extant psychology and mental health services, that team members would manage their clinical time by only employing brief interventions (maximum of 12 sessions), and that the referral rate would be moderated both by using specific acceptance criteria (see below) and by working closely with referral agents. The team commenced its work in April 2002, was the first of its kind in Glasgow, and receives the vast majority of its referrals from eight GP practices in the local area. The team comprises a consultant clinical psychologist (1.0 WTE (whole time equivalent)), a community psychiatric nurse (1.0 WTE), two counsellors (both 0.5 WTE) and an administrator (0.7 WTE). Referrals are accepted for clients who are aged 16 or over, who do not present with major alcohol, drug or severe mental health problems, and who appear likely to benefit from brief (a maximum of 12 sessions) psychological intervention.

As already described, the key focus of the team is to offer a service with no or negligible waiting times. In fact, at its inception, the team aimed to adhere to a maximum response time of two weeks. However, over the first two years of its existence, it was apparent that waiting times were increasing well beyond this limit. Furthermore, there was a growing concern that more patients were failing to attend their first appointments. This led to the introduction of an opt-in system in April 2004, an approach aimed at reducing the amount of clinical time wasted through non-attendance of first appointments. Yet, it is important to acknowledge that evidence demonstrating the utility of opt-in systems is equivocal [25]. Accordingly, once the current opt-in system has been in place for a sufficient length of time, the team intends to examine whether there have

been any beneficial effects upon waiting times and non-attendance rates. Obviously, in order to perform such an evaluation, it is essential to have exact figures for these variables prior to the introduction of the system. It was the primary aim of the current study to provide this baseline information.

Aims of the current investigation:

The aims of the current investigation were as follows:

- 1) Profile average waiting times from 1st April 2002 through to 31st March 2004.
- 2) Establish the number of patients discharged following failure to attend a single appointment from 1st April 2002 through to 31st March 2004.
- 3) Examine the relationship between waiting times and the number of patients discharged following failure to attend a single appointment.

Methods

Setting

Certain details of the setting have already been discussed in the Introduction. Given the context of this investigation, it is highlighted that all initial assessments are carried out by either the clinical psychologist (1.0 WTE) or the community psychiatric nurse (1.0 WTE). Also, it is stressed that team membership did fluctuate over the course of the two-year period under investigation. At the beginning of April 2002, only the consultant clinical psychologist (1.0 WTE) had commenced work. Then, the community psychiatric nurse (1.0 WTE) and the two counsellors (both 0.5 WTE) joined the team and began seeing patients at the start of May 2002. Team membership remained stable until a counsellor left in December 2003. This vacancy was not filled until after April 2004.

Subjects

This investigation focused on those patients categorised as routine referrals who were offered an initial appointment with a member of the team between 1st April 2002 and 31st March 2004. This generated a cohort of 374 patients.

The study excluded priority (N=60) or urgent (N=35) referrals offered initial appointments in the same two-year period. This exclusion criterion was implemented on account of the fact that the opt-in system introduced in April 2004 is only used for routine patients. Therefore, when examining the opt-in system in future, it will only be pertinent to examine the effects for routine referrals.

It is also stressed that some referrals were never even offered initial appointments. This cohort largely comprised inappropriate referrals and those clients who cancelled their referral before an appointment letter was sent. It represented approximately 10% of referrals between 1st April 2002 and 31st March 2004 and obviously could not be included in this study of waiting times.

Procedure

For each patient, the following information was obtained from either the team referral log or individual patient notes:

- i) date on which their referral was received by the team,
- ii) date for which they were offered their initial appointment with the team. (It is highlighted that this date often did not coincide with the actual date that the patient first attended. For instance, a number of patients requested that their initial appointment be rearranged for their convenience. Nevertheless, the current study focuses upon the date of the initial appointment *first* offered).

- iii) whether or not they ever actually attended an appointment with a member of the team.

These data were entered into a central database which contained no patient identifiers. Each patient was assigned to one of eight successive three-month blocks running from 1st April 2002 to 31st March 2004 (i.e. April-June 2002, July-September 2002, October-December 2002, January-March 2003, April-June 2003, July-September 2003, October-December 2003 and January-March 2004). Assignment to a particular three-month block was determined by the date of the initial appointment *first* offered, not the date that the referral was received.

For each patient, waiting time was calculated as the number of days between i) and ii) (see above). Then, for patients in each three-month block, the mean waiting time was calculated. In addition, standard error of the mean (SEM) and range were taken as indices of variability.

For attendance, patients were assigned to one of two groups:

- 1) *Attendees* - those who attended at least one appointment with the team.

Accordingly, this group included a wide range of clients, from those who simply attended a single assessment session through to those who engaged in a course of treatment.

- 2) *Non-attendees* - those who did not attend a single appointment. This group included those patients who failed to attend and never made any form of contact with the service, those who cancelled their referral once they had received an appointment letter, and those who made repeated requests to reschedule their initial appointment, but ultimately never attended.

These definitions of attendance and non-attendance have been employed in other studies of clinical psychology services [e.g. 19]. Furthermore, they seemed most appropriate on account of the fact that the newly introduced opt-in system focuses on attendance for the first appointment.

Statistical analysis

All exploratory data analyses and statistical procedures were conducted using the Statistical Package for the Social Sciences [SPSS; 26]. Howell [27] was employed as the main statistics resource text. All significance tests were two-tailed. A significance threshold of $p=0.05$ was implemented for all effects examined. Although data presented are untransformed means, suitable transformations were carried out where necessary to stabilise variance or reduce skew in the distributions.

Data meeting the assumptions of parametric analysis were analysed using t-tests or analysis of variance (ANOVA). Where two groups were compared on a single measure, unpaired t-tests were conducted. For these calculations, the pooled variance estimate was always employed, as advised by Howell [27]. When examining more than two groups for a single variable, one-way ANOVAs were performed. Categorical data were analysed using Pearson's Chi-square (χ^2) test.

Results

Waiting times

For the 374 routine referrals taken together, the mean (SEM) waiting time was 53 days (1.3 days). Mean waiting times for the eight three-month blocks running from 1st April 2002 to 31st March 2004 are presented in Table 1. They are also depicted in Figure 1.

Waiting times were analysed using one-way ANOVA with three-month block as the between-subjects factor. As expected, this analysis revealed a significant main effect of three-month block [$F(7,366) = 172, p < 0.001$]. There would be limited utility in performing numerous post-hoc comparisons between the eight three-month blocks. Instead, a single planned comparison was made between waiting times for the April-June 2002 and January-March 2004 blocks. It was confirmed that waiting times for the latter block were significantly longer than those for the former block [$t(114) = 39, p < 0.001$].

[Table 1 and Figure 1 about here]

Attendance

Of the original cohort of 374 routine referrals, 276 (74%) were classified as attendees and 98 (26%) were non-attendees. Of the 98 non-attendees, 60 never contacted the team, 20 cancelled their appointments and requested no further assistance, and 18 made contact in order to reschedule their initial appointment, but ultimately never attended. The number of attendees and non-attendees for the eight three-month blocks running from 1st April 2002 to 31st March 2004 are shown in Table 2 and Figure 2.

[Table 2 and Figure 2 about here]

Relationship between waiting times and attendance

The patient cohort was split into three relatively even groups according to their waiting times. The details of these groups are as follows:

- 1) *Short* waiting time group. $N = 127$; range of waiting times = 6-43 days.
- 2) *Medium* waiting time group. $N = 120$; range of waiting times = 44-68 days.

- 3) *Long* waiting time group. N = 127; range of waiting times = 69-109 days.

The numbers of patients categorised as attendees or non-attendees in each of the *short* and *long* groups were placed into a 2x2 contingency table (see Table 3). Analysis revealed that there was a significant association between waiting time and whether patients ever attended [$\chi^2(1) = 5.1, p < 0.05$].

[Table 3 about here]

This finding was confirmed by carrying out a simple comparison of the waiting times for all 276 attendees [mean (sem; range) = 52 days (1.5 days; 6-109 days)] and all 98 non-attendees [mean (sem; range) = 59 days (2.5 days; 10-101 days)]. Non-attendees waited significantly longer than attendees [$t(372) = 2.5, p < 0.05$]. Similarly, it was found that median (interquartile range) waiting times for attendees and non-attendees were 55 days (32-70) and 65 days (41.5-73.5), respectively.

Discussion

The current investigation examined the first two working years of a new primary care mental health team with a view to satisfying three main objectives. The findings relating to these objectives will be discussed in turn, followed by a discussion of methodological limitations and service recommendations.

Objective 1

The average waiting time for all 374 routine referrals was 53 days, equating to approximately 7½ weeks. In addition, it was shown that waiting times varied widely, with

the lowest being 6 days and the highest being 109 days (approximately 16 weeks). As expected, it was demonstrated that waiting times significantly increased between April 2002 and March 2004. However, although the general trend was for waiting times to increase over successive three-month blocks, inspection of the data indicates that waiting times fluctuated in both directions (see Figure 1). Nevertheless, the final three-month block between January and March 2004 was associated with the longest waiting times, and is reflective of the upward trend. Given that the service originally aimed for a maximum response time of two weeks, these findings are obviously disappointing. As extensively discussed in the Introduction, longer waiting times may be associated with a number of detrimental implications for both clients and service providers.

There are many factors that may have contributed to the increase in waiting times. This discussion will raise three possible factors. First, some patients have been seen for more than 12 sessions. Members of the team have commented that they have found it very difficult to discharge some patients simply because they have reached an arbitrary limit of 12 appointments. Second, relative to some other extant psychology and mental health services in the local area, the team maintains a short waiting time. Accordingly, it seems that referral agents have been more inclined to refer patients to the team, thereby exacerbating the problem of demand outstripping capacity (the clinical psychologist (1.0 WTE) and the community psychiatric nurse (1.0 WTE) were each able to offer approximately 80 initial assessments per annum). Third, it is likely that there was an indirect impact of the counselling vacancy in the final three-month block (January-March 2004). Indeed, there was a considerable rise in waiting times during this period.

Objective 2

Overall, it was found that 26% of routine referrals did not attend a single appointment with the team. This figure is consistent with other studies of clinical psychology services that have defined attendance using similar criteria [e.g. 19, 28]. Of the 98 non-attendees, the majority (N=60) did not contact the team in order to state that they would not be attending. Consequently, valuable clinical time was wasted (although see below). Indeed, this finding provides clear support for the potential utility in employing an opt-in system. Elaborating, it would be hoped that a sensitively worded opt-in letter and provision for an easy response (i.e. a stamped addressed envelope and reply slip) would encourage patients to contact the service to decline further assistance. Then, this would enable the team to offer their appointments to other patients. 20 non-attendees did, in fact, contact the team in order to decline the service once they received their initial appointment letters. Whilst objective data were not available for this study, it is noteworthy that the team feels that many of these cancellations have occurred at too short notice to allow appointments to be assigned to other clients on the waiting list. Once again, this suggests that employment of an opt-in system might be beneficial. In discussing non-attendance rates, two caveats should be raised. First, many mental health workers admit that when patients fail to attend appointments, they often use the spare time to write letters and carry out other administrative tasks. Indeed, this sentiment is endorsed by members of the team in this investigation. Therefore, this begs the question of whether clinical time is actually wasted by non-attendance. In fact, it would be interesting to conduct a survey into how clinical psychologists and other professionals use the time freed when a patient does not attend an appointment. Second, there will always be a degree of non-attendance which cannot be eliminated by the efforts of an individual service. For example, some patients may leave the area before they are offered

an appointment or some may feel too stigmatised or frightened by the prospect of receiving assistance for mental health difficulties.

Objective 3

As expected, this investigation revealed a significant association between waiting times and attendance. Specifically, attendees had shorter waiting times than non-attendees. This relationship has been demonstrated in a number of other studies of mental health services [e.g. 29]. Its manifestation can be interpreted in a variety of ways. For instance, it could be hypothesised that some referrals who are required to wait for a long time before their first appointments are able to overcome their difficulties using other resources (e.g. social support). A more bleak interpretation is that the experience of seeking support and being placed on a lengthy waiting list may generate disenchantment with the service [e.g. 11, 12]. Subsequently, although these patients would still benefit from psychological input, they feel disinclined to attend.

In absolute terms, it must be stressed that the difference between average waiting times for attendees and non-attendees was only seven days. Furthermore, a number of non-attendees (N=26 (from 98 in total)) were categorised as having *short* waiting times (range = 6-43 days) and many attendees (N=85 (from 276 in total)) had *long* waiting times (range = 69-109 days). Therefore, waiting time alone may have limited value in predicting whether patients will attend. In future, this hypothesis could be examined explicitly by carrying out a conditional stepwise logistic regression analysis using an array of variables postulated to influence attendance (e.g. gender, socio-economic status, waiting time, referral agent).

Methodological limitations

The findings of this study must be considered within the context of some of its methodological limitations. First, there was some variation in the delay between the patient meeting their referring agent (usually their GP) and the date on which the team received the referral. Therefore, waiting times, as defined in this investigation, may not wholly reflect waiting times as experienced by some of the patients. Nevertheless, the team did receive the vast majority of referrals within a few days. Second, as already discussed, a variety of factors may be influential in determining waiting times and attendance. Yet, this study simply focused upon the relationship between these two factors. Third, this investigation has solely examined attendance in relation to initial appointments. It is acknowledged that patients often fail to attend for return appointments.

Service Recommendations

Three recommendations are presented below:

- 1) As outlined in the Methods, attendees were defined as those patients who attended at least one appointment with the team. However, at present, there is no exact record of when attendees attend for the first time. Therefore, the attendee group includes: i) those who attended the initial appointment *first* offered, ii) those who contacted the team to reschedule their initial appointment and who therefore attended at a later date, and iii) those who failed to attend their initial appointment, but who subsequently made contact to arrange another appointment. Therefore, clinical time is, in fact, wasted with some attendees. Therefore, it is recommended that the existing referral log be amended to enable the identification

of the attendee sub-groups described above. This would allow the team to establish the amount of clinical time lost and whether any action is required.

- 2) At present, no record is kept of the number of return appointments not attended. Given the problem of increasing waiting times, it could be helpful to monitor the clinical time lost in this context.
- 3) It would be informative to carry out an evaluation of the opt-in system once it has been functioning for six months. In particular, it would be important to establish whether its employment has had any demonstrable benefits upon waiting times and the number of non-attendees. If it was found that the opt-in system was not creating the desired effects, it may be necessary to introduce other strategies. For example, the team may consider employing more group-based treatment approaches.

Summary

In conclusion, it has been demonstrated that waiting times for routine referrals significantly increased between April 2002 and March 2004. 26% of clients failed to attend a single appointment with the team. The majority of these non-attendees did not contact the service and accordingly, their initial appointments were wasted. Those who had longer waiting times were significantly less likely to attend. Methodological limitations and service recommendations are discussed.

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Table 1. Mean waiting times (days) for routine referrals for each of the three-month blocks running from 1st April 2002 to 31st March 2004. SEM and range are taken as indices of variability.

Three-month block	N	Mean waiting time (days)	SEM (days)	Range (days)
Apr-June '02	71	19	1.1	6-43
July-Sep '02	41	33	2.2	9-84
Oct-Dec '02	42	67	1.6	32-91
Jan-Mar '03	39	69	1.4	50-90
Apr-June '03	54	59	1.7	36-88
July-Sep '03	42	52	2.1	21-76
Oct-Dec '03	40	63	2.6	6-87
Jan-Mar '04	45	87	1.3	65-109
Overall	374	53	1.3	6-109

Abbreviations: N=number of patients offered initial appointments; SEM=standard error of the mean.

Table 2. Numbers of routine referrals categorised as attendees and non-attendees for each of the three-month blocks running from 1st April 2002 to 31st March 2004.

	Number of attendees	Number of non-attendees
Apr-June '02	52	19
July-Sep '02	33	8
Oct-Dec '02	28	14
Jan-Mar '03	30	9
Apr-June '03	41	13
July-Sep '03	34	8
Oct-Dec '03	27	13
Jan-Mar '04	31	14
Overall	276	98

Table 3. Numbers of routine referrals categorised as attendees or non-attendees as a function of whether they had *short* (6-43 days) or *long* (69-109 days) waiting times.

	Attendees	Non-attendees
<i>Short waiting time group</i>	101	26
<i>Long waiting time</i>	85	42

Figure 1. Mean waiting times (days) for routine referrals. These are shown for successive three-month blocks running from 1st April 2002 to 31st March 2004. Bars represent 1 SEM.

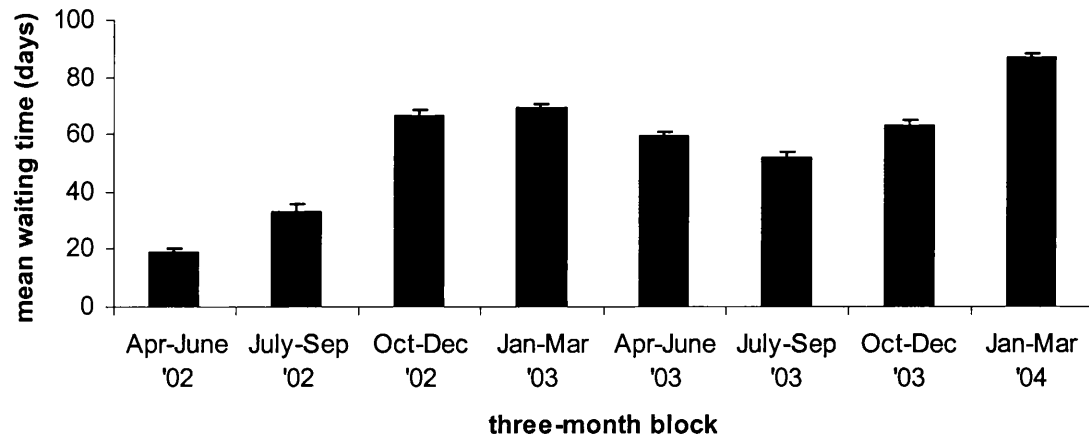
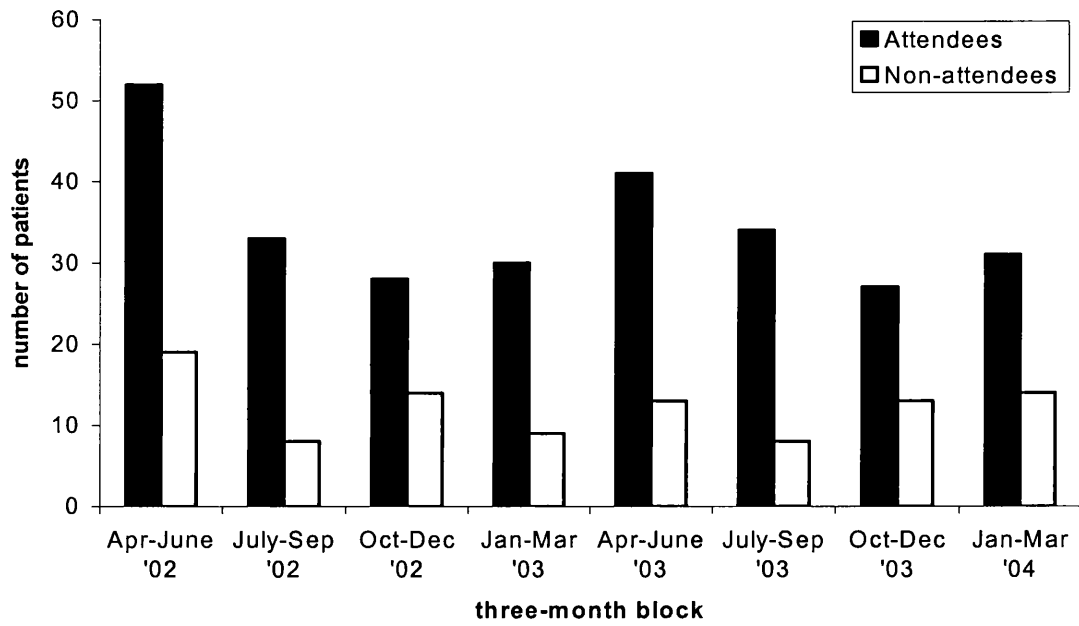


Figure 2. Numbers of routine referrals categorised as attendees or non-attendees. These are shown for successive three-month blocks running from 1st April 2002 to 31st March 2004.



Chapter 2

Systematic Review

The effects of suppressing obsessive intrusive thoughts: a systematic review of the experimental literature

Abstract

Thought suppression has been commonly cited as a developmental and/or maintaining factor in cognitive-behavioural conceptualisations of obsessive-compulsive disorder (OCD). The current review synthesised findings from experimental investigations that have examined the suppression of thoughts characteristic of OCD. Computerised database searches and other strategies were used to identify relevant papers. In total, 11 studies satisfied criteria for inclusion. Employing a structured rating scale, two studies were found to be of high methodological quality, eight of moderate quality, and one of low quality. With respect to thought occurrences, no study provided evidence for the purported rebound effect of suppression. Only two investigations generated data consistent with immediate enhancement. Moreover, almost all effect sizes went in the opposite direction to expectation. For measures beyond thought occurrence, findings were mixed. Whilst there appears to be limited support for the citation of thought suppression in conceptualisations of obsessional problems, the review highlights an extant literature lacking in many respects. Studies over longer time periods and within participants' everyday environment are therefore recommended, as are studies using clinical samples.

Keywords: obsessive-compulsive disorder, thought suppression, systematic review

Introduction

Fallibility in thought suppression

An investigation by Wegner and colleagues (Wegner et al., 1987) has had a remarkable impact upon subsequent conceptualisations of psychological problems. Their study comprised two 5-minute experimental periods during which participants vocalised

their stream of consciousness into a tape recorder. For the first period, participants were randomly assigned to one of two conditions, suppression and expression. In the suppression condition, participants verbalised their thoughts whilst trying not to think about a white bear. In the expression condition, participants tried to think of a white bear. In the second experimental period, instructions were swapped between groups. During both experimental periods, participants rang a bell whenever thoughts about a white bear came to mind.

Two important findings emerged from this work. First, participants were not able to suppress completely thoughts about white bears. Second, comparison of performance under expression instructions revealed that participants who had already suppressed in the first period recorded significantly more thoughts about a white bear relative to those who expressed in the first period. This phenomenon was termed a 'rebound effect' since suppression led to a subsequent surge in thoughts. These observations suggested that attempted thought suppression can have paradoxical effects as a self-control strategy (Wegner et al., 1987). Wegner et al. also postulated that this form of mental control could play a role in generating and maintaining obsessions and preoccupations.

Further studies of thought suppression

The Wegner study generated a great deal of experimental research interest in thought suppression. Several authors since, have assessed the effects of suppressing neutral thoughts. Some noted rebound effects (e.g. Clark et al., 1991; Clark et al., 1993), others did not (e.g. Merckelbach et al., 1991; Muris et al., 1993). In addition, some investigators found that suppression led to an 'immediate enhancement effect' whereby, *whilst* suppressing, participants experience more target thoughts than those in a control

condition (e.g. Lavy & van den Hout, 1990). Other studies did not demonstrate this effect (e.g. Clark et al., 1991).

Given the potential relevance for understanding psychological disorders characterised by recurrent unwanted thoughts, researchers have also looked at the suppression of disorder-specific thoughts such as worry-related thoughts (Mathews & Milroy, 1994; Becker et al., 1998), anxious thoughts (e.g. Roemer & Borkovec, 1994; Koster et al., 2003), trauma-related thoughts (e.g. Harvey & Bryant, 1998; Shipherd & Beck, 2005), and obsessional thoughts (e.g. McNally & Ricciardi, 1996; Purdon et al., 2005). Most of these studies have been conducted in non-clinical populations, again with rather inconsistent results (Purdon, 1999).

However, a recent meta-analysis of studies examining neutral and clinically relevant thoughts (Abramowitz et al., 2001) did confirm a small-to-medium rebound effect of suppression, although there was no evidence for an immediate enhancement effect. These data may, to some extent, justify inclusion of thought suppression in recent cognitive conceptualisations of psychological disorders, including obsessive-compulsive disorder (OCD; Salkovskis, 1989), posttraumatic stress disorder (PTSD; Ehlers & Clark, 2000), and generalised anxiety disorder (GAD; Wells, 1995).

The purported role of thought suppression in obsessive-compulsive disorder

Theoretically at least, the potential relevance of thought suppression to OCD, a disorder characterised by persistent, unwanted thoughts, images and impulses, is obvious. Indeed, a number of cognitive-behavioural accounts of OCD cite thought suppression as key to disorder development and maintenance (Salkovskis, 1989, 1998; Clark & Purdon, 1993; Rachman, 1997, 1998; Clark, 2004). All these conceptualisations are based upon the view that clinical obsessions originate from the same type of unwanted, ego-dystonic

intrusions documented as frequent and naturally occurring in the general population (Clark & O'Connor, 2005). Several studies have shown that unwanted intrusive thoughts, with content similar to clinical obsessions, are experienced by 80-99% of the population (e.g. Rachman & de Silva, 1978; Salkovskis & Harrison, 1984; Purdon & Clark, 1993). Cognitive-behavioural formulations posit that appraisal of these intrusions, and accompanying coping strategies (including suppression), are instrumental in the emergence and maintenance of clinical obsessions.

Salkovskis (1985, 1989) for instance, hypothesises that obsessional patients interpret intrusions as an indication of responsibility for harm to themselves or others unless preventative action is taken. This interpretation then increases: (1) discomfort, anxiety, and depression; (2) accessibility of the original thought and other related ideas; and (3) behavioural “neutralising” responses that constitute attempts to escape or avoid responsibility. Each of these effects contributes not only to the maintenance of anxiety, but also to a worsening spiral of intrusive thoughts leading to maladaptive affective, cognitive, and behavioural problems (Salkovskis, 1998). The realm of behavioural “neutralising” responses may include compulsive behaviour, avoidance of situations related to the obsessional thought, reassurance seeking (thus diluting or sharing responsibility), and, most pertinent for this review, attempts to get rid of, or exclude, the thought from mind.

Rachman (1998) similarly proposes that an inflated sense of significance attached to unwanted intrusions leads to vigorous and intense suppression attempts. Rachman points to previous findings demonstrating the deficiencies in thought suppression (Wegner et al., 1987) and concludes that such attempts may produce an increase in the frequency of the obsession. Moreover, this increase in frequency may strengthen beliefs about the significance of the obsession. Therefore, a vicious cycle is established.

Clark and Purdon (Clark & Purdon, 1993; Purdon & Clark, 1999; Clark, 2004; Purdon, 2004) offer further insights. They suggest that it is important to consider pre-existing beliefs about thoughts and thought processes in general. For example, individuals who believe that mental control is an important part of self-control will have a high stake in being able to control thoughts. Accordingly, if and when thought suppression fails, it is likely to be more distressing and more detrimental to mood. This may result in further increases in intrusion frequency.

In a recent review, Purdon (2004) provided a helpful summary of the potential insidious effects of thought suppression in OCD. First, it leads to an increase in thought frequency. Second, individuals become hypervigilant to thoughts and thought processes, thereby making obsession triggers and traces more salient. Third, it terminates exposure to the thought, thus precluding new learning about its importance. Fourth, inevitable thought recurrences enhance negative appraisals regarding the meaning of the thought. Overall, increased frequency and enhanced negative appraisals induce further decline in mood, making negative thoughts and appraisals more accessible. In turn, the motivation to control thoughts is more enhanced.

