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THE ROLE OF COGNITIVE PROCESSES IN SLEEP DISTURBANCE: A COMPARISON OF JAPANESE AND ENGLISH UNIVERSITY STUDENTS

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Abstract. The present study investigated the role of cognitive processes in the maintenance of clinically significant sleep disturbance across two cultures. A questionnaire was administered to 60 Japanese and 60 English university students to assess the presence of sleep disturbance, predominance of pre-sleep cognitive activity, use of thought management strategies to control pre-sleep cognitive activity, and the content of pre-sleep cognitive activity. The results indicated that across both cultures poor sleepers attributed their sleep disturbance to the presence of uncontrollable pre-sleep cognitive activity. Minor differences between the Japanese and English samples included the strategies employed to control pre-sleep cognitive activity. The English participants were more likely to engage in reappraisal whereas the Japanese sample were more likely to engage in punishment and worry. These results are suggestive of the cross-cultural applicability of cognitive models of insomnia.

Keywords: Sleep, insomnia, cross-cultural, Japan, England.

Introduction

One of the most widely replicated findings in the insomnia literature is that patients with insomnia report unpleasant and uncontrollable cognitive activity during the pre-sleep period as the cause of their sleep disturbance. Lichstein and Rosenthal (1980) found that people with insomnia are ten times more likely to cite cognitive arousal as central to their sleep difficulties compared to somatic arousal. Espie and colleagues reported

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that the cognitive items of the Sleep Disturbance Questionnaire (SDQ; e.g., ''My mind keeps turning things over, I am unable to empty my mind'') were the most highly rated of the 12 items (Espie, Brooks, & Lindsay, 1989). The latter finding has recently been replicated (Harvey, 2000).

The content of the pre-sleep cognitive activity experienced by people with insomnia has been well documented. Methods to elicit content have included questionnaires (Fichten et al., 1998; Harvey, 2000; Watts, Coyle, & East, 1994) and direct sampling (Kuisk, Bertelson, & Walsh, 1989; Wicklow & Espie, 2000; Van Egeren, Haynes, Franzen, & Hamilton, 1983). Together, these studies indicate that the pre-sleep cognitive activity of insomniacs is negatively toned, concerned with thoughts about sleep, sometimes focused on the perception of body sensations or the external environment, and often involves attempts to plan or problem solve (especially about family, work and recent concerns).

Despite this prior research, we know very little about the strategies people who suffer from sleep disturbance employ to manage their unwanted cognitive activity. Management strategies are crucial variables as many studies, across a range of populations, have demonstrated paradoxical effects associated with attempted suppression of unwanted thoughts (Clark, Ball, & Pape, 1991; Harvey & Bryant, 1998; Salkovskis & Reynolds, 1994; Shipherd & Beck, 1999; Wegner, Schneider, Carter, & White, 1987). There is preliminary support for the applicability of these findings to insomnia. People with insomnia are more likely to report the use of thought suppression compared to good sleepers (Gendron, Blais, & Morin, 1998; Harvey, 2001). Further, in an experimental manipulation, participants instructed to suppress their pre-sleep cognitive activity estimated their sleep onset latency to be longer and their sleep quality to be poorer compared to participants given non-suppression instructions (Harvey, in press, a). People with insomnia are also more likely to employ reappraisal and worry control strategies during the pre-sleep period compared to good sleepers (Harvey, 2001). While reappraisal strategies may effectively solve problems and manage worries during the daytime, engaging in reappraisal and worry during the pre-sleep period is likely to interfere with sleep. Optimal sleep-onset will occur if there is (1) minimal cognitive processing, (2) minimal cognitive drive, (3) minimal effort and (4) minimal affective load (Espie & Wicklow, in press).

The cross-cultural applicability of the observed prominence of cognitive processes in insomnia is limited as the research is based on samples from Australia, Italy, North America and the United Kingdom. The aim of the present study was to extend the knowledge base relating to the role of cognitive processes in those who report problems with sleep across cultures. We recruited Japanese and English college students who were either poor sleepers or good sleepers. Questionnaires designed to index (1) the predominance of pre-sleep cognitive activity, (2) the strategies employed to manage pre-sleep cognitive activity, and (3) the content of cognitive activity during the pre-sleep period were administered. Previous research has indicated the prevalence and some risk factors associated with sleep disturbance in Japan to be almost identical to Western countries (Kageyama et al., 1997; Kim, Uchiyama, Okawa, Liu, & Ogihara, 2000; Motohashi & Takano, 1995; Tachibana, Izumi, Honda, & Takemoto, 1998). However, these studies have not determined the extent to which cognitive processes contribute to maintenance of sleep disturbance in Japan.

