A controlled comparative investigation of rumination, worry, emotional inhibition and arousability in adults with nREM parasomnias, insomnia and good sleepers

and

Clinical Research Portfolio

Volume I

(Volume II bound separately)

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Submitted in partial requirement for the Degree of Doctorate in Clinical Psychology (DClinPsy)

Faculty of Medicine Graduate School

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Volume I

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CHAPTER ONE: SYSTEMATIC REVIEW

What is the association between emotional expression and psychological adjustment in patients with a diagnosis of cancer?

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Abstract

Objective: A diagnosis of cancer increasingly means living with a chronic disease whereby life is preserved but the individual has adverse experiences to manage in relation to treatment and illness symptoms. Accordingly, research has focused on factors associated with psychological adjustment, one example being that of the expression of emotions. The purpose of this review was to summarise findings on the association between emotional expression and psychological adjustment in patients with a diagnosis of cancer. Specific questions are outlined in relation to the concepts of emotional expression used by researchers, the expression of separate emotions and the methods used to measure this construct.

***Methods*:** Following searches of electronic databases and key journals, 15 papers reporting on the outcomes of 13 individual studies met inclusion criteria. Assessment of methodological quality was applied using a specifically designed rating tool.

Results: Findings from the majority of studies indicate that attempts to suppress, inhibit or control emotional expression is linked to poorer psychological adjustment and the expression of emotions is associated with better adjustment. Several studies found suppression of certain emotions but not others were linked with psychological adjustment, however specific relationships were not consistent across studies. Only two studies used methodologies other than self-report to measure emotional expression and there were some discrepancies in findings between these two approaches in relation to their association with both each other and psychological adjustment.

Discussion: Main findings are outlined. Methodological strengths and limitations are discussed with recommendations for future research and clinical practice implications.

Introduction

Psychological adjustment in cancer patients

Previously, until the 1950s, a diagnosis of cancer meant an expectation of death for the patient. With the beginning of chemotherapy and improvements in life-sustaining supports at this time, came the first studies on psychological reactions to cancer [1]. From the 1960s onwards there was an emphasis on palliative care and an increase in concern from the field of psychology about care for the terminally ill [1]. As technology further advances, an increasing number of people are living with what is now a chronic illness, whereby life is preserved but the individual has various adverse experiences to deal with in relation to treatment and illness symptoms. As such, with what have recently been termed "survivorship initiatives", there has been a move towards a focus on improving ongoing care for those living with and beyond cancer, in addition to high quality end of life care [2]. Accordingly, professionals caring for people with cancer and researchers in the field of "psycho-oncology" have turned their focus to patients' psychological adjustment to cancer [3]. Prevalence rates vary according to assessments used but an early comprehensive study by Derogatis and colleagues found that 47% of new admissions to three collaborating cancer centres met criteria for a formal diagnostic psychiatric disorder [4]. More recent reports suggest that around 35% of patients with cancer experience a level of distress consistent with a psychiatric disorder [5], with 15-20% experiencing levels that are sub-clinical but significant enough to impact on the individual's health and quality of life [6]. Not all cancer patients, however, experience significant distress, leading to investigation into factors impacting on psychological adjustment. Studies have focused on both psychological and social factors in addition to demographic and medical/disease related factors, with some implicating a more prominent role of psychological factors in adjustment [7-10].

Emotional Expression and non-expression in breast cancer populations

One psychological construct that has received attention in research relating to both cancer and other chronic illness populations is emotional expression. Several studies have pointed to higher levels of emotional suppression in patients with cancer [11-13], with some researchers proposing that it has a role in influencing the onset and progression of cancer and survival outcomes [14,15,16]. However, a more recent study by Graves and colleagues between cancer "survivors" and healthy controls found no difference on measures of emotional expression [17]. Similarly, Servae et al found no differences in

levels of emotional expression per se but that those with breast cancer reported more ambivalence towards emotional expression compared with controls [18]. It would seem that the association between the cancer experience and emotional expression remains equivocal and Graves et al suggest that this is likely to be due to methodological, statistical and conceptual differences between studies. Nevertheless, on the premise that there may be some association between breast cancer and emotional expression, within the evolving research into psychological factors and psychological adjustment, several researchers have investigated whether this is one such associated variable. Indeed, with the belief that emotional expression is "good" for psychological adjustment, intervention studies utilising it as a component have also been developed with some, but not consistently, reported improved outcomes [19,20].

Constructs of emotional expression and non-expression

Studies investigating the general concept of emotional expression and its associations with psychological adjustment in patients with cancer have utilised a number of overlapping but distinct psychological constructs. In reviewing the literature in this area, it is important to consider first the constructs they are reporting to measure.

One conceptualisation of emotional non-expression has been referred to as "emotional suppression". This term has been described as involving a conscious effort to inhibit expressive elements of emotional experiences [21]. An example of this might be somebody remaining outwardly calm while being churned up with anger inside.[I] This latter description has also been referred to as "emotional inhibition". A related concept has been that of "emotional control", likewise referring to a tendency for individuals to control the expression of emotions [23]. The use of these three terms in the literature appears to be interchangeable with studies purporting to be investigating emotional suppression or emotional inhibition using measures designed to measure emotional control. A more distinct form of non-expression, termed Alexithymia, refers to a deficit in expressing emotions and identifying feelings in the self and others [24]. While some researchers have focused on the non-expression of emotions, others have taken an "expression approach", focusing on measuring the active expression of emotions. Although often not referred to by investigators in the area, a distinction should be acknowledged between emotional expression defined as spontaneous venting of negative

[I] Emotional suppression here, and throughout the text, refers to the suppression of emotional *expression* as opposed to the suppression of the *experience* of an emotion as the term has been used elsewhere [22].

emotions and as a cognitive process involving verbalisation and communication of inner emotional states [25].

Considering the expression of separate emotions

Investigators often refer to a general tendency towards emotional expression or its suppression, this being particularly evident in research on interventions incorporating emotional expression. However, as is highlighted by Schlatter et al, different emotions may be linked with distinctive motivational, psychophysiological and behavioural processes and it is likely that their suppression will have different influences on psychological adjustment [21]. As such a number of studies have investigated the expression of different emotions in addition to the general expression of emotion.

The present review

In 2002 Panagopoulou et al conducted a meta-analysis reviewing the effects of emotional expression in chronic diseases [25]. The report aimed to identify the differential effect of emotional expression and non-expression on the course and adaptation to chronic disease. A weak but significant association was found between increases in psychological distress and emotional non-expression, but the inverse relation was not present for emotional expression. The authors highlighted that future research should focus on longitudinal designs exploring effects of emotional expression on the psychological adaptation to chronic disease and that the implications of emotional expression in the course of various forms of medical treatment should be explored. A limit to this review was that it did not delineate potential differences in the relation of the expression of separate emotions and their association with psychological adjustment.

A number of studies have been conducted since Panagopoulou's report, with a proportion incorporating a longitudinal element to their design. Further, while research has traditionally used self-report as a measurement of emotional expression, with the acknowledgement of potential limits to this, use of other attempts to measure this construct has emerged. It was therefore considered timely to review the literature in this area as it stands, with a focus on cancer populations.

Aims

The present review aims to establish findings on the association between emotional expression/non-expression and psychological adjustment in patients with a diagnosis of cancer by summarising and evaluating relevant studies in this area. The review

incorporates research from both the non-expression and expression approach, acknowledging the conceptual differences between the two. For conciseness, however, the term emotional expression will be used to incorporate the two distinct approaches simultaneously other than where the distinction is required for comparison purposes. In light of the literature and conceptual considerations outlined above, an initial general question emerges followed by three specific questions:

Research Questions

1) What is the evidence for an association between emotional expression and psychological adjustment in people with cancer?

2) Are there differential relationships between the different concepts of emotional expression and their association with psychological adjustment?

3) Is the expression of different emotions differentially associated with psychological adjustment?

4) How do the results of studies using self-report measures of emotional expression compare to those utilising other approaches to its measurement?

Methods

Search strategy

To identify potentially suitable studies the following electronic databases were searched from start of indexing to June 2011: Ovid Medline, Embase, Psychinfo and All EBM Reviews. Limits were set on search terms to include 'English language', 'human' and 'adults >18years'.

The search terms used were:

1. [cancer*] OR [neoplasm*] OR [tumo?r] or [carcinogen*]

2. emotion* adj2 [inhibit* or suppress* or express* or control* or repress* or regulat*] OR [alexithymia]

3. [distress*] OR [stress] OR [mood] OR [depress*] or [anxiety*] OR [wellbeing] OR [mental health] OR [adjustment] OR psychological adj2 [response* or symptom* or morbid* or outcome*]

The results of these searches were then combined using the Boolean operator 'AND'. Search terms were also mapped onto relevant subject headings.

Inclusion/exclusion criteria

Cancer populations do not necessarily represent a homogenous group with the experience of each type of cancer bringing its unique set of stressors, however it was deemed that there are certain common experiences across cancer groups allowing for consideration of the population as a whole. Further, there is evidence to suggest that levels of psychological distress do not necessarily differ according to cancer type [26]. The primary focus of this review was to question the association between measures of emotional expression and psychological adjustment to cancer. There were a number of studies that explored relationships between these two variables to some degree, but that did not quite report on this specifically. For example, studies evaluating psychological interventions which include emotional expression as a treatment component were excluded because it is not possible to separate out the specific effects of emotional expression from other aspects of treatment. Those studies investigating emotional expression as a moderating or mediating variable of the association between two other variables were also excluded on the basis that inclusion of these studies would arguably result in the scope of the review becoming too broad, with difficulties arising in the cross-comparison of findings. In operationalising psychological adjustment, studies were included if they included indices of positive adjustment such as positive affect and well-being and negative adjustment including psychological symptoms such as general mood disturbance, distress, anxiety and depression. Quality of life was considered too broad a construct incorporating social in addition to psychological concepts and, therefore, studies investigating its measurement were excluded. Finally, it was deemed important that studies investigated the association of emotional expression with psychological adjustment as opposed to its association relative to other coping styles. In view of these considerations, all studies obtained via the electronic search were examined for inclusion in relation to the following criteria:

Inclusion criteria

1. Studies that include a cancer population (aged 18 years or over)
2. Studies investigating an association between emotional expression and psychological adjustment

3. Studies which include a measure of emotional expression as an independent variable

4. Studies which include a measure of psychological adjustment (e.g. depression/anxiety, mood disturbance, distress) as a dependent variable

5. Studies published in a peer-reviewed journal article written in English

Exclusion criteria

1. Studies evaluating psychological interventions including emotional expression as a component which may impact on psychological adjustment to cancer

2. Studies investigating emotional expression as a moderating or mediating variable between another construct and psychological adjustment.

3. Studies investigating quality of life as a general concept

4. Studies including emotional expression as a coping style compared to other coping styles as opposed to measuring *levels* of emotional expression

5. Review articles, single case studies, dissertation abstracts, book chapters and conference proceedings

Results

The electronic search yielded a total of 1736 articles once duplicates were removed. 1432 articles were deemed unsuitable and excluded on the basis of reading the title alone. On reading the abstracts of the remaining 304 articles, a further 281 were excluded. Full text articles of the resulting 23 studies that were potentially suitable for review were obtained, of which 15 met criteria for inclusion in this review (See Appendix 1.2 for articles excluded at this stage). Reference and citation lists for these 15 articles were searched to ensure no appropriate studies had been missed. Finally, the content's pages of key journals including *Psycho-oncology* and *Health Psychology* were hand searched and this also identified no further articles. See Figure 1.1 for a description of the search process. Of the 15 articles considered for review, findings from the same cohorts were used in the three studies by Iwamitsu et al [27-29]. Owen et al and Cordova et al also reported findings drawn from the same research pool [30,31]. To be comprehensive, all studies will be included in the present review but will be reviewed together.

Assessment of methodological quality

A quality rating scale was devised for the purpose of this review, using and adapting items from the SIGN 50: a guideline developer's handbook [32]. This scale covered the following areas: study aims and objectives, design, participant recruitment, outcome measurement, participant characteristics, statistical analysis and results (see Appendix 1.3). A score of 0, 1 and for certain items 2 could be allocated depending on the degree to which each aspect of methodology was met and a total of 21 points could be awarded. Papers received a rating of "high" if 75% of this score was achieved; "medium" if between 50 and 75% was obtained and "low" if less than 50% was acquired. Articles reporting findings from the same cohort were considered together for a combined methodological quality rating to represent the study as a whole.

Reliability of quality rating

Fifty percent of studies were randomly selected and independently rated by another researcher using the same rating scale. There was > 95% agreement between raters and discrepancies were resolved via a meeting to discuss and review disagreements.

Review of findings

Table 1.1 presents data extracted from each study to facilitate comparisons across study design, methodology, psychological construct and measurement, main findings and other aspects deemed important and relevant for the current review. The narrative review below aims to provide an initial summary of the studies selected, followed by a distillation of the overall findings and a consideration of what each study contributes in reference to the research questions. To avoid repetition, the studies utilising self-report to measure emotional expression will be considered followed by a separate section reviewing findings in relation to studies using other approaches.

Figure 1.1 Flow chart of study selection process

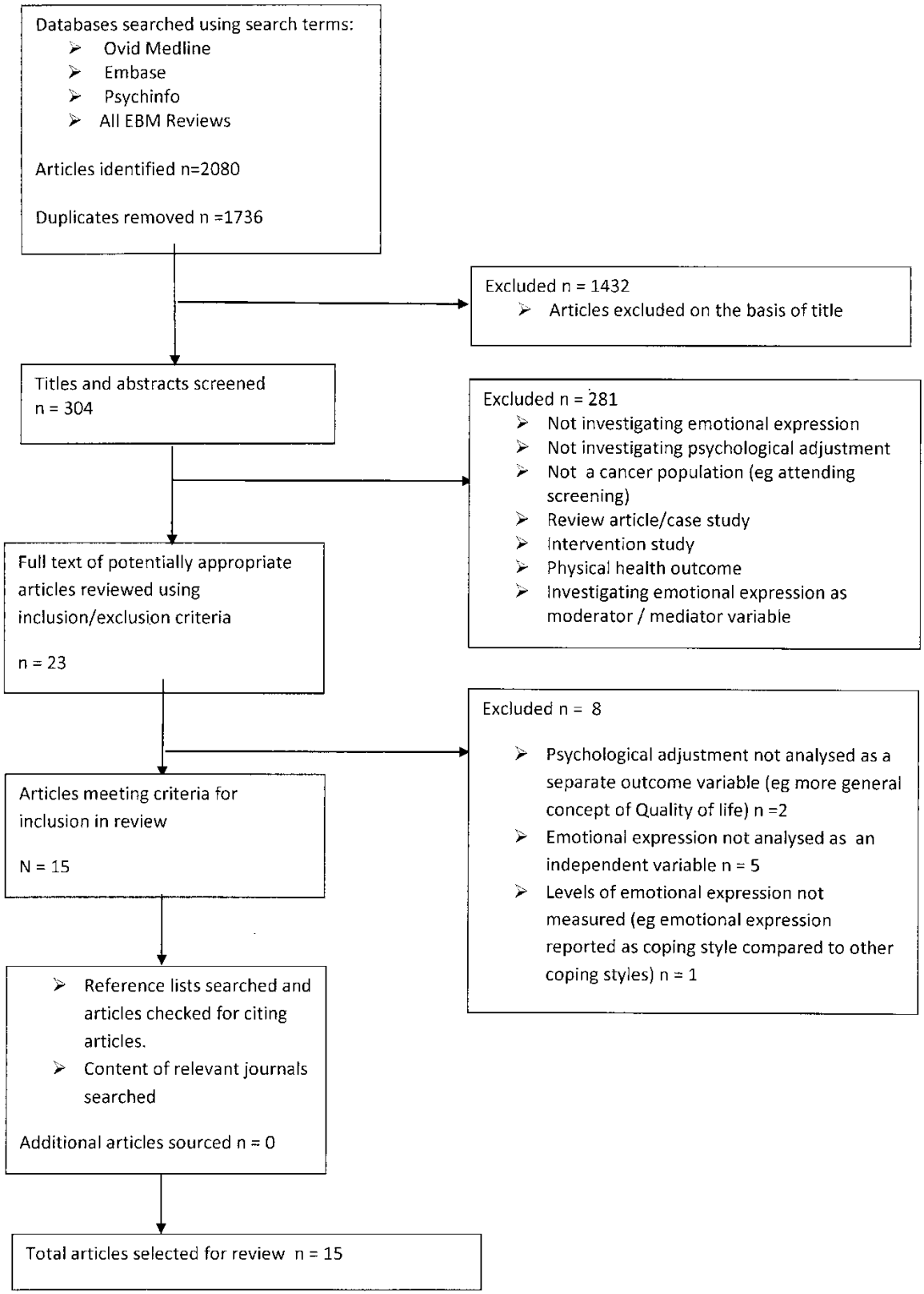

Table 1.1 Summary table of studies included in Systematic Review

Study & quality rating	Study design	Main methods/ When psychological factors assessed	Participants 1. N 2. mean age (years) 3. cancer population	Measure of emotional expression 1. construct 2. method of measurement 3. measure	Measure of psychological adjustment 1. construct 2. method of measurement 3. Measure	Statistical analysis	Main findings
Grassi et al 1988 Medium (67%)	Longitudinal	Emotional expression measured before biopsy. Psychological adjustment measured before biopsy and after the first week following mastectomy (before discharge from hospital) and at six months follow-up	1.N = 35 2. 52.11 3 Breast cancer	1. Suppression of negative feelings 2. Self-report 3. Courtald emotional control scale (CECS)	1 Anxiety, depression, hostility, somatisation 2. Self-report 3. Symptom Questionnaire	Pearson product-moment correlation	Before biopsy: significant negative correlation between control of anger and depression and anxiety. First week after mastectomy: trend (but not significant) towards higher depression scores associated with suppression of anxiety, depression and emotions in general. 6 months after mastectomy, hostility associated with control of anger, depression and general emotions; depression associated with suppression of depression