Rationale for the current review

It has been accepted for some time that obsessions give rise to resistance (e.g. Rachman & Hodgson, 1980). In fact, active resistance is a defining feature of obsessions (American Psychiatric Association, 2000) and an important criterion for distinguishing obsessions from worry and depressive rumination (Turner et al., 1992; Wells & Morrison, 1994). One form of active resistance is thought suppression, a mechanism which, as outlined above, features in cognitive-behavioural models of OCD. Given it is nearly twenty years since the first experimental investigation of thought suppression (Wegner et

al., 1987), it would seem timely to carry out a systematic review of experimental studies which have examined its effects in relation to OCD-relevant thoughts.

It is acknowledged that informative reviews of the thought suppression literature have already been published (Purdon, 1999, 2004; Purdon & Clark, 2000; Rassin et al., 2000; Wenzlaff & Wegner, 2000; Smári, 2001; Abramowitz et al., 2001), with some particularly focussed on the implications of thought suppression for OCD (Purdon & Clark, 2000; Smári, 2001; Purdon, 2004). However, to date, no review has been conducted in a systematic manner. Thus, there has not been transparency regarding why certain studies have been included. Moreover, no review has employed a methodical approach to assess study quality. Here, these limitations are remedied by applying strict inclusion criteria for study selection, and by assessing study quality using a standardised approach.

Findings are synthesised into two main categories. First, the impact of suppression upon thought occurrence is examined. Second, the effect of suppression on other pertinent domains is considered (thought appraisals, mood state). It is hoped the review will lead to the extraction of some important insights and provide further justification for the citation of this mechanism in formulations of OCD.

Method

Computerised search

In May 2006, the following computerised databases were searched: All EBM Reviews (Cochrane DSR, ACP Journal Club, DARE, and CCTR), EMBASE, CINAHL, MEDLINE (R), and PsycINFO. These keywords were employed: [THOUGHT\$ adj5 SUPPRESS\$] or [REBOUND EFFECT] or [THOUGHT CONTROL] or [MENTAL CONTROL] or [THOUGHT REBOUND] or [IRONIC PROCESS\$] or [WHITE

BEAR\$]. The search was limited to studies reported in English and published in 1987 or thereafter. The latter criterion was based upon the year in which Wegner and colleagues published their original investigation into thought suppression (Wegner et al., 1987). In addition, duplicates were removed from the retrieved articles.

On two occasions, the title and abstract of retrieved papers were studied to ascertain relevance to the present review. Then, for those considered relevant, the full article was obtained and read in order to determine whether it satisfied inclusion criteria (see below). The final decision regarding inclusion was made by the author and another researcher experienced in conducting systematic reviews (Dr Niall Broomfield, University of Glasgow).

Other search strategies

In order to detect relevant studies not found via the computerised search, the following additional steps were taken:

- 1) The reference sections of papers retrieved through the computerised search and subsequently selected for the review were examined.
- 2) The reference sections of pertinent non-systematic reviews identified in the computerised search were inspected.
- 3) An expert in the field (Dr Christine Purdon, University of Waterloo, Canada) was contacted.
- 4) The following key journals were hand searched from 1987 to May 2006, inclusive: Behaviour Research and Therapy, Cognitive Therapy and Research, Behavioural and Cognitive Psychotherapy, Journal of Anxiety Disorders, and Journal of Behavior Therapy and Experimental Psychiatry.

Inclusion and exclusion criteria

Inclusion criteria:

- 1) Studies in which a main aim focused on determining the effects of thought suppression.
- 2) Experimental studies which, *at the very least*, recruited one group of participants, employed a single measure of thought frequency, and used a thought suppression manipulation.
- 3) In those studies which recruited OCD patients, the target thoughts used in the experiment were related to obsessional problems. For studies using analogue samples, a procedure was adopted such that the target thoughts were relevant to OCD. In this regard, the process (e.g. uncontrollable, intrusive) *and* content (e.g. ego-dystonic: contrary to or inconsistent with one's sense of self as reflected in core personal values, ideals, and moral attributes) of the target thoughts had been considered (for a discussion of this issue, see Clark & Purdon, 1995).

In order to establish whether criterion 3 was satisfied by some of the studies being considered, corresponding authors were contacted [Paul Salkovskis (Institute of Psychiatry, UK), Peter Muris (Maastricht University, The Netherlands), and Jacob Smári (University of Iceland)].

Exclusion criterion:

- 1) Unpublished dissertations.

Ratings of methodological quality

A structured rating scale was developed to assess the quality of included studies (see Appendix 2.2). Scale items were based on guidelines pertaining to quality assessment issued by the Centre of Reviews and Dissemination (CRD; Khan et al., 2001), and a published checklist (Downs & Black, 1998). The latter was specifically designed to assess studies employing differing designs. Items in the current checklist were also informed by methodological issues raised in reviews of empirical studies examining thought suppression (Purdon, 2000; Abramowitz et al., 2001). In addition, the author incorporated items that seemed particularly pertinent.

Items were scored as '1' if criteria were met and as '0' if they were not met, or if the necessary information was not provided. Some items were considered particularly important, in which case a score of '2' was given if criteria were satisfied. When a particular question was not applicable to a study, it was marked as 'X'. Once the checklist was completed for a study, a percentage score was calculated based upon the maximum possible total. Ratings above 70% were taken as indicative of high quality, those in the range of 40% to 70% were judged to be of moderate quality, and scores below 40% were classified as low in quality. These ratings provided the author with a general indicator for the confidence with which particular findings could be taken. They also enabled comparison between studies in a standardised way, thus minimising subjective opinion.

The author and another psychology researcher rated all the papers independently. Initial agreement was high (91%), and through discussion, complete agreement was reached on all checklist items for each study.

Calculating effect sizes

Where possible, ‘immediate enhancement’ and ‘rebound’ effect sizes (ESs) were calculated for suppression groups. Immediate enhancement ESs were calculated according to the difference between thought occurrences under suppression instructions compared with baseline. Rebound ESs were computed based on the difference between thought occurrences in the post-suppression block compared with baseline. ESs were derived by calculating the difference between means and dividing by the pooled standard deviation (SD_{pooled}). This is a valid approach when the correlation between scores at two levels of a within-subjects variable is not known (Dunlap et al., 1996). In line with Cohen (1977, 1988), ES magnitudes of 0.2, 0.5, and 0.8 corresponded to small, medium, and large effects, respectively.

Results

Retrieval of studies

The computerised search yielded 2142 articles. Of these, 2110 were excluded on the basis of title and abstract alone. From the remaining 32 articles, 7 were non-systematic reviews or meta-analyses of relevance to the current review (Purdon, 1999; Purdon & Clark, 2000; Rassin et al., 2000; Wenzlaff & Wegner, 2000; Smári, 2001; Abramowitz et al., 2001; Purdon, 2004). From the other 25 papers, 14 were excluded after reading the full text. Reasons for their exclusion are documented in Table 1.

Thus, from the computerised search, 11 experimental studies remained and were included in the review. The other search strategies yielded no further studies.

[Table 1 about here]

Methodological quality ratings

Table 2 shows the scoring for each paper. Overall study quality ranged from 33% to 75%, with a mean of 56%. Two studies were of high quality, eight of moderate quality, and one of low quality.

[Table 2 about here]

General observations about the eleven studies included in the review

Table 3 provides a descriptive summary of each of the eleven studies included in the review. A few observations about these studies are now made.

[Table 3 about here]

Cohorts recruited

Total study sample sizes ranged from 40 to 219. In four investigations, not all participants monitored obsessional thoughts; some were required to track positive or neutral target thoughts instead. Across studies, the mean number of participants monitoring obsessive intrusive thoughts was 58. For these individuals, the mean number within particular experimental groups was 22 (range: 10-44; the lower value for this range is a best estimate; McNally & Ricciardi (1996) quoted an overall sample size of 42, but did not report how many were placed in each of their 4 experimental groups).

Only two studies recruited OCD patients (Janeck & Calamari, 1999; Purdon et al., 2005). For both studies, patients were attending out-patient clinics and diagnoses were confirmed using structured clinical interviews. As would be expected, there was significant comorbidity in both cohorts and many were taking psychoactive medication. It

was not reported whether patients had any history of receiving psychological interventions for their difficulties. In one of these two clinical studies (Janeck and Calamari, 1999), a non-clinical control group was also recruited. This group was screened for anxiety disorders using a structured clinical interview, but no self-report measure of current obsessive-compulsive symptomatology was administered. An adapted version of the Intrusive Thoughts Questionnaire (ITQ; Edwards & Dickerson, 1987; see below for a description of this measure) was employed to ensure that all participants had experienced at least one negative intrusion in the previous two weeks. Many of the group were students or university employees.

Of the remaining nine studies, eight exclusively recruited university students. The other investigation used hospital staff. Four of these non-clinical studies (Trinder & Salkovskis, 1994; Salkovskis & Campbell, 1994; Belloch et al., 2004; Hardy & Brewin, 2005) employed basic screening procedures to select participants who had experienced obsessional-type intrusions.

Four of the non-clinical studies utilised the Maudsley Obsessive-Compulsive Inventory (MOCI; Hodgson & Rachman, 1977), a 30-item self-report questionnaire, to assess the degree of obsessive-compulsive symptomatology in their samples (Trinder & Salkovskis, 1994; Belloch et al., 2004; Hardy & Brewin, 2005; Marcks & Woods, 2005). All found that mean severity was within the normal range (means ranged from 3.3 to 9.4). One study (Hardy & Brewin, 2005) differentiated two groups ('high' and 'low' obsessional) on the basis of scores on the MOCI, although the authors did not quote the mean group scores separately (overall mean = 7.7). Purdon and Clark (2001) used the Revised Obsessive Intrusions Inventory (ROII; Purdon & Clark, 1993, 1994; see below for description), a self-report measure which assesses the frequency of obsessional intrusions. They did not report any values, but stated that their cohort fell within the

expected range for ‘a university sample’. Finally, three non-clinical studies documented little or no information regarding the degree of obsessional symptomatology in their samples (McNally & Ricciardi, 1996; Purdon, 2001; Rassin, 2001).

Experimental settings and time course

Only one study (Trinder & Salkovskis, 1994) was conducted in participants’ everyday environment. This investigation took place over the course of four days. The remaining ten studies were laboratory-based and employed experimental blocks which lasted 3 to 6 minutes.

Identification of obsessive intrusive thought

A variety of approaches were employed to identify a target thought. Four studies (Purdon & Clark, 2001; Belloch et al., 2004; Hardy & Brewin, 2005; Marcks & Woods, 2005) used the ROII (Purdon & Clark, 1993, 1994), a self-report measure comprising two sections. Section One (52 items) assesses the frequency of obsessional intrusive thoughts, images and impulses. Items are rated on a seven-point scale ranging from 0 (“I have never had this thought”) to 6 (“I have this thought frequently throughout the day”). Section Two pinpoints the most upsetting intrusion endorsed in Section One, which is then rated on a number of dimensions (e.g. unpleasantness, guilt). An earlier version of the ROII showed good discriminant and concurrent validity (Purdon & Clark, 1993, 1994).

One study (Purdon et al., 2005) employed the Interpretation of Intrusions Inventory (III), a measure with good psychometric properties (Obsessive Compulsive Cognitions Working Group (OCCWG), 1997, 2001). This 31-item self-report inventory assesses individuals’ interpretations of obsessional thoughts. Ratings regarding

‘responsibility’, ‘importance of thoughts’, and ‘need to control thoughts’ are made in reference to personal examples of recent obsessions. Participants used the most upsetting thought recorded in the III as their target thought.

Janeck and Calamari (1999) used a modified version of the ITQ (Edwards & Dickerson, 1987). There has been limited investigation into the psychometric properties of the original ITQ (Clark & Purdon, 1995). The questionnaire provides descriptions and examples of positive and negative intrusive thoughts. Participants are then asked to identify a personal example of each thought type from the last two weeks, and rate them on a number of attributes. For their study, Janeck and Calamari removed the questions pertaining to positive thoughts. They also used a procedure to confirm that the OCD patients had selected thoughts related to their core obsessional concerns. This was achieved by asking the therapists who assessed the patients to rate the similarity between their target thought and their most distressing obsessions. On a range of 0 (“not at all similar”) to 10 (“identical”), the mean score was 7.95. Therefore, it did appear that there was a strong obsessional element to the target thoughts identified. Whilst the ITQ is largely focused upon identifying OCD-type thoughts, some non-clinical controls did choose thoughts that seemed more like worries (e.g. failing exams; John Calamari, personal communication). With this caveat in mind, the data from the non-clinical group are still presented in this review.

Rassin (2001) adopted an intriguing approach derived from a previous study (Rachman et al., 1996). Participants were given a piece of paper with the sentence, “I hope that _____ will soon be in a car accident”, and were instructed to fill the gap with the name of a living person close to them. This was designed to simulate a Thought-Action Fusion intrusion (TAF; a cognitive bias implying an inflated sense of responsibility for one’s own thoughts and cited as playing a role in the development and

maintenance of obsessional problems). Moreover, the researcher reported evidence to suggest that this manipulation induced obsession-like stress in the study cohort. Participants were instructed to monitor thoughts about the accident during the experiment.

The remaining three studies used verbal/written instructions or unidentified questionnaires (Salkovskis & Campbell, 1994; Trinder & Salkovskis, 1994; McNally & Ricciardi, 1996). These were geared towards assisting participants in selecting negative intrusive thoughts that were relevant to OCD, both in terms of form and content. However, on account of limited information provided by the authors, there is less certainty about whether this was actually achieved for all participants.

Experimental conditions

Researchers mostly employed variants of three experimental conditions, ‘suppression’, ‘non-suppression’, and ‘mention’ (also referred to as ‘free expression’, ‘record’, and ‘monitor-only’). ‘Non-suppression’ and ‘mention’ were both used as control conditions. For the suppression condition, participants were told that they could think about anything whilst trying as hard as they could to suppress their target thought. However, they were urged to record the times that their target thought did come to mind. In the mention condition, participants were instructed to think about anything they liked, including their target thought. Again, they were reminded to mark the occasions when their target thought did enter their thoughts. Finally, the non-suppression condition was an important variant of the mention condition. Participants were told not to suppress any thoughts, including their target thought. Again, they had to record the times when their target thought did come to mind. These instructions were designed to prevent participants

in the control condition from engaging in spontaneous suppression attempts in response to unwanted thoughts (Purdon & Clark, 2000).

Inspection of Table 3 confirms that additional experimental conditions were used by some researchers (Salkovskis & Campbell, 1994; Trinder & Salkovskis, 1994; Marcks & Woods, 2005). These are described along with the findings from these studies (see later).

Notably, no study employed the expression instructions used by Wegner and colleagues (Wegner et al., 1987). These instructions asked participants to think actively about the target thought. The ecological validity of these instructions has since been questioned, especially when applied to unwanted thoughts (e.g. Merckelbach et al., 1991).

Finally, in three of the laboratory-based studies (Purdon, 2001; Purdon & Clark, 2001; Purdon et al., 2005), participants engaged in an attentional task whilst monitoring their targets thoughts. Ostensibly, this was used to help maintain focus and prevent boredom or daydreaming.

Experimental design

One laboratory-based study employed a crossover design (McNally & Ricciardi, 1996; see Table 3). It is well documented that order and practice effects confound the interpretation of findings from the second block of such studies (e.g. Clark et al., 1991; Purdon & Clark, 2000).

The other nine laboratory-based studies used a parallel groups design. This is the preferred approach in the field (Abramowitz et al., 2001). Participants tracked the frequency of their target thoughts over a series of experimental blocks. Across studies, two to five blocks were employed in the series. Within each study, these blocks were

always of the same time length. Figure 1 represents the experimental structure common to eight of the investigations (it does not apply to Hardy and Brewin (2005); see Table 3). It is highlighted that abbreviations in Figure 1 are used in subsequent text and tables to aid the description of findings from different studies.

[Figure 1 about here]

The naturalistic study (Trinder & Salkovskis, 1994) incorporated a single 4-day block during which three groups monitored their targets thoughts under different conditions.

Monitoring occurrence of target thought

All 11 studies assessed the frequency with which target thoughts occurred. For nine of the laboratory-based studies, thought events were marked *immediately* using a computer mouse (4 studies), a bell (1 study), a tally counter (3 studies), or check marks on a piece of paper (1 study). For the tenth laboratory-based study (Rassin, 2001), participants gave a *retrospective* estimate of frequency at the end of each block. In the one naturalistic study, participants were required to put a tick on a postcard when the thought came to mind.

Four laboratory-based studies used an additional measure of thought recurrence using either thought streaming (participants vocalise 'stream-of-consciousness' into tape recorder; 1 study) or visual analogue scales (3 studies). These attempted to capture the time devoted to the target thought (3 studies) or the proportion of thoughts related to the target thought (1 study).

Other effects of suppression

Two studies did not look beyond frequency and duration of target thoughts (McNally & Ricciardi, 1996; Hardy & Brewin, 2005). However, the remaining nine studies did attempt to examine other effects of thought suppression. These studies used quite a range of variables. Their findings are discussed later.

Summary

From the eleven studies, two were conducted with OCD patients. The remainder used non-clinical individuals who were mostly experiencing normal levels of obsessional symptomatology. Even within a relatively small cohort of studies, it is apparent that researchers have applied a range of methodologies in examining thought suppression in the context of obsessions.

Effect of suppression on thought occurrence

Table 4 offers an overview of the findings from the eleven studies which are relevant to the purported ‘immediate enhancement’ and ‘rebound’ effects of suppression on thought occurrence. Although some investigations examined a variety of target thoughts (i.e. obsessive, positive, neutral, general negative intrusions), only data for obsessive-type intrusions are presented. For those studies which incorporated a B/L block (see Figure 1), ESs are calculated for the suppression group. The results from suppression manipulation checks are also included.

[Table 4 about here]

Belloch and colleagues (2004) generated data which suggested that, rather than leading to enhancement/rebound effects, suppression may interfere with the habituation of obsessive intrusive thoughts. For their suppression group, there was a significant decline in thought frequency between B/L and Exp blocks (see Figure 1), but there was no significant difference between Exp and Post-Exp blocks (see Figure 1). In contrast, their non-suppression group showed a significant decline in both of these comparisons. The authors did not report analyses of the differences between the two groups for any of the blocks. However, visual inspection of their means and standard deviations suggests that no significant differences would have been revealed. Two more studies (Purdon, 2001; Purdon & Clark, 2001) presented data which were consistent with the notion that suppression may interfere with habituation of OCD-type thoughts.

In a study of OCD patients, Purdon and associates (2005) produced evidence to indicate that those under suppression instructions actually had some degree of control. The caveat should be raised that this conclusion was based upon simple effects analyses of an interaction effect only approaching significance ($p < 0.08$). In the Exp block, the suppression group had significantly fewer intrusions than those in the control condition. For the Post-Exp block, the difference between groups was non-significant. Visual inspection of these data raises questions about whether the two groups were matched in terms of pre-experimental intrusion frequency. With this possibility in mind, it is acknowledged that the two groups were well matched in terms of their scores on the Yale-Brown Obsessive Compulsive Scale (Y-BOCS; Goodwin et al., 1989a, 1989b), a measure of symptom severity in OCD. They were also matched for mood levels. However, the researchers did not report whether psychiatric comorbidity was equivalent across groups. In all, this study illustrates the value in employing a B/L block when it comes to interpreting frequency data.

In the only naturalistic study, Trinder and Salkovskis (1994) showed that suppressors had significantly more intrusions over the four-day period than the other two groups (mention and 'think through'). This was taken as potential evidence for an enhancement effect of suppression. Again, since B/L data were not collected, it is impossible to discount the possibility that the difference between groups existed pre-experimentally. It is noted however that all three groups were well matched in terms of anxiety, depression and obsessional symptomatology. The investigators included the 'think through' condition to control for the salience of suppression instructions; being told to suppress or think through requires a thought-focused reaction. The significant difference between frequencies for these two groups led the researchers to argue that the higher values associated with suppression were due to suppression per se, rather than being an effect of salience of the instructions. On account of the study design though, it is difficult to establish whether this enhancement occurred whilst participants actually suppressed. Instead, there remains the possibility that suppression effort fluctuated over the four days and that increases in frequency were due to rebound effects in periods when suppression effort was low. In light of this possibility, Trinder and Salkovskis conducted a detailed analysis of discomfort ratings over the four days. This indicated that the suppression group did not experience greater fluctuations or extremes in discomfort relative to the other two groups. Such fluctuations would be expected if thought rebound was occurring in intermittent periods of low suppression effort. It was therefore concluded that the pattern of findings was more consistent with suppression effort remaining constant during the study and leading to a concurrent increase in frequency.

In the second study using OCD patients (Janeck & Calamari, 1999), it was found that the two OCD groups (suppression and control) had significantly more intrusions than the two non-clinical groups. Thought occurrence also dropped significantly over the

course of the blocks. No other significant effects emerged. There was a suggestion that compared with non-clinical controls who suppressed, more OCD patients who suppressed showed a rebound effect (NC: 0/16 vs. OCD: 4/16). However, this conclusion was based upon Pearson's χ^2 analysis of very small numbers and must be interpreted with caution.

In their laboratory-based study of suppression, Salkovskis and Campbell (1994) employed five groups of participants (see Table 3). In the comparison of frequencies for the suppression and mention groups, it was found that the suppression group had significantly more intrusions across both Exp and Post-Exp blocks. This difference was shown to be constant over the two blocks, thereby indicating that a rebound effect of suppression had not manifested. Overall, these findings were viewed as further evidence for suppression resulting in increased intrusion. The role of distraction was examined by employing the other three experimental conditions. It was found that suppression with general distraction instructions still resulted in enhancement, but either telling people not to distract or providing distraction by way of a task, seemed to abolish the effect. The authors were uncertain about the implications for these findings and recommended further research.

Of the remaining 4 studies, only one claimed to have demonstrated an immediate enhancement effect of suppression (Marcks & Woods, 2005). In order to establish whether such an effect manifested, Marcks and Woods employed a one-way ANCOVA for scores in the Exp block, using frequency of target thoughts in the B/L block as a covariate. Analysis revealed that, relative to the mention group, the suppression group had significantly more thoughts in the Exp block. This was taken as evidence for an immediate enhancement effect. Yet, inspection of the scores in Table 4 confirms that no such effect manifested; the frequency of thoughts for the suppression group dropped between B/L and Exp blocks. Instead, it does appear that, in line with Belloch and

colleagues (2004), the suppression group may have shown an attenuated rate of decline in obsessional thoughts across the blocks. Unfortunately, the authors' choice of analysis procedure prohibits further elucidation on this possibility. This would have been possible had they employed repeated measures ANOVA. In fact, the investigators did use repeated measures ANCOVA when it came to analysing for changes between the Exp and Post-Exp blocks. Again, they took frequency in the B/L block as a covariate. The interaction effect between group and block was found to be non-significant and accordingly, it was concluded that no rebound effect had occurred. They did not report the outcomes for the main effects of group and block.

The final three studies failed to produce empirical data in support of the purported immediate enhancement and rebound effects. In fact, Rassin (2001) showed that, compared with the non-suppression control condition, those under suppression instructions exhibited some degree of relative control in terms of the amount of time spent thinking about the accident. However, the equivalent effect did not emerge in the analysis of intrusion frequency data. Again, no B/L measures of thought occurrence were taken in this study. Given that the target thought was effectively supplied by the experimenter, it would have been helpful to confirm that this manipulation had had an equivalent impact in both groups prior to entering the suppression/non-suppression conditions. Hardy and Brewin (2005) used a novel approach to assess the effects of suppression (see Table 3). Even so, they did not demonstrate enhancement or rebound effects. Finally, in the only study to employ a crossover design, McNally and Ricciardi (1996) did not find an enhancement effect due to suppression in the first block. On account of the difficulty in interpreting performance in the second block of a crossover design, the associated findings are not discussed.

In summary, of the eleven studies included in this review, none provide empirical support for the notion that suppression leads to a subsequent rebound in obsessive intrusive thought occurrence. Two studies generated data indicating that suppression may cause an immediate enhancement in thoughts, although interpretation of these data would have been assisted by the inclusion of B/L blocks. For those investigations where it was possible to calculate ESs, the vast majority went in the opposite direction to expectation (i.e. negative values). Some studies found that, rather than leading to enhancement/rebound effects, suppression interferes with the natural habituation of unwanted thoughts. Finally, others showed that suppression may, in fact, bestow some control over thought occurrence.

Beyond thought occurrence

Table 5 offers an overview of the findings pertaining to effects of suppression which go beyond thought occurrence. Since researchers have had ranging interests, there is limited consistency both in the effects that have been examined and in the manner in which they have been assessed. Accordingly, in contrast to the results for thought occurrence, it was a challenge to extract any general conclusions. In spite of this, findings are discussed, divided into two realms: (1) discomfort (including distress and unpleasantness); and (2) other measures (e.g. responsibility, guilt, acceptability).

[Table 5 about here]

Discomfort/distress/unpleasantness

In the only naturalistic study (Trinder & Salkovskis, 1994), the suppression group rated their thoughts as significantly more uncomfortable than the mention group over the

four days. This matched the findings in relation to frequency of target thoughts over this period. It might have been expected that thinking through an obsessional thought would lead to improved emotional processing. In fact, the ‘think through’ group reported higher levels of discomfort than the mention group, although this difference was non-significant. Perhaps one of the most significant findings in the study was in relation to the discomfort ratings given during and after the habituation sequence in session 2 (after the four days). For the habituation sequence, participants were asked to imagine the thought as clearly as possible, and then, when they had done this, record their discomfort. This was done five times, with one minute between each occasion. At the end of the sequence, the thoughts were again rated for discomfort, along with a number of other measures. The purpose of this procedure was to examine whether suppression influenced the natural habituation of unwanted thoughts. If so, it was expected that the group who suppressed over the previous four days would show a different pattern of discomfort during and after the habituation sequence. In fact, analysis of scores in session 2, covarying for scores at session 1, found no significant effects involving group. Obviously, this contrasted with the findings for the discomfort ratings collected during the previous four days. Trinder and Salkovskis were alert to the possibility that this effect suggested intrusive thoughts formed in a laboratory setting are not experienced in the same way as those occurring in the natural setting. Obviously, such a possibility has important implications for laboratory-based research of thought suppression.

Purdon and Clark (2001) employed VASs to assess discomfort and unpleasantness in relation to the intrusions experienced during the Exp and Post-Exp blocks. For discomfort scores, both groups dropped significantly over the two blocks. In the Exp block, the difference between groups was non-significant. However, in the Post-Exp block, the suppression group experienced significantly more discomfort than the

non-suppression group. In the analysis of unpleasantness ratings, no significant effects emerged. The findings for discomfort were similar to those for thought frequency and provided further support for the notion that suppression may interfere with the habituation of obsessive intrusive thoughts.

Marcks and Woods (2005) conducted a study with a strong emphasis on clinical utility. They compared thought suppression with an acceptance-based technique for impact on discomfort accompanying unwanted thoughts. An acceptance-based approach (e.g. Acceptance and Commitment Therapy; ACT; Hayes et al., 1999) focuses on increasing one's willingness to experience uncomfortable thoughts and feelings without avoiding, struggling with, or viewing them as being true. By engendering a perspective in which thoughts and feelings are simply noticed, the negative impact of such events should diminish (Hayes et al., 1996).

Marcks and Woods found that the suppression group manifested a significant increase in discomfort between Exp and Post-Exp blocks. Therefore, suppression produced a 'rebound' in distress (the rebound effect did not emerge for thought frequencies). In contrast, the acceptance group showed a significant decrease in discomfort between these blocks, whilst ratings remained stable in the mention control group. Therefore, even though the acceptance group experienced thoughts at a similar rate to the suppression and mention groups, these individuals reported a significant improvement in associated discomfort. These data offered initial evidence to support the idea that acceptance may help in dealing with unwanted thoughts. Unfortunately, the researchers did not report their findings for 'acceptance' ratings taken during the experiment. Also, inspection of their data reveals that discomfort ratings for the acceptance group were higher than those for the mention control group. The authors did not comment on this outcome.

