online © ML Comm

ORIGINAL ARTICLE

pISSN 2093-9175 / eISSN 2233-8853
Sleep Med Res 2013;4(2):43-50

A Pilot Study Investigating Differences in Sleep and Life Preoccupations in Chronic and Acute Insomnia

Samantha Man, PhD[1,3], Mark Freeston, PhD[2], Jason. G. Ellis, PhD[3], David. R. Lee, PhD[4]

[1]School of Psychology, Newcastle University, Newcastle upon Tyne, UK
[2]Institute of Neuroscience, Newcastle University, Newcastle upon Tyne, UK
[3]Northumbria Centre for Sleep Research, Northumbria University, Newcastle upon Tyne, UK
[4]Sleep Unlimited Ltd, County Durham, UK

Background and Objective Theory suggests that during the transition from acute to chronic insomnia a shift in attention, from life events to sleep difficulties, occurs. The aim of this study was to examine whether this shift indeed exists, by measuring the frequency and type of preoccupations in acute and chronic insomnia.

Methods Using a cross-sectional design, two groups [people with acute insomnia (n = 11) and chronic insomnia (n = 20)] completed a series of standardized and semi-idiosyncratic measures daily, over the period of one week. They also wore actigraphs to provide objective measures of sleep parameters.

Results Findings suggest no differences in preoccupation between the two groups but show the acute insomnia group report significantly higher levels of perceived stress. Exploratory analysis suggests a reduction in scores on standardized measures across all participants between time 1 and time 2, and no differences on objectively measured sleep parameters.

Conclusions Results indicate there is no difference between people with acute and chronic insomnia in level, and type, of reported preoccupation and that people with acute insomnia are as preoccupied during the day by both sleep and life events, as people with chronic insomnia. Limitations are discussed and future research questions are considered. **Sleep Med Res 2013;4(2):43-50**

Key Words Acute insomnia, Adjustment insomnia, Chronic insomnia, Preoccupation, Stress.

INTRODUCTION

Despite little research attention the concept of acute insomnia (AI) has been around for over two decades and is a phenomenon which during the life-course is commonly experienced.[1] Estimates indicate that prevalence of AI in the UK may be 7.9% (with an annual incidence of between 31.2% and 36.6%) with transition rates to chronic insomnia (CI) of approximately 21.43%.[2] AI was recently conceptualized in line with the proposed DSM-5 criteria for Insomnia Disorder differing only by duration (between 3 days and 3 months) and the presence of a triggering event or series of events.[3]

Although several theoretical models have attempted to describe the maintenance of insomnia, over time very few have detailed the development of acute insomnia and the factors that presage transition from acute to chronic insomnia. Most notably, the"3P" Model[4] proposes that individuals possess a level of premorbid disposition (biological, social or psychological) towards sleep difficulties. Furthermore, due to a triggering event, often associated with life stress, certain individuals will begin to experience AI. This is supported by evidence that 74% of people could recall a life event relating to onset of insomnia[5] and that stressors (health, relationships, work) have been the most commonly associated factors with the onset of insomnia.[6] Further, the attention-intention-effort (A-I-E) pathway illustrated the progression from 'adjustment insomnia' (or acute insomnia) to 'psychophysiologic insomnia' (or chronic insomnia).[7] Taking a starting point that insomnia is precipitated by life event stress, the model posits that

Received: August 23, 2013
Revised: February 4, 2014
Accepted: October 17, 2014

Correspondence
Samantha Man, PhD
School of Psychology,
Newcastle University,
4th Floor, Ridley Building 1,
Queen Victoria Road,
Newcastle upon Tyne,
NE1 7RU, UK
Tel +44-191-222-7925
Fax +44-191-208-7520
E-mail Sammy.man@ntw.nhs.uk

during adjustment insomnia attentional resources are directed towards the source of the stress, resulting in stressor-related preoccupation and associated sleep difficulties. When the stress associated with the event reduces some people return to normal sleep, whilst for others a shift in their attention and preoccupations towards their on-going sleep difficulties marks the transition from acute to chronic insomnia.

