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Main Section

I CAN'T SLEEP, MY MIND IS RACING! AN INVESTIGATION OF STRATEGIES OF THOUGHT CONTROL IN INSOMNIA

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Abstract People with sleep-onset insomnia commonly attribute their difficulty falling asleep to intrusive thoughts, worries, or ''a racing mind''. Previous research has implicated strategies of thought control in the maintenance of symptoms in a number of psychological disorders. The purpose of the present study was to compare individuals diagnosed with insomnia ($n = 30$) and good sleepers ($n = 29$) for the strategies employed to manage cognitive activity during the pre-sleep period. Reappraisal, worry, and suppression were employed more by participants with insomnia than by good sleepers. Good sleepers employed social control, replacement, suppression, and reappraisal strategies most frequently, whereas the strategies most frequently employed by insomniacs were suppression and reappraisal. The results are discussed in terms of the role of strategies employed to manage pre-sleep cognitive activity in the maintenance and reversal of insomnia.

Keywords: Insomnia, sleep, cognition, thought control, treatment.

Introduction

The investigation of management strategies for worrisome thoughts and unwanted intrusive cognitions has been fertile territory for clinical researchers in recent years. Initially, Wegner and colleagues demonstrated that the suppression of thoughts related to a white bear lead to a rebound in the occurrence of these thoughts (Wegner, Schneider, Carter, & White, 1987). This work led to the proposal that ironic effects of thought control are a laboratory model for the maintenance of intrusive and unwanted thoughts in psychological disorders (Salkovskis, 1989; Wegner, 1989). Evidence for this proposal has been observed in the context of acute stress disorder (ASD; Harvey & Bryant, 1998), posttraumatic stress disorder (PTSD; Shipherd & Beck, 1999), and obsessive compulsive disorder (OCD; Salkovskis et al., 1995 cited in Salkovskis & Kirk, 1997).

Thought suppression is not a unitary concept. Salkovskis and Campbell (1994) differenti-

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ated between simple suppression instructions, suppression with general instructions to distract, suppression with general ''don't distract'' instructions, and suppression supplemented with a competing and engaging task. Consistent with the work of Wegner (1989), an increase in the frequency of the target thought was noted when suppression was attempted. Interestingly, a decreased frequency was noted when suppression instructions were accompanied by instructions to replace the target thought with a specific engaging task. These findings suggest that while some thought control strategies may be unhelpful and maintain disorders, other strategies may effectively intervene and relieve the individual of their unwanted thoughts.

The thought control questionnaire (TCQ), designed by Wells and Davies (1994), indexes five thought control strategies (distraction, punishment, reappraisal, social control, worry). In a non-clinical sample, punishment and worry were associated with psychopathology measures (Wells & Davies, 1994). Consistently, in individuals diagnosed with OCD (Amir, Cashman, & Foa, 1997) and ASD (Warda & Bryant, 1998), worry and punishment were related to high levels of symptomatology. Distraction, social control, and reappraisal were employed by ASD patients most frequently (Warda & Bryant, 1998). OCD participants reported being most likely to attempt thought control via reappraisal, punishment, and social control.

Insomniacs commonly complain of intrusive thoughts and worries (Borkovec, 1982) and/or a ''racing mind'' (Geer & Katkin, 1966) whilst trying to sleep. Indeed, cognitive arousal is 10 times more likely than somatic arousal to be cited by insomniacs as the main determinant of their sleeping processes (Lichstein & Rosenthal, 1980). Further, the cognitive items on The Sleep Disturbance Questionnaire (''My minds keeps turning things over, I am unable to empty my mind'') were the most highly rated of 12 items and a principal component analysis led to the extraction of a first factor named ''mental anxiety'', accounting for 40% of the variance (Espie, Brooks, & Lindsay, 1989). Extending these findings by demonstrating an association between cognitive activity and objective sleep parameters, a high positive correlation has been reported between measures of pre-sleep cognitive activity and sleep onset latency (Nicassio, Mendlowitz, Fussell, & Petras, 1985; Van Egeren, Haynes, Franzen, & Hamilton, 1983). Watts and colleagues reported that the content of pre-sleep cognitive activity clustered into five categories: trivial topics, thoughts about sleep, family and long term concerns, positive concerns and plans, preoccupation with bodily sensations (e.g., feeling tense), and work and recent concerns (Watts, Coyle, & East, 1994). Together, these studies suggest that cognitive activity during the pre-sleep period is typically negatively toned and often concerned with a recent problem or not falling asleep. Based on previous research (Harvey & Bryant, 1998; Salkovskis & Campbell, 1994), it is possible that the thought control strategy selected may have a role in fuelling or extinguishing pre-sleep cognition.