Salkovskis and Campbell (1994) found no significant effects in their analysis of discomfort ratings given by the suppression and mention groups. Therefore, although the suppression group experienced significantly more intrusions over the course of the study, these individuals did not record greater discomfort. The role of distraction was then examined by analysing the data from all five experimental groups (see Table 3). There was a significant interaction between group and block. This was almost entirely accounted for by the ‘suppression whilst carrying out a distracting task’ group. For this group, there was a sharp contrast between Exp and Post-Exp blocks, an effect that was not seen in the other groups. Specifically, whilst carrying out a distracting task in the Exp block, their discomfort was considerably reduced. The authors were uncertain about the implications for these findings and recommended further research.

Two studies (Purdon, 2001; Purdon et al., 2005), one of which recruited OCD patients, measured anxiety associated with the target thought during both the Exp and Post-Exp blocks. Neither study documented repeated measures ANOVA for these data. Instead, an alternative approach was adopted to examine the impact of suppression upon distress. Hierarchical multiple regression analyses were employed to identify predictors of anxiety caused by thought occurrences *in the Exp block* only. For both studies, neither experimental group nor thought frequency in the Exp block was found to be a significant unique predictor. Perhaps more importantly, neither study found that the interaction between group and frequency predicted distress. This variable was included on the basis that thought occurrences whilst suppressing might be more disturbing than those experienced whilst trying not to suppress. In both studies, scores from the III (see earlier) and the Concerns over Failure in Thought Control Questionnaire (CFTQ; Purdon, 2001) were also entered into the regression analyses. The CFTQ is a novel measure which provides an immediate assessment regarding the impact of thought recurrences.

Specifically, it examines how these thought recurrences influence appraisals reflecting responsibility, thought-fusion, and control beliefs implicated in conceptualisations of OCD. Little work has been conducted into the psychometric properties of the CFTQ and its two subscales ('need to control', 'fusion/dystonicity') are based upon face validity alone. However, with both students and OCD patients, the subscales have exhibited strong internal consistency (Purdon, 2001; Purdon et al., 2005).

The III was administered prior to the experimental blocks. By virtue of the fact that the CFTQ assesses in vivo appraisals of thought recurrences, it was given to participants after the Post-Exp block. However, they were asked to base their answers solely upon their experiences in the Exp block. Obviously, this is problematic. It is acknowledged though that the researchers chose not to administer it straight after the Exp block because they did not want to disturb potential rebound effects in the Post-Exp block (Christine Purdon, personal communication). Purdon (2001) found that the 'importance of thoughts' subscale from the III and the 'fusion/dystonicity' subscale of the CFTQ emerged as significant unique predictors. The former indicates that increased beliefs about thoughts having moral implications and portending future events, were associated with more anxiety. The latter reflects that greater concerns about the thought coming true or about it revealing negative aspects of one's personality were associated with greater discomfort.

In the other study which used this approach (Purdon et al., 2005), the 'fusion/dystonicity' subscale of the CFTQ was also shown to be a significant unique predictor. Taken together, these findings demonstrated that, for both students and OCD patients, negative thought appraisals were associated with greater levels of anxiety in the Exp block, irrespective of whether participants were suppressing or not suppressing.

Three other studies employed some measure of discomfort (Janeck & Calamari, 1999; Rassin, 2001; Belloch et al., 2004). Janeck and Calamari (1999) found that, relative to non-clinical controls, OCD patients experienced significantly more distress on account of their intrusions. Distress ratings also significantly decreased for all participants over the experimental blocks. No other effects were significant. In another investigation, equivalent findings were reported for unpleasantness ratings taken at pre- and post-experiment (Belloch et al., 2004). Finally, Rassin (2001) assessed general anxiety (i.e. not specific to the target thought) at the end of each block. Again, scores decreased significantly over the course of the experiment, but there were no significant effects involving group.

In summary, a mixed picture emerges with respect to discomfort-type ratings. Two studies (Trinder & Salkovskis, 1994; Marcks & Woods, 2005) generated data indicating that suppression led to heightened levels of discomfort. For one of these studies (Trinder & Salkovskis, 1994), the effect manifested for discomfort during the four-day naturalistic phase, but not in the laboratory. Purdon and Clark (2001) provided further support for the notion that suppression may, instead, interfere with the habituation of obsessive intrusive thoughts. In contrast, the other six studies did not find that suppression instructions influenced distress levels. Finally, two studies highlighted that negative appraisals predict discomfort associated with the recurrence of unwanted thoughts (Purdon, 2001; Purdon et al., 2005). In considering the overall findings, two caveats are raised. First, researchers employed subtly different measures across studies. Second, in light of the effects of suppression upon thought occurrence, a limited impact on discomfort ratings would perhaps be expected.

Other measures

Belloch and colleagues (2004) assessed annoyance caused by not being able to avoid having the target thought in the Exp and Post-Exp blocks. For the control group, annoyance dropped significantly between the Exp and Post-Exp blocks. Whilst annoyance also decreased in the suppression group, this change was non-significant. The authors did not report whether there were significant group differences for either block. Even so, the findings tallied with their results for thought frequency and strengthened the argument that suppression may interfere with the natural habituation of unwanted thoughts. In the same study, it was shown that guilt associated with having the thought diminished for both groups over the course of the experiment. However, the experimental group did not significantly modify this effect. The findings regarding ‘worry about the consequences of having the thought’ were not reported.

Trinder and Salkovskis (1994) used a number of variables to assess target thought appraisals after the habituation sequences in sessions 1 and 2: ease of formation, urge to put right, urge to distract, acceptability, and controllability. No significant effects involving group were revealed.

Salkovskis and Campbell (1994) also administered controllability and acceptability scales. For the former, they did not report their findings. Analysis of the acceptability scores from the mention and suppression groups found no significant effects. When the data from all five groups in this study were examined, a significant interaction between group and block emerged. Further exploration revealed that during the Exp block, the ‘suppression whilst carrying out a distracting task’ group rated their thoughts as significantly more acceptable than in the Post-Exp block. This mirrored the effects found for discomfort and thought frequency (see above). The results combined suggest that suppression, at least in the short term, is an effective control strategy when

individuals distract themselves with a specific task. The authors did not provide any details regarding the task administered.

Rassin (2001) generated data indicating that suppression may, in the short-term, diminish the strength of negative appraisals of TAF-like intrusions (participants were given an unfinished sentence describing a car accident and were asked to complete it by adding the name of a loved one). Relative to the non-suppression control group, the suppression group judged that completing the sentence was less morally wrong and that the accident was less likely to occur. The interpretation of these findings is complicated by the fact that these variables were first assessed *after* the Exp block. The study would have benefited from conducting an assessment of participants' views regarding the TAF-like intrusion prior to any experimental manipulation.

Purdon and Clark (2001) employed responsibility and unacceptability measures. For both, analyses were reported for all 6 experimental groups together (two groups each for positive, negative, and obsessional target thoughts). In terms of responsibility for having the thought, there was a significant decrease between the Exp and Post-Exp blocks. No effect involving suppression or thought type (positive, neutral, negative) approached significance. As expected, it was significantly more unacceptable to have obsessional thoughts than positive or neutral thoughts. Also, in the Exp block, those who suppressed target thoughts of any valence found them to be significantly more unacceptable than those who did not suppress. This is despite the fact that suppression did not cause an immediate enhancement in frequency for any of the three thought types. Overall, these findings suggest that that the instruction to suppress any thought may activate performance demands that participants expect themselves to meet. In failing to meet these demands entirely, the thoughts are then viewed as unacceptable. This

conclusion highlights a potentially important role for pre-existing beliefs about thought control capability.

Purdon and Clark (2001) also examined the effect of suppressing thoughts on mood state, as assessed using the Mood Measure. This instrument was derived from another measure (Howell & Conway, 1992) and is designed to assess positive and negative transient mood states. Little work has been conducted into its psychometric properties, although the 16 items have been found to load onto one factor. The scale also shows high internal consistency (Purdon & Clark, 2001). Correlational analyses showed that higher thought frequency for the group who suppressed obsessional thoughts was associated with more negative mood at post-experiment. This relationship was not found for the other 5 groups. Whilst causality is difficult to determine, this suggests that recurrence of *suppressed* obsessional thoughts is detrimental to mood. In fact, the relationship is likely to be bi-directional. Previous research has revealed a relationship between negative mood and difficulty in suppressing negative thoughts (Wenzlaff et al., 1988, 1991; Conway et al., 1991), and that thoughts are more difficult to dismiss during negative mood (Edwards & Dickerson, 1987; Sutherland et al., 1982). Thus, any decline in mood state is likely to make thought occurrences even more frequent, thereby further impacting upon mood.

Finally, another two studies have measured mood state at both pre- and post-experiment (Purdon, 2001; Purdon et al., 2005). Again, mood was assessed using the Mood Measure (Purdon & Clark, 2001). Neither study documented repeated measures ANOVA for these data. Instead, hierarchical multiple regression analyses were conducted to identify predictors of post-experimental mood state. As expected, both investigations found that pre-experimental mood predicted post-experimental mood. Group, total thought frequency (over the two blocks), and subscale scores from the III were not

significant independent predictors. However, Purdon (2001) reported that the interaction between group and total thought frequency did emerge as a significant predictor. Perhaps surprisingly, greater thought frequency was associated with more negative mood in the control group (non-suppression), but not in the suppression group. These effects contrasted starkly with the findings revealed by Purdon and Clark (2001; discussed above). Finally, for both studies, subscale scores on the CFTQ predicted mood state. Therefore, more negative appraisals of thought recurrences were associated with more negative mood.

As an interesting aside, these last two studies (Purdon, 2001; Purdon et al., 2005) also explored predictors of suppression effort in the non-suppression control group. This was based upon the observation that individuals under non-suppression instructions often exert significant suppression effort. Suppression effort by the non-suppression group in the Exp block was the dependent variable. Purdon (2001) found that greater thought frequency predicted greater suppression effort. Also, the 'need to control' subscale from the CFTQ emerged as a significant unique predictor. Thus, the greater the perceived necessity of thought control, the greater the suppression effort. Purdon and colleagues (2005) also revealed the latter relationship.

Again, this brief overview reveals a mixed picture. The one clear finding is of a research literature somewhat in its infancy, making it difficult to extract a general consensus. One study provided further support for the notion that suppression interferes with habituation of obsessive thoughts (Belloch et al., 2004). In contrast, Rassin (2001) demonstrated that, at least in the short-term, this form of mental control serves to alleviate negative appraisals of TAF-like intrusions. Salkovskis and Campbell (1994) also showed that, in the right conditions (i.e. whilst conducting a distracting task), suppression increases the acceptability of unpleasant intrusions. This finding highlights the need to

explore further the different strategies used by individuals to suppress their thoughts. Indeed, as discussed in previous work (e.g. Smári, 2001), the instruction to suppress is likely to trigger a range of different processes in different circumstances and people. It is plausible that some may be more helpful than others. In the last few years, Purdon and colleagues (Purdon, 2001; Purdon et al., 2005) have examined the role of appraisals of thought recurrence. They found that negative appraisals are associated with lower post-experimental mood, irrespective of whether participants suppress or not. Finally, it has been common for researchers to employ measures for which no significant effects of suppression were revealed or for which they failed to report the findings.

Discussion

The present review synthesised findings from experimental studies that had investigated the effects of suppressing OCD-type thoughts. The review was motivated by the fact that thought suppression has been commonly cited as an important factor in the development and maintenance of obsessional problems (Salkovskis, 1989, 1998; Clark & Purdon, 1993; Rachman, 1997, 1998; Clark, 2004).

Effect of suppression on thought occurrence

The first striking finding was that none of the 11 studies included in this review provided evidence for the purported ‘rebound’ effect of suppression (cf. Wegner et al., 1987). In other words, no study found that suppression of obsessive intrusive thoughts led to a subsequent surge in their occurrence. Moreover, where it was possible to calculate effect sizes for suppression groups, all effects went in the opposite direction to prediction. For example, in the study of highest methodological quality (Belloch et al., 2004), there was a medium effect size for a *decrease* in frequency between B/L and Post-Exp blocks.

With respect to an ‘immediate enhancement’ effect, the overall picture was more equivocal. Two studies (Salkovskis & Campbell, 1994; Trinder & Salkovskis, 1994) found that whilst suppressing, participants experienced significantly more thoughts than those who simply monitored. Interpretation of findings from these two studies would have been aided, however, by the inclusion of B/L blocks. As it stands, it cannot be discounted that the differences between groups existed pre-experimentally. The remaining nine studies found no evidence for the ‘immediate enhancement’ effect. Moreover, of the seven effect sizes calculated, six went in the opposite direction to prediction. In the one exception, the effect size was negligible ($ES=+0.09$).

An interesting conclusion drawn in some of the studies was that, rather than leading to enhancement/rebound effects, suppression may attenuate the natural habituation of unwanted thoughts (Purdon, 2001; Purdon & Clark, 2001; Belloch et al., 2004). Whilst such an eventuality would not be as dramatic as enhancement or rebound effects, it would still be of significance to our understanding of the maintenance of obsessions. Some possible reasons for how suppression may interfere with habituation are discussed later.

Finally, one investigation demonstrated that suppression can be relatively advantageous in the short term (Rassin, 2001). In fact, this was true for thought occurrence and negative appraisals. A study of OCD patients (Purdon et al., 2005) also provided tentative evidence that suppression can bestow some control over obsessional thoughts. Neither of these studies included B/L blocks, thereby limiting confidence in the conclusions. Yet, both serve to illustrate the possibility that suppression may be helpful in some circumstances.

Beyond thought occurrence

Bearing in mind the limited effects of suppression on thought occurrence, there might be little expectation with respect to findings on other variables. Indeed, the present review found that, for the majority of measures employed across studies (see Table 5), no significant effects involving suppression were reported.

For the two studies that demonstrated that suppression leads to relative increases in intrusions (Salkovskis & Campbell, 1994; Trinder & Salkovskis, 1994), there were mixed findings from the other variables employed. Given its design, perhaps the most informative effects were revealed in the naturalistic study (Trinder & Salkovskis, 1994). During this four-day experiment, the suppression group not only had significantly more intrusions, but also experienced more discomfort when these thoughts manifested. Intriguingly, on return to the laboratory, the effect on discomfort ratings disappeared. Despite the lack of a B/L block, this study, which ranked third in terms of methodological quality, generated strong naturalistic data indicating that suppression may be partially responsible for the persistence of obsessional problems.

Throughout the current review, it has been mooted that, rather than causing dramatic increases in thought occurrence, suppression may impede the natural habituation of obsessional thoughts (Purdon, 2001; Purdon & Clark, 2001; Belloch et al., 2004). Findings on variables beyond occurrence support this possibility (Purdon & Clark, 2001; Belloch et al., 2004). Purdon and Clark (2001) gave two plausible explanations for how suppression might interfere with habituation. First, suppression terminates exposure to a thought, in a similar way to completion of rituals. This precludes the opportunity to learn that particular catastrophic consequences of having the thought will not occur (Rachman, 1997, 1998; Salkovskis, 1985, 1989, 1998). Second, instructions to suppress may prime beliefs that thoughts can and should be controlled. Individuals who view failure in control

as a sign of mental weakness will interpret recurrences of the target thought as highly significant (Clark & Purdon, 1993; Purdon & Clark, 1999). This will serve to maintain the negativity associated with the thought during active suppression.

Purdon and colleagues (Purdon, 2001; Purdon et al., 2005) have also attempted to broaden the scope of thought suppression research by exploring the dynamic interactions cited within cognitive-behavioural models of OCD, in addition to the effects of suppression on frequency. They have shown that, both with undergraduates and OCD patients, the meaning attached to thought recurrences (e.g. need to control), irrespective of experimental condition, is associated with suppression effort, discomfort and more negative mood. Thus, understanding the personal significance of thought recurrences might be of central importance to understanding obsessional problems. Furthermore, cognitive restructuring of individuals' interpretations of thought recurrences may be required before they feel able to disengage from control attempts.

Limitations of included studies

Overall, there was a broad range in methodological quality ratings for the 11 studies (33% - 75%). Only two studies fell within the high quality range. Eight investigations were of moderate quality and one was of low quality. In light of this, a case may be made for replicating some studies using greater methodological rigour, thereby enhancing confidence in the findings. Moreover, it could be argued that a lack of high quality studies partially explains the failure to reveal the purported rebound effect of suppression. Yet, in the two studies judged to be of high quality (Belloch et al., 2004; Purdon et al., 2005), there was no evidence for rebound or immediate enhancement effects.

Nine of the 11 studies recruited analogue samples, 8 of which were from student populations. In many cases, participants were paid or given course credits for their time. The remaining 2 studies used OCD patients. The analogue cohorts were either unscreened or selected on the basis of simple screening procedures designed to ensure that individuals had experienced at least one obsessive intrusion in the recent past. Given the high prevalence of OCD-like intrusions (e.g. Rachman & de Silva, 1978), the latter were not especially stringent. Other than in the investigation conducted by Salkovskis and Campbell (1994), no analogue study made a concerted effort to recruit individuals experiencing obsessional symptomatology to a significant degree. Overall, the fact that most studies used healthy student populations is problematic in that it weakens the generalisability of their respective findings.

Perhaps the most striking observation was that 10 of the 11 studies were laboratory-based. For these studies, experimental blocks ranged from 3 to 6 minutes. Again, this raises serious questions about the ecological validity of the findings. Briefly monitoring obsessional thoughts in an artificial environment bears limited relation to the experience of dealing with these thoughts in everyday life.

All of the studies failed to report power calculations and 7 investigations had *at least one group* with fewer than 20 participants. Both of these observations point to the possibility that some of the studies were poorly powered.

All studies measured frequency of thoughts. Apart from Rassin (2001), researchers employed an event marking procedure. Whilst there is some consensus that this is the preferred approach (e.g. Purdon & Clark, 2000), it does have drawbacks. In particular, the issue of what constitutes an independent thought event is always going to be problematic. To complement frequency data and thereby generate a broader picture, four studies used a second measure of thought occurrence. These tapped into the amount

of time spent thinking about, or the proportion of thoughts related to, the target thought. The failure of the remaining seven studies to employ a second measure of thought occurrence is a limitation.

A variety of approaches were employed to identify target thoughts. Three studies used verbal/written instructions or unidentified questionnaires (Salkovskis & Campbell, 1994; Trinder & Salkovskis, 1994; McNally & Ricciardi, 1996). Although these were geared towards selecting thoughts relevant to OCD, there may be some doubt that this was always achieved. In this regard, it would have been helpful if the authors had documented the content of the thoughts selected, if indeed this information was collected. Looking at all 11 studies, only three provided any information regarding the content of the target thoughts (Purdon et al., 2001; Rassin, 2001; Belloch et al., 2004).

Seven studies did not obtain baseline data for thought occurrences. This prevented the calculation of effect sizes for ‘immediate enhancement’ and ‘rebound’ effects, and complicated the interpretation of findings.

Limitations of this review

This review focused exclusively upon experimental studies that used OCD-like intrusions as target thoughts. Consequently, other studies of thought suppression, some of which may have been relevant to the issues discussed in this review, were not included. For instance, some questionnaire-based investigations have examined the relationships between suppression, appraisals, thought frequency and OCD symptomatology (e.g. Smári & Hólmsteinsson, 2001; for a review, see Purdon, 2004). Correlational designs avoid the difficulty of creating naturalistic suppression experiments. On the other hand, inferences about causality are weaker.

In addition, the methodological quality checklist was developed ‘in house’ for the purposes of this review. Therefore, although based upon existing measures and guidelines (Downs & Black, 1998; Khan et al., 2001), overall quality scores should be viewed as an *indication* of methodological rigour.

Recommendations for future research

This review has clearly demonstrated that there is a short-term, laboratory-based bias in the experimental studies examining suppression of OCD-like thoughts. Indeed, this observation can be applied to the thought suppression literature in general. It is acknowledged that short-term, laboratory-based studies have been helpful in building our understanding of this mental control strategy. Even so, the author strongly urges that investigators look towards broadening the scope of their research by carrying out studies in participants’ everyday settings, and over longer time periods. Although such an approach is more demanding, findings will have greater ecological validity, and should be more informative to clinical practice.

There is a dearth in empirical investigations which have recruited either OCD patients or participants displaying high levels of obsessionality. Given the prominence afforded to thought suppression in cognitive-behavioural conceptualisations of the maintenance of obsessional problems, this must be rectified.

An observation made throughout this review is that interpretation of effects would have been aided if relevant baseline data had been collected. Accordingly, for future research, researchers should employ a baseline period in their investigations. Some authors have raised concerns that a baseline period may lead to the habituation of target thoughts, thereby diminishing its salience during the critical suppression condition. There are, however, a number points that can be made in response to this. One, the finding that

unwanted thoughts habituate may be interesting in itself. Two, employment of a control group would still allow comparisons to be made regarding the effects of suppression. Three, the possibility that target thoughts may habituate to insignificant levels is perhaps more indicative of the fact that studies have tended to recruit healthy volunteers who have rarely experienced their target thoughts prior to the experiment, and who report limited discomfort on account of them.

In reviewing the literature, it seems that commentators often focus upon the experimental factors (e.g. type of event marking procedure, control condition instructions) which best predict the manifestation of immediate enhancement and rebound effects for thought occurrences. Whilst this is an interesting line of enquiry, there is a danger that this leads researchers down the path of trying to identify the ‘magic formula’ for obtaining predicted effects. Instead, especially when considering clinical problems, it would be more helpful to characterise, as broadly as possible, what happens when individuals try to suppress their unwanted thoughts within natural settings.

Thought suppression researchers have also tended not to broach the issue of *how* individuals try to suppress. Indeed, the instruction to suppress a thought is likely to trigger a range of different processes in different circumstances and people (Smári, 2001). Only one study included in this review (Salkovskis & Campbell, 1994) instructed participants on how to suppress their target thoughts. With the possibility that some strategies may be more helpful than others in dealing with obsessional thoughts, it is clear how the existing literature can be extended. Similarly, the study conducted by Marcks and Woods (2005) will hopefully set a precedent for comparing the effects of suppression with those of therapy-based approaches in managing obsessive intrusions.

Active resistance is a defining feature of obsessional thoughts. Therefore, it is reasonable to query whether asking people to suppress these thoughts demands a change

in behaviour (Tolin et al., 2002; Purdon, 2004). Moreover, for six studies included in the present review, control instructions stipulated that participants try not to suppress any thoughts, including their target thought (non-suppression). This may well be asking them to act contrary to their natural inclinations. Overall, it could be argued that suppression is a non-intervention and non-suppression is an active condition. This then raises doubts about the utility of the non-suppression control condition, rendering comparisons between suppression and non-suppression potentially meaningless. In discussing this issue, Purdon (2001) suggests that it may be more fruitful for researchers to look at natural suppression effort. In so doing, it would be necessary to carry out more studies using correlational designs.

Finally, as outlined in this review, there has been growing interest in examining effects beyond thought occurrence. To date, the emphasis has been upon discomfort-type measures. Future research should continue to build the links between empirical work and cognitive theories of OCD by not only examining the impact of suppression on thought occurrence and discomfort, but also upon other thought appraisals cited in these theories (e.g. beliefs about the need to control thoughts, responsibility).

Conclusion

In summary, the current review demonstrates that, to date, there is no firm experimental evidence that suppression of OCD-type intrusions leads to a subsequent surge in these thoughts (i.e. rebound effect). Moreover, there is very limited support for the immediate enhancement effect of suppression. Of 14 effect size calculations, only one went in the predicted direction ($ES=+0.09$). With respect to variables other than occurrence, findings are mixed. Some studies offer tentative evidence that suppression may interfere with the natural habituation of obsessive intrusions. Whilst this may not be

as remarkable as purported enhancement/rebound effects, it could still play an important role in the maintenance of obsessions.

Overall then, experimental studies offer little credence to the citation of thought suppression in conceptualisations of obsessional problems. However, the extant literature is lacking in many respects. With this in mind, it is urged that researchers move away from the laboratory-based approach and conduct studies over longer time periods and within participants' everyday environment. The research area would also benefit from more investigations using clinical samples, or, at the very least, participants experiencing higher levels of obsessive symptomatology.

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Table 1. Fourteen papers that were excluded after reading the full text. The reasons for their exclusion are provided.

Study	Reason for exclusion
Brewin & Beaton (2002)	The target thought was a 'white bear'.
Brewin & Smart (2005)	The study was mainly focused upon assessing the relationship between working memory capacity and the ability to suppress obsessional thoughts in a single group of participants.
Clark et al. (1993)	The target thought related to a story about a 'green rabbit'.
Kelly & Kahn (1994)	The content of intrusive thoughts selected by participants was widespread (e.g. academic performance, relationships, future in general); in other words, the study was not especially focused upon assessing the effects of suppressing ego-dystonic intrusive thoughts, images, and impulses.
Kelly & Nauta (1997)	As for Kelly & Kahn (1994).
Lavy & Van Den Hout (1990)	The target thought related to 'vehicles'.
Muris et al. (1993)	The target thought was a 'white bear'.
Muris et al. (1996)	As for Kelly & Kahn (1994).
Rutledge et al. (1996)	The target thought was a 'white bear'.
Rutledge (1998)	As for Kelly & Kahn (1994).
Smári et al. (1994)	For some participants, the target thought related to a depressing story about a car crash in which a baby dies. For the remaining participants, the story was emotionally neutral.
Smári et al. (1995)	As for Kelly & Kahn (1994).
Smári & Hermodsdottir (2001)	As for Kelly & Kahn (1994).
Tolin et al. (2002)	The target thought was a 'white bear'.

Table 2. Methodological quality ratings given to each of the selected papers. Individual checklist items are described in detail in Appendix 2.2.

	Belloch et al (2004)	Purdon et al. (2005)	Trinder & Salkovskis (1994)	Janeck & Calamari (1999)	Salkovskis & Campbell (1994)	Marcks & Woods (2005)	Purdon (2001)	Purdon & Clark (2001)	Rassin (2001)	Hardy & Brewin (2005)	McNally & Ricciardi (1996)
1. Hypothesis/Aim/Objective	2	2	2	2	2	2	2	2	2	2	2
2. OCD patients	0	2	0	2	0	0	0	0	0	0	0
3. Naturalistic or lab-based	0	0	2	0	0	0	0	0	0	0	0
4. Participants paid/given credit	1	0	1	0	1	0	0	0	0	1	0
5. OCD – diagnostic criteria used	X	1	X	1	X	X	X	X	X	X	X
6. Inclusion/exclusion criteria	1	1	0	0	0	0	0	0	0	0	0
7. OCD symptomatology assessed	1	1	1	0	0	1	0	0	0	1	0
8. Comorbidity assessed	1	1	1	1	1	1	0	0	0	0	0
9. Parallel or crossover	1	1	1	1	1	1	1	1	1	1	0
10. Baseline thought frequency	1	0	0	1	0	1	0	0	0	1	0
11. Thought counting method used	1	1	1	1	1	1	1	1	1	1	1
12. Other measure of thoughts	1	0	0	1	0	0	0	0	1	0	1
13. Identifying target thought	2	2	1	1	1	2	2	2	1	2	1
14. Group that never suppressed	1	1	1	1	1	1	1	1	1	0	0
15. Control condition used	1	1	1	1	1	1	1	1	1	1	1
16. Randomisation	1	2	1	1	2	1	1	1	1	X	1
17. Matched by age and gender	1	0	1	0	1	0	1	1	1	0	0
18. Suppression manipulation check	1	1	1	1	1	1	1	1	1	0	0
19. Appropriate statistics	1	1	1	1	1	0	1	1	1	0	1
20. Power calculation	0	0	0	0	0	0	0	0	0	0	0
Possible total score	24	25	24	25	24	24	24	24	24	22	24
Actual total score	18	18	16	16	14	13	12	12	12	10	8
Rating (%)	75	72	67	64	58	54	50	50	50	45	33

Table 3. Descriptive summary of the 11 studies included in the review (given in order of methodological quality ratings, highest first).