Table 1.1 Summary table of studies included in Systematic Review

Watson et al 1991 High (76%)	Cross-sectional	Both emotional expression and psychological adjustment measured between 1 and 3 months of diagnosis	1. N =359 2. 55.8 years 3. Breast cancer	1. Emotional control 2. Self-report 3. CECS	1. Anxiety, depression, helplessness, fighting spirit, fatalism, anxious preoccupation 2. Self-report 3. Hospital Anxiety and Depression Scale (HADS), Mental Adjustment to Cancer scale (MAC)	Spearman's correlation Student's t-tests	Weak but significant associations between HADS anxiety and CECS anxiety and HADS depression and CECS depression. Comparisons of high vs low emotional controllers indicated that higher levels of HADS anxiety were reported for high than low emotional controllers. Tendency to control each emotion associated with fatalistic attitude towards disease. Helplessness associated with depression and anxiety
Classen et al 1996 High (76%)	Cross-sectional	Both emotional expression and psychological adjustment measured at baseline prior to randomisation to control or treatment group in group psychotherapy trial	1. N = 101 2. 53.0 3. Breast cancer	1. Emotional expression 2. Self-report 3. CECS	1. Mood disturbance 2. Self-report 3. Profile of Mood States (POMS)	Multiple regression analysis	Combined score on the CECS is positively associated with mood disturbance
Stanton et al 2000 High (76%)	Longitudinal	Emotional expression and psychological distress measured within 20 weeks following medical treatment, psychological distress measured again 3 months later	1. N= 92 2. 51.56 3. Stage I or II breast cancer	1. Emotional expression 2. Self-report 3. Emotional Approach Coping scales	1. Psychological distress 2. Self-report 3. POMS	Multiple regression analysis	Emotional expression associated with lower psychological distress 3 months later, when initial values on the dependent variables, age and other coping strategies were controlled for

Table 1.1 Summary table of studies included in Systematic Review

Ho et al 2004	Cross-sectional	Measures of emotional expression and psychological adjustment taken at one time point (with survivors disease-free in past 5 years)	1. N = 139	1. Emotional control	1. Perceived stress, anxiety, depression, helplessness, anxious-preoccupation, fighting spirit, fatalistic attitude	Pearson product-moment correlations	Overall emotional control associated with perceived stress, anxiety, depression, helplessness and anxious preoccupation. Control of anxiety and depression associated with anxiety and depression respectively.
Medium (71%)			2. 49.28 3.Heterogeneous female cancer survivors	2. Self-report 3. CECS	2. Self-report 3. The perceived stress scale (stress), The HADS (anxiety, depression,), negative emotion subscale in Mini Mental Adjustment to Cancer subscale (helplessness, anxious preoccupation)		
Iwamitsu et al 2005a, Iwamitsu et al 2005b, Iwamitsu et al 2003	Longitudinal	Emotional distress and emotional suppression measured at (a) first visit to clinic, emotional distress measured again at (b)	1.Iwamitsu 2003(N=16), Iwamitsu 2005a (N=21) Iwamitsu 2005b (N = 14)	1. Emotional suppression/inhibition	1. Psychological distress	Two- and three-way ANOVA, post-hoc Tukey's tests	Emotional suppression group felt more depressed and angry than the emotional expression group at first visit, after disclosure and at 3 months after discharge. Those in

Table 1.1 Summary table of studies included in Systematic Review

		diagnosis, (c) after operation, (d) 3 months after discharge	2003 (mean age not reported separately for breast cancer patients), Iwamitsu 2005a (mean age not reported separately for breast cancer patients) Iwamitsu 2005b (54.8)		2. Self-report		the anger suppression group were more anxious and depressed than those in the anger expression group (time points not specified by authors), There were no differences between the depression suppression and depression expression groups, anxiety suppression group felt more depressed in three sessions compared with the anxiety expression group (exception being after the op). Anger-hostility higher in anxiety suppression group after diagnosis and after discharge. Depression and anger-hostility in the anxiety suppression group tended to be high in 3 sessions whereas those in the anxiety expression group consistently low across four sessions
			3. Breast cancer	3. CECS	3. POMS		
Owen et al 2006, Cordova et al 2003,	Cross-sectional	Participants attending an ongoing support group were provided with questionnaires on emotional suppression and mood disturbance to complete at the end of a meeting. Subsection agreed to	1. N = 245 (71 included in sub-section of analysis comparing different measures of emotional expression)	1. Emotional expression / emotional suppression	1.Mood disturbance	Pearson product-moment correlations	Emotional suppression measured by self-report was significantly positively related to mood disturbance, none of the linguistic indicators of emotional expression were significantly correlated with self-reported emotional suppression or

Table 1.1 Summary table of studies included in Systematic Review

		complete an additional "written cancer narrative" for text analysis comparisons	2. 56.3	2. Text analysis (expression), self-report (suppression)	2. Self-report		mood disturbance
High (85%)			3.Heterogeneous cancer population (mixed gender)	3. Linguistic Inquiry and Word Count (LIWC) coding system, CECS	3 Profile of Mood States (POMS)		
Lieberman 2006 Medium (71%)	Longitudinal	Psychological adjustment measures completed at time one (within 8 weeks of joining an internet based bulletin board) and again after 6 months. Emotional expression measured through text analysis of messages posted by participants within that time period.	1. N=52 2. 45.5 3. Breast cancer	1. Emotional expression 2. Text analysis 3.LIWC coding system	1. depression 2. Self-report 3. Center for Epidemiologists Studies Depression Scale (CEDS-D)	Linear regression models	The greater the expression of anger and sadness (within the context of cancer), the lower depression after 6 months, conversely the more participants expressed anxiety, the higher were depressive scores after this time
Mantani et al 2007 Medium (67%)	Cross-sectional	Measures of alexithymia and psychological adjustment completed at one time point (with patients who had undergone surgery for breast cancer at least 3 months previously.	1. N=46 2. 52.3 years 3. Breast cancer	1. Alexithymia 2. Self-report 3. Toronto Alexithymia Scale (TAS-20)	1. Depression, anxiety 2. Self-report 3. Zung self-rating anxiety scale, Zung self-rating depression scale	Mann-Whitney U, Spearman's rank correlation, stepwise multiple regression analysis	High degree of alexithymia correlated with a high degree of patient anxiety
Manne et al 2008 High (90%)	Longitudinal	Measures of positive expressivity and psychological adaptation taken at	1. N= 113 2. 56.32	1. positive emotional expressivity 2. self-report	1. Depressive symptoms, positive affect 2. Self-report	Multilevel modelling with restricted maximum	Higher positive affect at Time 1 associated with stronger tendency toward positive emotional

Table 1.1 Summary table of studies included in Systematic Review

		four assessment time points: baseline, 3, 6 and 9 months (women on active treatment for cancer – no specific time points in relation to treatment)	3. Gynecological cancers	3. Emotional Expressiveness Questionnaire	3. Beck Depression Inventory, Mental Health Inventory - 18 (positive affect scale)	likelihood estimation	expressivity. Depressive symptoms at time 1 predicted by lower tendency toward positive emotional expressiveness. Both effects remained stable throughout the subsequent 9 months (ie predicted initial status but not rate of change in positive effect)
Schattler et al 2010 High (90%)	Longitudinal	Prior to initiation of chemotherapy, women completed emotional suppression measure. They then completed daily assessments of mood for the four cycles of chemotherapy (over 84 days)	1.N=40 2. 48.6 3. Breast cancer	1. Emotional suppression 2. Self-report 3. CECS	1. Anxiety, anger, depression 2. Self-report Speilberger State-Trait Anxiety Inventory short form, The measure of angry mood, CEDS-D	Pearson product-moment Correlational analysis, mixed linear model analysis of repeated measures data	Emotional suppression (total) was not associated with mood states, anxiety suppression was associated with lower reports of anxiety, anger suppression associated with higher depression, depression suppression associated with higher anxiety
Ando et al 2011 Medium (66%)	Longitudinal	Measures of emotional suppression and mood disturbance completed during clinical examination (time 1) and then approximately 1 week to 1 month later after being provided with diagnosis (time 2)	1. N = 38 2. 55.87 3 Breast cancer	1. Suppression of negative emotions 2. Self-report 3. CECS	1. Mood disturbance 2. Self-report 3. POMS	Multiple regression analysis	Negative emotional suppression did not have a significant effect on patients' psychological distress immediately after disclosure of the diagnosis

Summary of studies

The total sample size of the studies was 1281 (range of n = 21 – 359). With regards to cancer type, nine studies focused on breast cancer patients, one study investigated a heterogeneous cancer population (mixed gender), one study confined its investigation to women with gynaecological cancers and one looked at female heterogeneous cancer "survivors". Thus only one study included males [30,31]. In terms of design, five studies were cross-sectional and seven included a longitudinal component. The majority of the studies utilised self-report questionnaires to measure emotional expression, with one study using linguistic text analysis and one drawing on both methodologies. Table 1.1 outlines the constructs of emotional expression and psychological adjustment referred to by each study. Emotional expression was investigated as a general concept in ten of the studies with six also investigating the expression of separate emotions. According to the criteria defined, six studies were rated as high with the remaining six rated as medium in quality.

Associations between emotional expression and psychological adjustment

Emotional expression

The two studies investigating emotional expression found an association with psychological adjustment.

Manne and colleagues [33] conducted a longitudinal study investigating the impact of positive emotional expressivity on psychological adaptation among women diagnosed with gynaecological cancers (see Table 1.1). Having a stronger tendency toward positive emotional expressivity at baseline was associated with higher positive affect whilst a lower tendency was associated with more depressive symptoms. Both effects remained stable throughout the subsequent 9 months in that although emotional expressiveness predicted initial psychological status, it did not predict rate of change in affect. Further to being rated as high according to the quality rating scale, an additional strength of this study is that it looks at mental wellbeing as well as mental ill-health which the rest of the articles focus solely on. Psychological adjustment has also been investigated over time rather than at one time point, acknowledging the dynamic nature of adjustment to this chronic disease with stressors in relation to both illness symptoms and treatment procedures. A limitation is that the participants are drawn from a larger psychological intervention trial which may have resulted in a sample that was biased toward psychologically minded women who were more willing to participate in psychological interventions. A methodological

weakness common to all studies in this review is that no power calculation was used to justify the sample size obtained.

In another longitudinal study, Stanton et al investigated psychological adjustment to breast cancer [34]. Greater use of coping through emotional expression, measured within 20 weeks following medical treatment, was associated with lower psychological distress three months later. Stanton et al's study was also rated as high, one of the strengths being that the authors statistically controlled for age, other coping strategies (e.g. avoidance, problem-focused coping, spiritual coping and seeking social support) and initial levels of psychological adjustment, with the significant effect remaining. The authors acknowledge that the generalisability of these findings is limited to early stage breast cancer patients and to the period after termination of primary medical treatments. The study also utilised a self-report measure that was not used in any of the other studies in this review leading to limitations in its comparability to other research findings.

Emotional non-expression

A total of six studies found an association between constructs of emotional non-expression and psychological adjustment, with two studies reporting no such relationship.

As Table 1.1 shows, Watson et al's 1991 study investigating the association between emotional control, adjustment to cancer and levels of anxiety and depression in a sample of women recently diagnosed with breast cancer had the largest sample size of the studies selected for review and was rated as high [23]. Watson et al used the Courtald Emotional Control Scale (CECS), the Hospital Anxiety and Depression Scale (HADS) and the Mental Adjustment to Cancer Scale (MAC). The CECS was developed with a population of patients awaiting breast biopsy. It provides a total emotional control score in addition to separate indices of the control of anxiety, depression and anger [35]. The measure has been used extensively in cancer research with good psychometric properties demonstrated with this population (e.g. Schlatter et al [21], Classen et al [36], Owen et al [30], Ho et al [37], Iwamitsu et al[28] and Ando et al[38] in this review). This leads to the advantage of being able to compare the outcomes in this report with results of other studies in this area. Indeed, as can be seen in Table 1.1, 8 of the 12 studies reported in this review used this measure. The HADS has the benefit of being specifically designed for medical patients and has been validated for use with cancer populations and the MAC, as the name suggests, was developed and validated on a population with various cancer types. Further to looking at associations between emotional control and the other two variables, it was

specifically hypothesised that there would be an association between emotional control and feelings of helplessness as measured by the MAC and that helplessness would, in turn, be associated with more symptoms of depression. A tendency towards emotional control was indeed associated with helplessness and helplessness was associated with more symptoms of both depression and anxiety. Higher levels of HADS anxiety were reported for high than for low emotional controllers, however this difference was not observed for the HADS depression scores lending some support for the role of helplessness in linking these two variables.

Classen et al investigated the association of emotional control with psychological adjustment in a sample of women with metastatic or recurrent breast cancer finding higher levels of emotional control to be associated with greater mood disturbance [36]. Although rated as high, with clearly defined study objectives and sampling and the use of psychometrically sound measures, the interpretation of the results of this study has its limits. The study is of a cross-sectional design whereby no prediction is possible with regards to whether emotional inhibition predicts future adjustment. A further methodological weakness is that, despite reporting a range of demographic and medical variables, none of these were considered as potential confounders in analysis. There is also some confusion over the approach being used to measure emotional expression. As Table 1.1 indicates, the authors report that psychological adjustment is associated with expressing emotion, however, the CECS, which measures the extent to which individuals report controlling the expression of emotions, was used. Although some items, which are reversed when calculating the emotional control score, do reflect emotional expression, there are only 5 such items out of 21, indicating a measure of emotional control. It could be argued that a low score does not necessarily relate to active emotional expression which is implied by the authors.

In the earliest study included in this review, Grassi and Molinari investigated the relationship between suppression of negative feelings and psychological reaction to cancer in a group of breast cancer patients pre-biopsy, a week after mastectomy and six months later [39]. The CECS was used to measure emotional suppression, implying that the authors consider this to be measuring the same construct. Table 1.1 shows this overlap is present throughout research in this field, with 5 other studies using the CECS to measure emotional suppression. Indeed, the two terms are used interchangeably by the developers of the scale. Emotional suppression measured before lump biopsy was correlated with both depression and hostility at six months. No such associations were demonstrated at the

two earlier points at which psychological reaction was measured or with other psychological symptoms of anxiety and somatisation. This study was rated medium, one of its weaknesses being that a number of potential confounding variables were not taken into account in analysis (e.g. stage of disease, prognosis and type of therapy). Interpretation of the results is further limited by a small sample size with only 12 participants remaining at the final 6 month assessment stage.