The present study compared the thought control strategies reported by insomniacs with those reported by good sleepers. The relationship between the strategies employed, self-reported sleep onset latency, sleep quality, and cognitive interference in sleep onset were also examined. The TCQ was revised for use with insomniacs (hence the title TCQ-insomnia[1]) in three ways: the introductory paragraph was reworded to ensure particip-

[1] A copy of the TCQ-Insomnia is available from the author on request.

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ants answered the questions in relation to the pre-sleep period, to include suppression and replacement subscales in recognition of the non-unitary nature of the original distraction subscale, and to include items specifically relevant to sleep. In an attempt to thoroughly index thought control strategies, the TCQ-Insomnia (TCQ-I) was administered twice; for a *typical night* (requiring patients to summarize the strategies used) and for the *previous night* (to obtain a specific example). Hypotheses were two-fold. First, based on findings that thought suppression fuels cognitive activity (Salkovskis & Campbell, 1994; Wegner et al., 1987) and reports that insomniacs complain of unwanted intrusive pre-sleep cognitive activity (Espie et al., 1989; Lichstein & Rosenthal, 1980), it was hypothesized that insomniacs would employ suppression more often than good sleepers. Second, previous research has identified an association between psychopathology and the use of worry and punishment strategies (Wells & Davies, 1994; Amir et al., 1997; Warda & Bryant, 1998). It was therefore hypothesized that the use of worry and punishment cognitive strategies would also characterize individuals with insomnia.

Method

Participants

Thirty individuals with DSM-IV diagnosed insomnia (American Psychiatric Association, 1994) and 29 non-patient controls participated in the study. Participants were recruited from posters and flyers placed around the city asking for those ''interested in sleep research'' to contact the experimenter. In the absence of a psychometrically validated alternative, a structured clinical interview (Insomnia Diagnostic Interview; IDI) was constructed in order to carefully assess for each of the DSM-IV criteria for insomnia. The focus of the study was on the pre-sleep period, hence only those participants with sleep-onset insomnia were included. To ensure the sample comprised severe insomniacs, only those who complained of sleep problems for at least three nights a week were included (Morin, 1993). Nine participants (31%) had received treatment for insomnia in the past and three participants (10%) had received psychological treatment for PTSD ($n = 1$) and anxiety ($n = 2$).

The good sleeper group comprised participants who did not meet criteria for insomnia as assessed by the IDI. Further, they reported being satisfied with their sleep onset latency. Three participants (10%) reported receiving psychological treatment for relationship problems ($n = 2$) and depression ($n = 1$).

Measures

Thought Control Questionnaire-Insomnia (TCQ-I). The original TCQ is a 30-item self-report measure developed and validated by Wells and Davies (1994) to identify the frequency of use of five strategies of thought control: distraction, punishment, reappraisal, social control, and worry. Each subscale consists of six items rated on a 4-point Likert-type scale (1 ''never'', 4 ''almost always''). The five subscales have demonstrated moderately high internal consistency. A revised version of the TCQ was administered in the present study. Thirteen new items were added to the original TCQ to tap strategies particularly pertinent to getting to sleep (e.g., I count sheep, I decide to put the thoughts on hold until morning, I get out of bed and write about them, I let my mind go blank). In addition, given the recent

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interest in differentiating between different types of thought suppression (Salkovskis & Campbell, 1994), the distraction subscale was divided into two subscales (suppression, replacement) and additional items were generated for each. To qualify for the suppression subscale, the items must describe a strategy that diverts attention from the unwanted thought, without using a specific engaging task as a replacement (e.g., I tell myself not to think about the thought, I decide to put the thought ''on hold''). To qualify for the replacement subscale the item must describe a strategy that replaces an unwanted thought with another thought (e.g., I think about something else, I call to mind positive images instead). In the present experiment, the TCQ-I was administered twice. For the first administration, the instructions emphasized rating ''how often you use each technique to control the thoughts running through your mind as you are trying to get to sleep on a *typical night*''. The item per subscale breakdown for this version was: 5 suppression, 6 punishment, 9 reappraisal, 7 social control, 7 worry, and 9 replacement. For the second administration, the instructions were identical to those described above, except that the last phrase was replaced with ''as you were trying to get to sleep *last night*''. The items included in the questionnaire were identical to those just described except that items 5, 12, 17, 19, 29 and 30 from the original TCQ were excluded due to their irrelevance for the pre-sleep period *last night* (e.g., I found out how my friends dealt with these thoughts).