Authors/ Year	Sample and selection criteria	Setting, experimental design, and groups	Identification of OCD-like target thought	Monitoring target thought occurrence	Other effects of suppression investigated	Methodological comments (not covered in checklist)	Quality rating (%)
Belloch et al. (2004)	Students (n=87); MOCI mean=3.3. Inclusion- had target thought at least a few times a year. Exclusion- current, severe psycho- logical problems.	Lab-based. Parallel design. 3 blocks (B1, B2, B3; 5mins each). <i>Two groups monitored obsessional target thoughts:</i> Suppression (n=24) B1: non-suppression, B2: suppression, B3: non-suppression <u>Non-suppression</u> (n=19) B1, B2, B3: non-suppression <i>[The two other groups used 'white bears' as the target thought]</i>	Used ROII	Write check marks on a piece of paper (frequency) AND complete a VAS (after each block) to estimate <i>time devoted to target thought</i> (duration).	<u>Pre- and Post-</u> <u>experiment:</u> Appraisal of intrusion in relation to unpleasantness, guilt, and worry about consequences (5- point scales). <u>After B2 and B3:</u> Annoyance caused by intrusion in block (VAS).	Participants were seen in groups of 5.	75
Purdon et al. (2005)	OCD patients (n=50). Presence of at least one identifiable obsession.	Lab-based. Parallel design. Two blocks (B1, B2; 4 mins each). 2 groups: <u>Suppression</u> (n=26) B1: suppression; B2: non- suppression <u>Non-suppression</u> (n=24) B1, B2: non-suppression To prevent daydreaming whilst thought monitoring, all participants carried out an attentional task during both blocks.	Used III	Computer mouse clicks (frequency)	<u>Pre- & Post-</u> <u>experiment:</u> A measure of mood state (Mood Measure) <u>Post-experiment:</u> A measure of concerns about thought control failure (CFTQ) <u>After both blocks:</u> Anxiety caused by intrusion (VAS).	- Not reported if groups matched for psychiatric comorbidity. - Data were not collected regarding performance on the attentional task. Also not clear whether the task is necessary for such short blocks or whether it confounds the suppression manipulation in some way. - CFTQ was administered post-experiment, but with the instruction to reflect on thoughts occurring in B1 only.	72

Table 3 (continued).

Authors/ Year	Sample and selection criteria	Setting, experimental design, and groups	Identification of OCD-like target thought	Monitoring target thought occurrence	Other effects of suppression investigated	Methodological comments (not covered in checklist)	Quality rating (%)
Trinder & Salkovskis (1994)	Students (n=48). Selected for study if had had OCD- like thoughts in the last month. MOCI mean=5.2	Naturalistic. Parallel design. Two sessions (Sessions 1 & 2) separated by a four-day monitoring period. For this four-day period, there were 3 groups: <u>Suppression</u> (n=16) <u>Think Through</u> (n=16) (When thought comes to mind, think about it for as long as possible) <u>Mention</u> (n=16)	Given instructions	Put a tick on a postcard whenever thought occurred (frequency).	<u>4-day period</u> : Each day, rated discomfort caused by thought (VAS). <u>Both sessions</u> : Habituation sequence: asked to imagine target thought 5 times (rate discomfort each time). At the end of the sequence, rated thoughts for ease of formation, discomfort, urge to put right, urge to distract, acceptability, and controllability.	Numbers in each group were quite low.	67
Janeck & Calamari (1999)	OCD patients (n=31). Non-clinical (NC) controls (n=32). All had at least one negative intrusion in last 2 weeks.	Lab-based. Parallel design. Three blocks (B1, B2, B3; 5 mins each). Two OCD groups & 2 NC groups. <u>Suppression groups</u> (OCD: n=16; NC: n=16) B1: mention, B2: suppression, B3: mention. <u>Mention groups</u> (OCD: n=15; NC: n=16) B1, B2, B3: mention.	Used adapted version of ITQ. For OCD group, therapists completed a VAS to indicate how similar their target thought was to their most distressing obsessions.	Press a bell (frequency) AND complete a VAS (after each block) to estimate the proportion of thoughts related to intrusion.	After B2 and B3: Distress caused by intrusion during the block (VAS).	Fifteen patients were taking selective serotonin reuptake inhibitors. Numbers in each group were quite low. NC controls had had significantly more years in education.	64

Table 3 (continued).

Authors/ Year	Sample and selection criteria	Setting, experimental design, and groups	Identification of OCD-like target thought	Monitoring target thought occurrence	Other effects of suppression investigated	Methodological comments (not covered in checklist)	Quality rating (%)
Salkovskis & Campbell (1994)	Students (n=75). 3 or more negative intrusions in last month (& distress caused ≥30/100).	Lab-based. Parallel design. Two blocks (B1, B2; 5 mins each). 5 groups, all had mention instructions for B2: - Suppression in B1 (n=15) - Mention in B1 (n=14) - Suppression with general distraction instructions in B1 (n=16) - Suppression with 'don't distract' instructions in B1 (n=15) - Suppression whilst carrying out a distracting task in B1 (n=15).	Given instructions	Tally counter (frequency)	After both blocks: Discomfort, controllability, and acceptability ratings for the target thought during the previous block (VASs).	No details of task given to the 'suppression whilst task' group were provided. Numbers in each group were quite low.	58
Marcks & Woods (2005)	Students (n=103) All endorsed at least one item on ROI.1. MOCI mean=9.4	Lab-based. Parallel design. Three blocks (B1, B2, B3; 5 mins each). 3 groups: Suppression (n=33) B1: mention, B2: suppression, B3: mention. Acceptance (n=37) B1: mention, B2: acceptance [adapted from Acceptance and Commitment Therapy (Hayes et al., 1999)], B3: mention. Mention (n=33) B1, B2, B3: mention.	Used ROI.1	Tally counter (frequency)	After all 3 blocks: For that particular moment, rate discomfort, acceptance, and 'urge to do something" in relation to target thought (10-point scales).	Researchers only reported analyses of thought frequency data for the Suppression and Mention groups. Depression and anxiety levels, as determined using self-report measures, appeared quite high.	54

Table 3 (continued).

Authors/ Year	Sample and selection criteria	Setting, experimental design, and groups	Identification of OCD-like target thought	Monitoring target thought occurrence	Other effects of suppression investigated	Methodological comments (not covered in checklist)	Quality rating (%)
Purdon (2001)	Students (n=84) No selection criteria reported.	Lab-based. Parallel design. Two blocks (B1, B2; 4 mins each). 2 groups: <u>Suppression</u> (n=44) B1: suppression; B2: non-suppression <u>Non-suppression</u> (n=40) B1 & B2: non-suppression To prevent daydreaming whilst thought monitoring, all participants carried out an attentional task during both blocks.	Used III	Computer mouse clicks (frequency)	<u>Pre- & Post- experiment:</u> Mood state (Mood Measure) <u>Post-experiment:</u> A novel measure of concerns about thought control failure (CFTQ) <u>After both blocks:</u> Anxiety caused by intrusion (VAS).	- Data were not collected regarding performance on the attentional task. Also not clear whether the task is necessary for such short blocks or whether it confounds the suppression manipulation in some way. - CFTQ was administered post-experiment, but with the instruction to reflect on B1 only.	50
Purdon & Clark (2001)	Students (n=219) No selection criteria reported.	Lab-based. Parallel groups. Two blocks (B1, B2; 6 mins each). <i>Only two of the 6 groups monitored</i> <i>obsessional target thoughts:</i> <u>Suppression</u> (n=38) B1: suppression, B2: non-suppression <u>Non-suppression</u> (n=35) B1 & B2: non-suppression To prevent daydreaming whilst thought monitoring, all participants carried out an attentional task during both blocks. <i>[Of the four other groups, two tracked neutral thoughts ('white bears'), and two monitored positive thoughts]</i>	Used ROI	Computer mouse clicks (frequency)	<u>Pre- & Post- experiment:</u> Mood state (Mood Measure) <u>Before B1 and after both blocks:</u> Discomfort, unpleasantness, acceptability, and responsibility ratings in relation to the target thought (VASs).	Data were not collected regarding performance on the attentional task. Also not clear whether the task is necessary for such short blocks or whether it confounds the suppression manipulation in some way.	50

Table 3 (continued).

Authors/ Year	Sample and selection criteria	Setting, experimental design, and groups	Identification of OCD-like target thought	Monitoring target thought occurrence	Other effects of suppression investigated	Methodological comments (not covered in checklist)	Quality rating (%)
Rassin (2001)	Students (n=40) No selection criteria reported.	Lab-based. Parallel design. Two blocks (B1, B2; 5 mins each). In between B1 and B2, participants were handed piece of paper with target thought on it – allowed to do whatever they wanted with it in order to make things right (neutralising behaviour). <u>Suppression</u> (n=21) B1: suppression, B2: told that instructions for B1 were no longer applicable. <u>Non-suppression</u> (n=19) B1: non-suppression, B2: told that instructions for B1 were no longer applicable.	Handed the following sentence: “I hope that... will soon be in a car accident”. Told to complete it by writing in name of someone close to them. Also asked to form mental image of accident.	After both blocks: Given VAS to estimate time spent thinking about accident during the block (duration) AND asked to estimate frequency of intrusions relating to the accident.	After both blocks: Estimated likelihood of accident (%). VASs to assess: -Anxiety right now. -Morally wrong to complete the sentence. -Responsibility if accident happened. -Guilt if accident happened. -Urge to engage in neutralising action. After B2 only: Formed mental image of accident, as they had done when completing sentence initially (pre-experiment); used VAS to compare intensities of original and current image.	It is queried whether lay participants would understand what is meant by “neutralising action”, a term that was used in one of the VASs. It may have been better to assess the intensity of accident imagery at both pre- and post-experiment (using VASs, for instance), rather than asking participants to make a comparison between these images in a retrospective way [see column to the immediate left (<u>After B2 only</u>)]. The study would have benefited from conducting an assessment of participants’ views regarding the intrusion pre- B1.	50

Table 3 (continued).

Authors/ Year	Sample and selection criteria	Setting, experimental design, and groups	Identification of OCD-like target thought	Monitoring target thought occurrence	Other effects of suppression investigated	Methodological comments (not covered in checklist)	Quality rating (%)
Hardy & Brewin (2005)	Students (n=40). Had obsessive intrusive thought in past 2 weeks. MOCI mean=7.7	Lab-based. Parallel design. Five blocks (B1, B2, B3, B4, B5; 3 mins each). High (n=17) and Low (n=23) obsessionality groups identified on basis of scores on the MOCI. Both groups went through same protocol: B1: non-suppression B2: suppression B3: non-suppression B4: suppression B5: non-suppression	Used ROII	Tally counter (frequency)	None	Use of median split on MOCI scores to identify high and low obsessionality groups - some in Low group may have scored 6, some in High group may have scored 7 - not a clear boundary. Also, means for both groups not reported. The inclusion of control groups (non-suppression for all 5 blocks) may have aided interpretation.	45
McNally & Ricciardi (1996)	Hospital staff (n=42) No selection criteria reported.	Lab-based. Crossover design. Two blocks (B1, B2; 5 mins each). <i>Only two of the 4 groups monitored</i> <i>obsessional target thoughts:</i> <u>Initial Suppression</u> (n not given) B1: suppression, B2: mention <u>Initial Mention</u> (n not given) B1: mention, B2: suppression <i>[The two other groups used 'white bears' as the target thought]</i>	Given instructions	Vocalising thoughts into tape recorder (time spent vocalising target thought (secs)) AND computer mouse clicks (frequency)	None	Numbers in each group not quoted. Small sample size. Limited information on sample (only N and source). <u>All 4 groups</u> identified an obsessional thought prior to the experiment. This may have affected performance in the two 'white bear' groups.	33

ABBREVIATIONS: III=Interpretation of Intrusions Inventory (Obsessive Compulsive Cognitions Working Group, 1997, 2001); ROII=Revised Obsessive Intrusive Inventory (Purdon & Clark, 1993, 1994); MOCI=Maudsley Obsessive-Compulsive Inventory (Hodgson & Rachman, 1977); VAS=Visual Analogue Scale; CFTQ=Concerns over failure in thought control questionnaire (Purdon, 2001); ITQ=Intrusive Thoughts Questionnaire (Edwards & Dickerson, 1987).

Table 4. Obsessive thought occurrences found in the 11 studies (results for a second measure of thought occurrence are also given, if reported). Data are means and standard deviations (SDs), as functions of group [Suppression; Control (mention or non-suppression)] and experimental block [see Figure 1; B/L = baseline; Exp = Experimental (suppress or control instructions); Post-Exp = Post-Experimental]. Effect sizes (ES) are calculated for suppression groups in studies which employed a baseline block. The investigations are presented in the order of their methodological quality ratings, starting with the highest.

Authors & Year	Block	Suppression Group	Control group	Suppression manipulation check	Findings from analyses/Comments/Effect sizes (if possible)
Belloch et al. (2004) ^a	B/L	2.2 (0.7)	2.0 (0.7)	Confirmed compliance with suppression instructions.	<p>No evidence for enhancement or rebound effects.</p> <ul style="list-style-type: none"> Control group showed a significant drop between B/L and Exp and between Exp and Post-Exp. Suppression group only showed a significant drop between B/L and Exp. Authors argued that suppression may inhibit habituation of unwanted thoughts. Analyses were not reported for the differences between groups in the Exp and Post-Exp blocks. ESs: immediate enhancement = -0.85; rebound = -0.58. Thought frequency and duration data were strongly correlated – researchers therefore chose just to analyse frequency data. Duration data were not reported in the paper.
	Exp	1.5 (1.0)	1.6 (0.7)		
	Post-Exp	1.6 (1.1)	1.2 (1.1)		
Purdon et al. (2005)	B/L	-	-	Confirmed compliance with suppression instructions.	<p>No evidence for enhancement or rebound effects.</p> <ul style="list-style-type: none"> Suppression group demonstrated some relative control in that they had significantly less intrusions in Exp block compared with control group. There was no significant difference between the two groups in the Post-Exp block. [These conclusions were based upon simple effects analyses of a non-significant interaction ($p < 0.08$)]. Results possibly accounted for by pre-experimental differences.
	Exp	8.2 (7.5)	20.0 (24.7)		
	Post-Exp	10.7 (11.2)	18.3 (23.4)		

Table 4 (continued).

Authors & Year	Block	Suppression Group	Control group	Suppression manipulation check	Findings from analyses/Comments/Effect sizes (if possible)
Trinder & Salkovskis (1994) ^b	B/L	-	-	Confirmed compliance with suppression instructions.	<p><u>Evidence that suppression results in increased intrusions.</u></p> <ul style="list-style-type: none"> As the only naturalistic study, these values represent the mean number of intrusions experienced between the main meals of the day. Actual figures were not reported in the paper. Values given here are estimated from the authors' graph of the data. Unfortunately, indices of variance were not provided in the text or on the graph. Suppression group experienced significantly more intrusions than the 'mention' control group and the 'think through' group. This effect did not interact with stage in the 4-day period. Not possible to discount the possibility that these differences existed pre-experimentally.
	Exp	≈1.7 (-)	≈0.7 (-)		
	Post-Exp	-	-		
Janeck & Calamari (1999)	B/L	OCD	OCD	Confirmed compliance with suppression instructions.	<p><u>No evidence for enhancement or rebound effects.</u></p> <ul style="list-style-type: none"> Analysis of OCD & NC groups together: OCD groups had significantly more intrusions (freq & prop). There was also a significant decrease in thoughts across blocks (freq & prop). No other significant effects found. Analysis of OCD group alone: No significant effects reported for frequency data. Analysis not reported for proportion data. OCD suppression group <u>ESs</u>: immediate enhancement = +0.09 (frequency), -0.36 (proportion of thoughts related to intrusion); rebound = -0.06 (freq), -0.50 (prop). Non-clinical suppression group <u>ESs</u>: immediate enhancement = -0.26 (freq), -0.51 (prop); rebound = -0.52 (freq), -0.70 (prop). There was a suggestion that more OCD suppressors experienced rebound than NC suppressors – but Pearson's χ^2 analysis conducted on very low n.
		Non-clinical	Non-clinical		
	Exp	OCD	OCD		
		Non-clinical	Non-clinical		
	Post-Exp	OCD	OCD		
		Non-clinical	Non-clinical		

Table 4 (continued).

Authors & Year	Block	Suppression Group	Control group	Suppression manipulation check	Findings from analyses/Comments/Effect sizes (if possible)
Salkovskis & Campbell (1994) ^c	B/L	-	-	Check was conducted, but results were not reported.	<p><u>Evidence that suppression can lead to increased intrusions, but not a rebound effect.</u></p> <ul style="list-style-type: none"> No indices of variability provided in the paper. Suppression group experienced significantly more intrusions overall. Interaction effect between block and group was non-significant; this suggests that a rebound effect did not occur. Again, cannot discount the possibility that the overall difference existed pre-experimentally. Three other suppression groups - suppression with general distraction instructions still resulted in more intrusions; effect was abolished by telling people not to distract or providing distraction by way of a task.
	Exp	3.7 (-)	1.9 (-)		
	Post-Exp	3.9 (-)	2.1 (-)		
Marcks & Woods (2005) ^d	B/L	≈2.5 (-)	≈1.6 (-)	Confirmed compliance with the suppression instructions.	<p><u>No evidence for enhancement or rebound effects.</u></p> <ul style="list-style-type: none"> Means and SDs were not reported for the B/L and Post-Exp blocks. Therefore, means are estimated from the authors' graph of the data. Unfortunately, no indices of variance were provided on the graph, so SDs cannot be estimated. This also prevents the calculation of ESs. One-way analysis of covariance (ANCOVA) of thought frequencies in the Exp block, using B/L frequency as a covariate, showed that the suppression group had significantly more thoughts. The authors claimed to have revealed an immediate enhancement effect of suppression. However, visual inspection of the data clearly shows that this did not occur; for the suppression group, thought frequency dropped between the B/L and Exp blocks. Instead, the suppression group may have shown an attenuated rate of decline in obsessional thoughts between the two blocks. Repeated measures ANCOVA was used to examine frequencies in the Exp and Post-Exp blocks. The interaction between group and block was not significant. It was concluded that a rebound effect had not emerged.
	Exp	2.1 (2.2)	0.9 (1.6)		
	Post-Exp	≈1.9 (-)	≈1.0 (-)		

Table 4 (continued).

Authors & Year	Block	Suppression Group	Control group	Suppression manipulation check	Findings from analyses/Comments/Effect sizes (if possible)		
Purdon (2001)	B/L	-	-	Confirmed compliance with the suppression instructions.	<p><u>No evidence for enhancement or rebound effects.</u></p> <ul style="list-style-type: none"> Analysis of control group data revealed a significant decline in frequencies between blocks. There was no significant change for the suppression group. Suggested that suppression may interfere with the natural habituation of unwanted thoughts. There were no significant differences between the two groups in either block. 		
	Exp	6.5 (6.5)	8.6 (4.7)				
	Post-Exp	6.1 (7.1)	5.1 (4.0)				
Purdon & Clark (2001) *	B/L	-	-	Confirmed compliance with the suppression instructions.	<p><u>No evidence for enhancement or rebound effects.</u></p> <ul style="list-style-type: none"> Analysis of control group data revealed a significant decline in frequencies between blocks. There was no significant change for the suppression group. Suggested that suppression may interfere with the natural habituation of unwanted thoughts. There were no significant differences between the two groups in either block. 		
	Exp	6.5 (5.5)	5.9 (3.5)				
	Post-Exp	4.6 (6.0)	2.7 (2.4)				
Rassin (2001)	B/L	-	-	Confirmed compliance with the suppression instructions.	<p><u>No evidence for enhancement or rebound effects.</u></p> <ul style="list-style-type: none"> For frequencies (Freq), both groups showed a significant decline across the two blocks. Main effect of group and interaction effect between group and block were non-significant. For time spent thinking about the accident (Time (VAS score in mm)), the group x block interaction effect was found to be significant. Although simple effects analyses were not reported, visual inspection of their data clearly shows that the control group reported spending significantly more time thinking about the accident in the Exp block. This difference was not apparent in the Post-Exp block. Therefore, seems that suppression may have afforded some degree of control over thoughts. 		
	Exp	Freq 6.0 (3.6)	Freq 5.6 (2.8)			Time 29.7 (15.3)	Time 52.5 (22.1)
	Post-Exp	Freq 3.4 (4.0)	Freq 2.2 (1.4)			Time 26.3 (20.8)	Time 25.3 (16.2)

Table 4 (continued).

Authors & Year	Block	Suppression Group	Control group	Suppression manipulation check	Findings from analyses/Comments/Effect sizes (if possible)							
Hardy & Brewin (2005) ^f	B/L	5.4 (3.9)		Not conducted.	<p>No evidence for enhancement or rebound effects.</p> <ul style="list-style-type: none"> For this table, data have been collapsed across the 'high' and 'low' obsessional groups. The low obsessional group experienced significantly less intrusions in the 1st and 2nd Post-S blocks. There were no group differences in the other blocks. Visual inspection and analyses of the data confirmed that neither group exhibited enhancement or rebound effects. ESs: immediate enhancement = -0.22 (1st S block - B/L), -0.24 (2nd S block - B/L); rebound effect = -0.29 (1st Post-S block - B/L), -0.05 (2nd Post-S block - B/L). 							
	1 st S	4.6 (3.7)										
	1 st Post-S	4.3 (3.6)	Not applicable.									
	2 nd S	4.5 (4.1)										
	2 nd Post-S	5.2 (4.5)										
McNally & Ricciardi (1996) ^g	B/L	-	-	Not conducted.	<p>No evidence for enhancement or rebound effects.</p> <ul style="list-style-type: none"> This study employed a crossover design. Therefore, interpretation of findings in the second block is confounded by order and practice effects. Accordingly, the results from this block are not presented and no comment is made about the data. For the Exp block, analysis of both thought frequency (Freq) and time spent vocalising target thought (Time (seconds)) revealed no group differences. 							
	Exp	<table border="1"> <tr> <td>Freq</td> <td>3.5 (3.8)</td> </tr> <tr> <td>Time</td> <td>45.9 (36.5)</td> </tr> </table>	Freq	3.5 (3.8)	Time	45.9 (36.5)	<table border="1"> <tr> <td>Freq</td> <td>2.0 (2.4)</td> </tr> <tr> <td>Time</td> <td>53.9 (62.2)</td> </tr> </table>	Freq	2.0 (2.4)	Time	53.9 (62.2)	
Freq	3.5 (3.8)											
Time	45.9 (36.5)											
Freq	2.0 (2.4)											
Time	53.9 (62.2)											

N.B. Positive effect sizes (ESs) indicate that an initial enhancement effect or a rebound effect occurred. Negative values show that the opposite was found.

^a For this table, data for the 2 groups who monitored 'white bear' thoughts are not included; ^b The control group is taken as those individuals in the mention condition ('think through' condition is not included in this table); ^c Study employed three other groups with different distraction instructions (see Table 3), the data for which are not presented here; ^d Data for the 'acceptance' group are not presented here; ^e This study also recruited participants who had to suppress positive or neutral words. Their data are not provided in this table; ^f This study employed a different design. Following the B/L block, all participants went through two cycles of Suppression (S) followed by Control (Post-S) instructions. ^g Data for the 'white bear' groups are not presented in the table.

Table 5. Summary of the findings from the nine studies which examined effects of suppression which went beyond thought occurrence. The investigations are presented in the order of their methodological quality ratings, starting with the highest.

Authors/Year	Discomfort/Distress/Unpleasantness	Other measures
Belloch et al. (2004)	<p>Unpleasantness associated with having the thought: Both groups - significantly decreased from pre- to post-experiment.</p>	<p>Annoyance at not being able to avoid having the thought: Control group - significantly dropped between Exp and Post-Exp blocks. Suppression group - non-significant decrease. Guilt associated with having the thought: Both groups - significantly decreased from pre- to post-experiment. Worry about consequences of having the thought: Findings were not reported.</p>
Purdon et al. (2005)	<p>Hierarchical multiple regression analysis for anxiety caused by thought occurrences in Exp block: Group, thought frequency in Exp block, and group x frequency interaction did not predict anxiety. However, more negative pre-experimental mood was associated with greater anxiety over thought occurrences. Also, the 'fusion/dystonicity' subscale of the CFTQ emerged as a significant unique predictor. Thus, greater concerns about the thought coming true or about it revealing negative aspects of one's personality were associated with greater discomfort.</p> <p>Discomfort over the 4 days: Significantly higher in the suppression group compared with the mention group. The ratings for the 'think through' group were intermediate of, and not significantly different from, those for the other two groups. There was no significant interaction effect between group and time.</p> <p>Discomfort ratings during and after the habituation sequence in session 2: Analysis of scores in session 2, covarying for scores at session 1, found no significant effects involving group. Thus, suppressing, thinking through, or simply monitoring thought in the previous 4 days had no impact on discomfort aroused when subsequently forming it in the lab.</p>	<p>Hierarchical multiple regression analysis for post-experiment mood state: Unsurprisingly, mood state at pre-experiment was a significant predictor of mood state at post-experiment. Group, total thought frequency, and group x total thoughts interaction were not significant unique predictors. The 'need to control' subscale of the CFTQ did emerge as a significant predictor; escalating perceived need to control the thought was associated with more negative mood.</p>
Trinder & Salkovskis (1994)	<p>Discomfort over the 4 days: Significantly higher in the suppression group compared with the mention group. The ratings for the 'think through' group were intermediate of, and not significantly different from, those for the other two groups. There was no significant interaction effect between group and time.</p> <p>Discomfort ratings during and after the habituation sequence in session 2: Analysis of scores in session 2, covarying for scores at session 1, found no significant effects involving group. Thus, suppressing, thinking through, or simply monitoring thought in the previous 4 days had no impact on discomfort aroused when subsequently forming it in the lab.</p>	<p>Ease of formation / Urge to put right / Urge to distract, Acceptability, and Controllability: Analyses of scores in session 2, covarying for scores at session 1, revealed no significant effects involving group.</p>
Janeck & Calamari (1999)	<p>Distress caused by the target thought: OCD patients experienced significantly more distress on account of intrusions. Also, distress scores significantly decreased between Exp and Post-Exp blocks. No other effects were found to be significant.</p>	-

Table 5 (continued).