Iwamitsu et al investigated the relation between emotion suppression and emotional distress in breast cancer patients, like Grassi et al [39], at different points in the patient's journey (see Table 1.1) [27-29]. Iwamitsu et al split their sample into an emotional suppression and an emotional expression group with a cut-off being the median values for the total emotional control score of the CECS. The emotional suppression group reported more depression and anger than the emotional expression group at first visit, after disclosure of diagnosis and at three months after discharge but not after operation. This study was rated medium, being brought down by a lack of clarity in participant selection and characteristics reported. One of its strengths, however, like Manne et al's study [33], was its exploration of the dynamic nature of adjustment to cancer and its influences. For the emotional suppression group there were significant differences in the levels of distress between different points in time, whereas no such differences were found for the emotional expression group. This indicates a different pattern of adjustment for the two groups. It is also possible that inference could be made in terms of at what stage emotional suppression may be particularly detrimental to psychological adjustment and in turn, at what point any related intervention may be beneficial. However, little is made of this finding and its potential implications in Iwamitsu et al's report. This particular study was a section of an overall research programme comparing breast cancer patients with those whose tumour was discovered to be benign. For this particular analysis, only fourteen breast cancer patients were included with seven in each group and caution should be made in generalising the significant effects found with such a small sample. There is also some confusion in the approach to the construct of measuring emotional expression that is taken. Although the authors refer to findings in relation to emotional suppression, referring to the group with scores at the lower end of the CECS as "emotional expressers" could be misleading for the same reasons outlined in relation to Classen et al's study [36].

In their study of emotional control in Chinese female cancer survivors, Ho and colleagues found that higher levels were associated with perceived stress, anxiety, depression, helplessness and anxious preoccupation [37]. Emotional control positively predicted

stress levels even after the effect of depressed mood was under control. This study, rated as medium, was cross-sectional and as such no causal relationships can be implied. Also, Ho et al did not account for any patient characteristics as potential confounders in their analysis despite the variability in age and type of cancer in the sample. Although not longitudinal, a unique contribution this study makes is that it investigates "cancer survivors" who, defined by the inclusion criteria, have been disease free in the last 5 years. Some insight is therefore provided as to longer term adjustment of cancer sufferers. However, no information is provided as to how long the participants recruited have been disease free.

Ando and colleagues measured breast cancer patients' negative emotional suppression prior to diagnosis to investigate to what extent it was predictive of psychological distress immediately after diagnosis [38]. Like Iwamitsu et al [27-29], Ando et al used the CECS to measure emotional suppression and the POMS for their outcome of psychological distress, however, no significant effect was found. It is possible that this is due to differences in the use of the measure and analysis. Ando et al used multiple regression analysis with CECS scores entered as possible predictors of total mood disturbance as opposed to exploring differences between groups on subscales of the POMS. Also, there was a larger age range in Ando's study. It is difficult to ascertain if any other differences lie in the sample characteristics between the two studies as little information is provided in Iwamtsu et al's report. Ando et al's study was rated as medium. One weakness was its lack of clarity in some areas. For example, the measure of emotional suppression taken prior to diagnosis was taken at "their initial outpatient visit" to a breast clinic but there is no indication of at what stage patients are at in the diagnostic process at this point. A further limit of the study in relation to the questions raised in this specific review is that psychological response was taken almost immediately after diagnosis which arguably represents a more transient affective response that might remit spontaneously as opposed to giving an indication of psychological adjustment per se. Iwamitsu et al's study[27-29], while also taking measures at this time, was not limited to this one-off recording. A strength of Ando et al's study was that it compared demographics of those taking part and those not, in an attempt to ensure that these potential biases were not evident in the sample studied. Mantani et al's 2007 study below also accounted for this [24].

Schlatter et al 2010 examined whether emotional suppression was predictive of mood states for breast cancer patients during chemotherapy for breast cancer [21]. Emotional suppression was again measured using the CECS, taken at one time point specified as

within 12 weeks of surgery and prior to the onset of chemotherapy. Mood disturbance was then measured on a daily basis for the duration of four cycles of treatment (84 days). Measures of mood included anxiety (The Speilberger State-Trait Anxiety Inventory short form), anger (The measure of angry mood), and depression (The four-item version of the Centre for Epidemiological Studies Depression Scale). No association was found between emotional suppression in general and any of these mood outcomes, however as discussed below, Schattler et al also investigated the relation between the suppression of specific emotions and mood, where associations were found to be significant. Schattler et al's study was rated as high. A strength, where a number of the studies in this review are lacking, is that it considered a number of potential confounding medical variables that could be associated with emotional suppression, including prognostic status and stage. However, it was interesting to note that none of these variables were found to be significantly associated with emotional suppression and their inclusion as covariates in the mixed linear model analyses did not alter the patterns of the findings. One potential limit to the study was its use of one- to four-item measures of mood. However, with the multiple daily assessments being made, it was deemed unfeasible to use lengthier measures. Another caution, acknowledged by the authors themselves, is that the use of daily measures, whilst enhancing the potential sensitivity in detecting associations of emotional suppression with mood, may have increased focus on symptoms and mood in a way that could have impacted on the reports of their occurrence and intensity. A further limit lies in the authors' use of the data collected. Although variation in mood over time was explored, with anxious mood tending to be elevated at the onset of a cycle and decrease over the course of the cycle, no attempt was made to explore changes in mood in relation to suppression of emotion.

The only study investigating the construct of alexithymia was Mantani et al's exploration into associations between alexithymia and anxiety and depression in postsurgical women with breast cancer [24]. Rated as medium, this cross-sectional study utilised the 20-item Toronto Alexithymia Scale (TAS-20). The TAS-20 includes items rated on a five-point scale with a three-factor structure relating to the construct of alexithymia: difficulty in identifying feelings; difficulty in describing feelings; externally oriented thinking. It is highlighted by the authors that the TAS-20 has been demonstrated to have high construct validity and reliability. Bringing the rating down, however, is that no reference is made to the reliability within this condition-specific population. The Zung self-rating anxiety scale and Zung self-rating depression scale are used, again with no condition specific psychometric properties reported. A high degree of alexithymia correlated with a high

degree of patient anxiety but was not related to depression. Due to the cross-sectional nature of this study, it is not possible to determine whether the symptoms of alexithymia as measured by the TAS-20 indicate a trait like characteristic or what has been described as a "secondary" or "reactive" alexithymia as a defensive reaction to a stressful event.

Is the expression of different emotions differentially associated with psychological adjustment?

Critique of individual articles is included elsewhere in this review and therefore studies investigating the expression of separate emotions will be considered together in this section with less reference to the detail of the studies. All papers using self-report to investigate emotional expression confined their analysis to that of general emotional expression and therefore this section focuses on constructs relating to emotional non-expression.

Suppression of anxiety

A total of four studies reported on the associations between suppression of anxiety and psychological adjustment with inconsistent results. Both Watson et al [23] and Ho et al [37] demonstrated significant associations between anxiety suppression and greater anxiety. Conversely, Schlatter found that anxiety suppression was associated with lower reports of anxiety and Grassi et al found no significant associations between anxiety suppression and any psychological symptoms [21, 39]. Iwamitsu et al found that their anxiety suppression group did not differ significantly on levels of anxiety compared with the anxiety expression group but that they did score higher on the depression-dejection scale of the POMS at first visit, after diagnosis and three months after discharge [27-29]. They also scored higher on the anger-hostility scale after diagnosis and after discharge and on the fatigue-inertia scale after diagnosis.

Suppression of anger

A confusing picture also emerged from the three studies reporting associations between suppression of anger and psychological adjustment. Anger suppression was associated with higher depression in both Schlatter and Iwamitsu's studies[21, 27-29]. Iwamitsu et al also found that those who suppressed anger had significantly higher scores on the tension-anxiety subscale of the POMS compared with those who expressed anger. However, Grassi et al found a negative correlation between amount of anxiety and control of anger, before biopsy, in their study. Finally, Grassi et al found that control of anger was significantly positively correlated with hostility [39].

Suppression of depression

Finally, five studies investigated suppression of depression symptoms. Both Ho et al and Watson et al reported significant associations between the control of depression and self-report of levels of depression [23, 37]. Interestingly, Grassi found that whilst before biopsy control of depression was negatively correlated with amount of depression reported, one week after mastectomy, though not significant, there was a trend in the opposite direction [39]. Schattler et al found that suppression of depression was associated with higher anxiety and finally Iwamitsu et al found no difference between the depression suppression and depression expression groups on any measure of psychological adjustment [21,27-29].

How do results of studies using self-report measures of emotional expression compare to those utilising other approaches to its measurement?

Owen and colleagues conducted an interesting study investigating the relationship between self-report and linguistic indicators of emotional expression and how they both relate to adjustment to cancer [30, 31]. Their sample of individuals attending a community cancer support group completed the CECS and POMS as measures of emotional suppression and mood disturbance. Participants were also invited to provide a written narrative about their cancer experience. A computerised content analysis program developed by Pennebaker and Francis, named the Linguistic Inquiry and Word Count (LIWC) [40], was used to measure emotional expression in this narrative. The program uses a word counting approach comparing each word or word stem identified in a text sample to each of 2,290 words contained in content-specific dictionaries, including those relating to affective or emotional processes. In justification of its use, Owen et al[30] report that LIWC has been shown to replicate a manual content analysis of breast and prostate cancer online discussion groups. They also point to literature evidencing its use in studies demonstrating a link between emotional expression and improved physical health outcomes. Moderate to strong positive correlations were demonstrated between scores on the CECS and POMS. However, the authors' hypothesis that individuals who self-report lower levels of emotional suppression would be more likely to evidence emotional expression in written cancer narratives was not observed. Further, linguistic indicators of emotional expression were not significantly correlated with mood disturbance.

The reports by Cordova et al [31] and Owen et al [30] were rated as high overall. A strength in this research lies in its attempt to compare two methods of analysing the construct of emotional expression. The study was also methodologically sound with clear aims and hypotheses, a large sample size and consideration of confounding variables. For example, demographic and other personal characteristics of those who chose to provide a written cancer narrative and those who did not provide a narrative were considered and the groups did not differ with respect to age, gender or indices of socioeconomic status and ethnicity, medical factors, time spent using the support group or primary study variables indicating that these factors are unlikely to have biased the results obtained.

Lieberman and Goldstein also used the LIWC as a measure of emotional expression [41]. A measure of depression was completed by new members to a breast cancer internet based bulletin board. After 6 months, the measure was repeated and messages during that time were collected and analysed for emotional content. In concordance with Owen et al, initial analysis of negative emotions by themselves had no predictive validity for change in depression. However, examining individual dimensions of negative emotional expression within the context of cancer, Lieberman et al found that greater expression of anger and sadness was associated with lower depression after six months. Conversely, the more participants expressed anxiety, the higher were depressive scores after 6 months. Rated as medium, one weakness of the study is no clear inclusion or exclusion criteria defined as to who was eligible for participation in the study. Further, as is highlighted by the authors, the results are correlational and it is not possible to infer whether the expression of specific emotions is causing the changes in distress or rather a manifestation of these changes. However, the finding that emotional expression was not associated with depression at time 1 shows that there is at least a degree of change occurring in association with emotional expression.

Discussion

This review aimed to address the general question of whether there is an association between emotional expression and psychological adjustment in cancer patients. More specific enquiry was made regarding the concepts of emotional expression, the expression of separate emotions and the measurement of this construct. Main conclusions in relation to these questions are made along with a consideration of limitations to the research reviewed, recommendations for future research and clinical implications.

Associations between emotional expression and psychological adjustment

The majority of studies found a significant association between emotional expression and psychological adjustment. Including both those studies using self-report and those using linguistic indicators of emotional expression, a total of 10 studies found an association, with the direction of this relationship being consistent across studies. There was also some evidence for the change of the association of emotional expression with psychological adjustment over time with two studies indicating that emotional suppression was associated with psychological distress at 3 or 6 months follow-up but not shortly after an operation [27-29, 39]. Further, it was found that whereas variation in levels of distress over time emerged for Iwamitsu's group of "emotional suppression" patients, levels of distress remained constant for the "emotional expression" group.

Relationships between the different concepts of emotional expression and their association with psychological adjustment

Although the two studies finding no association were investigating emotional suppression, with the remainder of the studies using this construct finding an association with psychological adjustment it would appear that, based on the review of the studies included in this report, there are no apparent differences between the two main approaches to measuring emotional expression and its association with psychological adjustment: that is, attempts to suppress, inhibit or control emotional expression is linked to poorer psychological adjustment and the expression of emotions is associated with better adjustment. The one study investigating the construct of alexithymia also found that this was associated with poorer psychological adjustment [24]. Despite the complex and diverse reasons behind a lack of emotional expression, be it a deficit, a deliberate effort to control the expression of emotions or some other mechanism that is perhaps less conscious, it would appear that it is associated with poorer psychological adjustment. However, this

would be a bold statement to make with only three studies reporting a measurement of emotional expression, one of which using a measure of emotional control. It should also be highlighted that even if this claim was proven valid, it is important to examine why people do not express their emotions, particularly in the development of psychological interventions based on this association. Also, calculating combined effect sizes in their meta-analysis, Panagopoulou et al found a weak significant association between increases in psychological distress and emotional non-expression but that the inverse was not true for emotional expression [25].

Is the expression of different emotions differentially associated with psychological adjustment?

With several studies finding the suppression of certain emotions but not others being linked with poorer psychological adjustment, there is at least some suggestion that there is a differential association at play. Also of interest is that the suppression of one emotion has been linked to the report of another emotion. For example, both Schlatter et al [21] and Iwamitsu et al [27-29] found anger suppression to be associated with depression. Although there are some consistencies in the findings, there are also disparities that cannot be ignored and as such no confident claims can be made that the suppression of one emotion is or is not linked to a particular psychological outcome. One interesting finding was that Grassi et al [39] found that control of depression was correlated with lower depression before biopsy but the trend, although not significant, was in the different direction at a later stage, after mastectomy. This implies a complex interplay between emotional expression and psychological adjustment which varies according to context and could also account for differences in findings across studies. Another explanation for discrepancies in the findings could be in the scales used to measure constructs of psychological adjustment. To illustrate, Ho et al [37] and Watson et al [23] both used the HADS to measure anxiety and were congruent in reporting an association between higher scores on this subscale and control of this emotion, also measured by the same scale. The studies which did not report such outcomes utilised different measures of anxiety (see Table 1.1).

Studies using self-report measures of emotional expression compared to those utilising other approaches to its measurement

With only two studies utilising measures other than self-report, there is a limit to the conclusions which can be drawn in relation to this final question. However, Owen et al's [30, 31] finding that lower levels of emotional suppression according to self-report were not associated with evidence of higher levels of emotional expression in written narratives provides some considerations for the use of Pennebakers' LIWC in measuring emotional expression. One possibility is that although a measure of emotional expression is obtained, it does not tap into the construct of emotional suppression. This makes sense in that the conscious suppression of emotions as opposed to the mere lack of expression of emotions is likely to require some form of insight provided by the person being "observed" that would be brought about by self-report but not necessarily in LIWC. Another interpretation is that perceptions of one's ability to regulate emotion through emotional expression in everyday situations is not relevant to how they might perform in the specific circumstances created in a narrative writing task. Alternatively, linguistic indicators of emotional expression as measured by the LIWC are perhaps not sufficiently sensitive to detecting emotion expression in this population. The latter argument is given weight by the finding that linguistic indicators in this study were not significantly correlated with mood disturbance, where this association is largely found elsewhere.

It is difficult to compare directly the results of Lieberman's [41] study of the expression of separate emotions to those using self-report as the studies using self-report purport to be measuring emotional *suppression* of separate emotions. It is interesting to note, however, that greater expression of anger as measured in this study was related to lower depression and greater control of anger was related to higher depression in two self-report studies.