Procedure

The diagnostic interview and an indepth interview on the content of cognitive activity (Harvey, 2000) was completed the day prior to the execution of the present study. On the day of the study, participants completed the TCQ-I, Beck Anxiety Inventory (Beck, Epstein, Brown, & Steer, 1988), and Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). As an estimation of sleep onset latency, participants were asked to rate the following statement ''On a *typical night* in the past month, how long has it taken you to fall asleep after you go to bed and turn the lights off? As an estimation of overall sleep quality, participants were asked to rate the following statement: ''On a *typical night* during the last month how was your sleep overall?'' (1 ''very restless'', 10 ''very sound''). As an estimation of cognitive interference, participants were asked ''On a *typical night* during the last month how often would your thoughts keep you awake'' (0 ''never'', 10 ''every night''). At the conclusion of the interview, participants were given a series of ratings and questionnaires for completion the following morning in a sealed envelope labelled ''For tomorrow morning''. An estimation of sleep onset latency was obtained by asking participants to complete the following statement ''After turning out the light I fell asleep in ____ minutes'', sleep quality and cognitive interference were re-rated, and the TCQ-I and BAI were completed again. All questions were phrased in reference to *last night*. Participants returned the completed questionnaires via post.

Results

Participant characteristics

There were no significant differences between insomniacs and good sleepers for age [insomniacs'' $M = 21.2$, $SD = 6.55$, good sleepers: $M = 25.6$, $SD = 11.8$, $t(57) = 1.78$, *ns*] or sex

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[insomniacs: male = 12, female = 18, good sleepers: male = 10, female = 19, χ^2 (1, N = 59) = 0.07, ns]. Insomniacs scored higher than good sleepers on the BAI (insomniacs: M = 12.5, SD = 8.9, good sleepers: M = 7.1, SD = 7.3, $t(57) = -2.5$, $p < 0.5$), but not the BDI (insomniacs: M = 9.5, SD = 6.9, good sleepers: M = 6.5, SD = 6.1, $t(57) = -1.72$, *ns*). The insomnia group reported problems with sleeping for an average of 6.54 years (SD = 4.12, range = .25–16 years).

Ratings

Table 1 presents the average rating for sleep onset latency, sleep quality and cognitive interference. For a *typical night*, the insomnia group estimated their sleep onset latency as longer than good sleepers, $t(57) = 20.63$, $p < .001$. Data from the sleep diary (*last night*) replicated this result, $t(57) = -2.41$, $p < .05$. For a *typical night*, the insomnia group rated their sleep quality lower than good sleepers, $t(57) = 4.51$, $p < .001$. Data from the sleep diary (*last night*) replicated this result, $t(57) = 2.41$, $p < .05$. For a *typical night*, the insomnia group rated interference from cognitive activity as keeping them awake more than good sleepers, $t(57) = -7.53$, $p < .001$. Data from the sleep diary (*last night*) replicated this result, $t(57) = -4.08$, $p < .001$.

Thought control strategies

The number of items per subscale on the TCQ-I varied. Accordingly, the following analyses were based on the raw scores, expressed as a percentage of the maximum score possible within a subscale (see Table 1 for means). A 2 (Diagnosis: insomniac, good sleeper) × 6 (Thought control strategy: suppression, punishment, reappraisal, social control, worry, replacement) repeated measures ANOVA was conducted separately for a *typical night* and *last night*.

Typical night. There was no diagnosis main effect, $F(1, 56) = 1.74$, *ns*. The main effect for thought control strategy, $F(5, 50) = 70.6$, $p < .001$, and the interaction, $F(5, 50) = 2.69$, $P < .05$, was significant. Follow-up tests indicated that insomniacs were more likely to report using reappraisal, $t(57) = -2.14$, $p < .05$, and worry, $t(57) = -3.70$, $p < .001$, compared to good sleepers. Insomniacs reported using suppression and reappraisal strategies most often, which did not differ from each other in frequency of use, followed by social control, then replacement, followed by punishment and worry, which did not differ from each other. For good sleepers, the most commonly employed strategies were suppression and social control, which did not differ from each other in frequency of use, followed by reappraisal, followed by replacement, followed by punishment, which was used more frequently than worry.