Evidence to support this model has mainly come from experiments using attention-bias paradigms such as; the emotional Stroop, dot-probe task, and flicker-task. These show that people with chronic insomnia demonstrate an attention-bias towards sleep-related cues compared to people without insomnia.[8] Interestingly, a later study examined sleep-related attention biases in two groups of people diagnosed with cancer; one group had acute insomnia (0−3 months) and the other had persistent (12−18 months) insomnia. This study demonstrates that sleep-related cues elicit a higher attention bias to sleep-related words compared to people with acute insomnia.[9] Evidence surrounding sleep-related preoccupation in insomnia is more limited, although one study found differences in sleep-related preoccupations between good, average and poor sleepers.[10] To date sleep preoccupation has not been examined within the context of acute insomnia.

The primary aim of this study is to examine the AIE model in terms of the nature of preoccupation in people with AI compared to CI. The secondary aim is to investigate the relative differences between people with AI and CI in their subjective reporting of sleep preoccupation and sleep monitoring.

It was hypothesised that people with CI will show comparatively more sleep-related preoccupation than life-event preoccupation, relative to people with AI, who will show relatively more life-event preoccupation than sleep preoccupation over the course of a 24 hour period. Exploratory analysis will be undertaken to explore the difference in sleep quality between people with AI and CI using objective measures.

METHODS

Recruitment

Recruitment took place at the Northumbria Centre for Sleep Research via local advertising which asked for volunteers over the age of 18 who had "trouble sleeping" for 3 nights a week or more, for a period of 2 weeks or longer. An information sheet outlining participation requirements and demands was made available for potential participants. Written consent was obtained from all participants and those not meeting inclusion criteria were provided with sleep information and advised to seek support from general practioner regarding ongoing sleep concerns. This project received a favourable ethical opinion from Newcastle University Ethics Committee, who also provided indemnity cover.

Participants

Of the 105 people who responded to the advertisement, 44 (41.91%) made no further contact after the information sheet was sent out. During a second round of recruitment for people with AI, 24 people reporting CI were excluded. 38 people were invited to complete further screening, of which 8 were excluded for the following reasons: travel across two time zones in the preceding weeks (n = 1), cancelling the appointment (n = 4) and possible caseness for current or recent psychiatric disorder (n = 3). The latter was assessed via the Hospital Anxiety and Depression Scale[11] and clinical interview.

Procedure

Participants who expressed an interest in the study were invited to a screening appointment and were told that the aim of the study was to investigate different types of worries and thoughts in people with insomnia. Based on initial screening interview with a trained psychologist, participants who met Research Diagnostic Criteria for Primary Insomnia[12] were selected for inclusion in this study. This criterion was that individuals reported either; difficulty initiating sleep, maintaining sleep or waking up too early or feeling unrefreshed despite adequate opportunity to sleep. Furthermore participants should report daytime impairment related to poor sleep e.g. daytime sleepiness, fatigue, attention, concentration difficulty. Inclusion was subject to successful screening assessment that there was no current psychiatric or mood disorder or other sleep disorder or be the result of substance abuse. Participants were allocated to the AI group if they were reporting sleep difficulties for 2 weeks to 3 months, and to the CI group if they were reporting sleep difficulties for 6 months or longer. Temporal distinctions for those with chronic insomnia was based on the International Classification of Sleep Disorders which stipulates duration criteria as 6 months or longer for CI. Although AI is considered in a number of theoretical models it has not yet been defined in any nosolgies. The cut-off of two weeks to 3 months was used based on a previously stipulated cut off for transient insomnia which affects most people at one time or another, and which would normally resolve when the stressor recedes.[3,13] Once all screening criteria were satisfied participants then completed a battery of four standardized questionnaires. Participants were given a diary to complete once each evening, for seven days and an actigraph watch to wear each night in bed for seven nights. Following the seven-day data collection period participants returned the diary and completed three of the standardized questionnaires again. Participants were provided debrief information, given an opportunity to ask questions and received a sleep information package.

Measures

Screening questionnaire to obtain details of sleep problems and screen out for other sleep disorders; further details of this

can be found in a separate paper.[2]

The Hospital Anxiety and Depression Scale (HADS)[11] is a validated and widely used 14-item self-report measure for symptom severity and 'caseness' of anxiety and depression.