Critique of methodology in studies

Studies varied in their methodological quality according to the rating used with half rated as high and the other half medium. Promisingly no studies were rated as low. In addition to weaknesses highlighted throughout this review (e.g. lack of consideration of confounding variables, justification of sample size), a number of limits were evident that the rating scale used was not sensitive to. One of the weaknesses in this area of research is a heavy reliance on self-report in the literature and the potential problem of common method variance. While these measures are important in gaining valuable information on individuals' perceptions of their expressions of emotions, there are certain cognitive

memory and social desirability biases in relation to their use. As is indicated, there may be a discrepancy between this subjective perception and more objective measures. It is thus difficult to ascertain the construct validity of such measures. Moreover, Panagopoulou et al argue that it is difficult for respondents to distinguish between items referring to expressing and experiencing distress and the confounding effects become stronger when the levels of psychological distress are increased [25]. There is also a lack of clarity in reference to the conceptually distinct constructs of emotional expression, particularly where measures of emotional control were utilised in studies reporting on emotional expression as opposed to non-expression. This prevents clear interpretation of findings in the literature as a whole. Another limit is that, although seven of the twelve studies incorporated a longitudinal element to their design, no conclusions can be drawn with regards to long-term adjustment with the longest follow-up assessment made nine months after baseline. Finally, a limit in terms of scope of the literature is the lack of investigation of emotional expression and its association with psychological adjustment in men with cancer. Although Cordova et al [31] found no differences between men and women on emotional suppression and mood disturbance, it is noted that over 70% of the sample were females and further investigation with this population to replicate this finding is required to substantiate this claim. These shortcomings lead to several suggestions for future research outlined in the Research Agenda below:

Research Agenda:

- Further research evaluating behavioural and other indices of emotional expression and their relation to self-report. For example, use of objective measures such as peer reports, behavioural coding of emotional expression in addition to further refinement of linguistic text analysis in cancer populations
- Use of longitudinal studies with extended follow-up periods to investigate long term psychological adjustment in relation to emotional expression
- Further research into the association between emotional expression and psychological adjustment at different time points over the course of diagnosis and treatment with larger sample sizes.
- Expansion of research to include measurement of emotional expression and its association with psychological adjustment in men
- Continued research into association between expression of separate emotions and adjustment

Clinical implications

Despite limits relating to both the studies evaluated and the conclusions that can be drawn, there are certain implications for health professionals. Encouraging and facilitating cancer patients to identify and express both negative and positive emotions is likely to improve psychological adjustment. Indeed emotional expression is included as a component in interventions for cancer patients such as Adjuvent Psychological Therapy [42] and specific techniques such as expressive writing [43] have been used with this population [44, 45]. Developments with other clinical populations such as the use of spoken emotional disclosure methods with rheumatoid arthritis [46] and the integration of expressive writing techniques with mindfulness/awareness techniques and exercises to help patients with chronic pain to identify, express and integrate emotions [47] could also be considered with cancer patients. In targeting the facilitation of emotional expression, it may be beneficial for clinicians to focus on the specific emotions being suppressed and how this may be affecting their psychological adjustment. In addition, it is worth considering the time points at which emotional suppression may be impacting negatively on psychological adjustment and to be aware that emotional expression may be associated with poor psychological adjustment several months after surgery even if it is not evident at an earlier stage.

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CHAPTER TWO: MAJOR RESEARCH PROJECT

A controlled comparative investigation of rumination, worry, emotional inhibition and arousability in adults with nREM parasomnias, insomnia and good sleepers

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Lay Summary

The main aim of this study was to investigate psychological characteristics in adults who experience sleepwalking or night terrors, otherwise known as nREM parasomnias. A group of people who currently experience these events were compared to a group of people with insomnia and a group of "good sleepers" in a questionnaire based study. Participants answered questions in relation to the following psychological responses: emotional inhibition; worry; rumination and arousability (i.e. how much they are aroused either physically or mentally in different situations). It was found that the group with nREM parasomnias experienced higher levels of all of these measures than the good sleepers. Those with insomnia were also found to have higher levels on all of these measures apart from rumination. Overall these findings mean that psychological factors may play a part in the presentation of sleep walking and night terrors and it is worth continuing to explore this in further research. If findings like these are replicated in future research then, it is worth considering developing psychological interventions to help sufferers for whom such experiences are having a negative impact on their lives.

Abstract

Background: Little is known about the psychological characteristics of adults presenting with nREM parasomnias. Research indicates that a common factor associated with their onset is stress. Early studies suggest that adults experiencing such phenomena may be emotionally inhibited but no research has directly investigated this. Understanding of insomnia and its associated psychological factors is more developed with several studies finding a relationship with both worry and rumination. The role of somatic and especially cognitive arousal has also been emphasised.

Methods: The present study aimed to investigate these psychological factors in adults who experience nREM parasomnias. 148 adults were recruited with the index group of interest being the nREM parasomnia (nREMp) group (n = 48), a parallel sleep disorder group of people with Insomnia (n = 50) and a control group of good sleepers (GS) (n = 50). The three groups were compared for differences on self-report measures of emotional inhibition, worry, rumination and arousal.

Results: Compared with the GS group, significantly higher levels on all psychological variables were reported by the nREMp group and on all but rumination by the Insomnia group. The Insomnia group scored higher than the nREMp group on cognitive arousal with no other differences found between these two sleep disordered groups.

Conclusions: Preliminary evidence is presented for the influence of psychological factors in nREM parasomnias. Further studies are required to replicate and extend these findings. There are, however, implications for the development and evaluation of psychological interventions which could prove a viable alternative treatment option for such clients in clinical settings.

Introduction

What are nREM parasomnias?

The group of sleep disorders collectively known as parasomnias are characterised as undesirable physical or behavioural phenomena occurring during the sleep period.[1] Common parasomnias include those that occur in REM (Rapid Eye Movement) sleep such as nightmare disorder and REM sleep behaviour disorder, and Non REM (nREM) sleep-arousal disorder.[1] The present study focuses on nREM sleep-arousal disorders, also referred to as "nREM parasomnias". nREM parasomnias tend to arise from stages 3 and 4 of nREM sleep (slow wave sleep) and during the first third of the sleep cycle.[2] The episode generally occurs in the first half of the night and the individual has near-total or total amnesia following the event.[3] The main phenomena within this category of parasomnia are night terrors and sleepwalking.[2] Night or "sleep" terrors are episodes of extreme terror associated with intense vocalisation and body motility and high levels of autonomic discharge.[4] The individual is completely fixated on this frightening experience and, whilst awareness is restricted as such, cannot be reassured.[5] Sleepwalking or "somnambulism" is characterised by ambulatory activity during nREM sleep. Sleepwalking and night terrors have been reported in some cases to occur together.[6]

Night terrors and sleepwalking are described in the International Classification of Diseases (ICD-10) and the International Classification of Sleep Disorders (ICSD2).[7, 8] More specific forms of nREM parasomnias have also been reported including sleep-related eating disorder and sleep sex.[2]

Prevalence of nREM parasomnias

Episodes of night terrors and sleepwalking are more common in children than adults and usually decrease in frequency with increasing age.[2] However, their prevalence in adults has been found to be higher than is often assumed.[9] In a study based on self-report data in a sample from the UK general population, Ohayon and colleagues found that night terrors were reported by 2.2% of participants and sleepwalking by 2% compared with recent estimates of a 14.5 and 39.8 % prevalence rate estimated for night terrors and sleep walking respectively in young children.[6,10] No gender differences were indicated in Ohayon et al's study, however other studies have reported that sleepwalking is around twice as common in males compared to females.[5] nREM parasomnias have also been found to have a genetic basis and familial pattern. Specifically, the HLA gene DQBI has

been reported to be present in 35% of sleepwalkers compared to 13.3% of normal controls with the presence of nREM parasomnias in a first degree relative increasing the chances of developing the disorder by a factor of 10.[11]

Why study nREM parasomnias?

While the majority of people who experience nREM parasomnias will not come to the attention of researchers or sleep professionals, for some there is a great desire for help in reducing or eliminating their occurrence due to the distress and potential risk caused. Sleep can be interrupted which, as with other sleep disorders, leads to a disruption in daytime functioning. Behaviour related to the disorder can also cause harm and inconvenience to the self and/or others, impacting significantly on the individual's quality of life. Those afflicted can engage in complex motor activities including attempting to unlock locks, cook, climb out of windows, drive and engage in physically violent acts against others. [3,2] (see Appendix 2.2 for case illustration). In severe cases incidents of homicide, filicide and suicide have been reported.[9] Increasingly, experts in the field of these disorders are asked to give their opinion in legal cases where violent or injurious behaviours have purported to have arisen from sleep.[12]

Unfortunately, the evidence base for effective psychological and medical interventions is lacking. In a recent systematic review, Harris and colleagues reported a great need for adequately powered randomised controlled trials of treatments to better inform clinicians.[13] In order to develop psychological interventions, there needs to be investigation into the characteristics of people experiencing these phenomena and the possible factors that may predispose, precipitate and perpetuate these behaviours.

What do we know about nREM parsomnias and when they occur?

A common factor found to be associated with the onset of nREM parasomnias is stress.[11] In Ohayon and colleagues' aforementioned study, the group who experienced nREM parasomnia reported higher rates of stressful life events and mental stress in the past year compared with those experiencing no such behaviour.[6] Sleep deprivation and alcohol consumption have also been linked to their occurrence.[11]

There has been some investigation into a possible relationship between psychopathology and nREM parasomnias. Interestingly, Kales and colleagues found more intense clinical manifestations and high levels of psychopathology in adult-onset sleepwalkers compared with adults who had been sleepwalkers in childhood.[14] Ohayon found a high percentage of

subjects with nREM parasomnias had concurrent mood or anxiety disorders. Specifically, mood disorders were found in 30.4% of those with night terrors and 14.6% with sleepwalking compared with only 5.7% in healthy subjects.[6]

Crisp and colleagues investigated personality and psychoneurotic characteristics of adults with either sleepwalking or night terrors. A normal psychological profile apart from exceptionally high scores on hysteria, was demonstrated in both groups and high anxiety scores in the night terrors group.[15] Crisp notes that questions within the hysteria scale most often responded to positively by those with night terrors included items relating to being excessively emotional, but that few of these patients displayed such behaviour in wakefulness.[6] In reviewing literature on night terrors, Carlson et al similarly point to a tendency of people with night terrors to "*react with fear and apprehension and inhibit outward expression"* (Carlson et al 1982, p462).[16] Concurrent with this is the finding that sleepwalking and night terrors are more common in good, compliant children who do not show their emotions.[17] These early suggestions about the potential importance of psychological factors have not been followed up in research. For example, there has been no research directly investigating emotional expression in adults presenting with nREM parasomnias.

Turning to insomnia

When considering research into sleep disorders, one turns to the topic of insomnia and finds a greater understanding of its associated factors. Increasing age, female gender, psychiatric, in particular anxiety and depression, and medical disorders are all consistently found to be risk factors for insomnia.[18] As is the case with nREM parasomnias, various studies have shown that stressful life events are often associated with insomnia. More specifically, Morin and colleagues reported that the frequency of daily minor stresses was comparable for good and poor sleepers but the perceived impact of those stressors was higher for insomniacs, suggesting that it is the appraisal process rather than stress itself that is implicated in the presentation of insomnia.[19]

Incorporating established links between insomnia and stress, a number of cognitive behavioural models concerning factors that predispose, precipitate and perpetuate insomnia have lead to the development of psychological interventions and subsequent outcome studies. Harvey's cognitive model posits that, in the context of a life stressor cognitive arousal in the form of rumination and worry predisposes the individual to insomnia. Chronic insomnia can ensue with a shift in the content of cognitions to concerns regarding

the inability to sleep and consequences of sleep loss which, along with other cognitive processes such as selective attention for sleep-related threats and distorted perceptions of daytime deficits, serves to maintain insomnia.[20] In support of this model, several studies have found an association between both rumination and worry and poor sleep.[21-23] Other cognitive processes have also been implicated to have a role in insomnia. For example, Vela-Bueno found emotional inhibition to act as a mediating factor between rumination and sleep quality.[24]

The central tenet in Harvey's model lies in cognitive arousal. An alternative, neurocognitive model, delineates arousal along the three intersecting dimensions of somatic, cognitive and cortical arousal.[25] Where somatic arousal is thought to be more characteristic of acute insomnia, increased cortical arousal is proposed to be a conditioned response occurring around sleep onset and/or during the sleep period following repeated pairings of sleep related stimuli with insomnia related wakefulness. It is suggested that this cortical arousal acts as the biological precipitant to cognitive arousal in the context of chronic insomnia and contributes to sleep continuity disturbance through enhanced sensory processing, enhanced information processing and long term memory formation. Evidence for the role of somatic, or physiological, arousal comes from studies demonstrating higher metabolic rate and reduced heart-rate variability in patients with primary insomnia compared with good sleeper controls.[26,27] Increased cortical arousal has been demonstrated by studies demonstrating increased nREM high frequency EEG in patients with insomnia and investigations using functional neuroimaging techniques demonstrating greater global cerebral glucose metabolism.[28,29]

As opposed to hyperarousal, the psychobiological inhibition model of insomnia proposes that insomnia occurs in association with the failure to inhibit wakefulness.[30] Cognitive phenomena thought to be implicated in this difficulty include an attentional bias towards automatic processes which in turn prevents perceptual and behavioural disengagement, and sleep effort. Evidence in support of this model come from studies indicating that people with psychophysiological insomnia have been shown to exhibit heightened levels of attentional bias and effortful preoccupation with sleep.[31, 32]

Psychological interventions, predominantly taking a Cognitive Behavioural Therapy (CBT) approach have used techniques based on the theoretical underpinnings outlined above such as stimulus control, cognitive restructuring and imagery and relaxation.[33] A recent review of the evidence-base for psychological and behavioural interventions

reported that CBT produced reliable and sustained changes on several sleep parameters.[34] A meta-analysis by Riemann & Perlis concurs that psychological therapy produces improvements comparable to pharmacotherapy during the treatment period with the advantage of beneficial long-term effects.[35]

Considering insomnia as a psychophysiological sleep disorder, in which cognitive and behavioural factors play key roles, has lead to much progress in the understanding of its aetiology and treatment. The question arises as to whether the study of nREM parasomnias, also a psychophysiological disorder could be approached in a comparable manner. Ohayon et al reported that their night terror group had significantly higher rates of psychophysiological insomnia than their group with no parasomnia (6.4% vs 1.9%). Although there was no such higher rate in the sleepwalking group (2.0%), this indicates some comorbidity between the two sleep disorders and perhaps some overlapping but distinct psychological mechanisms.[6]

Aims and hypotheses

Aims

This study aimed to take into account what the literature offers thus far with regards to people who experience nREM parasomnias in conjunction with the more established research base on insomnia and its associations with psychological factors. As such, an attempt is made to profile nREM parasomnias in relation to a number of the psychological variables introduced above, namely emotional inhibition, worry, rumination and arousal. A further objective was to explore any specificity of these variables to people experiencing nREM parasomnias relative to another sleep disordered group. A controlled cross-sectional study was conducted with the index group of interest being the nREM parasomnia group, a parallel sleep disorder group of people with insomnia and a control group of good sleepers.

Hypotheses

The present study aimed to test the following hypotheses:

- It was first hypothesised that, confirming findings from previous research, people with insomnia will have levels of a) Emotional inhibition, b) Worry, c) Rumination and d) Arousal that are elevated relative to good sleepers.

- It was secondly hypothesised that, relative to good sleepers, the group experiencing nREM parasomnia, also a psychophysiological disorder, will also have higher levels of: a) Emotional inhibition, b) Worry, c) Rumination and d) Arousal.

Research questions

It was not clear, however, whether there would be any differences on these variables between the nREM parasomnia and insomnia group and in what direction this may be. Therefore several research questions with regards to these two clinical groups emerged:

- Are there differences between the insomnia and nREM parasomnia group in the nature or degree of a) Emotional inhibition, b) Worry, c) Rumination and d) Arousal?

Methods

Participants

Participants were aged 18 and over, reporting English as their first language. Allocation to the nREM parasomnia group and insomnia group was based on meeting criteria outlined in the (ICSD2) for nREM parasomnia and insomnia respectively.[8] (see Appendix 2:3 for criteria). To ensure that participants within the nREM parasomnia group could be defined as "currently" experiencing these phenomena, participants were also required to have experienced an episode within the past six months. Criteria for admission to the control group were not meeting criteria for insomnia or nREM parasomnia and reporting satisfaction with the amount of sleep obtained.