Last night. Significant effects were observed for diagnosis, $F(1, 56) = 11.77$, $p < .01$, thought control strategy, $F(5, 50) = 24.16$, $p < .001$, and the interaction, $F(5, 50) = 4.24$, $p < .01$. Follow-up tests indicated that insomniacs were more likely to report employing reappraisal, $t(57) = -4.32$, $p < .001$, suppression, $t(57) = -2.23$, $p < .05$, and worry, $t(57) = -3.05$, $p < .01$, compared to good sleepers. The most frequently used strategies reported by insomniacs were suppression and reappraisal, that were used more frequently than social control, replacement, worry, and punishment. For good sleepers, the most frequently

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Table 1. Mean scores for sleep onset latency sleep quality, cognitive interference, and TCQ-I subscale scores

	Insomnia	Good sleeper
Typical night		
Sleep onset latency	54.0 (40.4)	15.3 (11.0)
Sleep quality	5.8 (1.5)	7.9 (2.0)
Cognitive interference	7.0 (1.8)	2.7 (2.4)
Suppression	57.5 (11.1)	56.2 (17.6)
Punishment	32.6 (10.9)	29.7 (6.7)
Reappraisal	56.7 (14.9)	47.8 (16.5)
Social control	47.1 (10.7)	50.6 (22.0)
Worry	30.8 (10.8)	22.3 (5.9)
Replacement	40.3 (9.6)	39.5 (16.8)
Last night		
Sleep onset latency	34.2 (21.9)	19.6 (24.3)
Sleep quality	5.8 (2.6)	7.5 (2.8)
Cognitive interference	4.9 (2.6)	2.1 (2.6)
Suppression	47.6 (17.0)	37.7 (16.2)
Punishment	28.6 (6.1)	27.8 (6.8)
Reappraisal	44.5 (11.0)	33.7 (7.1)
Social control	39.1 (14.3)	35.5 (14.7)
Worry	37.7 (12.5)	29.4 (6.8)
Replacement	38.1 (15.2)	37.9 (16.4)

Note: Standard deviations appear in parentheses.
Sleep onset latency = *Typical night* – ''On a typical night in the past month, how long has it taken you to fall asleep after you go to bed and turn the lights off?'' (reported in minutes), *Last night* – ''After turning out the light I fell asleep in _____ minutes''.
Sleep quality = ''On a typical night during the last month [*As you were trying to get to sleep last night*] how was your sleep overall?'' (1 ''very restless'', 10 ''very sound'').
Cognitive interference = ''On a typical night during the last month [*As you were trying to get to sleep last night*] how often would your thoughts keep you awake'' (0 ''never'', 10 ''every night'').
TCQ-I subscale scores are expressed as a percentage of the maximum score possible within a subscale.

employed strategies were replacement, suppression, social control, and reappraisal, which did not differ from each other in frequency of use. Worry and punishment were the least frequently used strategies and they did not differ from each other in frequency of use.

Table 2 presents the Pearson correlations between TCQ-I subscale scores, BAI, BDI, sleep quality rating, and cognitive interference rating. For a *typical night*, punishment and worry were positively correlated with BAI, BDI, and cognitive interference and negatively correlated with sleep quality. In addition, reappraisal was negatively correlated with sleep quality, suppression was positively correlated with cognitive interference and worry was positively correlated with sleep onset latency.

For *last night*, punishment and worry were positively correlated with BAI and cognitive interference. In addition, reappraisal and suppression were positively correlated with cognitive interference and reappraisal and worry were positively correlated with sleep onset latency.

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Table 2. Correlations between TCQ-I subscale scores, BAI, BDI, sleep onset latency sleep quality, and cognitive interference scores

	Punishment	Reappraisal	Replacement	Social control	Suppression	Worry
Typical night						
BAI	0.39**	0.24	0.06	0.10	0.16	0.60***
BDI	0.55***	0.14	0.07	0.01	0.12	0.51***
Sleep onset latency	–0.07	0.12	0.01	0.01	0.01	0.27*
Sleep quality	–0.31*	–0.37**	0.01	0.00	–0.07	–0.43**
Cognitive interference	0.33*	0.07	0.01	0.09	0.54***	0.27*
Last night						
BAI	0.63***	0.23	0.16	0.26	0.16	0.52***
Sleep onset latency	0.21	0.31*	0.01	–0.02	0.02	0.27*
Sleep quality	0.00	–0.03	–0.20	–0.06	–0.26	–0.13
Cognitive interference	0.32*	0.29*	0.20	0.14	0.26*	0.32*