Insomnia Severity Index (ISI)[13] is a measure which has been shown to be a reliable and valid method of quantifying perceived insomnia severity across a range of population samples.[14]

Two types of primary measures were used to collect data; standardized questionnaires and semi-idiosyncratic diaries.

Sleep Associated Monitoring Index (SAMI)[15] is a self-report measure of sleep preoccupation. Respondents are asked to rate on a five-point scale (ranging from 1 = Not at all to 5 = All the time) items which include "before or as you go to bed how often do you calculate the number of hours sleep you hope to get?" and "throughout the day how often are you aware of your concentration being affected by your sleep (or lack of)?"

Sleep Preoccupation Scale (SPS)[10] was used to measure frequency of daytime sleep related preoccupation based on a 7-point scale (ranging from 0 = never to 7 = all the time). Example items include "I feel anxious about what will happen when I try to sleep tonight" and "I have a lie-in after a bad night's sleep".

Worry Domains Questionnaire (WDQ)[16] was used as a content-based measure of non-pathological worry across five domains; relationships, lack of confidence, aimless future, work and finances. Respondents were asked to rate on a 5-point scale (ranging from 'not at all' to 'extremely') how much they worried about each of the items. Example items include "I worry that my money will run out" and "I worry that I feel insecure". It is a scale that assesses both the negative and positive aspects of worry.

Perceived Stress Scale (PSS)[17,18] was used to obtain a measure of the degree to which individuals appraised situations in their life as stressful. This measure was only obtained on Day 1 and was not repeated with the other standardized measures.

A semi-idiosyncratic diary was developed for this study, and comprises a 16 item self-report scale which asked respondents to rate frequency of thoughts over the previous 24 hour period. The scale is made up of four subscales relating to work, interpersonal relationships, sleep and finances, these correspond to the domains in the WDQ[16] and daytime thoughts of sleep which the literature posits as relevant.[10,19] Respondents are asked to rate on a five-point scale (ranging from 'Not at all' to 'Constantly'). The scale takes approximately 3–4 minutes to complete. The diary did not ask about actual sleep.

Actigraphy (AW4: Cambridge Neurotechnology) was used as an objective measure of sleep. Epoch length was set at one minute. Participants were asked to wear the actiwatch at night time for 7 nights, setting markers on 'lights out' and 'lights on' in order to set markers for time spent in bed.

Power

An apriori power calculation was completed using previous data[10] with the closest approximation of sleeper groups ("average" and "poor"). This was chosen in the absence of a comparable study with AI and CI groups. An apriori, repeated measures within-between interaction compared average sleepers (M = 45.39; SD = 17.23) and poor sleepers (M = 57.23; SD = 22.61) scores on the SPS yielding a medium effect size (ES) of d = 0.59. Based on $\alpha = 0.05$, and desired power at 0.8 the total sample size needed would be 74; 37 in each group. However, as the main hypothesis is based on an interactional hypothesis postulating a medium ES (in the same range of effect as previously published ES[10]), a desired power of 0.8 and based on two measures with a medium-large correlation of 0.4; the total sample size required would be 40, 20 per group.

RESULTS

Given the smaller sample size of the AI group, an a priori decision was made to set alpha at 0.10 in order to reduce the change of making a Type II error. As such, confidence intervals of 90% have been used. Random number generation was used to replace missing values (n = 4, < 0.1%). Analyses of distributions revealed a number of dependent variables were significantly skewed. Data from one participant (AI) was excluded from analysis due to scores on standardized measures ranging between 0.5 to 2 standard deviations higher than the rest of the group. A winsorizing strategy (2.1% of individual scores) was employed to manage outliers, in order to minimise any effects of inflated variance.

Group Characteristics

The final sample consisted of 31 participants; ten in the AI group (10 females) and twenty in the CI group (11 males and 9 females). Average age in CI group was 35 years (SD = 10.5, range 24–62 years) with average length of sleep difficulties of 74 months (range: 5 months–20 years) and average reported sleep length of 5 hours (range: 3.5–6.5 hours). Ninety percent of participants were of white ethnic origin with 80% in full-time work. In the AI group the average age of participants was 42 years (SD = 11.6, range: 20–55 years) with average length of sleep difficulties of 2.5 months (ranging from 4 weeks to 3 months) and an average reported sleep length of 5 hours (range: 4–6 hours). 100% of participants were of white ethnic origin and 81% were in full-time work.