Method

Participants

Questionnaires titled ''A questionnaire about your sleep'' were distributed to college students in Japan (Daiichi University) and England (University of Oxford). Daiichi Keizai is a privately funded university on Kyushu Island. The University of Oxford is a state funded university in southern England. The English version of the questionnaire was translated into Japanese by a professional translator working at the International affairs department of Daiichi University. The Japanese version of the questionnaire was checked by an independent official translator to confirm the accuracy and stability of meaning of the original translation. All students were recruited via halls of residence. Students recruited from Daiichi Keizai were either studying economics or teaching. Students recruited from the University of Oxford were studying a broad range of subjects. Recruitment continued until 30 poor sleepers and 30 good sleepers had fully completed the questionnaire at both recruitment sites. Criteria for allocation to the poor sleeper group was a global score of 5 or more on the Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). This cut-off has been found to identify clinically significant sleep disturbance with 89.6% diagnostic sensitivity and 86.5% diagnostic specificity (Buysse et al., 1989; Watts et al., 1994). Criteria for allocation to the good sleeper group was a score of 4 or less on the PSQI. In England, it was necessary to distribute 142 questionnaires to obtain this number of respondents and in Japan it was necessary to distribute 134 questionnaires to obtain this number of respondents.

Procedure

The questionnaire comprised four sections.

Part 1: Participant characteristics. The questionnaire began by asking participants to record their age and sex. Participants then completed the PSQI. This is a 19-item measure of sleep quality, combined into seven component scores that can be summed to yield a global score. Participants were then asked to estimate, for a typical night in the last month, ''to what extent you are satisfied with the amount of time it takes you to fall asleep at night'' (rating scale: 1 ''not at all satisfied'', 10 ''very satisfied''). Participants were then asked to estimate, for a typical morning in the last month ''how do you feel on waking'' (rating scale: 1 ''exhausted'', 10 ''refreshed'') and to rate their sleep quality (rating scale: 1 ''very restless'', 10 ''very sound'').

Part 2: The predominance of pre-sleep cognitive activity. Several indices of pre-sleep mental activity were obtained. The Sleep Disturbance Questionnaire was administered (SDQ; Espie et al., 1989). This is a 12-item scale designed to assess the presence of physical tension, sleep incompatible behaviour, anxious ''effort to sleep'', and cognitive intrusion (see Table 1 for items). The scale has acceptable psychometric properties (Espie, Inglis, Harvey, & Tessier, 2000). Participants were also asked ''how many minutes/hours, on a typical night, would you spend thinking or worrying before you go to sleep'' (Response coded in minutes), the extent to which their ''mind is occupied with these thoughts'' (Rating scale: 1 ''not at all occupied'', 10 ''totally occupied''), how often ''you wake up during the night and find yourself thinking or worrying'' (Response coded in number of nights per

week), and how often ''you find it difficult to get to sleep because of thoughts or worries going through your mind'' (Rating scale: 1 ''never or less than once per month'', 2 ''less than once per week'', 3 ''on 1–2 nights per week'', 4 ''on 3–5 nights per week'', 5 ''every night or almost every night''). Finally, participants were asked to rate ''how often thinking too much keeps you awake'' (Rating scale: 0 ''Never'', 10 ''Every night'').

Part 3: Thought management strategies. As an index of strategies employed to manage pre-sleep cognitive activity the Thought Control Questionnaire-Insomnia (TCQ-I; Harvey, 2001) was administered. This is a revision of the Thought Control Questionnaire (TCQ) as developed by Wells and Davies (1994). The revision was completed to make the questionnaire more relevant to insomniacs and to split the distraction subscale in recognition of the difference between suppression and replacement thought management strategies. The TCQ-I has 6 subscales: suppression, replacement, punishment, reappraisal, social control and worry.

Part 4: Content of pre-sleep cognitive activity. The final section aimed to index the content of pre-sleep cognitive activity. Participants were asked the extent to which they thought about each of 29 topics (listed in Table 5) as they were trying to get to sleep (Response scale: never, sometimes, often, always). The 29 topics were drawn from the literature relating to generalized anxiety disorder (Breithaltz, Westling, & Ost, 1998; Dugas, Freeston, Doucet, Lachance, & Ladoucer, 1995) and have been previously administered to assess the content of pre-sleep cognitive activity among insomniacs (Harvey, 2000).