Conditions for exclusion included: Symptomatic evidence of another sleep disorder (e.g. sleep apnoea or periodic limb movement disorder); Sleep disturbance attributed to a psychiatric/medical condition or neurological disorder; significant drug or alcohol use. People meeting criteria for both nREM parasomnia and insomnia were excluded from the study.

Approximately 300 people were spoken to about the study and a structured interview was administered to 239 of these people with 33 people being excluded at this stage for the following reasons: 11 people did not meet inclusion criteria for any of the group (i.e. did not experience insomnia or nREM parasomnia but did not report satisfaction with sleep); 12 reported symptoms of another sleep disorder; 2 people met criteria for nREM

parasomnia and insomnia; 2 people did not speak English as their first language; 3 experienced REM parasomnia (e.g. REM sleep behaviour disorder) as opposed to nREM parasomnia; 2 were deemed to be experiencing mental health difficulties which would impact on their ability to participate in the study; 1 person experienced insomnia due to being pregnant and 2 people had not encountered their nREM parasomnias within the last 6 months. Of the remaining 206 people who were given the questionnaire either in person, via email or sent in the post, 44 did not complete this. Thus, 162 volunteers participated fully in the study. Demographic information was collected with regards to participants' age, gender and postal address.

Participant recruitment

Participants were recruited via the University of Glasgow Sleep Centre's (UGSC) ongoing operational procedures. As such, advertisements were placed on the UGSC website and posters displayed in GP surgeries and on University of Glasgow premises. Participants who had not been suitable for previous studies at the UGSC but had agreed to be contacted for future studies were also identified. Some participants were sourced through the parasomnia clinic at the UGSC. Three sleep professionals working clinically with people with nREM parasomnia were contacted about the study and agreed to inform their clients about the study and distribute participant information sheets.

The study was publicised via articles in national newspapers, social networking posts by the Mental Health Foundation (www.facebook.com/mentalhealthfoundation) and advertising at the Glasgow Science Centre. Members of the public who had taken part in the Great British Sleep Survey (http://www.sleepio.com/survey/), indicating a presence of a nREM parasomnia, were informed about the study and invited to contact the researcher if they were interested in participating.

This study was developed as part of a larger programme of research and suitable participants recruited into a parallel study investigating stress reactivity in people with nREM parasomnia, insomnia and good sleepers were offered the opportunity to take part in this study and vice versa. Additional recruitment was achieved via social connections and colleagues of the researcher.

Research procedure

People interested in participating in the study were invited to contact the UGSC by e-mail, telephone or face-to-face. Potential participants were screened using the UGSC standard screening interview administered to all volunteers intending to be involved in research at the UGSC, with additional screening items in relation to criteria for nREM parasomnia and specific health and demographic questions (Appendix 2.4). If deemed suitable, they were provided with a participant information sheet (Appendix 2.5) and a consent form (Appendix 2.6). Depending on their preference, those who consented to taking part were then emailed a link to the online version (see Appendix 2.7 for image of site homepage) of the questionnaire or provided with the paper set of questionnaires either by post or in person.

Study design

The study consisted of a between-groups cross-sectional design with three groups: Adults with primary insomnia, nREM parasomnia (nREMp) and good sleepers (GS). The primary independent variables in relation to the hypothesis outlined were participants' scores on self-report measures of emotional inhibition, rumination, worry and arousal. Group was the main independent variable.

Justification of sample size/Power calculation

No previous studies investigating any of the constructs of arousal, emotional inhibition, worry and rumination in relation to a nREM parasomnia population could be identified on which to base an estimated effect size. However studies investigating insomnia groups compared to controls have yielded large effect sizes. For example, using data from a study by Harvey & Greenall, an effect size of d=1.07 was found between an insomnia group and good sleepers on measures of worry, which would correspond to a large effect size according to Cohen's effect size conventions.[23,36] In answering its final research question, the present study investigated possible differences between two clinical populations and it was deemed likely that sufficient power would be required to detect a more conservative, medium effect size. *A priori* sample size calculations were conducted using the G*Power 3 software program for an independent samples t-test (two-tailed).[37] With a significance level set at 0.05, a standard power of 0.8 and a medium effect size of d=0.5, it was calculated that a sample size of 64 would be required in each group. The researcher aimed to recruit up to 100 participants per group and it was expected that obtaining this sample size would be sufficient to detect any significant differences between the two clinical

groups, in addition to differences between the clinical and control groups. It was anticipated that applying strict criteria for inclusion into the study and attempting to match the groups with regards to age and gender would also enhance the power of the study in detecting any existing effects[II].

Measures

Demographic, screening, sleep and clinical measures

Screening interview

Participants were screened administering the generic UGSC intake interview with additional study specific questions. Information gathered included age, postal address, weekly alcohol intake, drug use and medical history. (Appendix 2.4)

Participants were asked questions based on criteria outlined in the ICSD-2 for nREM parasomnia and insomnia. Those meeting criteria for either category of disorders were also asked questions with regards to the history and frequency of their sleep phenomena.

To ensure the absence of another sleep disorder, the screening interview consists of a brief algorithm based on criteria for narcolepsy, sleep breathing disorder, restless leg syndrome/periodic limb movement syndrome, circadian rhythm sleep disorder and parasomnia (including REM parasomnias).[38]

Sleep

The *Pittsburgh Sleep Quality Index (PSQI)* was utilised to provide a quantitative measure of sleep disturbance in addition to the above interview.[39] This self-report questionnaire measures estimated sleep quality and disturbance over 1 month. A global PSQI score of >5 has a reported sensitivity of 89.6% and specificity of 86.5% in distinguishing those with clinically significant sleep disturbance from those without. The PSQI has been shown to have a satisfactory level of internal consistency ($\alpha = 0.83$).

The *Sleep Condition Indicator (SCI)* was also employed.[40] The SCI is an unpublished self-report measure based upon proposed DSM-5 sleep disorder criteria (http://www.dsm5.org/ProposedRevision/Pages/Sleep-WakeDisorders.aspx) which has been developed at the UGSC and for which data has thus far been collected on 12,000

[II] In practice matching was conducted post-hoc, as outlined in the *sample characteristics* section of the results, because all attempts were made to maximise attainment of the target sample size.

people. Participants are asked to report on the pattern of their sleep over the past month in addition to the quality of their sleep, the impact any poor sleep has had on their life and the level of concern they have had about their sleep. Questions about the history of sleep problems are also included. The SCI has demonstrated good internal consistency (α = 0.89).[40]

An *Impact of Poor Sleep Assessment* was also used to confirm group allocation and covers six areas outlined in the DSM-5 proposed criteria for insomnia regarding the impact of sleep on daytime functioning [41]Specifically questions are asked in relation to mood, energy, relationships, daytime sleepiness, concentration and functioning at work.

Clinical

The *Depression Anxiety Stress Scales (21 items)* (DASS21) is a 21-item self-report measure of depression, anxiety and stress and was selected because it includes a specific stress scale and takes a dimensional view of DAS symptoms[42]; appropriate because this study was designed to exclude people with clinical disorders. Internal consistency for the scales are satisfactory with α=0.93 for the total scale, and α=0.88, α=0.82 and α=0.90 for the depression, anxiety and stress scales respectively.

<u>*Outcome measures*</u>

Emotional Inhibition

Emotion Inhibition was assessed using the *Emotion Inhibition Subscale* of the *Emotion Control Questionnaire* (ECQ-EI).[43] Participants were asked to rate 14 statements and situations as generally "true" or "false". E.g. "people find it difficult to tell if I'm excited about something or not". The ECQ-EI has been shown to have good internal consistency (α=0.77) and test-retest reliability (r=0.71).

The *Acceptance & Action Questionnaire – II* (AAQ-II) is a 7-item self-report questionnaire that measures psychological inflexibility and experiential avoidance.[44] Developed within the context of Acceptance and Commitment Therapy, this relates to an attempt to alter the form, frequency or situational sensitivity of difficult private events (i.e. thoughts, feelings and physiological sensations). E.g. "I worry about not being able to control my worries and feelings". This questionnaire also has good psychometric properties (α=0.84).

Rumination and Worry

Rumination was assessed using *The Rehearsal Subscale* of the *Emotion Control Questionnaire (ECQ-R)*. Participants are asked to rate 14 statements and situations as generally "true" or "false". E.g. "I get worked up just thinking about things that have upset me in the past", "I remember things that upset me or make me angry for a long time afterward". The ECQ-R has been shown to have high internal consistency (α=0.86) and test re-test reliability (r=0.80).[43]

Worry was measured using the *Penn State Worry Questionnaire* (PSWQ), a 16-item self-report instrument which measures the trait of worry.[45] Items include "I am always worrying about something" and "I have been a worrier all my life". The PSWQ has strong internal consistency (α=0.95) and test re-test reliability (r=0.93).

Arousability

Arousability was measured using the *Arousal Predisposition Scale* (APS).[46] The APS is a 12-item self-report measure of arousability demonstrated to have a split-half reliability of 0.83 and to predict individual differences in physiological arousal.[46] Examples of items are "I find that my heart keeps beating fast for a while after I have been "stirred up"" and "I get excited easily".

The Sleep Arousal Scale (SAS) was also utilised.[47] The SAS is a 16-item self-report measure which comprises both cognitive and somatic manifestations of arousal. Participants are asked to rate how intensely they experience symptoms as they attempt to fall asleep or return to sleep. Items include "Worry about falling asleep" (cognitive) and "Heart racing, pounding or beating irregularly" (somatic). Internal consistency for cognitive (8 items) and somatic (8 items) are good (α=0.76 and α=0.81 respectively). (see Appendix 2.8 for all measures).

Approach to data analysis

Data were first summarised to provide descriptive statistics. Preliminary analysis was conducted to check whether the three groups differed with respect to age, gender and socioeconomic status. Before conducting formal analysis, all variables were inspected to see if assumptions for parametric analysis were met. Normality of each distribution was checked using graphical and numerical methods with reference to skewness and kurtosis. Homogeneity of variance was assessed using Levene's test for equality of variances. Data not meeting these assumptions were transformed using square root or logarithmic

transformations[48], and where data could not be rectified, appropriate, equivalent non parametric tests were employed.

To test the main hypotheses, group differences with regard to the dependent variables were analysed using one way analysis of variance (ANOVA). Where significant effects were found, post hoc Bonferroni tests were used to identify associated between group differences. Subsequently, Bonferroni corrections were applied conservatively to see if effects remained significant upon controlling for multiple comparisons. To investigate the impact of age as a covariate, analyses of covariance (ANCOVA) was also considered. However in each case, the main effect remained significant and so original ANOVA results are referred to throughout the text (see Appendix 2.9 for all post-hoc analysis and ANCOVA results).

Internal consistency was ascertained for each dependent measure on the whole study sample, calculating Cronbach's alpha coefficient (α) for continuous data and Kuder-Richardson formula 20 (KR_{20}) for dichotomous data.

Relationships between the variables were finally explored using correlations. To investigate correlations between all dependent measures and the DASS subscales it was acknowledged that a substantial proportion of the data were not normally distributed and therefore a Spearman's rank order correlation coefficient was used. For subsequent specific correlations where data were normally distributed, the more powerful Pearson's product moment correlation was calculated.

Analyses were conducted using Statistical Package for Social Sciences (PASW 18) software package. Due to the exploratory nature of this study, tests were two-tailed with significance set at criteria $p < 0.05$ unless otherwise specified.

Ethical approval

NHS ethical approval and R&D approval was obtained from the Greater Glasgow & Clyde West of Scotland Research Ethics Service (See Appendix 2.10 for copy of approval letter).

Results

Sample characteristics

162 eligible participants completed the study. A disproportionate number of participants in the Good Sleeper group completed the study and therefore 12 of these were withdrawn from analysis to create more even sample sizes across groups. It is important to highlight that this was process was conducted independent of scores on the outcome variables of the study. In selecting data to remove, attempts were made to improve matching to the index sample of participants with nREM parasomnias with regards to gender and maintain close matching in age to this group, thus reducing unexplained variance. For example, by removing 6 females and 6 males from the Good Sleeper group, the ratio of males to females in this group became closer to that of the nREM parasomnia group. Participant's score on the PSQI was also considered in selecting participants for withdrawal, with 8 participant's data removed taking into account their score of > 5 on this measure (see Appendix 2.11 for specific details concerning participants removed). A final 148 participants were included for analysis and, based on the diagnostic and inclusion criteria applied, 50 were categorised as Good Sleepers (GS), 50 had Insomnia and 48 had an nREM parasomnia (nREMp).

Table 2.1 provides demographic details of the participants. The mean age across all participants was 38.9 years (SD= 14.14) with a total of 101 females and 47 males. With regards to group differences in demographic data, ANOVA and Bonferroni's post hoc test revealed that the Insomnia group was significantly older than both the nREMp ($p<0.001$) and GS groups ($p< 0.001$). Therefore subsequent hypothesis testing was performed initially without a covariate (ANOVA) and repeated with age as a covariate (ANCOVA). There were no gender differences between groups ($X^2 = 2.650$, $p = 0.266$).

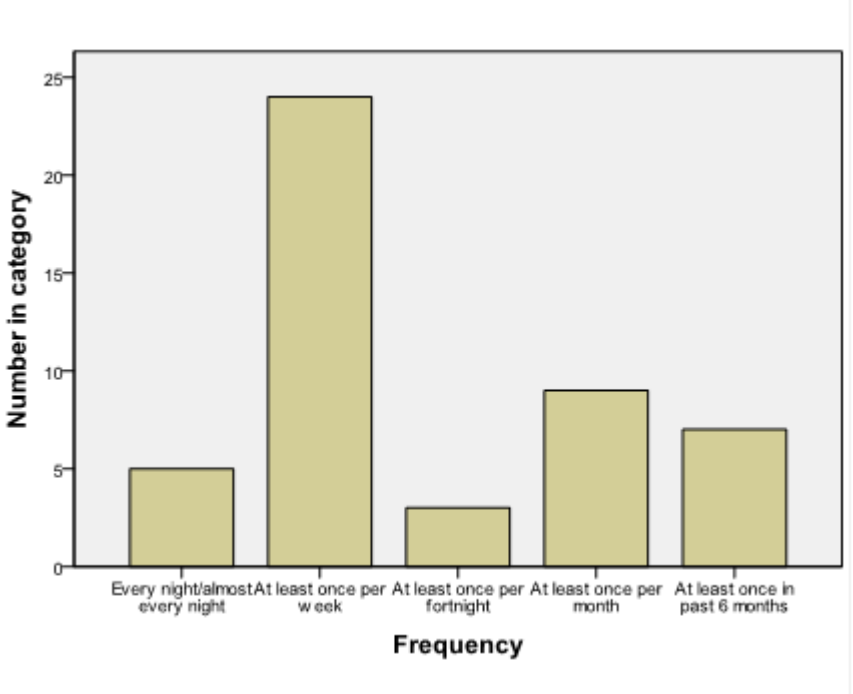
A total of 122 (82.43%) participants were based in Scotland, 22 lived in England (14.86%), 2 (1.35%) were currently residing in Australia, 1 person (0.68 %) lived in Northern Ireland and 1 (0.68%) in Belgium [III]. An indicator of socioeconomic status based on postcode was derived for participants living in Scotland and the groups did not differ significantly according to this index (X^2 =

[III]With the use of web-based recruitment it was not easily possible to restrict the sample to the UK. Participants residing outside the UK had contacted the UGSC upon viewing the centre's website or had been living in the UK when they initially found out about the study and subsequently moved abroad. No active attempts to recruit overseas were made.

4.850, p=0.09) (see Appendix 2.12).[IV] The mean number of units of alcohol consumed by the overall sample was 6.28 per week and intake did not differ significantly between groups [F(2,141) = 0.039, p=0.902]. Regular recreational drug use was not reported by any of the participants.