Table 1 shows the means, standard deviations, range and maximum possible scores on questionnaire items for participant demographics, depression and anxiety scores, insomnia severity and perceived stress. Independent-samples t-tests revealed the groups did not differ on perception of sleep quantity, anxiety, depression or severity of insomnia reported. There was

a small effect size on the HADS-Anxiety (r = 0.15), HADS-Depression (r = 0.14), and ISI (r = 0.11), indicating higher levels of anxiety, depression and insomnia severity in the CI group. The CI group was significantly higher on the PSS with a medium to large effect size,[20] t (28) = 2.46, p = 0.2, r = 0.4.

Actigraphy data was extracted using the Actiwatch Activity and Sleep Analysis 7 programme (Cambridge Neurotechnology Version 7.23). Consistent with guidelines where a minimum of 5 nights provides aggregate measures which more reliably characterize participants,[21] those who recorded markers (identified time to bed and time out of bed) on 5 nights or more were included in the actigraphy analysis. 4 participants were excluded due to no markers at all (n = 3) and only 3 nights (n = 1). Median number of actigraphy nights recorded was 7 for both CI group (n = 17) and AI group (n = 9). Table 2 shows the means and range of recorded sleep parameters. Independent-samples t-test was conducted to compare AI and CI groups and there were no significant differences. Effect size (r) was trivial for all sleep parameters, suggesting any differences, which may be there but are undetected, are unlikely to be great clinical interest.

Preliminary Analyses

Preliminary analyses of the daily diary data were carried out using repeated measures analysis of variance (ANOVA). All of

Table 1. Descriptive data, t-test and effect sizes for chronic insomnia (CI) and acute insomnia (AI) group on screening measures

Variable	Descriptive	CI (n = 20)	AI (n = 10)	t-test (df)	p-value	Effect size (r)
Hospital Anxiety and Depression Scale (anxiety)	Mean (SD)	9.10 (3.75)	10.30 (3.86)	0.82 (28)	0.42	0.15
	Range (max 21)	2–16	6–18			
	Confidence interval (90%)	7.7–10.6	8.1–12.5			
Hospital Anxiety and Depression Scale (depression)	Mean (SD)	4.15 (2.87)	4.90 (2.23)	0.72 (28)	0.48	0.14
	Range (max 21)	0–9	1–8			
	Confidence interval (90%)	3.0–5.3	3.6–6.2			
Perceived Stress Scale	Mean (SD)	16.15 (6.05)	21.60 (4.95)	2.46 (28)	0.02*	0.42
	Range (max 40)	3–28	15–29			
	Confidence interval (90%)	13.8–18.5	18.7–24.5			
Insomnia Severity Index	Mean (SD)	15.55 (4.15)	16.50 (4.19)	0.59 (28)	0.49	0.11
	Range (max 28)	10–23	11–23			
	Confidence interval (90%)	14.0–17.2	14.1–18.9			

*p < 0.10.

Table 2. Means and range of actual sleep, actual wake, sleep efficiency, sleep latency and fragmentation

Variable	Descriptive	CI (n = 20)	AI (n = 10)	t-test (df)	p-value	Effect size (r)
Actual sleep	Mean	06:33	06:40	-0.410 (24)	0.685	0.08
	Range	04:52–07:45	05:12–08:28			
	Confidence interval (90%)	06:10–06:56	06:01–07:18			
Actual wake	Mean	00:51	00:59	-0.307* (11.59)	0.764	0.09
	Range	00:12–01:46	00:12–02:10			
	Confidence interval (90%)	00:42–01:01	00:35–01:22			
Sleep efficiency	Mean	84.91%	83.6%	0.251 (24)	0.804	0.05
	Range	62.9–96.87%	64.56–96.46%			
	Confidence interval (90%)	81.79–88.03%	77.07–90.13%			
Sleep latency	Mean	00:14	00:12	-0.265 (24)	0.794	0.05
	Range	00:00–01:05	00:02–00:30			
	Confidence interval (90%)	00:06–00:22	00:04–00:19			
Fragmentation	Mean	29.61	31.82	-0.385 (24)	0.704	0.08
	Range	13.45–49.68	18.30–58.03			
	Confidence interval (90%)	25.63–33.50	24.06–39.58			