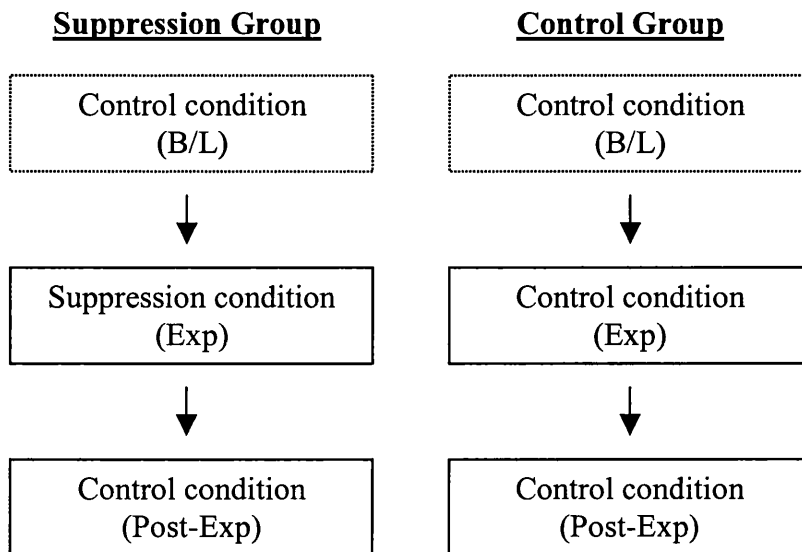
Authors/Year	Discomfort/Distress/Unpleasantness	Other measures
Salkovskis & Campbell (1994)	<p>Discomfort ratings: For the suppression and mention groups alone, there were no significant effects involving group. Taking all five groups together, there was a significant interaction between group and block; almost entirely accounted for by the 'suppression whilst carrying out a distracting task' group. For this group, there was a sharp contrast between the Exp and Post-Exp blocks, an effect not seen in the other groups. Specifically, whilst carrying out a distracting task in the Exp block, their discomfort was considerably reduced.</p>	<p>Acceptability ratings: Again, in comparing the suppression and mention groups alone, there were no significant effects involving group. Analysis of all five groups together revealed a significant interaction effect between group and block. As for the discomfort ratings, this was almost entirely accounted for by the 'suppression whilst carrying out a distracting task' group. Specifically, whilst carrying out the task in the Exp block, acceptability was higher than in the Post-Exp.</p> <p>Controllability ratings: Findings were not reported.</p>
Marcks & Woods (2005)	<p>Discomfort: Repeated measures ANCOVA was utilised to examine ratings for all three groups in the Exp and Post-Exp blocks, using B/L discomfort as a covariate. A significant interaction between group and block was found. Between blocks, discomfort in the suppression group significantly increased ('rebound'). In contrast, discomfort significantly decreased for the acceptance group. Ratings in the mention group remained stable.</p>	<p>Acceptance / Urge to do something: Findings were not reported.</p>
Purdon (2001)	<p>Hierarchical multiple regression analysis for anxiety caused by thought occurrences in Exp block: Group, thought frequency in Exp block, and group x frequency interaction did not predict anxiety. The 'importance of thoughts' subscale from the III and the 'fusion/dystonicity' subscale of the CFTQ emerged as significant unique predictors. The former indicated that increased views about thoughts having moral implications and as portending future events were associated with more anxiety. The latter reflects that greater concerns about the thought coming true or about it revealing negative aspects of one's personality were associated with greater discomfort.</p>	<p>Hierarchical multiple regression analysis for post-experiment mood state: Unsurprisingly, mood state at pre-experiment was a significant predictor of mood state at post-experiment. Group and total thought frequency did not predict mood state. However, the group x total thoughts interaction was a significant unique predictor. Further analysis found that greater thought frequency was associated with more negative mood for the non-suppression group, but not for the suppression group. Finally, the 'fusion/dystonicity' subscale of the CFTQ emerged as a significant unique predictor. Thus, increased concerns about the thought coming true or about it revealing negative aspects of one's personality were associated with lower mood.</p>

Table 5 (continued).

Authors/Year	Discomfort/Distress/Unpleasantness	Other measures
Purdon & Clark (2001)	<p>Discomfort: For both groups, scores dropped significantly between Exp and Post-Exp blocks. The difference between groups was non-significant in the Exp block. In the Post-Exp block, the suppression group experienced significantly more discomfort than the non-suppression group.</p> <p>Unpleasantness: Analysis was not reported for the obsessive thought group alone. From the analysis of all 6 groups, no effect involving suppression was found to be significant. Unsurprisingly, the obsessive intrusion group rated their thoughts as being significantly more unpleasant.</p>	<p>Acceptability: An analysis was not reported for the obsessive thought group alone. From the analysis of all 6 groups, a significant interaction between suppression status (suppression, non-suppression) and block emerged. Compared with the non-suppression groups, the suppression groups found their target thoughts significantly more unacceptable in the Exp block, but not the Post-Exp block. This effect was not modified by the nature of the target thought.</p> <p>Responsibility: Analysis was not reported for the obsessive intrusion group alone. From the analysis of all 6 groups, no effect involving suppression was found to be significant. There was a significant decrease for all participants between the Exp and Post-Exp blocks.</p> <p>Mood state at post-experiment: More frequent thought occurrences were associated with more negative mood for those individuals instructed to suppress obsessional thoughts. No such association was found for the other 5 groups.</p>
Rassin (2001)	<p>Anxiety in general: Significantly decreased across the two blocks for all participants.</p>	<p>Estimated likelihood of accident happening: Suppression group rated it as significantly less likely. Scores did not change between blocks.</p> <p>Morally wrong to complete the sentence: For both groups, ratings lowered significantly between the two blocks. Overall, the suppression group recorded significantly lower scores for this measure (i.e. they felt it was less morally wrong).</p> <p>Responsibility if accident happened / Guilt if accident happened / Urge to engage in neutralising action: Significantly decreased across the two blocks for all participants.</p> <p>Intensities of accident images: No difference between groups. Ratings indicated that images were less severe at the end of the experiment compared with those at the start.</p>

ABBREVIATIONS: III= Interpretation of Intrusions Inventory (Obsessive Compulsive Cognitions Working Group, 1997, 2001); CFTQ=Concerns over failure in thought control questionnaire (Purdon, 2001).

Figure 1. Representation of the experimental structure common to eight of the laboratory-based studies that employed a parallel groups design. It is stressed that some researchers did not conduct a baseline block (dashed) and that some studies recruited more than two groups. Control condition refers to either ‘mention’ or ‘non-suppression’ instructions. Abbreviations in parentheses are used in the subsequent text and tables.



ABBREVIATIONS: B/L = Baseline; Exp = Experimental; Post-Exp = Post-Experimental.

Chapter 3

Major Research Project Proposal

An investigation into the effects of thought suppression in a group of high worriers

For the Major Research Project reported in Chapter 4, a significant amendment was made to the protocol described in this proposal. This amendment is introduced at the end of this chapter. Both protocols were approved by the Local Research Ethics Committee (see Appendix 3.2).

Summary:

Wells' metacognitive model of Generalised Anxiety Disorder (GAD; Wells, 1995) predicts that thought suppression plays a key role in the maintenance of *worry about worry*. The present study is designed to examine this prediction. Two groups of high worriers will be recruited. Participants will be asked to identify their most potent current worry. They will be required to rate this worry on a number of dimensions including the amount of distress caused, its controllability, and the impact of the worry upon their general physical, mental and social well-being. The experiment itself will consist of three phases, each lasting for five minutes. At the end of each of these phases, subjects will be required to make the same ratings described above. During all three phases, subjects will monitor and record thought occurrences related to their identified worry. For Phase 1, all subjects will be told that they can think about anything, including their worry. In Phase 2, one group (Suppression group) will be told to suppress thoughts about their worry and the other group (Mention group) will continue as in Phase 1. For Phase 3, the instructions from Phase 1 will apply. Based upon Wells' model, it is hypothesised that, relative to the Mention group, the Suppression group will demonstrate an increase in the frequency of thoughts related to their worry during Phase 3. Furthermore, at the end of the experimental procedure, their concerns about the uncontrollability and harmful effects of worry will be inflated.

1. Introduction*1.1. Thought suppression*

A seminal investigation by Wegner and colleagues (Wegner et al., 1987) has had a remarkable impact upon subsequent conceptualisations of specific emotional disorders. For the first phase of this study, participants were instructed either to suppress or to

express (i.e. generate actively) thoughts about a white bear whilst relaying their stream of consciousness. In the second phase, suppression and expression instructions were swapped between the two groups. A comparison of performance in the expression condition revealed that those participants who had suppressed in the first stage had significantly more thoughts about a white bear than those subjects who expressed in the first stage. This phenomenon was duly termed the ‘rebound’ effect of suppression.

Since this investigation, other researchers have observed the paradoxical effect of suppression on frequency of neutral thoughts (Lavy & van den Hout, 1990; Clark et al., 1991). However, it is important to note that studies have yielded mixed results. For instance, some researchers have reported that suppression does not influence the frequency of the target thought (e.g. Muris et al., 1993), whilst others have noted a decrease in frequency (e.g. Roemer & Borkovec, 1994). Some authors have argued that this inconsistency may indicate that the effect of suppression is weak and transitory or that it could reflect important methodological discrepancies between studies (e.g. Abramowitz et al., 2001). Nevertheless, in a recent meta-analysis of controlled studies (Abramowitz et al., 2001), it was shown that there was a small to moderate ‘rebound’ effect of thought suppression. This ‘rebound’ effect has clear relevance for understanding psychological disorders characterised by the persistent recurrence of unwanted thoughts. Indeed, a considerable body of research has rapidly emerged which has examined suppression of thoughts analogous to those which are characteristic of certain psychological disorders. Most of these studies have been conducted in non-clinical populations and the work has rarely extended beyond simply measuring the impact of suppression on thought frequency (for a review, see Purdon, 1999). Once again, the results of these investigations have been inconsistent. Nevertheless, thought suppression has now been cited as a factor in the development and/or maintenance of various

problems. For example, it has been incorporated in conceptualisations of obsessive-compulsive disorder (OCD; Salkovskis, 1996), posttraumatic stress disorder (PTSD; Ehlers & Clark, 2000), generalised anxiety disorder (GAD; Wells, 1995), and depression (Wenzlaff et al., 1988).

1.2. Wells' metacognitive model of GAD

Wells argues that styles of thinking and the real or experienced uncontrollability and intrusiveness of thoughts will only be understood by recourse to metacognitive levels of explanation (Wells, 2005). This view is embraced in his metacognitive model of GAD which attempts to explain the difficult-to-control, excessive, distressing, and generalised nature of worry that is the central criterion for this diagnosis.

Wells' cognitive model of GAD (Wells, 1995) distinguishes between two types of worry, termed Type 1 and Type 2 worries. Type 1 worries focus upon external daily events such as finances, and non-cognitive internal events such as bodily sensations. In contrast, Type 2 worries are concerned with the nature and occurrence of thoughts themselves; in essence, Type 2 worry is *worry about worry*. Wells' model places especial importance upon the role of Type 2 worry in the manifestation of GAD. Indeed, Wells and Carter (1999, 2001) have provided data which support this view. Wells' accounts for the existence of *worry about worry* by positing that patients hold negative beliefs about worrying itself (e.g. worrying is harmful). These negative beliefs fall into two broad domains concerning (1) the uncontrollability of worry, and (2) the dangers of worry for mental, physical or social well-being. It is also postulated that once *worry about worry* is established through the activation of these beliefs, a number of additional factors are implicated in the escalation and maintenance of the problem: (1) emotional symptoms;

(2) behavioural responses; (3) thought control attempts. Each of these factors will be considered in turn.

First, Type 2 worry is associated with an increase in negative emotions such as anxiety and sadness. These symptoms may be interpreted as evidence supporting Type 2 concerns. For example, the sensation that one's mind is racing may be viewed as evidence for loss of mental control. Second, a person with GAD might engage in behavioural responses aimed at avoiding the dangers of worrying (e.g. reassurance seeking). There are three potential problems with these behaviours: (1) some behaviours generate conflicting, ambiguous, or incorrect information, thereby creating uncertainty which can act as another trigger for worrying; (2) behaviours such as seeking reassurance from others removes an opportunity to discover that worrying can be effectively self-controlled rather than avoided or controlled by others; and (3) the effective cessation of worrying prevents the person discovering that worrying is harmless. Third, an individual with GAD may engage in direct thought control strategies that are not helpful. In particular, the person may try to stop thinking thoughts that might trigger a worry sequence. Wells cites studies which have demonstrated that similar suppression attempts inadvertently lead to an increase in the occurrence of unwanted thoughts (e.g. Wegner et al., 1987; Clark et al, 1991, 1993) and concludes that this phenomenon may play a role in GAD. More specifically, ineffectiveness of thought suppression attempts may be interpreted as evidence of loss of mental control and could strengthen negative beliefs about the uncontrollability of worry. Accordingly, this perpetuates worry about worry.

1.3. Rationale for the current proposal

It is the role of thought suppression attempts in the maintenance of Type 2 worry that provides the focus for this proposal. Whilst a few studies have investigated how

suppression of worry-related thoughts influences the subsequent frequency of these thoughts (e.g. Mathews & Milroy, 1994), it is my understanding that no research has been conducted into the impact of suppression attempts on the appraisal of worry. Given Wells' predictions, it is obvious how the extant literature can be extended. The aims and hypotheses for the present proposal are outlined below.

2. Aims and Hypotheses

2.1. Aims

- (1) To establish whether attempts to suppress worrisome thoughts paradoxically lead to an increase in the frequency of these thoughts in a group of high worriers. Although it is acknowledged that this has been investigated in a small number of previous studies, results have varied. Moreover, fulfilment of this aim will aid the interpretation of the findings relating to the second aim of this study.
- (2) To determine whether thought suppression attempts lead to a strengthening of concerns about the uncontrollability of worry and its harmful effects. In essence, this tests Wells' prediction that thought control exacerbates *worry about worry*.

2.2. Hypothesis

Based upon Wells' cognitive model of GAD, it is hypothesised that worry suppression attempts will be associated with a subsequent increase in the frequency of these worries and with the exacerbation of concerns about the uncontrollability and harmful effects of worry.

3. Plan of Investigation

3.1. Participants and Recruitment

A cohort of 50 high worriers will be selected from an initial sample recruited via:

a) University of Glasgow staff and student e-mail; b) advertisement in the local community (e.g. university departments, local newspapers); and c) announcements during lectures at University of Glasgow. Selection of the 50 participants will be based upon their ratings on the Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990). This measure is described below. Prior research with college samples (Molina & Borkovec, 1994) has shown that a PSWQ total score of 56 falls 1 standard deviation below the mean of individuals diagnosed with GAD by the Anxiety Disorders Interview Schedule-Revised (ADIS-R; DiNardo & Barlow, 1988). Accordingly, participants in the present study will be regarded as ‘high worriers’ if their PSWQ total score is greater than or equal to 56. This cut-off point has been used in previous research examining the characteristics of high worriers (Ruscio, 2002). Based upon previous findings (Ruscio, 2002), it is anticipated that approximately 200 subjects will have to be recruited into the initial sample. Review of previous Major Research Projects indicates that recruitment of this sample size is attainable in the allotted time.

3.2. Measures

3.2.1. Pre-experimental measures

Participants will complete three self-report measures. The first is the Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990), a 16-item measure assessing trait worry. It was developed primarily out of clinical and research experiences with GAD clients and can be viewed as a measure that reflects severe worry. Items are rated on a 5-point Likert scale and are summed to form a total score ranging from 16 to 80. The

PSWQ has excellent psychometric properties in student, community and clinical samples (Ruscio & Borkovec, 2004). The second measure is the Generalised Anxiety Disorder Questionnaire (GAD-Q-IV; Newman et al., 2002), a self-report diagnostic measure of GAD. This measure has good reliability and validity (e.g. Newman et al., 2002) and shares a high level of diagnostic agreement ($\kappa = 0.70$) with the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown et al., 1994) that is at least as high as the diagnostic agreement between two independent administrations of the ADIS-IV GAD module ($\kappa = 0.65$; Brown et al., 2001). The GAD-Q-IV is scored following the DSM algorithm for GAD, and individuals meeting all of the criteria are diagnosed with the disorder. The final measure is the Beck Depression Inventory – Second Edition (BDI-II; Beck et al., 1996). Given the frequent co-occurrence of anxiety and depression in emotional disorders, it is felt that the degree of current depressive symptomatology should be characterised in the recruited sample. Furthermore, should it transpire that there is a significant difference in depressive symptomatology between the two experimental groups, it would be possible to partial out the effect of this discrepancy using analysis of covariance.

3.2.2. Experimental measures

Participants will be required to complete a number of visual analogue scales (VASs) at various points throughout the procedure. A VAS is a measurement instrument that attempts to measure a characteristic or attitude that is believed to range across a continuum of values and which cannot be directly measured. For this study, a VAS comprises a horizontal line, 100mm in length, which is anchored by descriptors at each end. The participant will be required to mark a point on the line which they feel

represents their current state. The VAS score is determined by measuring the distance between the left hand end of the line and the subject's mark.

3.3. Design and Procedures

All participants will provide written informed consent. Participants will be pseudo-randomly assigned to one of two groups, Suppression and Mention. Pseudo-randomisation will ensure that an equal number of participants (N=25) are placed in each group and that mean PSWQ scores are similar across the two experimental conditions. This process will be conducted by a researcher who is not involved with the study.

The experimental procedure consists of three main phases (Phases 1, 2, and 3), all of which last for 5 minutes. Before entering Phase 1, participants will be instructed to identify their most distressing current worry. In order to encourage them to comply with this instruction and to save them potential embarrassment, they will not be asked to give details of this worry to the experimenter. Instead, they will be asked to give a basic indication of the context of their worry (e.g. work). They will then be directed to rate their identified worry on a number of VASs. These scales will assess the amount of distress associated with that particular worry, the controllability of their worry, and the impact of the worry upon their general physical, mental and social well-being. Also, before commencing the experiment, subjects will be asked to rate their general levels of anxiety on a VAS.

Participants will be given the experimental instructions for the thought monitoring intervals (Phases 1, 2 & 3). Subjects will record thought occurrences relating to their identified worry by clicking on a computer mouse attached to a computer. This 'event marking' procedure is less intrusive than other means (e.g. stream of consciousness vocalisation) and may overcome the problem of participants wishing to appear that they

are complying with instructions (Purdon, 1999). In Phase 1, all participants will be told that they can think about anything, including their worry. At the end of this phase, they will complete the same VASs described above. In Phase 2, the Suppression group will be told that they can think of anything they like, but that they must try to suppress thoughts about their worry. The Mention group will continue as in Phase 1. At the end of Phase 2, participants will again complete the VASs previously described. In addition, all subjects will rate suppression effort and success on VASs (manipulation check). For Phase 3, the instructions given in Phase 1 will apply to all participants. This interval is included to establish whether a paradoxical ‘rebound’ effect of suppression can be observed. At the end of Phase 3, participants will once again complete the VASs described above. Also, they will rate spontaneous suppression effort and success on VASs (manipulation check). At the end of the experiment, subjects will be debriefed and thanked for participating. It is expected that the entire procedure will last for approximately 40 minutes.

3.4. Settings and Equipment

The experimental procedure will be carried out in a quiet room and distractions will be kept to a minimum. The primary piece of equipment will be a portable computer and mouse. Questionnaires and rating sheets will also be employed.

3.5. Power Calculation

A series of power calculations was conducted in order to examine how the power of this study would fluctuate as a function of number of participants and effect size. Computations were carried out using the computer software, G-POWER (Erdfelder et al., 1996). The calculations focused on the second aim of the study (see Aims and Hypotheses) given that this is the primary interest. The hypothesis associated with this

aim (see Aims and Hypotheses) dictates that data analyses using repeated measures analysis of variance (ANOVA) should reveal significant interaction effects between group (Suppression, Mention) and time (each subject will produce ratings at four different time points) for concerns about uncontrollability of worry and its harmful effects. Therefore, the power calculations examined the power of the study to detect these hypothesised interaction effects.

Assumptions were made in calculating power. First, since no published studies have examined this area of interest, it was not possible to estimate the effect size by referring to previous findings. Accordingly, it was necessary to employ Cohen's effect size (f) conventions for ANOVA (Cohen, 1977, 1988). Values for f of 0.1, 0.25, and 0.4 correspond to "small", "medium", and "large" effect sizes, respectively. Second, ρ , the population correlation between the individual levels of the within-subjects factor (time), was conservatively predicted to be 0.3. Third, it was assumed that the correlation between all possible pairs of the repeated measurements would be identical. This is an assumption of repeated measures ANOVA. Fourth, the significance level (α) was taken to be 0.05.

The results from the power calculations are depicted in Figure 1. Based upon the assumptions described above, this figure illustrates how the power of the study would fluctuate as a function of total number of participants (N) and effect size, f . Inspection of the graph indicates that, for "medium" effect sizes and with the proposed sample size of 50, the study will have adequate power (i.e. more than the standard threshold of 0.80). In fact, analysis revealed that the power of the proposed study to detect the hypothesised interaction effects between group and time is 0.95 (assuming "medium" effect sizes).

[Figure 1 about here]

3.6. Data Analysis

All exploratory data analyses and statistical procedures will be conducted using the Statistical Package for the Social Sciences (SPSS; Nie et al., 1970). Howell (1997) will be employed as the main statistics resource text. All significance tests will be two-tailed and a significance threshold of $p=0.05$ will be implemented for all effects examined. Raw data will be examined in order to determine whether the assumptions of parametric analysis are satisfied. As endorsed by Howell (1997), in those cases where either or both of the assumptions of homogeneity of variance and normality are not fulfilled, appropriate transformations may be performed.

Data meeting the assumptions of parametric analysis will be analysed using t-tests, or repeated measures analysis of variance (ANOVA). Where both groups are compared on a single measure (e.g. PSWQ scores), unpaired t-tests will be conducted. For these calculations, the pooled variance estimate will be employed, as advised by Howell (1997). In the current investigation, subjects will be measured for the same variable on more than one occasion (e.g. anxiety levels). Data of this form will be analysed employing repeated measures ANOVA. This procedure is sensitive to violations of the assumption of compound symmetry of the covariance matrix. In fact, in cases where there is departure from this assumption, the degrees of freedom will be adjusted using a value of ϵ calculated by either the Greenhouse-Geisser (1959) or the Huynh-Feldt (1976) procedure. As recommended by Howell (1997), when the value of ϵ computed by the Greenhouse-Geisser procedure is near or above 0.75, the ϵ value derived using the Huynh-Feldt procedure will be preferred. If analysis reveals a significant main effect of a within-subject factor with more than two levels, multiple comparisons will be carried out employing paired t-tests and a Bonferroni correction (Myers, 1979). Indeed, Maxwell (1980) showed that this method suitably controlled the familywise error rate. Simple

effects analyses will be used to investigate significant interactions between subject group and a within-subjects factor. Within-subjects simple effects will be evaluated by conducting separate repeated measures ANOVA for each group. Between-subjects simple effects will be examined by running discrete one-way ANOVAs at each level of the within-subjects factor, using the pooled error term from the original analysis that yielded the interaction. Further, for these between-subjects analyses, the degrees of freedom will be adjusted as advised by Howell (1997).

If it transpires that data are sometimes unsuitable for parametric analysis, equivalent non-parametric analyses will be conducted instead. Parametric and non-parametric correlations will be calculated using Pearson's product-moment and Spearman's rank correlation coefficients, respectively.

4. Practical Applications

Thought suppression has been cited as an important factor in the maintenance of worry about worry in GAD (Wells, 1995). The current study has the potential to generate data which support this viewpoint. Not only would this be a useful theoretical step, but it would provide further endorsement for some of the treatment methods which have been derived from this assumption (see Wells, 1995). It is also hoped that the findings from this investigation will generate ideas for future research which may lead to further improvements in the way in which GAD is treated.

5. Timescale

- Procedural aspects of the study (e.g. computer software for monitoring thought frequency; design of the VASs) will be formalised over the summer 2005.
- Ethical approval to be obtained by September 2005.

- Recruitment to commence in October 2005.
- Data collection to be completed by the end of April 2006.
- Draft of thesis to be completed by the end of June 2006.
- Submit research portfolio at the end of July 2006.

6. Ethical Approval

Ethical approval will be sought from the appropriate ethics committee(s). Most aspects of the study (e.g. completing questionnaires) are expected to be well tolerated. However, given that participants will be asked to focus upon a specific worry as part of the experimental procedure, it is expected that they will experience some mild transitory discomfort. Indeed, this possibility will be explicitly stated to potential participants in the Information Sheet. It is emphasised that comparable manipulations have been employed in a number of previous studies of similar populations (e.g. Mathews & Milroy, 1994; Purdon et al., 2005) and that no serious long-term effects have ever been reported. Once the procedure is completed, all subjects will be briefed regarding the specific rationale for the study.

If, whilst taking part in this study, the researcher determines that a participant may require professional attention (e.g. they present with signs of severe depression), their GP will be informed. This decision will always be discussed with the participant before the GP is informed. Also, the Information Sheet will state that such an eventuality may arise.

7. References

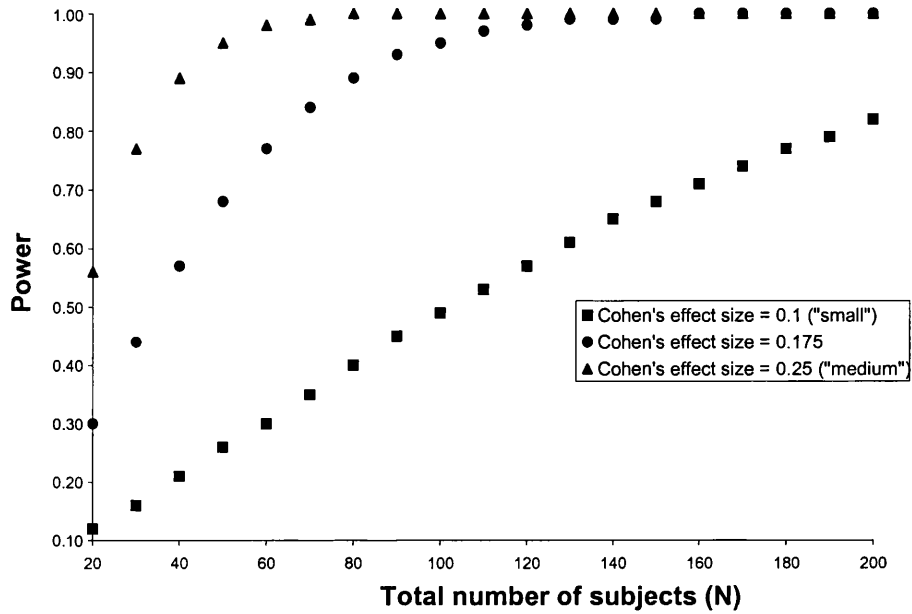
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Figure 1. A graph depicting the power of the design of this study to find a significant interaction between group and time as a function of the total number of subjects and Cohen's effect size, f .



ADDENDUM

Whilst piloting the protocol described in this chapter, its ecological validity has come under scrutiny. A few participants have remarked that the process seems quite contrived and that it does not reflect how they worry in the outside world. Accordingly, a significant amendment is proposed. The experiment will be run over the course of one week in participants' everyday environment. At the start and finish of this week, participants will meet with the researcher for approximately 30 minutes on each occasion. At the first session, participants will be asked to identify and rate a current worry (as described in the original proposal). Then, for the following week, they will keep a record of how often their worry enters their mind. For this task, they will be given a golf tally counter. At the end of each day, they will make a note of the tally counter score in a diary. Half of the cohort will be instructed to suppress their chosen worry, and the other half will be told to think about anything, including their worry. At the end of the week, participants will return for the second session at which they will again rate their worry. It is highlighted that a similar approach has been previously employed in published peer-reviewed research examining thought suppression (Trinder & Salkovskis, 1994). By using this methodology, the study will provide a more ecologically valid assessment of the effects of thought suppression within the context of worry.

It is acknowledged that the new procedure will be more demanding of participants' time. Other than that, the ethical considerations are unchanged.