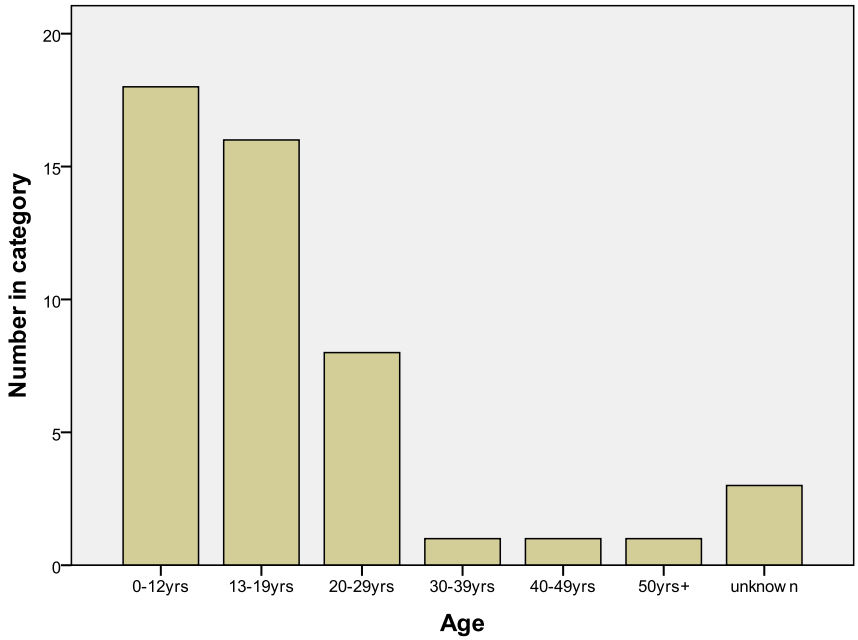
All participants in the nREM parasomnia group had experienced either a night terror or sleepwalking in the past 6 months. With regards to subtypes, 14 (29.2%) experienced sleepwalking, 24 (50 %) experienced night terrors and 10 (20.8%) experienced both phenomena. Figure 2.1 presents information on the frequency with which people experienced their nREM parasomnia in the past 6 months. Although several participants stated that this was variable, estimates ranged from at least once per night to twice in total within this time frame. Participants were also asked the age at which they first experienced their nREM parasomnia, the details of which are presented in Figure 2.2.

Figure 2.1 Frequency of nREM parasomnia episodes in past 6 months



[IV] It was not possible to convert English to Scottish deprivation scores. An index based on Scottish data, being the largest sub-sample, therefore serve as a proxy to an indication of socioeconomic status of the study sample

Figure 2.2 Age experienced first nREM parasomnia episode



In the Insomnia group, the average duration of sleep difficulties was 15.2 years (range 0.1-50.9). Of the 25 participants reporting to have had a problem for at least 11 years, 10 reported that they did not "sleep okay as a child", suggesting a more idiopathic form of primary insomnia.

Sleep characteristics across groups

The mean scores and standard deviations for each of the sleep measures are also presented in Table 2.1. As expected, those in the GS group scored significantly lower than both the nREMp and Insomnia group in the PSQI, the SCI and the Impact of poor sleep questionnaire, confirming that they are good sleepers. With regards to the two sleep disordered groups, those with insomnia scored significantly higher on the PSQI and on the SCI but there were no such significant differences in the Impact of poor sleep questionnaire.

Table 2.1 Demographic, sleep and clinical characteristics

Measure	GS (N = 50) Mean (SD)	nREM p (N= 48) Mean (SD)	Insomnia (N= 50) Mean (SD)	F(2,145) $X^2(2)$	P	Post-hoc
Age (years)	36.54 (11.6)	32.37 (11.6)	47.56(14.5)	18.885	<0.001	I>nREMp=GS
Alcohol	6.47 (5.84)	6.15(6.03)	6.21 (6.14)	0.039	0.902	
Gender:	**N (%)**	**N(%)**	**N(%)**			
Male	15 (30)	12 (25)	20 (40)	2.65	0.266	
Female	35 (70)	36 (75)	30 (60)			
Sleep data:	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**			
PSQI	2.80 (1.7)	7.21 (4.1)	12.02 (3.5)	113.912	<0.001	GS<nREMp<I
SCI [a]	2.82 (5.7)	15.79 (7.1)	22.26 (5.7)	101.22	<0.001	GS<nREMp<I
Impact of poor sleep	2.06 (6.6)	11.29 (7.1)	13.32 (6.6)	77.805	<0.001	GS<nREMp=I
Clinical data:						
DASS21 [a]***:***						
Depression	1.24 (2.3)	8.17 (9.8)	9.32 (8.7)	42.165	<0.001	GS<nREMp=I
Anxiety	0.94 (1.4)	7.17 (6.9)	6.68 (6.4)	55.299	<0.001	GS<nREMp=I
Stress	4.76 (5.70)	12.50 (8.7)	15.04 (7.3)	47.871	<0.001	GS<nREMp=I

[a] Kruskal-Wallis Test and Mann-Whitney Tests for *post-hoc* pairwise comparisons

GS = Good Sleepers, NREMp = NREM parasomnia, I = Insomnia, PSQI = Pittsburgh Sleep Quality Index, SCI = Sleep Condition Indicator

Clinical characteristics across groups

Table 2.1 also displays the clinical characteristics of each group as measured by the DASS21. The GS group scored significantly lower on all three scales compared with both the Insomnia and nREMp group. There were no significant differences between scores in the two sleep disordered groups on any of the scales. It should be highlighted that the mean scores for each group fall within the normal and mild level severity categories of each scale of the DASS.[49] Therefore although significant differences are evident between groups, these lie at the lower (likely subclinical) end of the scale and as such neither depression, anxiety or stress was considered as a covariate in subsequent testing of the main hypotheses (see Appendix 2.13) for a frequency count of participants in each severity category for the three DASS scales across groups).

Hypothesis testing

The descriptive statistics for each measure used in hypothesis testing are displayed in Table 2.2. The nREM parasomnia and Insomnia groups were both hypothesised to have higher levels on all variables compared with the good sleepers with differences between the two sleep disordered groups remaining an open research question. The results in relation to these hypotheses are presented separately for each variable below.

Emotional Inhibition

The mean scores and standard deviations on the Emotional Inhibition subscale of the ECQ are displayed for each group in Table 2.2 and presented graphically in Figure 2.3. It can be seen that, as hypothesised, both sleep disorder groups scored higher than the good sleepers on this scale. A one-way ANOVA revealed a significant main effect between groups [$F(2,145) = 7.508$, $p < 0.001$]. Bonferroni's post-hoc analysis was conducted to clarify these differences. Those within the nREMp group scored significantly higher than the GS group (P=0.001). The Insomnia group also scored significantly higher than the GS group (P=0.01). With regards to the research question concerning comparisons between the Insomnia and nREMp group, no significant differences were found (p=1). The internal consistency of the Emotional Inhibition subscale was found to be high ($KR_{20} = 0.81$).

Table 2.2 and Figure 2.3 also display the mean scores and standard deviations on the AAQ-II. A one-way analysis of ranks (Kruskal-Wallis) was used to investigate differences between the three groups on this variable. A significant group difference was found ($X^2 = 13.119$, $P < 0.001$). Subsequent pair-wise analysis using Mann-

Whitney tests revealed that the Insomnia group scored significantly higher than the GS ($p<0.001$). The nREMp scores were also significantly higher than the GS group ($p<0.001$), confirming the first two hypotheses. Again, no such differences were found between the two clinical groups ($p= 0.94$). Internal consistency of the AAQ-II was demonstrated to be high ($\alpha = 0.81$).

Table 2.2 – Outcome analysis

Measure	GS N = 50 Mean (SD)	nREMp N = 48 Mean (SD)	Insomnia N = 50 Mean (SD)	F(2,145) X^2 (2)	P	Post – hoc
Emotional inhibition						
ECQ-EI	4.60(1.8)	5.92 (2.0)	5.70 (1.7)	7.508	0.001	nREMp=I>GS
AAQ-II [a]	12.48(4.2)	19.31 (9.9)	19.24 (9.2)	13.119	0.001	nREMp=I>GS
Rumination & Worry						
ECQ-R	4.42 (2.7)	7.23 (3.1)	5.86 (3.4)	10.053	<0.001	nREMp>GS
PSWQ [b]	37.24 (10.3)	47.44 (12.1)	48.4 (14.4)	12.158	<0.001	nREMp=I>GS
Arousability						
APS	28.66 (6.7)	34.25 (7.5)	32.42 (8.2)	7.08	0.001	nREMp=I>GS
SAS cognitive [a]	13.4 (4.5)	18.73 (6.0)	25.28 (5.8)	70.201	<0.001	I>nREMp>GS
SAS somatic [a]	8.58 (1.0)	12.50 (4.5)	13.48 (4.2)	60.694	<0.001	nREMp=I>GS

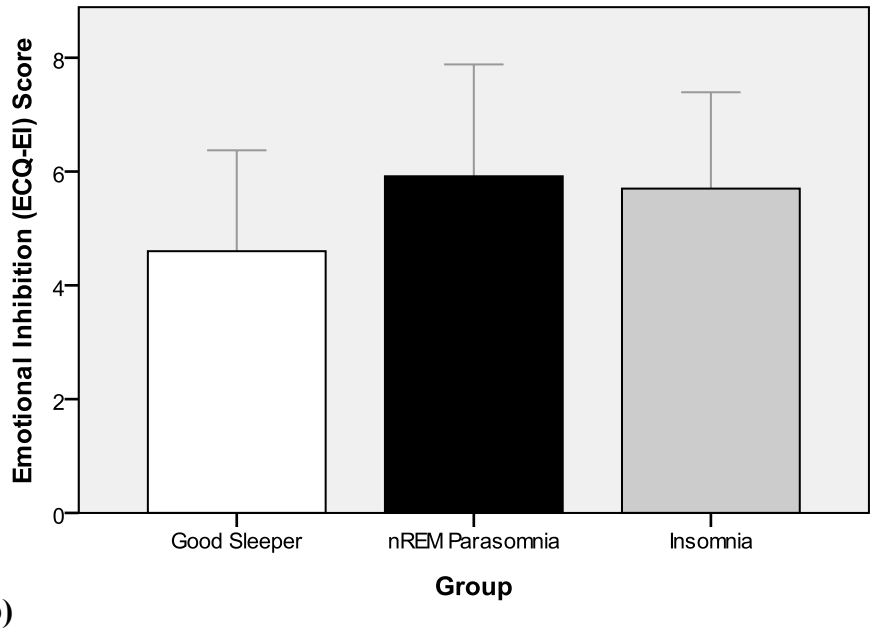
[a] Kruskal-Wallis Test with Mann-Whitney Tests for *post-hoc* pairwise comparisons

[b] Data transformed using logarithmic transformation

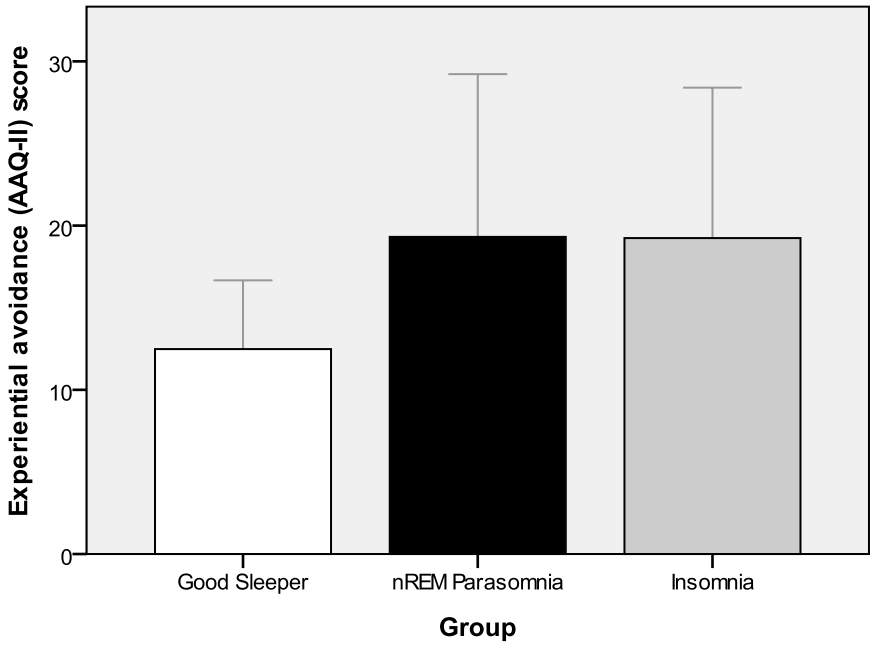
GS = Good Sleepers, nREMp = nREM parasomnia, I = Insomnia
ECQ-EI = Emotional Control Questionnaire-Emotional Inhibition Subscale; AAQ-II = Acceptance & Action Questionnaire II; ECQ-R = Emotional Control Questionnaire Rehearsal Subscale; PSWQ = Penn State Worry Questionnaire; APS = Arousal Predisposition Scale; SAS cognitive = Sleep Arousal Scale cognitive subscale; SAS = Sleep Arousal Scale somatic scale

Figure 2.3. Mean scores and standard deviations for (a) ECQ-EI and (b) AAQ-II

(a)



(b)



Rumination and worry

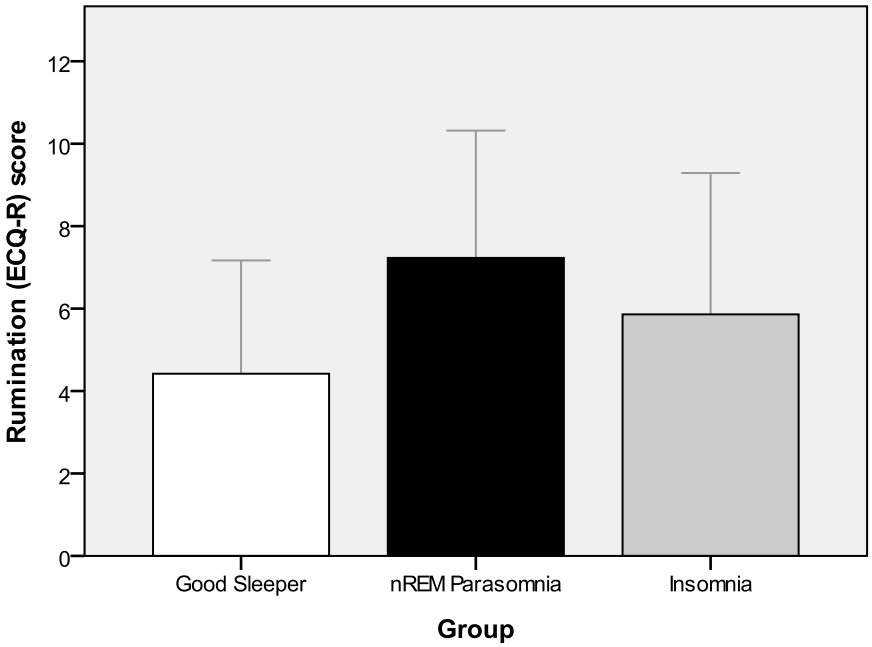
Rumination was measured by the Rehearsal subscale of the ECQ and mean scores and standard deviations are presented for each group in Table 2.2 and Figure 2.4. Higher scores are evident in the 2 clinical groups. A one-way ANOVA revealed a significant main effect between groups [$F(2,145) = 10.053$, $p < 0.001$]. Supporting the hypothesis that higher levels of rumination would be evident in those experiencing nREM parasomnia compared to good sleepers, a Bonferroni's post-hoc analysis revealed a significant difference between these two groups ($p < 0.001$). No other significant

group differences were uncovered. However, the difference in means between the Insomnia and GS group represented a small to medium effect size of d=0.47. A retrospective power analysis was calculated to determine what sample size would be required in each group to detect a meaningful difference should it exist. With a significance level set at an α level of 0.05, a standard power of 0.8 (one-tailed), the number required was calculated to be 57. Appendix 2.14 provides a tabular presentation of effect sizes and p-values revealed for all pair-wise comparisons indicating at what magnitude of effect significance is demonstrated. Satisfactory internal consistency was demonstrated for the Rehearsal subscale (KR_{20} = 0.78).