*Variance not assumed.
CI: chronic insomnia, AI: acute insomnia.

the interactions were non-significant, indicating that any differences did not vary as a function of group: Day × Group (F = 1.46, 0 = 0.22), Diary type × Group (F = 0.16, p = 0.69), Diary type × day (F = 0.538, p = 0.78) and Diary type × Day × Group (F = 0.946, p = 0.46). A small to medium ES ($\eta^2 = 0.04$) on the Diary type × day × group interaction suggests that any differences are unlikely to be of great importance. Therefore the mean scores for Preoccupation and Sleep data across the seven days were collapsed (averaged) in order to run the main analyses.

Main Analyses: Differences in Preoccupation Type

A mixed-design ANOVA was carried out with Group × measure type × preoccupation type, for comparison raw scores were converted to z-scores for analyses, however raw scores are reported (Table 3). Summary output data for interaction effects is shown in Table 4. The main hypothesis of an interaction between preoccupation type and group was not supported [F(1, 28) = 0.033, p = 0.57]; given the small effect size for this interaction ($\eta^2 = 0.01$) and with 15% power and $\alpha = 0.1$, the effect is unlikely to be of clinical significance. All other main effects and interactions returned non-significant results ($F \leq 0.059$, $p \geq 0.78$). Effect sizes were all effectively zero ($\eta^2 \leq 0.003$).

In summary, there was no interaction of preoccupation × group as hypothesised. That is, relative to each other the groups do not show significantly different types of preoccupation, nor do they report significantly different amounts of preoccupation. There was also no significant main effect of measure type or preoccupation, suggesting that how we measure preoccupation (one-off standardized questionnaires vs. daily diary) may be inconsequential and produced similar results in this context.

Table 3. Mean total scores and standard deviations for standardized and daily diary measures

	Chronic insomnia (n = 20)	Acute insomnia (n = 10)
Standardized measures		
Life preoccupation (Worry domains questionnaire) (Mean total scores)	20.75 (13.79)	21.7 (6.57)
Sleep preoccupation (Sleep preoccupation scale) (Mean total scores)	63.6 (20.91)	67.9 (12.71)
Daily diary measures		
Life preoccupation (12 items)		
Mean total score	7.65 (5.06)	8.25 (5.22)
Mean item score	0.65 (0.44)	0.71 (0.47)
Sleep preoccupation (4 items)		
Mean total score	4.63 (2.32)	5.0 (1.92)
Mean item score	1.16 (0.58)	1.18 (0.36)

Effect of monitoring

Repeated measures ANOVA was carried out with two within-subjects factors of time point (Time 1 vs. Time 2 corresponding to the seven-day data collection period) and measure (WDQ, SAMI, and SPS) and a between-subjects factor of group (chronic vs. acute). In order to compare the measures directly, raw scores were converted to z-scores and these were used for analyses, however raw scores are reported to facilitate interpretation; these are shown in Table 5. Summary output data for interaction effects is shown in Table 4.

There was a main effect of time, F(1, 28) = 9.64, p = 0.004, with a large effect size, $\eta^2 = 0.26$, indicating a reduction between the start and the end of the measurement across the three measures. There was no significant interaction effect of time × group, F(1, 28) = 2.63, p= 0.12, however there was a medium to large effect size $\eta^2 = 0.09$. The interaction of time × measure × group, F(2, 56) = 0.555, p = 0.58 was non-significant with a small effect size $\eta^2 = 0.019$ and all other main effects and interactions returned non-significant results, $F \leq 0.91$, $p \geq 0.41$. In summary, the significant main effect of time indicates that irrespective of group, participant's scores did change over the seven days and on inspection of mean scores this was illustrated by a reduction on all measures in both groups. The medium to large ES of time × group suggests that there may be an undetected effect of potential interest.