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Chapter 4

Major Research Project

**How do thought suppression attempts impact upon beliefs
about uncontrollability of worry?**

Abstract

According to Wells' metacognitive model of Generalised Anxiety Disorder (GAD; Wells, 1995, *Behavioural and Cognitive Psychotherapy*, 23, 301-320), GAD patients attempt to suppress intrusions that trigger worry. Wells postulates that these attempts are rarely effective and may, in fact, increase the frequency of worry triggers. These apparent failures are interpreted as evidence for loss of mental control, thereby exacerbating beliefs about the uncontrollability of worry. The current study tested these predictions. Sixty-two high worriers completed a naturalistic experiment comprising two sessions separated by an experimental week. In Session 1, participants recorded their beliefs about worry in general, including its uncontrollability. They then selected a current worry and recorded how often it came to mind over the following week. The Suppression group (N=32) suppressed their chosen worry during the week. The Mention group (N=30) simply monitored its occurrence. In Session 2, measures completed at Session 1 were repeated. Contrary to prediction, the Suppression group reported a significant improvement in the controllability of their worrying in general. No shift was demonstrated by the Mention group. In addition, relative to the Mention group, the Suppression group reported more success at suppressing their chosen worries, spent less time thinking about them, and found them to be more controllable and less distressing. Findings are discussed within the context of Wells' model.

Keywords: thought suppression, metacognition, worry, generalised anxiety disorder.

1. Introduction

1.1. Thought suppression

An investigation by Wegner and colleagues (Wegner et al., 1987) has had a remarkable impact upon subsequent conceptualisations of psychological disorders. The study comprised two 5-minute experimental periods during which participants were required to vocalise their stream of consciousness into a tape recorder. For the first period, participants were randomly assigned to one of two conditions, *suppression* and *expression*. In the suppression condition, participants verbalised their thoughts whilst trying not to think about a white bear. In the expression condition, participants were told to try to think of a white bear. In the second experimental period, instructions were swapped between groups. During both experimental periods, participants rang a bell whenever thoughts about a white bear came to mind.

Two important findings emerged from this work. First, participants were not able to suppress completely thoughts about white bears. Second, comparison of performance under *expression* instructions revealed that participants who had already suppressed in the first period recorded significantly more thoughts about a white bear relative to those who expressed in the first period. This phenomenon was termed a ‘rebound effect’ since suppression led to a subsequent surge in thoughts. These observations suggested that attempted thought suppression can have paradoxical effects as a self-control strategy (Wegner et al., 1987). Wegner et al. also postulated that this form of mental control could play a role in generating and maintaining obsessions and preoccupations.

The difficulties in interpreting the Wegner et al. (1987) findings are well documented. In particular, employment of a crossover design and the use of an expression, rather than a mention, control condition have been questioned (Lavy & van den Hout, 1990; Clark et al., 1991; Purdon & Clark, 2000). Nevertheless, this seminal

work provided the impetus for a number of experimental studies of thought suppression. These have been reviewed elsewhere (Purdon, 1999, 2004; Purdon & Clark, 2000; Rassin et al., 2000; Abramowitz et al., 2001; Smári, 2001). Overall, findings have proved inconsistent (Smári, 2001; Purdon, 2004). In studies examining neutral thoughts, some researchers have reported rebound effects (e.g. Clark et al., 1991; Clark et al., 1993), whereas others have not (e.g. Merckelbach et al., 1991; Muris et al., 1993). In addition, some investigators have observed an ‘immediate enhancement effect’ whereby, *whilst* suppressing, individuals experience target thoughts at a higher rate than participants in control conditions (e.g. Lavy & van den Hout, 1990). Other studies have not demonstrated this effect (e.g. Clark et al., 1991).

Immediate enhancement and rebound effects have clear relevance for understanding psychological disorders characterised by the persistent recurrence of unwanted thoughts. Accordingly, several studies have examined the suppression of clinically relevant, as opposed to neutral (e.g. white bear), cognitions. For example, some investigators have explored suppression of worry-related thoughts (Mathews & Milroy, 1994; Becker et al., 1998), anxious thoughts (e.g. Roemer & Borkovec, 1994; Koster et al., 2003), trauma-related thoughts (e.g. Harvey & Bryant, 1998; Shepherd & Beck, 2005), and obsessional thoughts (e.g. McNally & Ricciardi, 1996; Purdon et al., 2005). Most of these studies have been conducted on non-clinical analogue populations, and have also revealed rather equivocal findings (for a review, see Purdon, 1999). Some authors have argued these inconsistencies may reflect methodological discrepancies between studies, or that effects are weak or transitory (e.g. Abramowitz et al., 2001). In a recent meta-analysis of studies examining neutral and clinically relevant thoughts (Abramowitz et al., 2001), a small-to-medium rebound effect of suppression was confirmed, although there was no evidence for an immediate enhancement effect.

In sum, following the work by Wegner et al. (1987), thought suppression effects have received considerable research attention. Overall, findings have proved somewhat inconsistent. Nevertheless, thought suppression is commonly cited as a factor in the development and/or maintenance of emotional disorders. For instance, it is incorporated in cognitive conceptualisations of obsessive-compulsive disorder (OCD; Salkovskis, 1989), posttraumatic stress disorder (PTSD; Ehlers & Clark, 2000), and generalised anxiety disorder (GAD; Wells, 1995).

1.2. Wells' metacognitive model of GAD

Metacognition refers to cognitive factors that appraise, control, and monitor thinking. Wells argues that styles of thinking and the real or experienced uncontrollability and intrusiveness of thoughts will only be understood by recourse to metacognitive levels of explanation (Wells, 2005). This view is embraced in his metacognitive model of GAD (Wells, 1995) which attempts to explain the difficult-to-control, excessive, distressing, and generalised nature of worry that is the central feature of this diagnosis.

Wells' model of GAD distinguishes between two types of worry, termed Type 1 and Type 2 worries. Type 1 worry focuses upon external daily events such as finances, and non-cognitive internal events such as bodily sensations. In contrast, Type 2 worry is concerned with the nature and occurrence of thoughts themselves; in essence, Type 2 worry is *worry about worry*. Wells' model places especial importance upon the role of Type 2 worry in the manifestation of GAD.

Upon encountering an intrusive thought, often in the form of a "What if...?" question, Wells argues that a person with GAD activates positive beliefs about the use of worry as a coping strategy (e.g. worrying helps me work things out). This instigates a Type 1 worry sequence in which various negative outcomes are contemplated and

possible ways of coping are conceived. It is during this sequence that negative beliefs about worry are then triggered. These beliefs fall into two broad domains concerning: (1) the uncontrollability of worry; and (2) the dangers of worry for mental, physical or social well-being. Once negative worry beliefs become activated during a Type 1 episode, the person negatively appraises the occurrence of worry. This is Type 2 worry or *worry about worry*. Wells' model further postulates that once *worry about worry* is established, additional factors escalate and maintain the problem. One particular factor is the employment of thought control attempts. It is the purported role of thought control attempts in GAD that provides the focus for the current study.

According to Wells, by having conflicting beliefs about worry, individuals with GAD are left in a state of cognitive dissonance. GAD patients attempt to overcome this conflict by trying not to think thoughts that might trigger worry. In other words, they try to suppress these thoughts. Pointing to findings from the experimental literature (Wegner et al., 1987; Clark et al., 1991), Wells argues that this is problematic because thought suppression attempts are rarely entirely effective and may, in fact, increase the frequency of worry triggers. This ineffectiveness, Wells argues, is then interpreted by GAD patients as evidence for loss of mental control, thereby strengthening their beliefs about the uncontrollability of worry. Accordingly, *worry about worry* is perpetuated.

1.3. Rationale for the current study

The present study therefore aimed to investigate the impact of thought suppression attempts upon beliefs about worry. Whilst a few studies have investigated how suppression of worries influences their frequency (e.g. Mathews & Milroy, 1994; Becker et al., 1998), no research has examined the effect of suppression on the appraisal of worry itself. Given Wells' prediction that thought suppression attempts strengthen

beliefs about the uncontrollability of worry, it is clear how the extant literature can be extended.

The current study is in keeping with a growing trend within the thought suppression literature. Whereas earlier studies predominantly measured thought frequencies, more recent work has examined the impact of suppression on more diverse phenomena such as emotional experience and cognitive appraisals (e.g. Purdon et al., 2005). Indeed, it has been suggested that the most important effects of suppression may not relate to thought frequency at all (Purdon, 1999).

We were also keen in the present work to maximise ecological validity. The vast majority of studies examining thought suppression have been conducted within a laboratory setting and over a matter of minutes. In contrast, the present study was conducted within the participants' natural environment and over the course of a week. It is argued that this approach is more relevant to clinical experience.

Finally, in piloting this study, we endeavoured to be consistent with Wells' model by asking participants to identify intrusions which triggered their Type 1 worry sequences. However, many found it extremely challenging to make the distinction between intrusive triggers and the worry sequence itself. Therefore, the protocol was amended so that participants were requested: (i) to select a current worry, and if assigned to the suppression group, (ii) to try to suppress it *as soon as* it came to mind.

Accordingly, in a more indirect way, participants still suppressed the initial thought relating to their chosen worry (i.e. the intrusion). Another benefit in adopting this approach was that it allowed greater consistency in the instructions given to participants.

The primary hypothesis for the present study was that suppression attempts would lead to a strengthening of beliefs about the uncontrollability of worry. In keeping with

Wells' model, the study also monitored for the impact of suppression on other metabeliefs cited as being important in GAD.

2. Method

2.1. Overview

Sixty-two high worriers completed the experiment which comprised two sessions separated by an experimental week. At Session 1, participants recorded their beliefs about worry in general, including level of uncontrollability. They then selected a current worry, and rated it along a number of dimensions, including uncontrollability. Next, they were given a tally counter to record how often the chosen worry came to mind over the experimental week. Half of the cohort was told to suppress their chosen worry for the experimental week. The other half was instructed simply to monitor its occurrence. At the end of each day, participants noted their tally counter scores in a diary. At Session 2, measures completed at Session 1 were repeated.

2.2. Power calculation

Prior to recruitment, power calculations were conducted to examine how the power of the study would fluctuate as a function of number of participants and effect size. Computations were carried out using the computer software, G-POWER (Erdfelder et al., 1996). The calculations focused on the hypothesis that data analysis using repeated measures analysis of variance (ANOVA) would reveal a significant interaction effect between group (Suppression, Mention) and session (Session 1, Session 2) for ratings of uncontrollability of worry. Assumptions were made in calculating power. First, since no published studies have examined this area of interest, it was not possible to estimate the effect size by referring to previous findings. Accordingly, Cohen's effect size (f)

conventions for ANOVA were employed (Cohen, 1977, 1988). Second, rho, the population correlation between the individual levels of the within-subjects factor (session), was conservatively predicted to be 0.3. Third, the significance level (α) was taken to be 0.05. Calculations revealed that, for a medium effect size and with a sample size of 60, the study would have adequate power (i.e. more than the standard threshold of 0.80).

2.3. Recruitment of a cohort of high worriers

The Local Research Ethics Committee approved the study (see Appendix 3.2) and all participants gave written informed consent. Undergraduate and postgraduate students at the University of Glasgow were approached via an introductory e-mail forwarded by the University Computing Services. The researcher (AM) did not therefore have direct access to student e-mail addresses. The e-mail asked whether the recipients considered themselves to be “worriers” and whether they would be interested in participating in a study investigating the ways in which people worry. Attached to the e-mail were an information sheet (see Appendix 3.3) and a document for basic personal details (name, date of birth, gender, contact telephone number, address and e-mail address). Those interested in participating were asked to complete the personal details sheet and return it to the researcher by e-mail. Upon receipt, the researcher posted to the potential participant a pack containing a stamped addressed envelope, an information sheet, a consent form, and a copy of the Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990). The latter is a 16-item self-report measure which assesses trait worry. Items are rated on a 5-point Likert scale and summed to form a total score ranging from 16 to 80. The PSWQ has excellent psychometric properties in student, community and clinical samples (Ruscio & Borkovec, 2004). If, after rereading the information sheet, the

students were still interested in participating, they completed the consent form and PSWQ, and returned them to the researcher.

In total, 289 students responded to the e-mail, and all received a pack. Of these, 128 returned the completed forms. The decision regarding which participants were then contacted was made based upon PSWQ scores. Prior research with college samples (Molina & Borkovec, 1994) has shown that a PSWQ total score of 56 falls 1 standard deviation below the mean of individuals diagnosed with GAD by the Anxiety Disorders Interview Schedule-Revised (ADIS-R; DiNardo & Barlow, 1988). Accordingly, for the present study, participants were defined as high worriers if their PSWQ total score was greater than or equal to 56. This cut-off point has been used in previous research examining the characteristics of high worriers (Ruscio, 2002). Employing this cut-off, 95 high worriers were identified. The 33 participants who scored below the cut-off were contacted by e-mail, told that they would not be participating, and thanked.

Of the 95 high worriers, 85 were contacted by telephone to explain further the nature of the study and give the participants the opportunity to ask questions. It was not possible to get in touch with the other 10 individuals. Those receiving any form of psychological/psychiatric treatment were excluded at this stage (n=4). Nine decided they no longer wished to take part in the study. The remaining 72 high worriers agreed to participate in the experiment.

2.4. Procedure

The basic procedure is depicted in Figure 1. The current study was conducted over the period of one week. At the beginning and end of this week, participants met with the researcher on a one-to-one basis. Each session (Sessions 1 and 2) lasted approximately 30 minutes and both took place in the same room.

[Figure 1 about here]

2.4.1. Session 1

2.4.1.1. Questionnaires

At the start of the session, participants completed the Generalised Anxiety Disorder Questionnaire (GAD-Q-IV; Newman et al., 2002) and the Beck Depression Inventory - Second Edition (BDI-II; Beck et al., 1996). The GAD-Q-IV is a self-report diagnostic measure of GAD with good reliability and validity (e.g. Newman et al., 2002). Using the recommended cut-off score of 5.7 (Newman et al., 2002), diagnostic agreement ($\kappa = 0.67$) with the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV; Brown et al., 1994) is as high as that between two independent ADIS-IV GAD module administrations ($\kappa = 0.65$; Brown et al., 2001). The BDI-II is a 21-item self-report inventory with well-established psychometric properties (Beck et al., 1996; Whisman et al., 2000). Given the frequent co-occurrence of anxiety and depression in emotional disorders, it was necessary to characterise the degree of depressive symptomatology in the cohort.

2.4.1.2. Introducing Visual Analogue Scales

After questionnaire completion, participants were given a practice Visual Analogue Scale (VAS) for 'how cloudy it is right now' (0mm=not at all, 100mm=extremely). Each VAS during the experiment similarly comprised a horizontal line, 100mm in length, anchored by descriptors at each end. For each one, participants marked the line to reflect their current view. VAS scores were determined by measuring the distance between the left hand end of the line and the participant's mark.

2.4.1.3. Anxiety levels at the start of the session

Participants were then presented with a VAS which assessed the following: How anxious are you feeling right now? (0mm=not at all, 100mm=extremely).

2.4.1.4. Overall worrying VASs

The participants were then given 6 VASs, each presented on a separate page. These assessed the following (descriptors for the 0mm and 100mm anchor points, respectively, are given in parentheses): (a) Reflect upon your overall worries. How much distress do your worries cause you? (none at all, a great deal); (b) Reflect upon the act of worrying. How uncontrollable is your worrying? (not at all, extremely); (c) Reflect upon the act of worrying. How bad is your worrying for your health and well-being? (not at all, extremely); (d) Reflect upon the act of worrying. How much does your worrying help you to deal with problems? (not at all, a great deal); (e) Reflect upon the act of worrying. How much does your worrying help you to solve problems? (not at all, a great deal); and (f) Reflect upon the act of worrying. How much does your worrying help you to prepare for potential difficulties? (not at all, a great deal)

2.4.1.5. Selection and rating of a specific worry

Participants were next asked to reflect upon their current worries. They were told to select a specific worry that had been particularly troubling them in the last week and which would likely to be still bothering them in a week's time. It was stressed that they should give this choice careful thought. In order to encourage compliance and minimise potential embarrassment, participants were not required to give details of their worry to the researcher. Once identified, participants spent 30 seconds thinking over the worry in their mind (worry priming period). After this, participants identified a category within which their worry fell. Categories were based upon those elucidated by Roemer et al (1997). Two VAS manipulation checks were then completed: "How easy was it for you to bring your chosen worry to mind and keep it there?" (0mm=not at all, 100mm=extremely) and, "How anxious are you feeling right now? (0mm=not at all, 100mm=extremely).

Next, participants completed 5 further VASs, each on a separate page: (a) In the last week, how much have you tried to suppress thinking about your chosen worry? (not at all, a great deal); (b) In the last week, how successful have you been at suppressing your chosen worry? (not at all, extremely); (c) In the last week, how much time have you spent thinking about your chosen worry? (none at all, all the time); (d) In the last week, how much distress has your chosen worry caused you? (none at all, a great deal); and (e) In the last week, how uncontrollable has your chosen worry been? (not at all, extremely)

2.4.1.6. Tally counter and worry monitoring

Participants were then given a golf tally counter and instructed to keep this with them at all times for the next week. It was suggested that, during the day, they could keep the tally counter in their pocket or in their bag and at night, they should leave it next to

their bed. To help them remember their counters, a yellow spot, 5mm in diameter, was placed on their watch, keys, or mobile phone.

All participants were then instructed in using the tally counter to register chosen worry occurrences (see Appendix 3.4). In brief, they were told to click once for each time that their thoughts turned to their chosen worry. It was stressed that they should only click once whether the worry entered the mind fleetingly or stayed for a longer period. They were also assured that it did not matter what made their worry come to mind.

2.4.1.7. *Suppression and Mention groups*

The high worriers were then randomly assigned to one of two groups, Suppression and Mention. Seventy-two envelopes were prepared, half of which had a slip of paper with “S” on it, and the other half of which had a piece of paper marked “M”. Participants selected an envelope and according to their selection, were given one of two possible instructions:

“S” (Suppression group) – *“For the whole of the next week, I want you to try as hard as you can to suppress your chosen worry; that is, try not to allow your worry to enter your head. If and when your worry does come to mind, try to push it away immediately. However, still be sure to click for the times when your chosen worry does enter your head”.*

“M” (Mention group) – *“For the whole of the next week, it does not matter whether your chosen worry comes to mind often or not. It might or it might not, it can do either. However, be sure to click for the times when your chosen worry does enter your head”.*

2.4.1.8. *Diary*

Participants were then handed a diary for the coming week comprising 8 sheets, one for each day of the study. At the end of each day, the tally counter score was recorded, and five VASs were completed: (a) How much did you try to suppress your chosen worry during the day? (did not try at all, tried my hardest); (b) How successful were you at suppressing your chosen worry during the day? (not at all, extremely); (c) How much time did you spend thinking about your chosen worry during the day? (no time at all, all the time); (d) How much distress did your chosen worry cause you during the day? (none at all, a great deal); and (e) How uncontrollable was your chosen worry during the day? (not at all, extremely).

Attached to the front of the diary was a *Key Points To Remember* sheet which summarised the main instructions for the week. Before ending the session, participants read this sheet to confirm that it corresponded with their understanding of the procedure for the week.

2.4.2. *Experimental week*

At the end of each day, participants filled in the relevant sheet from their diary and reset their tally counter to zero.

2.4.3. *Session 2*

The diary and tally counter were collected from participants. They then completed the same VASs introduced in sections 2.4.1.3. and 2.4.1.4. Next, they were asked to think about their chosen worry for 30 seconds. At the end of this period, they were administered the VASs described in section 2.4.1.5.

The researcher then asked a series of open-ended questions regarding the experimental week. It was checked that the chosen worry continued to be an active concern. Participants also estimated the accuracy with which the tally counter scores reflected the number of times that their worry had come to mind during the week: 0%=completely inaccurate; 100%=perfect.

At the end of the session, the study rationale was explained.

2.5. Data Analysis

All exploratory data analyses and statistical procedures were conducted using the Statistical Package for the Social Sciences (SPSS; Nie et al., 1970). Howell (1997) was employed as the main statistics resource text. All significance tests were two-tailed and a significance threshold of $p=0.05$ was implemented throughout. Raw data were examined to determine whether the assumptions of parametric analysis were satisfied. As endorsed by Howell (1997), in those cases where either or both of the assumptions of homogeneity of variance and normality were not fulfilled, transformations were performed if possible.

Data meeting assumptions for parametric analysis were analysed using t-tests, or repeated measures analysis of variance (ANOVA). Where both groups were compared on a single measure, unpaired t-tests were conducted. For these calculations, the pooled variance estimate was employed (cf. Howell, 1997). When participants were measured for the same variable on more than one occasion (e.g. worry uncontrollability ratings), data were analysed using repeated measures ANOVA, a procedure which is sensitive to violations of the assumption of compound symmetry of the covariance matrix. In cases where there was a departure from this assumption, Greenhouse-Geisser (1959) or Huynh-Feldt (1976) correction procedures were employed.

Simple effects analyses were used to investigate significant interactions between group and a within-subjects factor. Within-subjects simple effects were evaluated by conducting separate repeated measures ANOVA for each group. Between-subjects simple effects were examined by running discrete one-way ANOVAs at each level of the within-subjects factor, using the pooled error term from the original analysis that yielded the interaction. Further, for these between-subjects analyses, the degrees of freedom were adjusted (cf. Howell, 1997).

Where data were unsuitable for parametric analysis, Mann-Whitney U tests were employed to compare two groups on a single measure. Categorical data were analysed using Pearson's Chi-square (χ^2) test.

Demographic and clinical data (e.g. age and BDI-II scores) are described using the mean with the standard deviation (SD) of the mean as the index of variability. Experimental data are presented using the mean with the standard error of the mean (SEM).

3. Results

3.1. Overview

Results are divided into five main sections. The first (3.2) covers the basic demographic and clinical data gathered from participants. The second (3.3) reports the data obtained in Sessions 1 and 2 relating to participants' views regarding worry in general. The third (3.4) presents the findings collected in Sessions 1 and 2 which were specific to the chosen worries. The fourth (3.5) documents the analyses of the data from participants' diaries. The last section (3.6) offers a summary of the main findings.

3.2. Participant characteristics

From the original cohort of 72 high worriers, 62 participants successfully completed the study. Six failed to attend for the first session and 4 withdrew from the study between Sessions 1 and 2 (3 from the Mention group, 1 from the Suppression group).

The characteristics of the 62 high worriers who completed the study are presented in Table 1. The two groups did not differ significantly on age [$z=-0.09$, $p>0.9$], gender ratio [$\chi^2(1)=0.15$, $p>0.6$], PSWQ [$z=-0.35$, $p>0.7$], GAD-Q-IV [$z=-0.64$, $p>0.5$], or BDI-II [$z=-0.37$, $p>0.7$]. Analysis did not reveal a significant association between group and GAD diagnosis, as determined using the GAD-Q-IV [$\chi^2(1)=1.35$, $p>0.2$].

[Table 1 about here]

3.3. Appraisals of overall worrying

VAS data and repeated measures ANOVA results are presented in Table 2.

[Table 2 about here]

Given the main hypothesis of the study, the key analysis concerned beliefs about the uncontrollability of worry in general. A significant interaction effect between group and session was found [$F(1,60)=5.9$, $p<0.05$]. This is depicted in Figure 2. Investigation of simple effects established that in contrast to the Mention group [$F<1$], the Suppression group rated their worry as significantly more controllable in Session 2 compared with Session 1 [$F(1,31)=6.0$, $p<0.05$]. At both Sessions 1 and 2, ratings of uncontrollability did

not differentiate the two groups [Session 1: $F < 1$; Session 2: $F(1,90) = 3.6$, non-significant; $F_{0.05}(1,90) \approx 4.0$].

Table 2 confirms that no other analyses revealed significant effects.

[Figure 2 about here]

3.4. Chosen worries

3.4.1. Manipulation checks

3.4.1.1. Ease with which chosen worry was brought to mind and kept there

For all participants across both sessions, the mean (SEM) rating was 79.0 (1.9) where 0mm=not at all and 100mm=extremely. Therefore, the cohort was able to hold their chosen worry in mind during the 30-second priming period. Repeated measures ANOVA revealed no significant effects [all $F_s < 1.9$].

3.4.1.2. Anxiety levels after priming chosen worry

VAS anxiety scores after arrival and the worry priming period were examined using a three-way repeated measure ANOVA with one between-subjects factor (group) and two within-subjects factors (session, time-point (after arrival, after worry priming period)). As expected, a significant main effect of time-point was revealed [$F(1,60) = 80.1$, $p < 0.001$]. All participants were significantly more anxious after worry priming [mean(SEM) = 52.5 (2.3)] compared with shortly after arrival [mean(SEM) = 33.6 (2.1)]. The main effects of session [$F(1,60) = 2.7$, $p > 0.1$] and group [$F(1,60) = 2.5$, $p > 0.1$] did not approach significance, nor were there any significant higher order interactions [all $F_s < 1.6$].

3.4.2. *Categories for chosen worry*

Table 3 shows the frequencies at which particular worry categories were selected. Twenty-four participants chose two or more categories to describe their chosen worry. Accordingly, the total frequency is greater than 62.

[Table 3 about here]

3.4.3. *Suppression effort manipulation check*

These data are presented in Table 4 and depicted in Figure 3. Analysis revealed significant main effects of group [$F(1,60)=38.9, p<0.001$] and session [$F(1,60)=7.4, p<0.01$], and importantly, a significant group by session interaction [$F(1,60)=31.8, p<0.001$]. Simple effects calculations found that the Mention group made significantly less effort to suppress their chosen worry in the experimental week compared with the week leading up to Session 1 [$F(1,29)=33.8, p<0.001$]. In contrast, the Suppression group made significantly more effort to suppress in the experimental week compared with the week before Session 1 [$F(1,31)=4.4, p<0.05$]. Furthermore, in line with expectation, suppression effort ratings differentiated the two groups at Session 2 [$F(1,119)=70$, significant; $F_{0.05}(1,119) \approx 4.0$], but not at Session 1 [$F<1$].

[Table 4 about here]

[Figure 3 about here]

3.4.4. *Subjective success in suppressing the chosen worry*

The results for this measure are shown in Table 4 and Figure 4. Two-way repeated measures ANOVA demonstrated significant main effects for both group [$F(1,59)=6.8$,

$p < 0.05$] and session [$F(1,59)=8.7, p < 0.01$]. There was also a significant interaction between group and session [$F(1,59)=23.1, p < 0.001$]. Simple effects analyses revealed that the Suppression group rated their suppression success as significantly higher in the experimental week compared with the week leading up to Session 1 [$F(1,31)=35.2, p < 0.001$]. There was no such effect for the Mention group [$F(1,28)=1.5, p > 0.2$]. Furthermore, relative to the Mention group, the Suppression group had significantly more suppression success in the experimental week [$F(1,112)=25$, significant; $F_{0.05}(1,112) \approx 4.0$], but not in the week before Session 1 [$F < 1$].

[Figure 4 about here]

3.4.5. Remaining VASs

These data are provided in Table 4 along with the corresponding analyses. In brief, for the experimental week compared with the week before Session 1, all participants thought significantly less about their chosen worry [$F(1,60)=47.4, p < 0.001$], were caused significantly less distress by their chosen worry [$F(1,60)=24.0, p < 0.001$], and reported that it seemed significantly more controllable [$F(1,60)=15.4, p < 0.001$].

No other significant effects were revealed.

3.5. Diary data

Sessions 1 and 2 fell on days 1 and 8, respectively. Given that the data gathered on these days did not cover full 24-hour periods, they are omitted from the analyses.