Results

Except where otherwise specified a 2 (Sleep Status: Poor sleeper vs. Good sleeper) by 2 (Country: Japan vs. English) analysis of variance was conducted.

Part 1: Participant characteristics

There were no differences in the number of males and females (Japanese: Poor sleeper – Males = 10, Females = 20, Good sleepers – Males = 16, Females = 14. English: Poor sleepers – Males = 9, Females = 21, Good sleepers – Males = 11, Females = 19). The English participants were older than the Japanese participants (Japanese: Poor sleeper M = 19.0, SD = 8.2, Good sleepers M = 18.7, SD = 3.8. English: Poor sleeper M = 21.1 SD = 3.4, Good sleepers M = 20.0, SD = 1.5), F (1, 116) = 21.9, $p < .001$. For the PSQI global score, poor sleepers scored higher than good sleepers (Japanese: Poor sleeper M = 8.2, SD = 2.4, Good sleepers M = 3.8, SD = 1.2. English: Poor sleeper M = 8.6, SD = 2.2, Good sleepers M = 3.7, SD = 1.2), F (1, 116) = 187.0, $p < .001$. Poor sleepers had a longer sleep onset latency than good sleepers (Japanese: Poor sleeper M = 36.1 (minutes), SD = 39.9, Good sleepers M = 16.4, SD = 10.1. English: Poor sleeper M = 36.4, SD = 20.1, Good sleepers M = 13.3, SD = 7.9), F (1, 116) = 24.4, $p < .001$. Poor sleepers had a shorter total sleep time than good sleepers (Japanese: Poor sleeper M = 6.3 (hours), SD = 1.7, Good sleepers M = 6.9, SD = 1.5. English: Poor sleeper M = 6.6, SD = 0.9, Good sleepers M = 7.5, SD = 0.7), F (1, 116) = 8.7, p .01. Poor sleepers had a lower sleep efficiency score[1]

[1.] Sleep efficiency (%) = (Number of hours slept/Number of hours spent in bed) × 100.

than good sleepers (Japanese: Poor sleeper $M = 82.7$ (%), $SD = 18.3$, Good sleepers $M = 88.8$, $SD = 18.1$. English: Poor sleeper $M = 79.6$, $SD = 10.0$, Good sleepers $M = 89.8$, $SD = 6.5$), F (1, 116) = 9.5, $p < .01$. Compared to the good sleepers, the poor sleeper group were less satisfied with their sleep onset latency (Japanese: Poor sleeper $M = 5.4$, $SD = 3.3$, Good sleepers $M = 7.0$, $SD = 2.4$. English: Poor sleeper $M = 5.5$, $SD = 2.5$, Good sleepers $M = 8.5$, $SD = 1.6$), F (1, 116) = 24.3, $p < .001$, less refreshed on waking (Japanese: Poor sleeper $M = 4.5$, $SD = 2.5$, Good sleepers $M = 5.6$, $SD = 2.3$. English: Poor sleeper $M = 4.3$, $SD = 2.0$, Good sleepers $M = 6.1$, $SD = 1.7$), F (1, 116) = 13.3, $p < .001$, and reported poorer sleep quality (Japanese: Poor sleeper $M = 5.2$, $SD = 2.6$, Good sleepers $M = 6.4$, $SD = 2.1$. English: Poor sleeper $M = 5.3$, $SD = 1.8$, Good sleepers $M = 7.5$, $SD = 1.5$), F (1, 116) = 21.4, $p < .001$. No country nor interaction effects were observed.

Part 2. The predominance of pre-sleep cognitive activity

Table 1 presents the percentage of poor sleepers who rated each item of the Sleep Disturbance Questionnaire. Averaging the responses to ''Often true'' and ''Very often true'' the three items with the highest percentage of responses for Japanese participants were ''I worry that I won't cope tomorrow if I don't sleep well'' (30%), ''I spend time reading/watching TV when I should be sleeping'' (26%), and ''I am unable to empty my mind'' (26%). The highest percentage of responses for English participants were ''My mind keeps turning things over'' (35%), ''My thinking takes a long time to unwind'' (29%), and ''I am unable to empty my mind'' (28%).