Table 4. Summary table of analysis of variance (ANOVA) output of interactions on main analyses and effect of monitoring

ANOVA	Within-subject effect interactions	F	p-value	Effect size (η^2)
Preoccupation type × measure type × group	Measure type × group	0.059	0.81	0.002
	Preoccupation type × group	0.333	0.57	0.012
	Measure type × preoccupation type	0.008	0.93	0.000
	Measure type × preoccupation type × group	0.008	0.78	0.003
Effect of monitoring (time 1 vs. time 2 on standardized measures)	Time × group	2.631	0.17	0.086
	Measure type × group	0.049	0.92	0.002
	Time × measure type*	0.909	0.41	0.031
	Time × measure type × group*	0.555	0.58	0.019

*Greenhouse-Geisser correction applied.

Table 5. Mean total scores and standard deviations on WDQ, SAMI, SPS and subscales of SPS from time 1 to time 2

	Worry Domains Questionnaire (WDQ)		Sleep Preoccupation Scale (SPS)		Sleep Associated Monitoring Index (SAMI)		SPS-cognitive subscale mean item score (8 items)		SPS-behavioural subscale mean item score (16 items)	
	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2	Time 1	Time 2
Chronic (n = 20)	20.75	19.5	63.6	62.05	83.8	80.4	3.19	2.99	2.64	2.65
	(13.79)	(12.40)	(20.91)	(22.28)	(22.14)	(21.0)	(1.31)	(1.29)	(1.07)	(1.16)
Acute (n = 10)	21.7	18	67.9	61.5	91.9	77.1	3.19	2.98	3.04	2.76
	(6.57)	(10.85)	(12.71)	(16.11)	(22.62)	(13.25)	(1.00)	(0.89)	(0.67)	(0.80)

Time 1 is on Day one of testing, Time 2 is following 7 day of data collection when participants returned equipment.

Further Analysis

Due to unbalanced gender representation (AI = 100% female), the main analyses described above were repeated with only female CI participants, however the patterns of results did not alter. As there was no interaction effect of diary type × day × group [$F(3.97, 59.48) = 0.574$, $p = 0.681$] the mean daily diary scores across all seven days were collapsed. There was no difference in the patterns of results by gender, that is, there were no interaction effects of measure type × group ($F = 0.000$, $p = 0.99$), preoccupation type × group ($F = 0.076$, $p = 0.79$), measure type × preoccupation type ($F = 0.000$, $p = 0.99$) or measure type × preoccupation type × group ($F = 0.256$, $p = 0.620$).

DISCUSSION

The main hypothesis was that if people with CI have an attention bias towards sleep-related cues[8,9] then it would follow that their preoccupations would be about sleep and not life-event stress. Similarly if, as Spielman's[4] theory suggests, 'life stress' precipitates the onset of sleep problems; then we might expect the AI group to show preoccupation with life events where their attention is focused, and not with sleep. Results show there was no difference between the two groups on type or level of preoccupation and thus, the main hypothesis was not supported. Exploratory analysis looking at the objective sleep quality of participants in both groups showed there was no difference on a number of sleep parameters. Furthermore, irrespective of group, there was a significant difference in scores on standardized measures (SAMI, SPS, and WDQ) between Time 1 and Time 2 and despite non-significant results on the interaction of time × group, the medium-large ES suggests that if adequately powered there may be a group effect between Time 1 and Time 2. The significant difference between groups on PSS scores however lends support to the Spielman theory, as the AI group reported significantly higher perceived levels of stress.

The results provide preliminary evidence about the types of cognitions that people experience in the first few months of insomnia. In the A-I-E model[7] it is proposed that people with adjustment insomnia may be "incubating an insomnia response". This implies that during the acute phase individuals who are dealing with their life stress event are unwittingly starting to show behaviours and/or cognitions associated with insomnia. If this inference is correct, the fact that the AI group is reporting sleep preoccupations to the same degree as CI, less than 3 months after onset, suggests that the 'incubation' response may be occurring earlier than this point. As both groups reported the same level of preoccupation about sleep and life events but the AI group had significantly higher stress, this lends support to the suggestion that it is not the number of stressful events, but the perceived level of stress that precipitates insomnia.[2,22] Higher perceived stress in the AI group appears consistent with Spielman's model[4] and evidence about precipitants to insomnia.[5,6] Findings from the exploratory analysis suggest that despite no objective difference in sleep quality or quantity, there may be a difference in perception of sleep. Evidence suggests that in people with CI, distorted perception of sleep is one of the perpetuating factors in the maintenance of insomnia[19] and improves when people are provided feedback about their sleep quality[23] and if they monitor sleep as it leads to an "enhanced awareness";[13] potentially an intervention which could be applied to people with AI.