3.5.1. Tally counter scores

The mean (SEM) estimated accuracy of the tally counter scores was 79.8% (1.5%), where 0%=completely inaccurate and 100%=perfect. Accuracy estimates did not differentiate the two groups [$U=454$, $z=-0.38$, $p>0.7$; Mention group mean (SEM)=80.4% (2.1%); Suppression group mean=79.3% (2.1%)].

[Figure 5 about here]

[Table 5 about here]

Tally counter score data are presented in Table 5 and Figure 5. Analysis using repeated measures ANOVA with group and day as factors found a significant main effect of day [$F(5,300)=4.4$, $p<0.01$]. A paired t-test demonstrated tally counter scores were significantly higher on Day 2 compared with Day 7 [$t(61)=2.1$, $p<0.05$; Day 2 mean (SEM)=15.3 (1.7); Day 7 mean (SEM)=12.5 (1.2)]. From the omnibus ANOVA, the main effect of group was non-significant [$F(1,60)=1.6$, $p>0.2$], but the group by day interaction approached significance [$F(5,300)=2.2$, $p=0.057$]. Given the potential importance of this finding, simple effects analyses were conducted. This revealed that, whilst tally counter scores for the Mention group remained stable during the week [$F<1$], those for the Suppression group significantly changed [$F(5,155)=4.6$, $p<0.01$]. Inspection of Figure 5 indicates that scores for the Suppression group decreased over the course of the week. In fact, scores for this group were significantly higher on Day 2 compared with Day 7 [$t(31)=2.8$, $p<0.01$]. Yet, on both Days 2 and 7, tally counter scores did not differentiate the groups [Day 2: $F<1$; Day 7: $F(1,99)=3.4$, non-significant; $F_{0.05}(1,99) \approx 4.0$].

3.5.2. VAS ratings

Analyses for all five of the VASs used in the diary revealed no significant main effects of day, nor any significant interaction effects between group and day. The ratings on these measures were therefore collapsed across the day factor and are presented in Table 6, along with the results from the original two-way repeated measures ANOVA. Inspection of this table shows a significant main effect of group for all five VASs employed. As a manipulation check, analysis confirmed that the Suppression group tried to suppress their chosen worry significantly more than the Mention group throughout the week [$F(1,59)=49.0, <0.001$]. Moreover, relative to the Mention group, the Suppression group recorded more success at suppressing their chosen worry [$F(1,57)=43.8, p<0.001$], spent less time thinking about it [$F(1,60)=6.0, <0.05$], experienced less distress on account of it [$F(1,60)=5.1, <0.05$], and found it to be more controllable [$F(1,60)=4.2, p<0.05$].

[Table 6 about here]

3.6. Summary of main findings

- This study recruited two groups of high worriers matched for age, gender ratio, and symptomatology.
- In session 1, both groups selected personal worries which stimulated comparable levels of anxiety, and which, in the previous week, had caused them equivalent levels of distress, had occupied their thinking to the same extent, and had been similarly uncontrollable.

- Manipulation checks confirmed that, relative to the Mention group, the Suppression group tried significantly harder to suppress their chosen worries during the experimental week.
- For the Suppression group, there was a significant decline in the number of times the chosen worries came to mind as the week progressed. In contrast, worry occurrences remained stable in the Mention group.
- The Suppression group reported significantly more success at suppressing their chosen worries, spent relatively less time thinking about their chosen worries, experienced less distress on account of them, and found them to be more controllable. Compared with the week before the study, both groups spent less time thinking about their chosen worries, experienced less distress on account of them, and found them to be more controllable.
- After the experimental week, the Suppression group reported a significant improvement in the controllability of their overall worrying. No such effect was found for the Mention group. There were no significant shifts in the other positive and negative beliefs measured.

4. Discussion

The primary aim of this study was to test experimentally a prediction from Wells' (1995) metacognitive model of GAD. Working on the basis that individuals with GAD try not to think thoughts that trigger worry, Wells argues that such suppression attempts are rarely entirely effective and may, in fact, increase the frequency of worry triggers (cf. Wegner et al, 1987). This ineffectiveness is, in turn, interpreted as evidence for loss of mental control and consequently, beliefs about the uncontrollability of worry are strengthened (Wells, 1995, 2005).

The results from the study are quite striking. Contrary to prediction, high worriers, instructed to suppress a specific worry for a week, recorded a subsequent improvement in the controllability of their worrying in general. No such shift was demonstrated by high worriers in a control (mention) condition. These effects did not emerge in isolation. On two different measures of subjective suppression success, the Suppression group was significantly more successful at suppressing chosen worries relative to controls. Moreover, during the week (diary data), the Suppression group spent significantly less time thinking about their chosen worries, found them to be more controllable, and experienced less distress on account of them. Finally, whilst worry occurrences remained stable in the Mention group, the Suppression group experienced a significant decline in worry frequency as the week progressed. It should be noted that the last two effects emerged after further analysis of an interaction effect which only approached significance ($p=0.057$).

The cohesion in these findings lends support to the view that genuine effects have been uncovered. In turn, this raises the obvious question of how they can be reconciled with Wells' model of GAD. In fact, in some respects, the findings are supportive of the model and its implications for treatment. In the present study, attempts to suppress amongst high worriers proved relatively successful, in turn promoting a beneficial adjustment in beliefs about uncontrollability of worry. The latter effect (resultant belief change) is entirely in keeping with the Wells model. When working with GAD patients, Wells advocates employment of verbal reattribution techniques and behavioural experiments to achieve metacognitive change (Wells, 1997, 2005). These procedures are geared towards enabling the patient to experience, and/or become aware of, some control over worry. Through these means, changes in uncontrollability metabeliefs are realised. The present study has confirmed that: 1) experience of some control at one level (chosen

worry) leads to a significant and advantageous shift at the metacognitive level; and 2) a simple week-long manipulation, akin to a behavioural experiment, effects metacognitive change. Indeed, perhaps the most important finding in the current study is the demonstration that a simple procedure is safe and beneficial to individuals suffering with levels of worry equivalent to those seen in GAD patients.

Where Wells' model has difficulty relates to what actually happens when worriers try to suppress intrusions that trigger worry. The model asserts that suppression attempts are rarely *entirely effective*. In other words, a person may even experience some relative success at suppressing, but the thoughts will inevitably recur to some extent. This is then taken as evidence for loss of mental control, thereby maintaining beliefs about worry uncontrollability. In the present study, the Suppression group was, indeed, not completely efficient in suppressing their chosen worries. Nevertheless, relative to the Mention group, the Suppression group appraised their suppression efforts in a positive light. Perhaps then, there is a more delicate balance than Wells implies, in how a worrier interprets the outcome of suppression attempts.

There are many factors which could play a role in the appraisal of thought recurrences during suppression. For example, as discussed by other authors (e.g. Purdon, 1999), some individuals may invest highly in being able to control thoughts. Accordingly, even if they achieve some suppression success, thought recurrences will still be experienced as aversive. Similarly, participants low in mood may be particularly sensitive to failures in thought control. Conversely, on account of holding tacit positive beliefs about worry (e.g. worrying helps me cope; Borkovec & Roemer, 1995; Davey et al., 1996; Cartwright-Hatton & Wells, 1997), individuals may, from time to time, be quite receptive of recurrent worry triggers. In turn, suppression success may be viewed more positively. All told, interpretation of suppression success, and its consequences for beliefs

about worry uncontrollability, are likely to be dynamic processes, influenced by many factors. Accordingly, based on the present data, the position held within the Wells model may require some reworking. Future research could examine further how worriers appraise suppression attempts. In particular, one could explore the intermediary roles of beliefs about importance of thought control and meanings attached to thought recurrences.

Given the inconsistencies in the thought suppression literature (Purdon, 1999; Abramowitz et al., 2001), it is perhaps not surprising that the current investigation did not observe equivalent phenomena to the immediate enhancement and rebound effects seen in laboratory-based studies (e.g. Wegner et al., 1987; Lavy & van den Hout, 1990; Clark et al., 1991, 1993). In fact, a review of thought suppression in psychopathology (Purdon, 1999) found that, of the few studies that have investigated the suppression of worry-related thoughts, none demonstrated paradoxical effects on thought occurrence. More recent experimental work supports this view (Behar et al., 2005). Still, the question remains regarding the apparent ability of high worriers here, to suppress to some degree. In fact, it is not unprecedented for an experimental study to find suppression to be relatively effective. For instance, two studies examining suppression of OCD-type intrusions (Rassin, 2001; Purdon et al., 2005) generated evidence that suppression offers some control. Looking beyond thought suppression research, Borkovec and colleagues (1983) found that individuals instructed to postpone their worries until a specified worry period experienced fewer worrisome thoughts than participants in a control condition.

Wells (1997, 2005) also advocates employment of worry periods, although with a different rationale. In essence, the aim of the exercise is to disconfirm beliefs about worry uncontrollability. Upon noticing a worry trigger, GAD patients are asked to postpone/suspend the worry process until a specified period. Later, this period should

only be used if necessary. Wells (2005) emphasises a distinction between suppression and postponement/suspension. So, the GAD patient should not suppress worry-related thoughts, but simply decide not to engage a worry sequence in response to them. Thus, the initial thought may remain in consciousness, but the patient does not engage with it. Wells (1997) has documented that when this procedure is applied, patients typically report success in worry postponement, and often do not use the worry period. This should lead to a corresponding shift in beliefs about worry uncontrollability.

Wells' account introduces the possibility that the high worriers in the present study were not suppressing, but were instead postponing their worries in some way. However, given the explicit nature of the suppression instructions and the results from the manipulation checks, this seems a little implausible. Alternatively, it might be argued that suppression and postponement interventions are both effective strategies in dealing with worry triggers. A number of questions are now raised in relation to the suppression vs. postponement distinction. One, in clinical reality, even if clinicians understand this distinction, what do patients make of it? Two, assuming patients do grasp the distinction, how well do they implement it? Three, is it possible that patients fluctuate between using both strategies? These questions could be the focus of interesting future research. Moreover, it would be most informative to carry out a study in which both suppression and postponement conditions are employed.

At debriefing, many participants in the Suppression group (19/32) spontaneously mentioned that they tried to distract themselves (with different thoughts or activities) when they noticed a worry-related thought come to mind. In light of the overall findings, this raises the possibility that this strategy led to some suppression success. In fact, in a recent study of thought control strategies in GAD (Coles & Heimberg, 2005), it was argued that there is growing evidence that distraction may be an adaptive method of

thought control. A clear limitation of the present study is that no rigorous attempt was made to assess the psychological mechanisms by which thought suppression was attempted. This is a common drawback in the thought suppression literature. The instruction to suppress a thought is likely to trigger a range of different processes in different circumstances and people (Smári, 2001). The Thought Control Questionnaire (TCQ, Wells & Davies, 1994) cites five main strategies used to control unpleasant and unwanted thoughts: distraction, social control, worry (about something else), punishment, and reappraisal. Future research should examine whether particular control strategies are associated with greater suppression success of worry triggers and improvements in beliefs about worry uncontrollability.

Three additional findings of note were observed. The first relates to participants' ratings of their chosen worries in Sessions 1 and 2. For these ratings, participants based their answers on the previous week. For the experiment week (Session 2 ratings) compared with the pre-experiment week (Session 1 ratings), all participants, *irrespective of condition*, spent less time thinking about their chosen worries, experienced less distress on account of them, and found them to be more controllable (see Table 4). One interpretation of these findings is that the self-monitoring process common to both groups was beneficial in some way. Indeed, a number of participants commented that the study had made them aware that they did not worry as much as they had thought. This may have important therapeutic implications and should be investigated further. An alternative explanation is that during the week, habituation of the chosen worry occurred. However, this is less likely given that priming of the chosen worry aroused equivalent levels of anxiety in both sessions.

It is highlighted that there are discrepancies between findings described immediately above, and those revealed by diary data. As already discussed, analyses of

diary data *did* reveal significant effects of suppression for time spent, distress, and controllability scores in relation to chosen worries. One plausible explanation for these discrepancies is that, relative to retrospective ratings, an in vivo diary is a more sensitive measure. Alternatively, the marked changes in retrospective scores between Sessions 1 and 2, irrespective of experimental condition, may have obscured effects of suppression.

A second interesting finding was that the Mention group tried significantly less to suppress their chosen worries in the experimental week compared with the pre-experimental week (see Figure 3). Again, this may reflect the influence of self-monitoring during the experiment. Thus, at Session 1, perhaps both groups gave inflated ratings of effort to suppress chosen worries in the previous week. By Session 2, following a week of paying close attention to worrying style, the Mention group may have gained a better appreciation of how much they normally suppress. Values for suppression effort in the Mention group are interesting in themselves. Both diary (mean=26.3) and Session 2 (mean=25.3) scores (0mm=not at all, 100mm=a great deal) indicate that suppression effort was not especially high. This suggests that thought suppression is not commonly attempted by high worriers, and may limit the significance of its role in the maintenance of worry about worry. Indeed, other researchers have concluded that GAD patients may not try to suppress or control worry more than non-anxious controls (Purdon, 1999, Craske & Hazlett-Stevens, 2002).

The final results of interest relate to other beliefs about worry. In keeping with Wells' model, we looked at participants' beliefs about the detrimental impact of worry on health and well-being. For all participants, ratings for this belief stayed constant during the study. Viewed as a behavioural experiment, the study was not geared towards generating experiential evidence that worrying is not dangerous. Moreover, for the Suppression group at least, one of the potential drawbacks of suppression success is that

it precludes disconfirmation of beliefs about the danger of worry. Accordingly, it is perhaps not surprising that this belief did not shift. It was also shown that there were no significant changes in positive beliefs about worry. Again, given the focus of the experimental intervention, this was perhaps to be expected.

Whilst the external validity of the study was enhanced by its completion over a week, within the everyday environment of participants, there were methodological limitations. First, some participants commented that they found the tally counter and yellow sticker intrusive at times, especially in the early part of the week. These may therefore have acted as triggers for chosen worries and may have unduly disrupted the naturalistic nature of the study. Future studies might consider not collecting on-the-spot frequency data; e.g. at the end of each day, participants could estimate total number of target thoughts that day. Indeed, when, as here, research is more focused on the *appraisal* of thought control, immediate thought frequency data may be less critical.

A second limitation relates to the lack of a baseline period. As it stands, it is not guaranteed that the two groups were matched on pre-experimental chosen worry frequency. Accordingly, it is not possible to be certain about the impact of suppression on this measure. The experimental week could have been divided into two blocks, the first to collect baseline data, the second to conduct the suppression and mention manipulations. In fact, at the outset, this design was considered. However, it was decided that it would be impractical, both for researcher and participants.

Third, an analogue sample was recruited. Arguably, this creates some doubt about the external validity of the findings. However, mean score on the PSWQ [mean(SD) = 65.9(5.8)] was similar to that seen in individuals diagnosed with GAD using a structured clinical interview (Molina & Borkovec, 1994; mean(SD) = 67.7(8.9)) or the GAD-Q-IV (Ruscio, 2002; mean(SD) = 67.2(9.5)). Therefore, participants were experiencing worry

severity at a level typical of that seen in clinical samples. Furthermore, GAD-Q-IV data revealed that two-thirds of the sample satisfied DSM-IV criteria for GAD.

Finally, over half of the worries selected were related to work/studies (see Table 3). Again, this probably reflects the fact that a student sample was recruited.

Understandably, questions may arise regarding the extent to which the current findings apply to clinical samples, in which worries are likely to be more wide-ranging. In fact, in a recent meta-analysis (Abramowitz et al., 2001), most thought suppression studies, including those using disorder-relevant target thoughts, recruited healthy or unselected undergraduate volunteers. Even though the present study is an improvement upon the usual approach, it will be important to examine whether the present findings can be replicated with a cohort of GAD patients seeking treatment. This could have exciting implications for interventions with GAD, especially those focused at the metacognitive level.

In summary, contrary to expectation, high worriers, asked to suppress a chosen worry for a week, reported a significant increase in worry controllability. High worriers who only monitored a chosen worry did not show this change. These effects challenge the assumption within Wells' model of GAD that thought suppression leads to the exacerbation of beliefs about worry uncontrollability. Perhaps a key lesson from these data relates to the dangers of clinical dogma. Although the original empirical investigation of thought suppression was conducted only twenty years ago, it has already been incorporated as a maintaining/exacerbating factor in many recent conceptualisations of psychological problems. Yet, the current findings, along with those of other investigations (for a review, see Purdon, 1999), show that the effects of thought suppression are far from clear-cut. Thus, although further research is required, the present

findings indicate that due caution should be exercised when citing thought suppression in generic formulations of psychopathology, in particular GAD.

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Table 1. Characteristics of the Suppression and Mention groups. Data are means with SDs in parentheses.

	Mention	Suppression
N	30	32
Age (years)	21.7 (3.0)	22.9 (6.1)
Female:Male	28:2	29:3
PSWQ score	65.7 (5.6)	66.1 (6.0)
GAD-Q-IV score	8.1 (3.0)	7.5 (3.2)
GAD diagnosis	22	19
BDI-II score	14.3 (7.6)	16.1 (11.3)

ABBREVIATIONS: N = Number in group; PSWQ = Penn State Worry Questionnaire; GAD-Q-IV= Generalised Anxiety Disorder Questionnaire; GAD diagnosis = Number of participants who satisfied criteria for a diagnosis of Generalised Anxiety Disorder, as determined using the GAD-Q-IV; BDI-II = Beck Depression Inventory - Second Edition.

Table 2. Mean (SEM) Visual Analogue Scale ratings for those measures examining overall worry, as a function of group (Mention, Suppression) and session (Session 1, Session 2). The findings from analyses using two-way repeated measures ANOVA are also incorporated.

	Mention		Suppression		Group	Effects Session	Group x Session
	Session 1	Session 2	Session 1	Session 2			
	Visual Analogue Scale (0mm and 100mm descriptors)						
Reflect upon your overall worries. How much distress do your worries cause you? (none at all, a great deal)	69.3 (2.6)	63.8 (3.0)	67.9 (3.0)	65.9 (3.5)	F<1	F(1,60)=3.2, p=0.08	F<1
Reflect upon the act of worrying. How uncontrollable is your worrying? (not at all, extremely)	59.5 (3.5)	62.0 (3.3)	61.1 (3.4)	52.7 (3.6)	F<1	F(1,60)=1.7, p>0.15	F(1,60)=5.9, p<0.05
Reflect upon the act of worrying. How bad is your worrying for your health and well-being? (not at all, extremely)	56.0 (3.9)	58.1 (4.2)	59.9 (4.6)	57.2 (4.3)	F<1	F<1	F<1
Reflect upon the act of worrying. How much does your worrying help you to deal with problems? (not at all, a great deal)	38.9 (4.8)	39.0 (4.5)	30.3 (4.2)	31.3 (4.0)	F(1,60)=2.1, p>0.15	F<1	F<1
Reflect upon the act of worrying. How much does your worrying help you to solve problems? (not at all, a great deal)	33.5 (4.7)	31.5 (4.1)	26.1 (3.6)	33.9 (4.1)	F<1	F(1,60)=2.2, p>0.15	F(1,60)=3.2, p=0.08
Reflect upon the act of worrying. How much does your worrying help you to prepare for potential difficulties? (not at all, a great deal)	47.1 (4.5)	42.5 (4.6)	43.4 (3.9)	44.5 (4.2)	F<1	F<1	F(1,60)=1.1, p>0.25

Table 3. The frequencies at which participants chose particular worry categories to represent their chosen worry

Worry Category	Number of participants
Illness/Health/Injury	7
The future	22
Family/Home	7
Relationships/Friendships	7
Success/Failure	15
Finances	5
Work/Studies	36
Psychological/Emotional concerns	2
Minor/Routine concerns	0
Other	0

Table 4. Mean (SEM) Visual Analogue Scale ratings for the chosen worry, as a function of group (Mention, Suppression) and session (Session 1, Session 2). The findings from analyses using two-way repeated measures ANOVA are also presented.

Visual Analogue Scale (0mm and 100mm descriptors)	Mention		Suppression		Group	Effects Session	Group x Session
	Session 1	Session 2	Session 1	Session 2			
	In the last week, how much have you tried to suppress thinking about your chosen worry? (not at all, a great deal)	59.2 (4.8)	25.3 (3.8)	63.6 (5.1)	75.4 (2.8)	F(1,60)=38.9, p<0.001	F(1,60)=7.4, p<0.01
In the last week, how successful have you been at suppressing your chosen worry? (not at all, extremely) *	37.2 (4.9)	30.4 (4.6)	31.8 (3.2)	60.1 (4.1)	F(1,59)=6.8, p<0.05	F(1,59)=8.7, p<0.01	F(1,59)=23.1, p<0.001
In the last week, how much time have you spent thinking about your chosen worry? (none at all, all the time)	72.2 (3.4)	58.4 (2.8)	70.6 (3.4)	51.5 (3.1)	F(1,60)=1.2, p>0.25	F(1,60)=47.4, p<0.001	F(1,60)=1.2, p>0.25
In the last week, how much distress has your chosen worry caused you? (none at all, a great deal)	66.0 (4.1)	52.4 (3.8)	65.3 (4.2)	49.3 (3.4)	F<1	F(1,60)=24.0, p<0.001	F<1
In the last week, how uncontrollable has your chosen worry been? (not at all, extremely)	56.5 (4.3)	47.7 (4.0)	59.4 (3.7)	40.6 (4.4)	F<1	F(1,60)=15.4, p<0.001	F(1,60)=2.0, p>0.15

* One participant from the Mention group was removed from the analysis on account of an incomplete data set.

Table 5. Mean (SEM) tally counter scores, as a function of group and day.

Group	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Mention	13.8 (1.7)	14.3 (2.0)	13.3 (1.6)	14.0 (1.9)	12.9 (2.0)	14.3 (1.8)
Suppression	16.8 (2.9)	13.5 (2.5)	12.8 (2.9)	12.7 (2.5)	10.8 (2.4)	10.7 (1.6)

Table 6. Mean (SEM) Visual Analogue Scale ratings from the diary, as a function of group (Mention, Suppression). The findings from the original two-way repeated measures ANOVA, for which group and day were factors, are also presented.

Visual Analogue Scale (0mm and 100mm descriptors)	Mention	Suppression	Effects (F, p)		
			Group	Day	Group x Day
How much did you try to suppress your chosen worry during the day? (did not try at all, tried my hardest)*	26.3 (3.3)	61.3 (3.3)	49.0, <0.001	1.6, >0.15	F<1
How successful were you at suppressing your chosen worry during the day? (not at all, extremely)**	31.0 (3.4)	61.7 (2.8)	43.8, p<0.001	F<1	F<1
How much time did you spend thinking about your chosen worry during the day? (no time at all, all the time)	44.2 (2.5)	35.3 (3.1)	6.0, <0.05	F<1,	F<1
How much distress did your chosen worry cause you during the day? (none at all, a great deal)	43.3 (2.7)	35.2 (3.1)	5.1, <0.05	F<1	F<1
How uncontrollable was your chosen worry during the day? (not at all, extremely)	39.9 (2.2)	33.2 (2.9)	4.2, p<0.05	1.0, >0.35	1.1, >0.35

* One participant from the Suppression group was removed from the analysis on account of having an incomplete data set. ** 3 participants (2 from Mention, 1 from Suppression) were removed from this analysis due to incomplete data sets.

Figure 1. A basic outline of the procedure employed in the study.

<p><u>SESSION 1</u></p> <ul style="list-style-type: none"> - Complete GAD-Q-IV and BDI-II. - Rate current anxiety on VAS. - Complete overall worry appraisals on 6 VASs (distress caused, uncontrollability, bad for health and well-being, help deal with problems, help solve problems, help prepare for potential difficulties). - Select current worry – worry priming period (30 secs). Then 2 VAS manipulation checks (current anxiety, ease with which chosen worry was brought to mind and kept there). Five more VASs relating to chosen worry in the last week (tried to suppress, success at suppressing, time spent thinking about it, distress caused, uncontrollability). - Given tally counter and worry monitoring instructions. - Random assignment to Suppression and Mention groups. Given corresponding instructions.
<p><u>EXPERIMENTAL WEEK</u></p> <ul style="list-style-type: none"> - Fill in diary at end of each day: tally counter score and 5 VASs relating to chosen worry during day (try to suppress, success at suppressing, time spent thinking about it, distress caused by it, uncontrollability).
<p><u>SESSION 2</u></p> <ul style="list-style-type: none"> - Return diary. - Rate current anxiety on VAS. - Complete overall worry appraisals on 6 VASs (distress caused, uncontrollability, bad for health and well-being, help deal with problems, help solve problems, help prepare for potential difficulties). - Worry priming period (30 secs). Then 2 VAS manipulation checks (current anxiety, ease with which chosen worry was brought to mind and kept there). Five more VASs relating to chosen worry in the last week (tried to suppress, success at suppressing, time spent thinking about it, distress caused, uncontrollability). - Debriefed.

ABBREVIATIONS: GAD-Q-IV=Generalised Anxiety Disorder Questionnaire; BDI-II= Beck Depression Inventory - Second Edition; VAS=Visual Analogue Scale.

Figure 2. Mean Visual Analogue Scale ratings for uncontrollability of overall worry by the Mention and Suppression groups, as a function of session (Session 1, Session 2). The anchor point descriptors on the original VAS were *not at all* (0mm) and *extremely* (100mm). Bars represent 1 SEM.

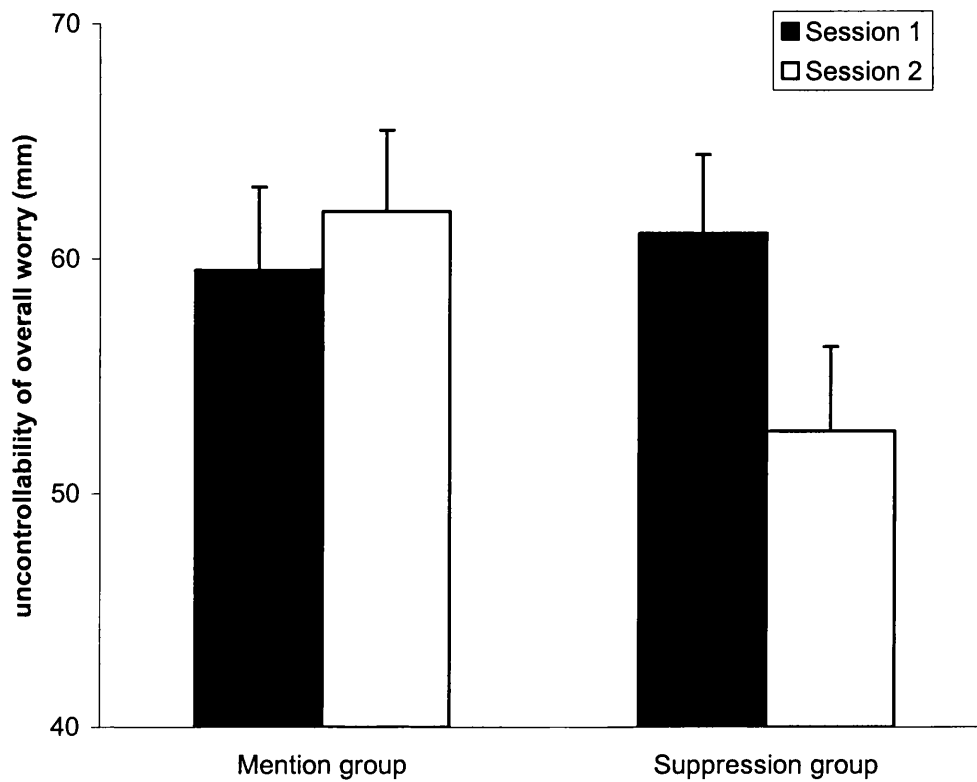


Figure 3. Mean participant ratings for how much they tried to suppress their chosen worry in the last week, as a function of session (Session 1, Session 2). The anchor point descriptors from the original VAS were *not at all* (0mm) and *a great deal* (100mm). Bars represent 1 SEM.