Table 2 presents the mean values for the other questions relating to the predominance of pre-sleep cognitive activity. For time spent worrying during the pre-sleep period, there was a significant main effect for Sleep Status, F (1, 116) = 8.08, $p < .01$, and for Country, F (1, 116) = 5.5, $p < .05$, such that the poor sleepers spent more time worrying during the pre-sleep period than good sleepers and Japanese participants spent more time worrying during the pre-sleep period than the English participants. There was no interaction. There were no significant differences for the extent to which the mind was occupied with thoughts during the pre-sleep period. For the number of awakenings during the night due to cognitive activity, there was a significant Country main effect, F (1, 116) = 5.4, $p < .05$, such that Japanese participants reported more frequent awakenings due to cognitive activity than English participants. There was no Sleep Status main effect or interaction. In terms of the frequency of difficulty getting to sleep due to worry, there was a main effect for Sleep Status, F (1, 116) = 23.1, $p < .001$, such that the poor sleepers had difficulty getting to sleep because of worry more frequently than good sleepers. There was no Country main effect or interaction. For the rating of ''how often thinking too much keeps you awake'' there was a Sleep Status main effect, F (1, 116) = 19.5, $p < .001$, and Country main effect, F (1, 116) = 4.5, $p < .05$. That is, the poor sleepers indicated that cognitive activity keeps them awake more frequently than good sleepers and English participants rated that cognitive activity keeps them awake more frequently than Japanese participants.

Part 3. Thought management strategies

Mean scores for each TCQ-Insomnia subscale are presented in Table 2. There were no significant main effects for the social, replacement or suppression subscales. For the

Table 1. Percentage of poor sleepers responding to each item from the Sleep Disturbance Questionnaire

	Japanese					English				
	Never true	Seldom true	Sometimes true	Often true	Very often true	Never true	Seldom true	Sometimes true	Often true	Very often true
1. I can't get into a comfortable position	17	31	24	17	10	10	21	45	17	7
2. My mind keeps turning things over	10	14	31	21	24	0	7	24	38	31
3. I can't get my sleep pattern into a proper routine	21	21	15	21	21	3	24	24	31	17
4. I get too ''worked up'' at not sleeping	38	35	17	7	3	21	21	31	21	5
5. I find it hard to ''let go'' and relax my body	24	21	28	10	17	17	38	14	28	3
6. My thinking takes a long time to ''unwind''	24	21	24	21	10	3	17	21	41	17
7. I don't feel tired enough at bedtime	24	41	10	21	3	31	35	17	14	3
8. I try too hard to get to sleep	21	17	17	24	21	14	45	21	21	0
9. My body is full of tension	31	38	17	7	7	21	28	35	14	3
10. I'm unable to empty my mind	14	24	10	27	24	7	17	21	35	21
11. I spend time reading/watching TV when I should be sleeping	10	17	21	21	31	31	21	31	3	14
12. I worry that I won't cope tomorrow if I don't sleep well	17	10	14	24	35	3	28	24	31	14

Table 2. Mean scores for the predominance of pre-sleep cognitive activity and each TCQ-Insomnia subscale

	Japanese		English	
Predominance of pre-sleep cognitive activity	Insomnia	Good sleeper	Insomnia	Good sleeper
How many minutes/hours, on a typical night, do you spend thinking or worrying before you go to sleep? (minutes)	54.3 (71.4)	31.7 (35.4)	35.6 (23.7)	14.2 (12.4)
To what extent is your mind occupied with these thoughts? (1 'Not at all occupied, 10 'totally occupied')	6.1 (3.1)	6.1 (2.6)	7.0 (1.8)	6.1 (1.9)
How often do you wake up during the night and find yourself thinking or worrying? (number of nights per week)	1.3 (2.2)	0.9 (1.6)	0.5 (0.9)	0.4 (1.0)
How often do you find it difficult to get to sleep because of thoughts or worries going through your mind?*	2.4 (1.3)	1.8 (0.8)	3.0 (1.0)	1.9 (0.7)
How often does thinking too much keep you awake? (0 'Never, 10 'Every night')	4.8 (2.9)	3.7 (2.6)	9.6 (2.2)	3.8 (1.5)
TCQ-Insomnia subscale				
Suppression	46.6 (13.5)	47.4 (12.2)	52.9 (13.8)	49.1 (9.8)
Social	61.1 (12.3)	58.4 (9.8)	59.6 (17.2)	55.4 (15.2)
Re-appraisal	52.1 (17.3)	43.9 (13.8)	54.8 (13.7)	53.0 (12.6)
Worry	50.6 (18.1)	44.3 (13.2)	34.7 (8.5)	36.1 (7.9)
Punishment	36.1 (12.2)	37.4 (14.0)	34.1 (7.6)	31.6 (7.3)
Replacement	51.2 (12.5)	48.7 (10.5)	52.1 (13.4)	51.0 (10.8)

Note. Standard deviations appear in parentheses.