As this study was underpowered, non-significant results may be a result of 'failure to detect' however, a number of steps taken in the study design show it was appropriately robust against erroneous results based on design error. Firstly, the effect sizes (on interactions relating to the primary hypothesis) were so small that it is unlikely that, if the target sample numbers had been met, a more substantial effect would have been observed or of clinical significance. Secondly, the criteria applied ensured groups were sufficiently distinct in terms of duration of symptoms; the groups did not differ in terms of severity of insomnia. Thirdly, the study design was strengthened by including two ways of measuring both life event and sleep related preoccupation (semi-idiosyncratic daily measure and standardized measures). Results indicated no difference between the types of measurement used suggesting the results were not a result of flawed measurement or the limitations of using a newly developed measure. Finally, the a priori decision to adjust alpha increased the possibility of a Type I error, as the effect sizes were effectively zero in the analysis the decision is unlikely to have an effect and this was further supported by visual inspection of the

means which showed little difference between groups.

Limitations to the population sample used in this study also exist. Although the sample size for the CI group was sufficient according to the apriori power calculation, the AI group was relatively small. Results show that the AI group reported significantly higher levels of stress which might also suggest that more generally people with AI may be less amenable to taking part in research. Consequently by their very nature they are a difficult to recruit sample, hence why this population was not previously been studied in this context. Although it has consistently been shown that females report higher prevalence of insomnia[24] and despite there being no published data on the prevalence of acute insomnia according to gender, somewhat surprisingly the AI group was exclusively female. The fact that no males experiencing acute insomnia responded to the advertisement (despite males with CI responding, which indicates that the advertisement was reaching both genders) is an interesting finding in itself. Comparing matched samples showed no difference to the results; however this is not considered a substitute for the need to replicate results with a larger sample and balanced gender representation across groups. Similarly within-group variability in age is not considered to be a significant limitation in this study as there was no significant difference between group variability, however evidence shows that insomnia is more prevalent in older people and future studies could consider grouping participants by age range. Recruitment methods employed also meant that participants were subject to a self-selection bias and although not a fully representative sample of the insomnia population, could be considered to reflect a treatment-seeking population. Furthermore, participants were responding directly to a call for people having difficulties sleeping, therefore more likely to be attending to sleep and this may have inflated the endorsement of sleep preoccupation items, particularly in the AI group.

Preliminary evidence suggests that further research using a longitudinal design would be warranted and could provide important data on the role of preoccupations over the progression of insomnia. Two potentially interesting areas for future research are; exploring the relationships between type of stress, preoccupation and insomnia; and the role of perception, monitoring and sleep in people with AI. This would extend the work which has already been done with CI and may help develop treatments for people with AI.

Findings from this study raise two tentative questions of interest. Firstly, given that preoccupation did not differ as a function of group then it raises a question about when, during the acute episode, it would be indicated to initiate treatment[1] given that people with AI are already showing cognitions which are believed to perpetuate the cycle of insomnia and lead to chronicity. Examining the potential effectiveness and thus the cost-benefit of early intervention at this point cannot be disregarded, and may feasibly be adopted within a stepped care model for treatment of insomnia.[25] Secondly, findings raise the question about the utility and function of diagnostic classifications for insomnia. So far, arbitrary time points have been used to categorize AI[1] however initial findings point bring into question the clinical utility or importance of these subcategories may be something to question.

Conclusion

The objectives of this study were to explore the level and type of preoccupation (sleep vs. life event) of AI relative to people with CI. Findings did not support the hypothesis, suggesting there is no difference between people with AI and CI in level and type of preoccupation and that people with AI are as preoccupied during the day by both sleep and life events, as people with CI. Whilst further research is necessary to determine potential differences between AI and CI other than duration of insomnia, these results raise potential implications in relation to the criteria that distinguish them. Determining the point, if at all, at which a shift in attention and cognition occurs in people with AI, would provide valuable information to extend our understanding of the development of insomnia and inform future guidance of when early intervention may be indicated.