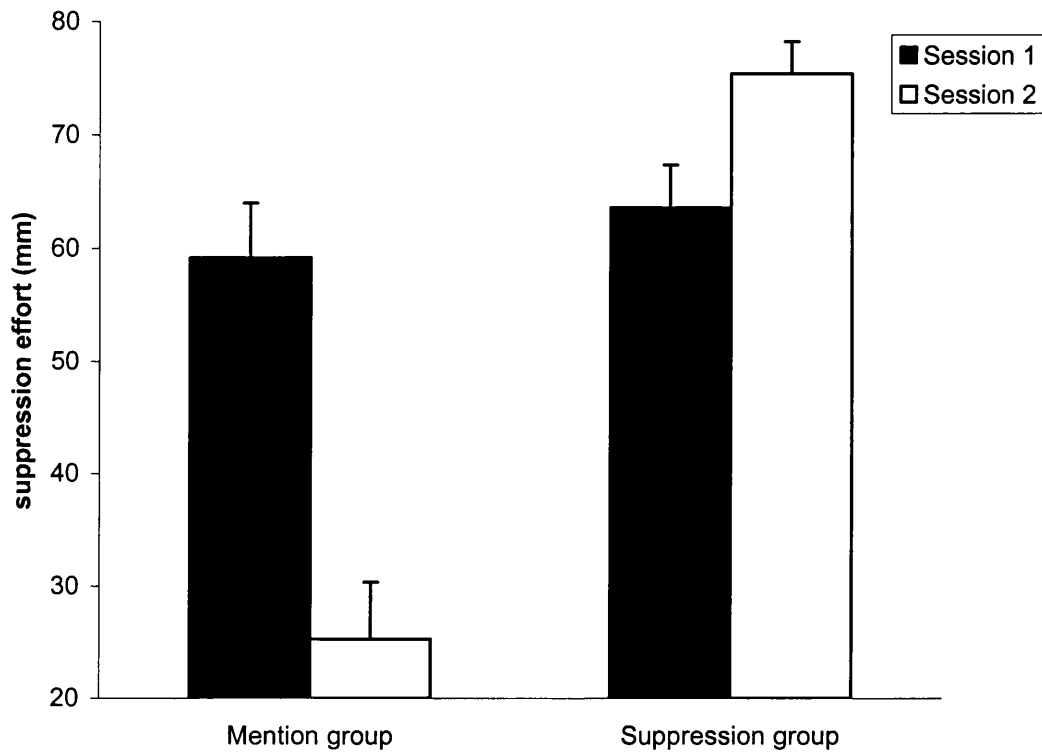


Figure 4. Mean participant ratings for how successful they were at suppressing their current worry in the last week, as a function of session (Session 1, Session 2). The anchor point descriptors from the original VAS were *not at all* (0mm) and *extremely* (100mm). Bars represent 1 SEM.

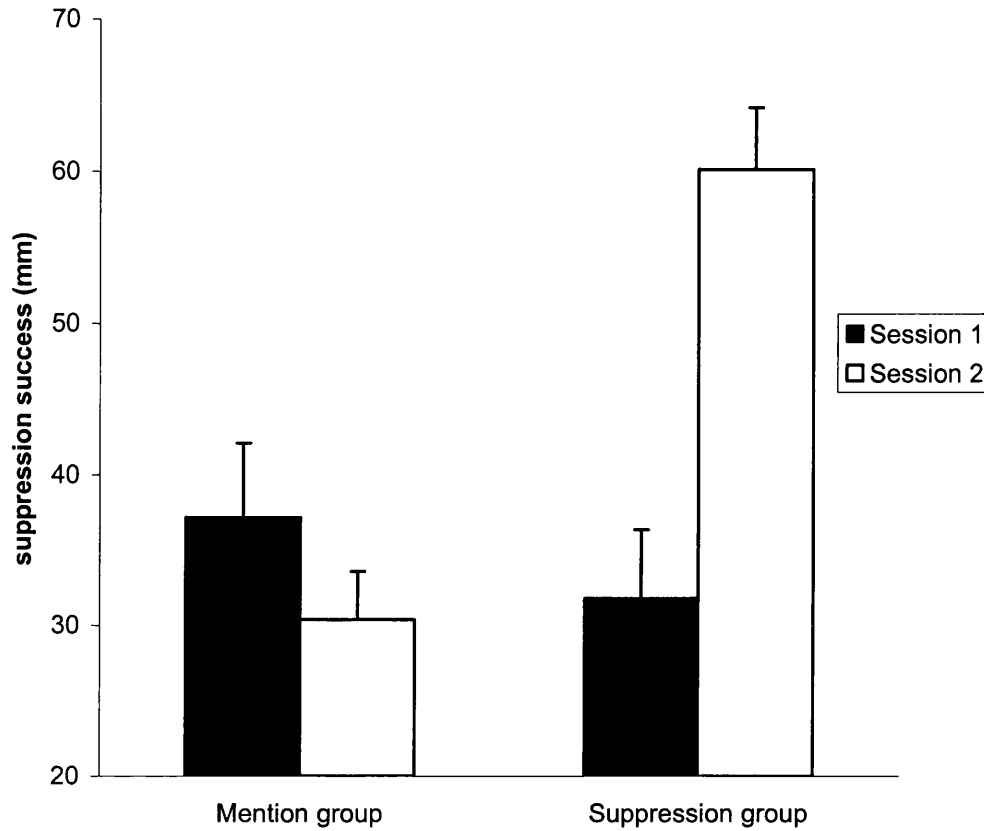
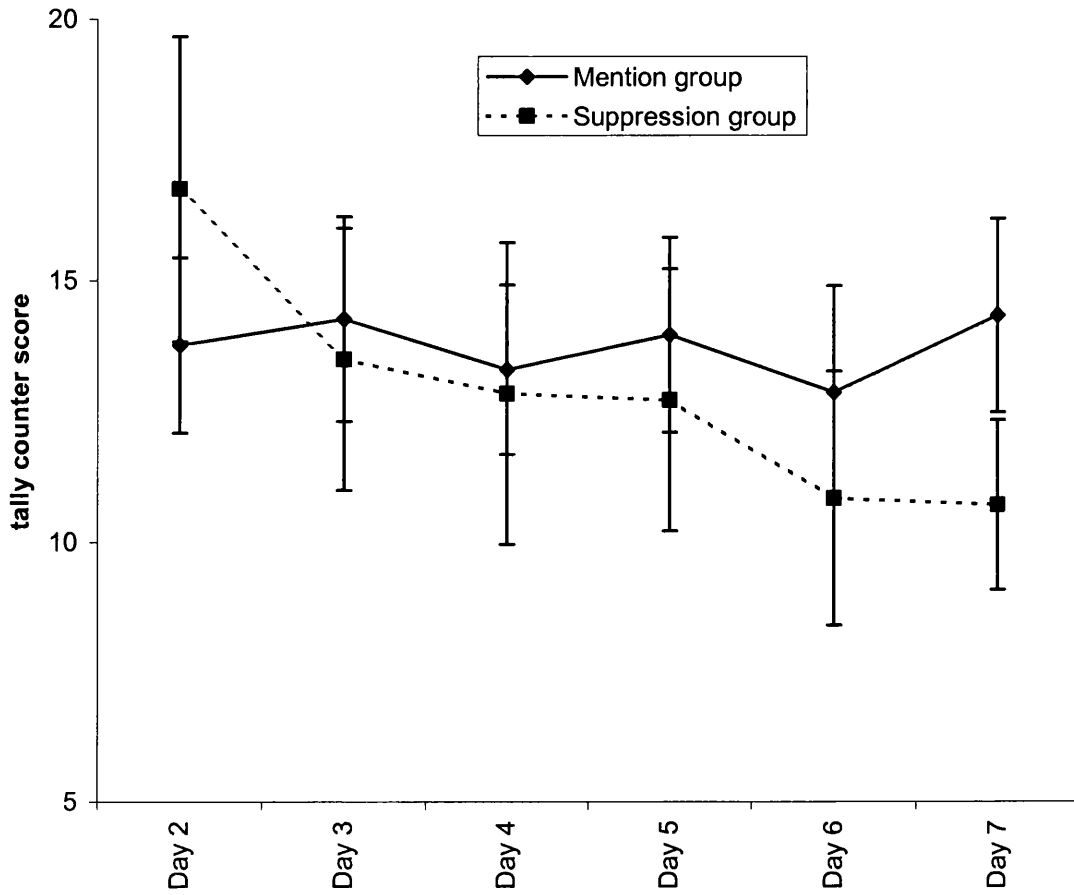


Figure 5. Mean tally counter scores over the course of the experimental week. Bars represent ± 1 SEM.



Chapter 5

Single Case Experiment

Simplified habit reversal: an examination of its effectiveness with a 35-year old man with chronic eyelash pulling

Abstract

This paper reports upon the use of a simplified habit reversal approach with a 35-year old man, D, who presented with a life-long habit of playing with, and pulling on, his eyelashes. The intervention took place over 70 days and was conducted using an AB₁B₂ single case experimental design. Self-monitoring (A) was followed by awareness enhancement (B₁), and then competing response training (B₂). Both B₁ and B₂ incorporated social support. D became significantly more aware of his habit and there was an 85% reduction in habit frequency between awareness enhancement and competing response training. Feedback at three-months follow-up indicated that improvements had been maintained. Overall, this study supports the employment of habit reversal techniques with long-term, problematic habits.

Keywords: habits, hair pulling, behaviour therapy, habit reversal, case study

Appendices

Appendix 1.1 - Notes for contributors to *Health Bulletin*

Papers, articles and other contributions should be sent to the Editor, *Health Bulletin*, Scottish Executive Health Department, Room IE05, St Andrew's House, Edinburgh EH1 3DE. They must be submitted exclusively for *Health Bulletin*. Acceptance is on the understanding that editorial revision may be necessary. All papers are reviewed by the Editor and by peer review, referees being drawn from a panel of appropriate professionals. No correspondence can be entered into in relation to articles found to be unsuitable and returned to authors.

Potential contributions can be submitted in two ways. Material submitted for publication must be typewritten on one side of the paper only, in double spacing and with adequate margins, and each page should be numbered. The top typed copy should be submitted, with four other copies. We are willing to receive one copy typewritten in the above format and accompanied by a disk (Microsoft Word version 98, Excel for tables and figures). All papers should be prefaced by a structured Abstract, of about 250 words in length. It should normally contain six clearly headed sections entitled Objective, Design, Setting, Subjects, Results and Conclusion. The name, appointment and place of work of the authors should be supplied on a separate title page. This same page should include the full postal address of one author, to whom correspondence and reprints will be directed. There should be adequate references to any relevant previous work on the subject; these references should appear at the end of the material on a separate page or pages, using the Vancouver style, which in the case of papers in journals includes:

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Title of paper
Full name of journal
Year published
Volume number
Opening and closing page numbers

Reference to books should similarly include author's name and initials, full title, edition (if necessary), place of publication, publisher's name, year and, if required, volume number, chapter number or page number.

Appendix 2.1 - Notes for contributors to *Clinical Psychology Review*

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Corresponding author. Clearly indicate who is willing to handle correspondence at all stages of refereeing and publication, also post-publication. **Ensure that telephone and fax numbers (with country and area code) are provided in addition to the e-mail address and the complete postal address.**

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Abstract. A concise and factual abstract is required (not exceeding 200 words). This should be typed on a separate page following the title page. The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separate from the article, so it must be able to stand alone. References should therefore be avoided, but if essential, they must be cited in full, without reference to the reference list.

STYLE AND REFERENCES: Manuscripts should be carefully prepared using the Publication Manual of the American Psychological Association, 5th ed., 1994, for style. The reference section must be double spaced, and all works cited must be listed. Please note that journal names are not to be abbreviated.

Reference Style for Journals: Cook, J. M., Orvaschel, H., Simco, E., Hersen, M., and Joiner, Jr., T. E. (2004). A test of the tripartite model of depression and anxiety in older adult psychiatric outpatients, *Psychology and Aging*, 19, 444-45.

For Books: Hersen, M. (Ed.). (2005). Comprehensive handbook of behavioral assessment (2 Volumes). New York: Academic Press (Elsevier Scientific).

TABLES AND FIGURES: Present these, in order, at the end of the article. High-resolution graphics files must always be provided separate from the main text file (see <http://ees.elsevier.com/cpr> for full instructions, including other supplementary files such as high-resolution images, movies, animation sequences, background datasets, sound clips and more).

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Appendix 2.2 - Methodological quality checklist

1) How was the hypothesis/aim/objective of the study described?	
Well	2
Adequately	1
Poorly	0
External Validity	
2) Were participants diagnosed with OCD?	
Yes	2
No, but participants rated highly on OCD inventories (e.g. MOCI)	1
No	0
3) Was the study conducted in a naturalistic or lab-based setting?	
Naturalistic	2
Lab-based	0
4) Were participants offered money or course credits for taking part?	
No	1
Yes	0
Internal Validity	
<u>Selection of samples</u>	
<i>OCD patients:</i>	
5) Were accepted diagnostic criteria employed (e.g. DSM)?	
Yes	1
No/Not reported	0
<i>All participants, irrespective of OCD status:</i>	
6) Were clear inclusion and exclusion criteria employed?	
Yes	1
No/Not reported	0
7) Was OCD symptomatology assessed using a recognised measure (e.g. MOCI) and were the findings reported?	
Yes	1
No	0
8) Were co-morbid psychological disorders/symptoms measured using reliable and valid tools (e.g. SCID, BDI, BAI)?	
Yes (minimum of anxiety and depression)	1
No	0
<u>Design</u>	
9) Was a parallel groups or crossover design employed?	
Parallel groups	1
Crossover	0

Measurement of thought frequency

10) Was a baseline measure of thought frequency taken?

Yes	1
No	0

11) Did the thought counting method employed seem reasonable?

Yes	1
No	0

12) Other than thought counts, was at least one other measure of thought recurrence used?

Yes (e.g. Visual Analogue Scale)	1
No	0

Target thought

13) What method was used to select a target thought?

Participant's own thought: using an appropriate validated questionnaire (e.g. ROII, III)	2
Participant's own thought: using instructions or a questionnaire (e.g. ITQ) which probably ensured that the thought was obsessive/ego-dystonic Thought-Action Fusion (TAF) thought was provided by researcher	1
Thought-Action Fusion (TAF) thought was provided by researcher	1
Not stated	0

Experimental conditions14) Was at least one group of participants **never given suppression instructions**?

Yes	1
No	0

15) The control condition was:

Mention type	1
Non-suppression type	1
Expression type (as used by Wegner and colleagues (1987))	0

16) Was assignment of participants to condition randomised?

Yes and adequately (e.g. computer generated random numbers)	2
Yes, but not adequately (e.g. use of birth dates), or not stated how it was done	1
No	0
Unable to determine	0

17) If there were two groups or more, were they matched with respect to age and gender?

Yes	1
No	0
Unable to determine	0

Manipulation check

18) Was a suppression effort manipulation check conducted?

Yes	1
No	0

Data analyses

19) Were appropriate statistical procedures employed to look at the impact of suppression on thought frequency?

Yes	1
No	0

Power

20) Was a power calculation conducted?

Yes	1
No	0
Unable to determine	0

Maximum possible score = 25

Appendix 3.1 - Notes for contributors to *Behaviour Research and Therapy*

Submission to the journal prior to acceptance Authors can submit their articles electronically via the Elsevier Editorial System (EES) page of this journal <http://ees.elsevier.com/brat>. The system automatically converts source files to a single Adobe Acrobat PDF version of the article, which is used in the peer-review process. Please note that even though manuscript source files are converted to PDF at submission for the review process, these source files are needed for further processing after acceptance. All correspondence, including notification of the Editor's decision and requests for revision, takes place by e-mail and via the Author's homepage, removing the need for a hard-copy paper trail.

Online submission is strongly preferred but authors can, in special cases, also submit via mail. Four copies of the manuscript, including one set of high-quality original illustrations, suitable for direct reproduction, should be submitted to **Professor G. T. Wilson, Psychological Clinic at Gordon Road, Rutgers, The State University of New Jersey, 41C Gordon Road, Piscataway, New Jersey, 08854-8067, USA**. Email: brat@rci.rutgers.edu. (Copies of the illustrations are acceptable for the other sets of manuscripts, as long as the quality permits refereeing.)

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Corresponding author. Clearly indicate who is willing to handle correspondence at all stages of refereeing and publication, also post-publication. **Ensure that telephone and fax numbers (with country and area code) are provided in addition to the e-mail address and the complete postal address.**

Present/permanent address. If an author has moved since the work described in the article was done, or was visiting at the time, a 'Present address' (or 'Permanent address') may be indicated as a footnote to that author's name. The address at which the author actually did the work must be retained as the main, affiliation address. Superscript Arabic numerals are used for such footnotes.

Abstract. A concise and factual abstract is required (maximum length 200 words). The abstract should state briefly the purpose of the research, the principal results and major conclusions. An abstract is often presented separate from the article, so it must be able to stand alone. References should therefore be avoided, but if essential, they must be cited in full, without reference to the reference list.

Keywords. Immediately after the abstract, provide a maximum of 6 keywords, to be chosen from the APA list of index descriptors. These keywords will be used for indexing purposes.

Abbreviations. Define abbreviations that are not standard in this field at their first occurrence in the article: in the abstract but also in the main text after it. Ensure consistency of abbreviations throughout the article.

N.B. Acknowledgements. Collate acknowledgements in a separate section at the end of the article and do **not**, therefore, include them on the title page, as a footnote to the title or otherwise.

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Arrangement of the article Subdivision of the article. Divide your article into clearly defined and numbered sections. Subsections should be numbered 1.1 (then 1.1.1, 1.1.2), 1.2, etc. (the abstract is not included in section numbering). Use this numbering also for internal cross-referencing: do not just refer to 'the text.' Any subsection may be given a brief heading. Each heading should appear on its own separate line.

Appendices. If there is more than one appendix, they should be identified as A, B, etc. Formulae and equations in appendices should be given separate numbering: (Eq. A.1), (Eq. A.2), etc.; in a subsequent appendix, (Eq. B.1) and so forth.

Acknowledgements. Place acknowledgements, including information on grants received, before the references, in a separate section, and not as a footnote on the title page.

Figure legends, tables, figures, schemes. Present these, in this order, at the end of the article. They are described in more detail below. High-resolution graphics files must always be provided separate from the main text file (see Preparation of illustrations).

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

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

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

Note that journal names are not to be abbreviated.

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Appendix 3.2 - Ethical approval letters

Primary Care Division

Gartnavel Royal Hospital
1055 Great Western Road
Glasgow G12 0XH
Tel: 0141 211 3600
www.nhs.org.uk



Dr Andrew McLean
Trainee Clinical Psychologist
University of Glasgow
Section of Psychological Medicine
Division of Community Based Sciences
Gartnavel Royal Hospital,
1055 Great Western Road
G12 0XH

Date 26 August 2005
Your Ref
Our Ref

Direct line 0141 211 3824
Fax 0141 211 3814
E-mail anne.mcmahon@gartnavel.gla.ac.uk
glacomen.scot.nhs.uk

Dear Dr McLean

Full title of study: An investigation into the effects of thought suppression in a group of high worriers.
REC reference number: 05/S0701/85

Thank you for your letter of 09 August 2005, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information was considered at the meeting of the Sub-Committee of the REC held on 25 August 2005. A list of the members who were present at the meeting is attached.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised.

The favourable opinion applies to the research sites listed on the attached form.

Conditions of approval

The favourable opinion is given provided that you comply with the conditions set out in the attached document. You are advised to study the conditions carefully.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
Application		27 June 2005
Investigator CV		27 June 2005
Investigator CV	Supervisor	27 June 2005



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Page 2

Protocol		27 June 2005
Covering Letter		27 June 2005
Covering Letter	two	09 August 2005
Summary/Synopsis		27 June 2005
Copy of Questionnaire		27 June 2005
Participant Information Sheet		27 June 2005
Participant Information Sheet	two	09 August 2005
Participant Consent Form		27 June 2005
Response to Request for Further Information		09 August 2005
Other	Introductory e-mail	09 August 2005

Management approval

The study should not commence at any NHS site until the local Principal Investigator has obtained final management approval from the R&D Department for the relevant NHS care organisation.

Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

Notification of other bodies

The Committee Administrator will notify the research sponsor that the study has a favourable ethical opinion.

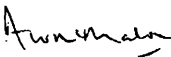
Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

05/S0701/85	Please quote this number on all correspondence
-------------	--

With the Committee's best wishes for the success of this project.

Yours sincerely



A W McMahon
Research Ethics Co-ordinator (Manager) on behalf of Dr Paul Fleming, Chair

Email: Anne.McMahon@gartnavel.gla.ac.uk

Enclosures:

Attendance at Sub-Committee of the REC meeting on 25 August 2005
 Standard approval conditions
 Site approval form (SF1)

Primary Care Division

Gartnavel Royal Hospital
1055 Great Western Road
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Tel: 0141 211 3600
www.nhs.org.uk



Dr Andrew McLean
Trainee Clinical Psychologist
University of Glasgow
Section of Psychological Medicine
Division of Community Based Sciences
Gartnavel Royal Hospital,
1055 Great Western Road
G12 0XH

Date 18 January 2006
Your Ref
Our Ref

Direct line 0141 211 3824
Fax 0141 211 3814
E-mail anne.mcmahon@gartnavel.gla.ac.uk
glacomen.scot.nhs.uk

Dear Dr McLean

Full title of study: An investigation into the effects of thought suppression
in a group of high worriers.
REC reference number: 05/S0701/85

Thank you for the amendment dated 20 December 2005 regarding the above named submission in which you indicate the extension of the time period and alteration to the setting.

The members of the Committee present gave a favourable ethical opinion of the amendment on the basis described in the notice of amendment form and supporting documentation.

Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

Research governance approval

All investigators and research collaborators in the NHS should notify the R&D Department for the relevant NHS care organisation of this amendment and check whether it affects research governance approval of the research.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

[REC reference number]: 05/S0701/85 Please quote this number on all correspondence

Yours sincerely

A W McMahon
Research Ethics Co-ordinator (Manager) on behalf of Dr Paul Fleming, Chair



D16:18:

Appendix 3.3 - Participant Information Sheet***Participant Information Sheet******How do people's attempts to suppress worrisome thoughts affect their concerns about worry?***

Project Title: An investigation into the effects of thought suppression in a group of high worriers.

You are being invited to take part in a research study. Before deciding whether you wish to participate, it is important to read the following information so that you understand why the research is being carried out and what your participation would involve. Please take time to read the information carefully and consider whether you wish to take part.

What is the research about?

This research is about worry. Worry is a very common human experience. This study is focused upon gaining a better understanding of what happens when people try to stop themselves from worrying. It is hoped that the findings from this research will improve our understanding of how people view the worrying process.

Why have I been asked to take part?

This is an *analogue study*. In other words, to improve our understanding of how worry affects patients, this study will investigate the experiences of worry in a non-clinical population. This may lead to ideas both for future research and for improvements in clinical practice with people who seek help from mental health services because of their worries.

Do I have to take part?

Taking part in this study is entirely voluntary. If you do decide to take part, you will be asked to keep this information sheet and to sign and return a consent form. Also, even if you decide to take part, you are still free to withdraw from the study at any time, without providing an explanation. Any information collected from you would then be destroyed.

What will happen to me if I take part?

There are two stages in the study. For stage 1, you will be asked to fill in and return a questionnaire about your style of worrying. This questionnaire takes no more than 5 minutes to complete. You may then be contacted by telephone and asked some questions about your past and current mental and physical health in order to establish whether you meet certain criteria for taking part in stage 2. Participation in stage 2 will involve two short sessions with the researcher at times of your convenience and at a location within the university. Each of these sessions will last approximately 30 minutes and there will be a period of one week between them. At the first session, you will be requested to identify one of your current worries and to rate it for certain attributes. Then, for the following week, you will be asked to record how often you think about your identified worry and to fill in a diary at the end of each day. In the second session, you will again be asked to rate your worry for a number of attributes.

What are the possible disadvantages and risks of taking part?

There are no known risks associated with taking part in a study of this sort. The methodology used in this study has been used by other researchers. However, if you do find any aspects of the study distressing, you should let the investigator know. It is stressed that your participation is voluntary.

What are the possible benefits of taking part?

There are no direct benefits for you. However, it is hoped that this research will generate ideas for future research and lead to improvements in the treatment of worry in clinical populations.

Will my taking part in this study be kept confidential?

Yes. All information will be kept strictly confidential. However, your GP will be informed if the researcher becomes concerned about your physical or mental well-being (e.g. if it seemed that you may be suffering from severe depression). Every attempt would be made to discuss this course of action with you before contacting your GP.

What will happen to the results of the research study?

Participants will be provided with a summary of the findings from the study. It is hoped that the study will be published in a scientific journal. Also, the study will be submitted for examination as part of the requirements for the Doctorate in Clinical Psychology at the University of Glasgow. Your identification will not be included in any publication.

Who is organising and funding the research?

Department of Psychological Medicine, University of Glasgow.

Who has reviewed the study?

The study has been reviewed and approved by the Department of Psychological Medicine, University of Glasgow, and the Greater Glasgow Primary Care Division - Community and Mental Health Research Ethics Committee.

Contact for further information

If you wish to discuss any points covered in the information sheet or wish to ask any questions about specific aspects of the study, please do not hesitate to contact **Andrew M^cLean** at the address or telephone number given below:

Andrew M^cLean
Trainee Clinical Psychologist
Department of Psychological Medicine
Gartnavel Royal Hospital
Glasgow, G12 OXH
Tel: 0141 211 0607
email: glasgowworrystudy@yahoo.co.uk

Thank you very much for reading this information sheet. Please keep this copy for reference.

Appendix 3.4 - Verbal instructions for monitoring chosen worry

“Over the next week, I would like you to make a special effort to be aware of what you are thinking because I am interested in finding out if and when particular thoughts enter your head. Specifically, I would like you to record every time your chosen worry enters your head. When you spot that your worry has come to mind, I want you to click once on the tally counter. This task may feel a little strange at first, but people soon get used to it. I’m now going to cover a few issues which are sometimes raised. The first is that some people wonder, “am I clicking too much?” or “am I clicking too little?” It really doesn’t matter – all I ask is that you try to be as accurate as you can throughout the week. The second issue is whether it matters what triggers you to think about your worry. Again, this doesn’t matter – for instance, someone could ask you about it, you could be daydreaming, you could hear something on the news that’s related to your worry, you could see the yellow spot on your watch, keys, or mobile phone, or you could think about this study. The third issue is to do with the accessibility of the tally counter. I understand that there are times when you are not going to be able to get to your tally counter. Please just try to keep count in your head and click the counter the appropriate number of times when you can. Finally, and most importantly, some people ask about whether it matters how long the worry stays in your mind. The answer is no, this doesn’t matter. Just click for each occasion that your chosen worry comes to mind. So, whether your worry enters your mind fleetingly or stays for 10 minutes, this is just one click. Equally, if you worry for a while, then get distracted by something for a bit, and then after that, worry again, this would count as two clicks. So, in other words, each time your thoughts return to your chosen worry, click the tally counter”.