Note: * $p < .05$, *** $p < .01$, *** $p < .001$.
BAI = Beck Depression Inventory, BDI = Beck Depression Inventory.
Sleep onset latency = *Typical night* – ''On a typical night in the past month, how long has it taken you to fall asleep after you go to bed and turn the lights off?'' (reported in minutes), *Last night* – ''After turning out the light I fell asleep in _____ minutes''.
Sleep quality = ''On a typical night during the last month [*As you were trying to get to sleep last night*] how was your sleep overall?'' (1 ''very restless'', 10 ''very sound'').
Cognitive interference = ''On a typical night during the last month [*As you were trying to get to sleep last night*] how often would your thoughts keep you awake'' (0 ''never'', 10 ''every night'').

Discussion

Consistent with previous findings, participants diagnosed with insomnia rated their sleep quality lower and the interference with sleep from cognitive activity higher compared to good sleepers (Borkovec, 1982; Lichstein & Rosenthal, 1980). Cognitive interference was associated with more frequent use of suppression, punishment, reappraisal, and worry strategies. Sleep quality was associated with less frequent use of punishment, reappraisal, and worry. Reappraisal and worry were found to be employed by the insomnia group more than by good sleepers for both a typical night and last night. When considering the results for last night only, suppression was found to be employed more by insomniacs than good sleepers. The most frequently employed strategies by insomniacs, at both assessment points, were suppression and reappraisal.

Taken together, the more frequent use of suppression by insomniacs compared to good sleepers and the correlations observed with cognitive interference are in accord with previous reports that thought suppression is not an effective through control strategy (Harvey & Bryant, 1998; Shipherd & Beck, 1999). Compared to good sleepers, insomniacs were more likely to use worry strategies. Further, worry was correlated with sleep quality and cognitive

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interference. These findings are consistent with previous work that has highlighted worry as a major component of the clinical profile of individuals diagnosed with insomnia (Borkovec, Lane, & Van Oot, 1981; Roth, Kramer, & Lutz, 1976). Insomnia researchers should endeavour to move beyond conceptualizing worry as an aspect of the phenomenology of the disorder, to the delineation of its functions. For example, recent work with generalized anxiety disorder suggests that worry may function as a distraction from more emotionally difficult concerns (Borkovec, Ray, & Stober, 1998).

Interestingly, while worry and punishment were among the least frequently employed strategies across diagnostic status, they were significantly correlated with sleep quality, cognitive interference, BAI, and BDI. This finding is consistent with the observation that the use of punishment and worry strategies were observed in OCD (Amir et al., 1997) and ASD (Warda & Bryant, 1998). Insomniacs were more likely to employ reappraisal during the pre-sleep period compared to good sleepers. While reappraisal strategies may effectively solve problems and manage worries during the daytime, use during the pre-sleep period may lengthen sleep onset latency and reduce quality of sleep (Espie & Wicklow, in press).

Social control and replacement strategies were frequently employed by good sleepers to manage pre-sleep cognitive activity. Moreover, they were the only TCQ-I subscales not to be correlated with BDI, BAI, sleep quality, or cognitive interference. These findings suggest that social control and replacement strategies have potential to effectively manage unwanted thoughts.

There was a high degree of overlap between the results relating to a typical night and last night. Nonetheless, the inclusion of the latter yielded important novel information, particularly relating to thought suppression and replacement. The present results highlight the utility of extending the TCQ to include the specific assessment of thought suppression and replacement in the investigation of thought management in clinical disorders.

In summary, the present study suggests that controlling pre-sleep cognitive activity with suppression, reappraisal, worry, or punishment is associated with dysfunction. Conversely, good sleeping seems to be associated with replacement and social control strategies. Extensive interviewing (as in Freeston & Ladouceur, 1997), longitudinal research, and the experimental manipulation of individual thought control strategies will illuminate causality and treatment implications. Future research should test the reliability and validity of the TCQ-I with a larger sample of insomniacs and also explore the possibility that any active control mechanism will be maladaptive. Perhaps devoting minimal effort to the promotion of sleep may be the desired state (Espie & Wicklow, in press).

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