Conflicts of Interest

The authors have no financial conflicts of interest.

REFERENCES

1. Morin CM. Definition of acute insomnia: diagnostic and treatment implications. *Sleep Med Rev* 2012;16:3-4.
2. Ellis JG, Perlis ML, Neale LF, Espie CA, Bastien CH. The natural history of insomnia: focus on prevalence and incidence of acute insomnia. *J Psychiatr Res* 2012;46:1278-85.
3. Ellis JG, Gehrman P, Espie CA, Riemann D, Perlis ML. Acute insomnia: current conceptualizations and future directions. *Sleep Med Rev* 2012; 16:5-14.
4. Spielman AJ, Caruso LS, Glovinsky PB. A behavioral perspective on insomnia treatment. *Psychiatr Clin North Am* 1987;10:541-53.
5. Healey ES, Kales A, Monroe LJ, Bixler EO, Chamberlin K, Soldatos CR. Onset of insomnia: role of life-stress events. *Psychosom Med* 1981;43: 439-51.
6. Bastien CH, Vallières A, Morin CM. Precipitating factors of insomnia. *Behav Sleep Med* 2004;2:50-62.
7. Espie CA, Broomfield NM, MacMahon KM, Macphee LM, Taylor LM. The attention-intention-effort pathway in the development of psychophysiologic insomnia: a theoretical review. *Sleep Med Rev* 2006;10:215-45.
8. Marchetti LM, Biello SM, Broomfield NM, Macmahon KM, Espie CA. Who is pre-occupied with sleep? A comparison of attention bias in people with psychophysiological insomnia, delayed sleep phase syndrome and good sleepers using the induced change blindness paradigm. *J Sleep Res* 2006;15:212-21.
9. Taylor LM, Espie CA, White CA. Attentional bias in people with acute versus persistent insomnia secondary to cancer. *Behav Sleep Med* 2003; 1:200-12.
10. Ellis J, Mitchell K, Hogh H. Sleep preoccupation in poor sleepers: psychometric properties of the Sleep Preoccupation Scale. *J Psychosom Res* 2007;63:579-85.
11. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983;67:361-70.

12. Edinger JD, Bonnet MH, Bootzin RR, Doghramji K, Dorsey CM, Espie CA, et al. Derivation of research diagnostic criteria for insomnia: report of an American Academy of Sleep Medicine Work Group. *Sleep* 2004;27:1567-96.
13. Morin CM. *Insomnia: Psychological Assessment and Management.* New York: Guilford 1993.
14. Bastien CH, Vallières A, Morin CM. Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep Med* 2001;2:297-307.
15. Semler CN, Harvey AG. Monitoring for sleep-related threat: a pilot study of the Sleep Associated Monitoring Index (SAMI). *Psychosom Med* 2004;66:242-50.
16. Tallis F, Eysenck M, Mathews A. A questionnaire for the measurement of nonpathological worry. *Pers Individ Dif* 1992;13:161-8.
17. Cohen S, Williamson G. Perceived Stress in a Probability Sample of the United States. In: Spacapan S, Oskamp S. *The Social Psychology of Health.* Newbury Park, CA: Sage 1988.
18. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav* 1983;24:385-96.
19. Harvey AG. A cognitive model of insomnia. *Behav Res Ther* 2002;40:869-93.
20. Cohen J. *Statistical Power Analysis for the Behavioral Sciences.* 2nd ed. Hillsdale: Lawrence Erlbaum Associates 1988.
21. Sadeh A, Acebo C. The role of actigraphy in sleep medicine. *Sleep Med Rev* 2002;6:113-24.
22. Morin CM, Rodrigue S, Ivers H. Role of stress, arousal, and coping skills in primary insomnia. *Psychosom Med* 2003;65:259-67.
23. Tang NK, Harvey AG. Correcting distorted perception of sleep in insomnia: a novel behavioural experiment? *Behav Res Ther* 2004;42:27-39.
24. Zhang B, Wing YK. Sex differences in insomnia: a meta-analysis. *Sleep* 2006;29:85-93.
25. Bower P, Gilbody S. Stepped care in psychological therapies: access, effectiveness and efficiency. Narrative literature review. *Br J Psychiatry* 2005;186:11-7.