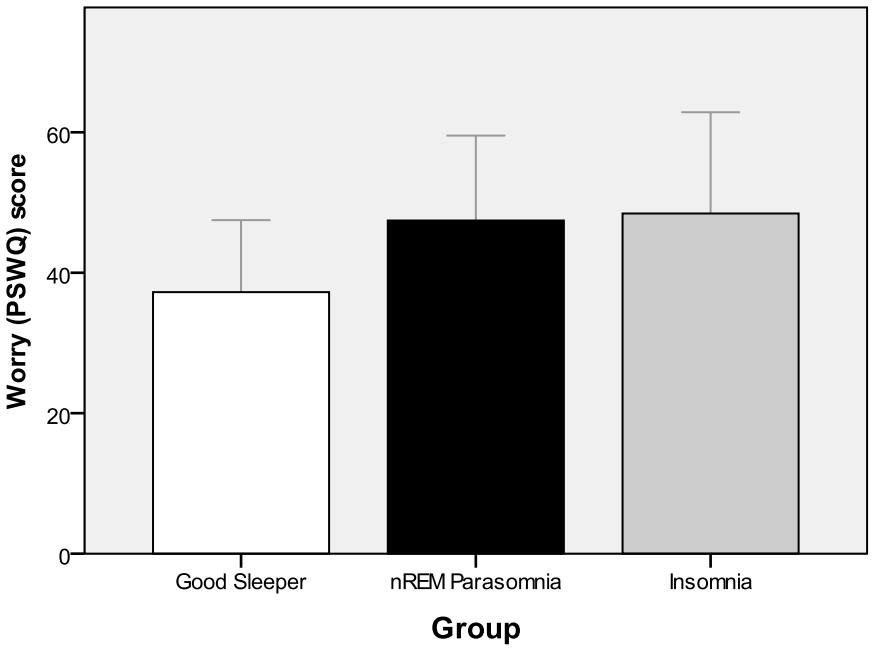
Mean scores and standard deviations are presented in Table 2.2 and Figure 2.4 for all three groups on the PSWQ. A one-way ANOVA found a significant group effect [F (2,145) = 12.158, p<0.001]. It was hypothesised that both the Insomnia and nREMp group would score higher than the GS group and this was confirmed with Bonferroni's tests (p < 0.001 and p< 0.001 respectively). In relation to the research question concerning the two sleep-disorder groups, no significant differences were revealed (p=1). Internal consistency of the PSWQ was high (α = 0.93).

Figure 2.4 Mean scores and standard deviations for (a) ECQ-R and (b) PSWQ

(a)



(b)



Arousal

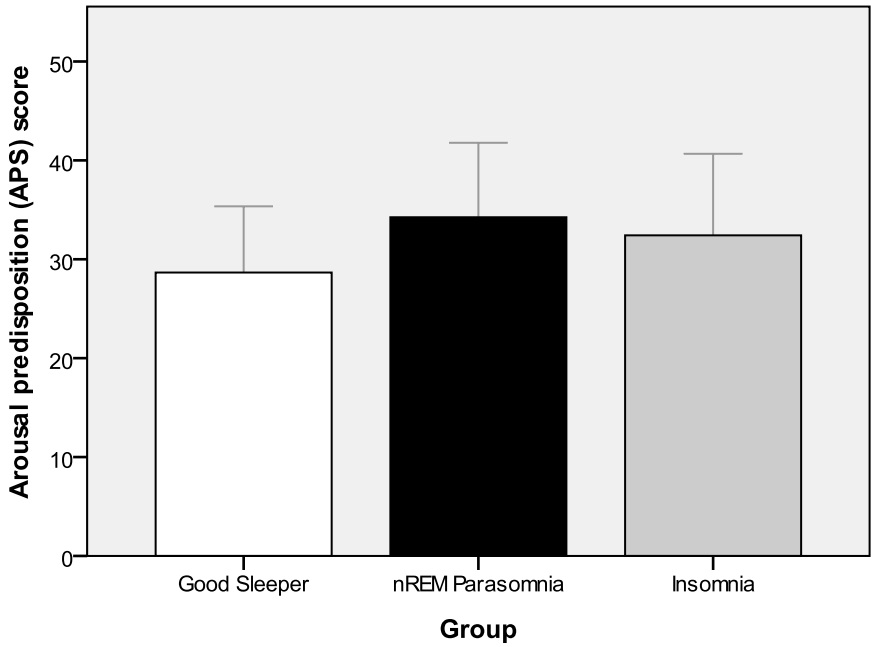
It was hypothesised that people in the insomnia and nREM parasomnia groups would report higher levels of arousal than good sleepers. The question was also raised as to whether there would be any differences between the two sleep disordered groups on these measures. Table 2.2 and Figure 2.5 display the mean scores and standard deviations for the APS for each group. A one-way ANOVA resulted in a significant group effect [$F(2,145) = 7.080$, $p<0.001$]. A post-hoc Bonferroni's test revealed that both the Insomnia and nREMp group scored higher than the GS group ($p=0.04$ and $p=0.001$ respectively). However, applying Bonferroni's corrections, increasing the significance level to a more conservative $p<0.017$ the difference between the GS and Insomnia group no longer met significance. No significant differences were found between the two sleep disordered groups ($p=0.69$). A high internal consistency of the APS was demonstrated ($\alpha = 0.84$).

Mean scores and standard deviations for the cognitive and somatic subscales of the SAS are also displayed in Table 2.2 and Figure 2.5. The highest scores were found in the Insomnia group, this being particularly evident in the cognitive subscale. Considering the cognitive subscale initially, a Kruskal-Wallis test indicated a significant group effect ($X^2 = 70.201$, $p< 0.001$). Pairwise analysis using Mann-Whitney tests showed that the Insomnia group were significantly more cognitively aroused than the GS ($p <0.001$), as were the nREMp group ($p<0.001$). Those in the Insomnia group also scored

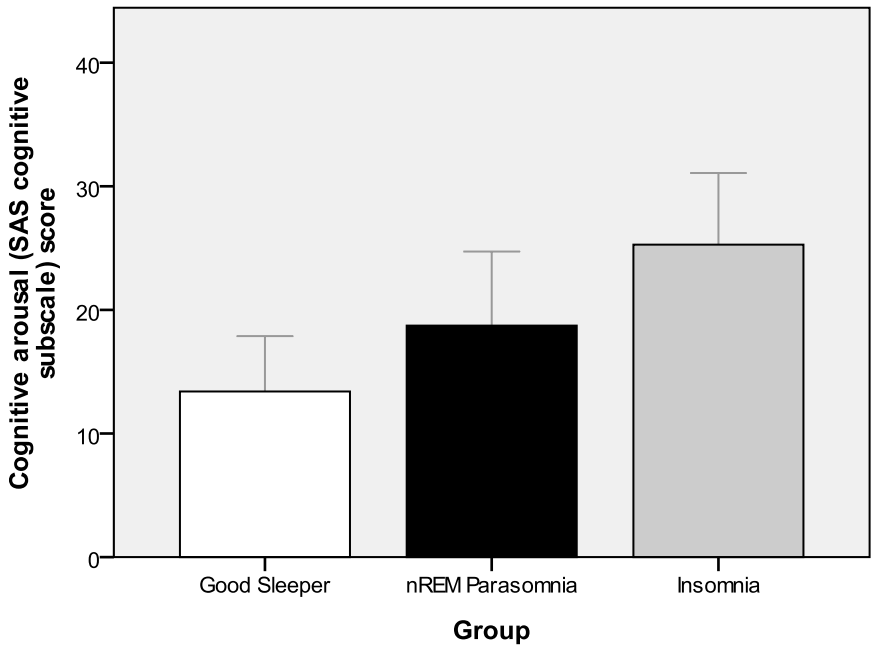
significantly higher than the nREMp group ($p < 0.001$) on this measure. A significant group effect was also found on the somatic subscale ($X^2 = 60.694$, $p < 0.001$) with both the Insomnia and nREMp group scoring significantly higher on this measure than the good sleepers ($p < 0.001$ and $p < 0.001$ respectively). Although scores were higher on this subscale in the Insomnia group compared with the nREMp group, this difference was not found to be significant ($p = 0.118$). Internal consistency of both the cognitive and somatic subscales were good ($\alpha = 0.89$ and $\alpha = 0.78$ respectively).

Figure 2.5 Mean scores and standard deviations for (a) APS, (b) SAS cognitive & (c) SAS somatic

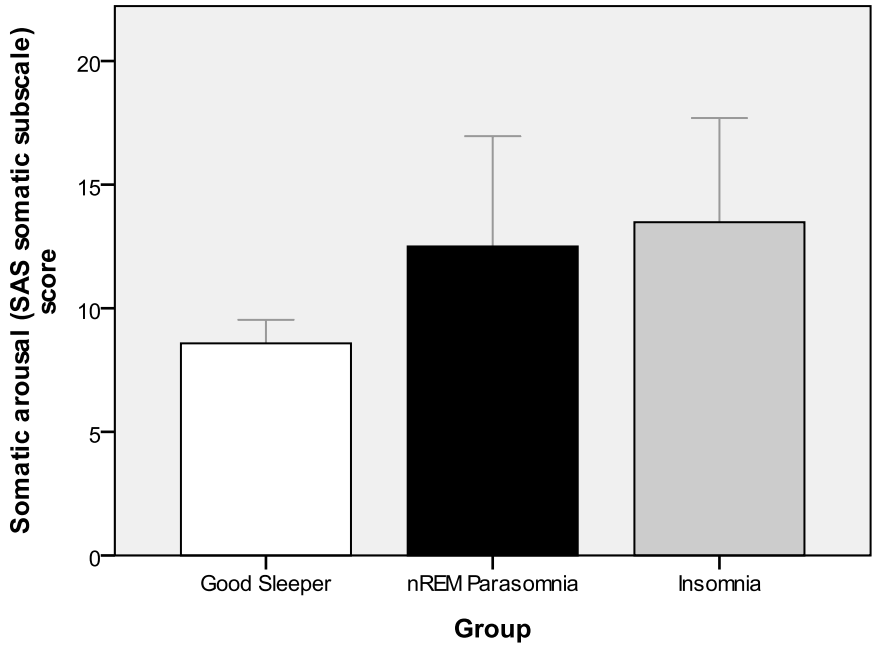
(a)



(b)



(c)



Associations between dependent variables and DASS subscales

Correlations were investigated between the dependent variable measures and each of the DASS subscales (see Appendix 2.15 for correlation matrix). Significant correlations (P<0.001) were found between all measures indicating an association and potential overlap between some of the constructs being measured. However, values for Spearman's rank order correlation coefficient were all within the low or moderate correlation ranges indicating that distinct psychological constructs are being measured. Interestingly, the lowest correlation was between the AAQ-II and ECQ-II scale (r_s = 0.303) whereby variability of scores on one questionnaire is accounted for by only 9.18% of variability in the other. The highest correlation was between the APS and the PSWQ (r_s = 0.668) where approximately 45% of the variance of the former is explained by the latter.

Associations between the PSQI and ECQ-EI

Correlations between sleep quality and emotional inhibition as measured by the PSQI and the ECQ-EI were explored. In line with the differences in scores on the ECQ-EI between the sleep disordered groups and the good sleepers, PSQI was found to be significantly positively correlated with ECQ-EI (r = 0.240, p<0.005).

In consideration of the aforementioned differences between groups on each of the DASS subscales, the influence of these subscales on the relationship between the ECQ-EI and the PSQI was investigated by conducting partial correlations, controlling for the effects of each subscale individually. Indeed, the correlation between the PSQI and

ECQ-EI did not hold when the Depression, Anxiety and Stress subscales of the DASS were controlled for (r=0.075, p=0.18), indicating that the relationship could be due to this third factor.

Discussion

Little attention has been paid to psychological processes associated with nREM parasomnias, although stress is commonly associated with their expression, and there appears to be a higher prevalence of mood disorder, compared to healthy subjects. Expert opinion has also suggested that people with nREM parasomnias may be 'emotionally inhibited'. By contrast, there is a relative wealth of research on insomnia, another sleep disorder of a psychophysiological nature which can be potentiated by stress. Could it be that factors contributing to the development and maintenance of insomnia might also be implicated in nREM parasomnias? The present study aimed to profile nREM parasomnias on a number of psychological variables, drawn from the limited literature on this particular disorder, as well as from the more established insomnia evidence base. The main findings are discussed, followed by a consideration of the strengths and limitations of the study and its clinical and research implications.

Insomnia: emotional inhibition, worry, rumination and arousal

As hypothesised, the insomnia group reported higher levels on measures of emotional inhibition, worry and trait-like arousability in addition to cognitive and somatic pre-sleep arousal. The expected outcome of increased rumination, however was not established.

The elevated levels of emotional inhibition, measured by the emotional inhibition subscale of the ECQ, compared with good sleepers, are concurrent with Vela-Bueno et al's finding of associations between emotional inhibition (using the same scale) and sleep quality. It could be understood in the context of theories such as those proposed by Pennebaker who argues that emotional inhibition results in an increase in stress and intrusive, ruminative thoughts.[50] It could be that it is its association with these factors that leads to an increased vulnerability to insomnia in the way that it has been proposed for other psychological difficulties. The finding that this group scored higher on the AAQ-II, which specifically measures experiential avoidance, is in line with arguments for the use of mindfulness based techniques in addition to traditional CBT strategies in treating insomnia. Increased experiential avoidance could involve controlled information processing strategies contributing to the inhibition of de-arousal proposed

in Espie's model of insomnia.[51] This may be amenable to change through techniques endorsed in mindfulness approaches such as encouraging the acceptance of spontaneously occurring physiological and mental processes.[52] There has been little prior use of this particular measure in insomnia populations with the exception of a study by McCracken et al in which associations were found with measures of sleep quality in chronic pain patients with insomnia.[53]

Confirming findings from previous research, the higher levels of self-reported worry in the insomnia group, provide increased support for Harvey's aforementioned cognitive model which emphasises its role in insomnia.[23] No such significant difference was found on the measure of rumination used, indicating that this related concept is perhaps not as predominant in insomnia. However, retrospective power analysis showed a sample size of 57 would be required to detect a meaningful difference should it exist and it may be that the study was underpowered in this respect.

Replicating findings of previous research into arousability, it was also found that those with insomnia reported more cognitive and somatic arousal compared with good sleepers. With regards to the more trait like arousal predisposition scale, applying Bonferroni's corrections, increasing the significance level to a more conservative $P<0.017$, meant an initial significant difference on this measure was no longer present. It is recognised, however, that a trade-off exists between that of controlling the familywise error rate but increasing the risk of a type-II error and therefore the initial significance achieved should be not be discarded as uninformative.

nREM parasomnia: emotional inhibition, worry, rumination and arousal

With regards to hypotheses concerning the primary index group of interest, the participants experiencing nREM parasomnias reported significantly higher levels on all measurements of emotional inhibition, worry, rumination and arousability.

The finding of higher levels of emotional inhibition relative to good sleepers is congruent with previous research pointing to this characteristic in people with nREM parasomnias. It also provides empirical support to anecdotal reports from clinicians working therapeutically with this group (Espie, personal communication). Such professionals have described clients with nREM parasomnias to have a tendency to cope well with stress at a surface level, appearing calm and in control but, that through therapeutic exploration, an underlying emotional vulnerability has emerged. Use of the Emotional Inhibition subscale of the ECQ appears to have tapped into this notion with

items relating to remaining outwardly calm despite experiencing strong negative emotions and the concept of inhibiting the expressive elements of emotional experiences. The mechanism by which emotional inhibition is associated with the occurrence of behaviours such as sleep walking requires further investigation. Like, insomnia, however, it could be considered in relation to Pennebaker's theory that emotional inhibition is associated with increased stress. It is proposed that the inhibition of expression of thoughts or feelings requires exertion that places a cumulative stress both on the mind and physiologically resulting in stress-related physical and psychological health difficulties. Indeed, this is supported by early studies showing that both adults and children with emotional unexpressive tendencies are more physiologically reactive to emotional stimuli and later experimental research linking emotional suppression to increased autonomic arousal.[54,55]

Participants with nREM parasomnias also scored higher on the AAQ-II. This indicates that in addition to a tendency to inhibit the expression of emotions, experiential avoidance, referring to a more private construct relating to an individual's attempts to avoid the experience of undesirable internal events, could also be implicated in the presentation of nREM parsasomnias. There has also been some research into emotional avoidance and physiological arousal. Interestingly, elevated heart rate activity has been found in a "high experiential avoidance" group as measured by the AAQ compared to a "low experiential avoidance" group during neutral and resting baseline periods but not in response to unpleasant stimuli.[56,57] It has been suggested that continuous attempts to regulate emotion leads to greater general levels of arousal.[57] It could be suggested that emotional inhibition both in terms of its outward expression and experiential avoidance, is a factor contributing to the increased arousal levels demonstrated in the population in this study, presenting with these "disorders of arousal".