* Rating scale = 1 ''never or less than once a month'', 2 ''less than once per week'', 3 ''on 1–2 nights per week'', 4 ''on 3–5 nights per week'', 5 ''every night or almost every''

reappraisal subscale there was a significant Country main effect, F (1, 116) = 4.66, $p < .05$, such that the English participants were more likely to engage in reappraisal than the Japanese participants. There was no Sleep Status main effect or interaction. For the worry subscale there was a Country main effect, F (1, 116) = 25.8, $p < .001$, such that the Japanese participants reported worrying more than the English participants. There was no Sleep Status main effect and no interaction. For the punishment subscale there was a Country main effect, F (1, 116) = 3.88, $p < .05$, such that Japanese participants reported using punishment strategies more than English participants. There was no Sleep Status main effect or interaction.

Part 4: The content of pre-sleep cognitive activity

Table 3 presents the percentage of Japanese and English poor sleepers endorsing each item on the Content of Pre-Sleep Cognitive Activity Questionnaire. A Bonferoni adjustment was applied ($p < .01$) to control for multiple *t*-test. Poor sleepers in England were more likely to think about ''work'', ''study'', ''illness in others'', and ''the future'' compared to Japanese participants. They were also more likely to go ''over things that happened today in detail'' and ''over things that will happen tomorrow in detail'' compared with the Japanese participants.

Discussion

The aim of the present study was to investigate the role of cognitive processes in the maintenance of sleep disturbance across cultures. The first variable investigated was the predominance of cognitive activity. The most frequently endorsed items of the SDQ indicate that poor sleepers, across the two samples, attribute their sleep disturbance to the presence of unwanted cognitive activity. The only exception was that the second most commonly endorsed response by Japanese participants was ''I spend time reading/watching TV when I should be sleeping''. Notably, this item was one of the least endorsed items among English participants. This finding is consistent with the observation that short sleep duration in young Japanese people may be explained, at least in part, by engaging in nocturnal activities (Liu, et al., 2000). Endorsing the SDQ findings, poor sleepers from both countries reported (1) spending more time worrying during the pre-sleep period, (2) having more difficulty getting to sleep due to worry, and (3) that cognitive activity keeps them awake more frequently compared to good sleepers. Together, these findings highlight the predominance of pre-sleep cognitive activity among poor sleepers in both the Japanese and English samples. The findings are also consistent with previous research that indicates similarity across cultures in rate and risk factors for poor sleepers (Kageyama et al., 1997; Kim et al., 2000; Motohashi & Takano, 1995; Tachibana et al., 1998).

The Content of Pre-Sleep Cognitive Activity Questionnaire was remarkable for the minimal differences between the Japanese and English samples. The two groups differed on only six variables. Specifically, the English participants reported thinking about work, study, illness in others, the future, things that happened today, and things that will happen tomorrow more than the Japanese participants. The SDQ findings suggest one possible account of the differences observed; perhaps participants in the Japanese sample distract from concerns about work, study and things that will happen tomorrow by reading or watching TV in bed. It should also be noted that the Content of Pre-sleep Cognitive Activity Questionnaire was developed in North America and Britain and it is therefore possible that it better reflects those cultures. It is possible that items most relevant to Japanese participants were not included in the assessment protocol.

There were some interesting differences between the Japanese and English samples. The Japanese participants reported waking ''throughout the night'' because of excessive cognitive activity whereas the English participants reported pre-sleep cognitive activity to interfere with ''getting to sleep''. In other words, while the predominance of cognitive activity occurs within both cultures the specific manifestations may be culturally influenced. There were also differences according to the country of origin in terms of the strategies employed to

Table 3. Percentage of poor sleepers endorsing items on the Content of Pre-Sleep Cognitive Activity Questionnaire

	Japanese %				English %				χ^2 (N = 120, ds = 3)
	Never	Sometimes	Often	Always	Never	Sometimes	Often	Always	
Work	55	35	3	7	17	31	45	7	16.1*
Study	41	45	10	3	3	21	69	7	24.8*
A conflict/argument I am having	38	31	24	7	17	41	38	3	3.9
The health of loved ones	31	48	14	7	24	52	24	0	3.1
My health	41	35	17	7	35	38	24	3	0.9
Death	59	24	10	7	59	28	14	0	2.2
Not sleeping	45	21	21	14	24	52	21	3	7.6
My intimate relationships	35	35	21	10	10	31	45	14	6.5
Sex	45	35	17	3	31	41	21	7	1.3
My general personal relationships	38	35	24	3	7	35	55	3	9.8
Finances	24	38	21	17	28	45	24	3	2.9
Existential issues	52	31	10	7	52	28	17	3	0.8
''If only'' situations	41	21	21	17	17	45	38	0	9.9
Illness in myself	66	28	7	0	45	41	14	0	2.6
Illness in others	66	24	3	7	31	51	17	0	11.1*
Injury/sickness in myself	79	21	0	0	45	41	14	0	8.8
Injury/sickness in others	62	35	0	3	38	48	14	0	7.4
The future	17	31	17	35	7	17	59	17	10.6*
I worry about worrying so much	31	24	10	35	48	31	14	7	8.6
Safety/security of myself	45	35	10	10	31	38	31	0	6.8
Safety/security of others	45	31	10	14	45	38	17	0	4.7
Physical appearance	45	35	7	14	35	45	17	3	3.9
Time	24	48	21	5	31	28	38	3	3.7
Minor everyday concerns	42	38	7	14	24	45	28	3	6.9
Socio-political issues	69	25	7	0	69	24	7	0	0.0
Relationships with family/friends	14	41	28	17	3	45	41	10	3.1
Being lonely	35	35	17	14	35	45	21	0	4.5
Going over things that happened today in detail	35	45	14	7	3	55	35	7	10.3*
Going over things that will happen tomorrow in detail	38	35	10	17	7	55	35	3	14.1*

Note. Standard deviations appear in parentheses.
* $p < .01$, ** $p < .001$

manage pre-sleep cognitive activity. English participants were more likely to report using reappraisal strategies to manage their pre-sleep cognitive activity whereas Japanese participants were more likely to report using worry and punishment strategies. The absence of differences between the poor and good sleeping groups for thought control strategies was surprising. Previously, engaging in suppression, reappraisal and worry during the pre-sleep period have been associated with insomnia (Harvey, 2001). It is likely that the poor sleeper sample employed in the present study was less severe than that employed in the previous study where only those participants who met diagnostic criteria for insomnia, based on a clinician administered structured interview, were included.

There are several limitations to the present study. First, allocation to the poor sleeper group was made on the basis of the PSQI. While this questionnaire has been shown to accurately diagnose clinically significant sleep disturbance with high sensitivity and specificity, it is not possible in the present study to differentiate between different types of sleep disturbance (e.g., primary insomnia vs. delayed sleep phase syndrome). Second, while the college student sample has the advantage of ease of access and homogeneity, it is not necessarily representative of insomnia in the general adult population. Importantly, this study presents a cross-cultural comparison. As such, the samples should ideally be closely matched on pertinent variables and be representative of the population being studied. Clearly, in the present study bias may have been introduced as a result of differences between the samples in age (the English sample being older than the Japanese sample) and socio-economic status (the Japanese university, from which the sample was drawn, is fee-paying whereas the English university has minimal fees). Future research should aim for a larger, more representative sample and should endeavour to match for demographic variables including socio-economic status and age. Third, the measures used were developed in Britain and North America and are therefore likely to represent that cultural bias. Finally, significant associations between sleep disturbance and excessive pre-sleep cognitive activity do not necessarily imply causality. It is possible that cognitive activity is merely epiphemenal to sleeplessness (Freedman & Sattler, 1982). However, experimental studies where cognitive activity is manipulated suggest excessive cognitive activity is an important maintaining process (Ansfield, Wegner, & Bowser, 1996; Gross & Borkovec, 1982).

In conclusion, consistent with previous findings (Kageyama et al., 1997; Kim et al., 2000; Motohashi & Takano, 1995; Tachibana et al., 1998) minimal differences were observed between the Japanese and English samples. Across both samples poor sleepers attributed their sleep disturbance to the presence of uncontrollable pre-sleep cognitive activity. These findings provide preliminary support for the prominence of cognitive processes cross-culturally and raise the possibility that cognitive models of insomnia may provide an explanation of the disorder across a variety of cultural contexts (Borkovec, 1982; Espie, 1991; Harvey, in press, b; Lundh, 1998; Morin, 1993).

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