The suggestion that levels of rumination and worry might be elevated in people presenting with nREM parasomnias arose from evidence in relation to insomnia as opposed to any previous literature specific to this population. That this hypothesis was confirmed indicates that, indeed, certain psychological factors implicated in insomnia also appear to be relevant to this sleep disorder. It could be that such "persevarative" cognitions as rumination and worry in people with nREM parasomnias, like those experiencing insomnia, can be seen as a form of cognitive arousal which are also associated with sympathetic arousal.[58]

Both cognitive and somatic pre-sleep arousal and trait like arousability, all implicated in the development and maintenance of insomnia, were also found to be significantly higher in the nREM parasomnia group compared to good sleepers. It could be postulated that, for example, a vulnerability to arousal developing for psychological reasons, such as those uncovered in this study, manifests itself through partial arousals out of slow wave sleep in the form of sleepwalking or night terrors.

Although at this stage it is only possible to make suggestive statements about the mechanisms by which the factors reported in this study may be influencing the presentation of nREM parasomnia, the results at least suggest that, parallel to insomnia, there is a potential interaction between psychological and physiological processes at play.

Differences between those with insomnia and nREM parasomnia

A research question was posed regarding the specificity of the nature and degree of psychological measures to the nREM parasomnia group compared with the insomnia group. The only significant difference uncovered was that of the insomnia group reporting higher levels of pre-sleep cognitive arousal than the nREM parasomnia group. In previous research, cognitive arousal has been consistently found to be more strongly associated with insomnia complaints than somatic arousal.[59,60] It is interesting to note here that although both somatic and cognitive arousal was found to be higher in the nREM parasomnia group compared to good sleepers, the effect size for the difference in the somatic subscale was larger than for the cognitive subscale (Appendix 2.14). It could be tentatively suggested that arousal is perhaps more evident in somatic, compared with cognitive, symptoms in this group, however more research would be required to explore this possibility.

A key finding in this study is that the nREM parasomnia group were found to have levels of maladaptive psychological responses that were comparable to the insomnia group. Despite their commonalities as psychophysiological disorders of sleep, however, there are distinct differences in how the sleep process is interfered with in insomnia and nREM parasomnias. nREM parasomnias represent disorders of arousal from sleep rather than a difficulty initiating or maintaining sleep. It is reasonable to suggest therefore that there would be some difference in the nature of psychological factors in this interference. If this is the case, the measures used in this study were not sensitive to such differences. Further theorising is needed with regards to where potential differences may lie between the two groups. For example, perhaps there are distinct

vulnerabilities in relation to separate constructs of emotional inhibition whereby one may be more associated with a deficit in identifying and expressing emotions such as what is termed "alexithymia" and the other with a conscious emotion regulation strategy.

Further theorising with regards to where potential differences may lie between people experiencing these two disorders and the selection of appropriate measurement in its investigation would help to enlighten this line of enquiry. For example, utilising measures of separate constructs of emotional inhibition (e.g. in relation to a deficit vs a conscious emotion regulation strategy) may capture distinct vulnerabilities.

The lack of disparity found on the psychological measures between the nREM parasomnia and insomnia groups in this study could also suggest that the same vulnerabilities are present within both sleep disorders but expressed differently. People with insomnia experience a difficulty with down-regulating arousal. A clear conscious self-perpetuating mechanism occurs whereby an individual's increased efforts to sleep paradoxically inhibits de-arousal and thus sleep.

Perhaps in the case of nREM parasomnias, similar vulnerabilities, such as certain psychological responses to stress, manifest themselves in arousal from slow wave sleep. Unlike those with insomnia, however, due to some form of up-regulation or "anchor" into this stage of sleep, preventing the individual from fully wakening, this results in only partial arousal from sleep. There could be some interaction here with specific factors implicated in deepening sleep or making arousal from sleep more difficult (e.g. sleep deprivation) which could further increase the chances of sleepwalking/night terrors (see Pressman, 2007 for a review).[11] The types of behaviours that tend to occur, such as walking, eating and in some instances sexual activities, or in the case of night terrors, extreme reflexive emotions of fear, appear primitive in nature. It could be postulated that while the primitive, subcortical part of the brain wakes up, other, higher functioning aspects of the brain remain in a sleep state. The potential for parts of the brain being "awake" during sleep is in line with the notion of "local sleep". Contrary to the traditionally held view of the brain as a whole being in distinct states of awake, REM and nREM sleep, there is evidence to suggest that sleep is "local" in that at any one point in time, electrical markers of sleep can be restricted to certain areas of the brain. Such evidence comes from research examining simultaneously recorded scalp EEG, intracerebral EEG, and unit firing in multiple brain regions of neurosurgical patients and studies of rats showing that, when kept awake beyond their normal sleep

time, neurons in different cortical areas can suddenly go 'offline' in a way that resembles nREM sleep.[61,62] Further research in this area could inform understanding of the neurological substrates of nREM parasomnias.

Whereas the occurrence of insomnia increases with age, the opposite is found with nREM parasomnias, which are more common among children and usually "outgrown" during adolescence. This typical developmental process could represent better integration of brain functioning and those individuals who maintain nREM parasomnia into adulthood may have a distinctive problem with arousal that is due to a lack of maturation in this respect.

For people with insomnia, the cognitive processes implicated in perpetuating the disorder are incorporated into cognitive behavioural interventions with effective outcomes. People experiencing nREM parasomnia have a much less active role in maintaining their disorder, however treatment focusing on intervening with the psychological mechanism that could be implicated in the expression of these behaviours such as those uncovered in this study could potentially result in elimination or at least reduction in their presentation. Such an approach to intervention is considered below.

Strengths and limitations

One of the strengths of the study is the strict inclusion criteria that were applied in selecting participants, particularly in relation to the nREM parasomnia groups. Each participant underwent a comprehensive screening interview, covering both diagnostic criteria for the specific nREM parasomnia reported and an algorithm to confirm no symptomatic evidence of another sleep disorder. This added to the validity of the study in ensuring that it could be claimed with a high degree of confidence that those being studied did indeed experience this particular phenomenon. For example, less rigorous procedures may have lead to the inclusion of people with other parasomnias such as REM sleep behaviour disorder which shares similar features. Further, discrimination from an insomnia group enabled the exploration of possible psychological factors that may have been specific to nREM parasomnias as opposed to a sleep disorder per se.

Some limitations, however, are important to outline when interpreting the findings in this study. It should be acknowledged that this study was cross-sectional in design and therefore it is not possible to determine any causal relationship between nREM parasomnias and the psychological factors that were found to be associated with their occurrence. Although it seems more plausible theoretically that such factors would

contribute to, rather than be a result of this phenomena, prospective studies would be required to have more confidence in this direction. The study also relied solely on self-report for measurements of its outcome variables which entail certain potential biases. It could be argued that people may not be able to give an accurate response due to cognitive and memory biases, thus measuring an individual's perception of a construct rather than measuring it directly. Future studies could employ objective measures, for example of physiological arousal or alternative indices of emotional expression such as linguistic text analysis.

Further limitations relate to the participants recruited. The sample included both clinical cases and people from the general population. It is possible that clinic attendees, for whom nREM parasomnias have caused sufficient disruption in their lives so as to seek professional help, may represent a qualitatively different population to those who experience nREM parasomnias with no such resulting impact. Such variance in this group was not controlled for in this study. There was also no distinction made between adult onset nREM parasomnias and those who have experienced such phenomena since childhood. Interestingly, the majority of participants in this study had experienced their first nREM parasomnia at least by their teenage year. The finding that, compared to controls, this group displayed higher levels of psychological responses that are arguably maladaptive in nature, goes contrary to Kales' aforementioned report of more intense clinical manifestations in adult onset compared to child onset sleepwalkers.[14] Finally, no attempt was made to investigate differences in subtypes of nREM parasomnias on any of the variables. Including participants who experienced both types, 70% of this group experienced night terrors. Therefore, without replication of these results with a greater representation of sleep walkers, there is the potential interpretation that the findings are indicative of night terrors as opposed to nREM parasomnias more generally.

A final limitation when considering the generalisability of the findings in this study is the possibility of a type-II error. The originality in the focus of this study, while a strength, meant there was limited information on which to determine a sample size to ensure any differences between the groups would be detected. Although attempts were made to overcome this by aiming to recruit a large sample size of 100 per group in order to detect a small to medium effect size, this level of recruitment was not achieved. Indeed, where a retrospective power analysis calculation was performed with regards to rumination and insomnia, a sample size of only 57 was required to detect a difference should it be replicated. It is possible that, should the targeted sample size have been

achieved, a significant effect would have ensued here, replicating previous findings of higher levels of rumination in this group compared to controls. It should be noted, however, that nonsignificant findings between the two sleep disordered groups were generally associated with very small effects sizes, thus increasing confidence that type II errors were not committed in this respect. Sample size was initially unequal across groups, with a disproportionate number of good sleepers. In removing participants from this group to create more even numbers, the opportunity arose to improve matching to the nREM parasomnia group, particularly in relation to gender. It should be noted that analysis was not re-run with the inclusion of the 12 participants who had been removed. The presence of unequal sample sizes between groups violates assumptions of certain statistical analysis and therefore it was considered that repeating the analysis with such violations could not be taken as validation of the analysis that was originally conducted.

Implications

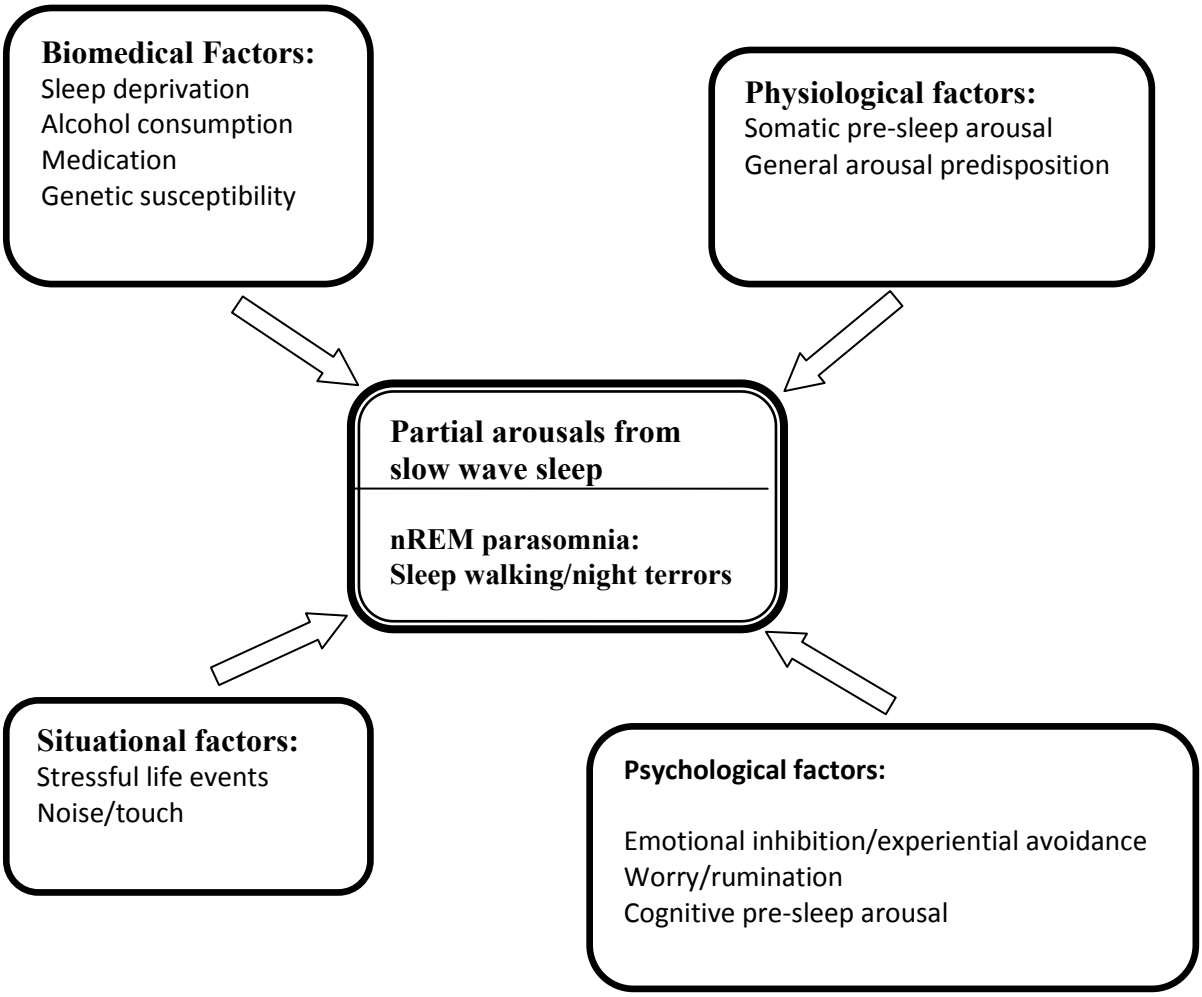
Despite these limitations, the findings in this study provide some important initial evidence concerning psychological factors influencing the presentation of nREM parasomnias. Previous research has provided evidence for biomedical predictors of the occurrence of such phenomena including sleep deprivation and alcohol consumption. The diagram presented in Figure 2.6 below represents a potential starting block on which further theory could be built. The figure incorporates the psychological and physiological factors suggested by findings in this study to be influencing the presentation of nREM parasomnias, in addition to the biomedical and situational factors previously identified. Further investigation is required into the interplay between these factors in contributing to this sleep disorder. Much understanding of the aetiology and maintenance of insomnia has stemmed from psychologists drawing on models from other areas of psychology and clinical experience and investigating psychological processes in people with insomnia. The findings in this study suggest there may be value in approaching the study of people experiencing nREM parasomnias from the same perspective.

If these findings are replicated, a greater emphasis on psychological intervention is implicated as opposed to restriction to the existing medical treatment and behavioural and risk management strategies that can be advised to such sufferers. nREM parasomnias are an unpredictable, irregular phenomena and not an ideal model for corrective medication which is more suitable for regular symptoms. Medication such as clonazepam and paroxetine have been reported to be effective for nREM parasomnias and can be taken as a preventative measure, despite a low probability of its

presentation.[38] When considering medication as a treatment route, patients with nREM parasomnias have to weigh up the risks and benefits of such action and are often put off by potential side effects. As is the case with insomnia sufferers, psychological interventions, should they prove effective, could present an appealing alternative treatment option. There has been some promising development of psychological interventions in the area of parasomnias occurring during REM sleep such as nightmares. CBT treatments here have focused on exposure technique such as writing down nightmares and imagery rehearsal in which the patient learns to rewrite and engage in imaginal rehearsal of a new version of their dreams which is not distressing. These techniques have proved to be effective in improving subjective sleep quality and reducing nightmare frequency and psychological distress.[63-65]

Further research should involve building on the database thus far developed through this study, collecting data for more psychological measures on this client group. This may include, for example, those relating to constructs of emotional expression such as measures of alexithymia, as discussed above, and measures of other coping styles, which may shed more light on how such people respond to stress. Given its relative uncommonness, this would be facilitated by multi-centre collaboration. If the particular psychological responses reported here are found to be replicated in future studies then interventions specific to these can be developed and evaluated. In relation to tendencies toward emotional inhibition, expressive writing tasks may be of benefit, whereas general cognitive strategies such as cognitive restructuring may help to reduce worry (see Appendix 2.16 for structure of a Parasomnia Treatment Programme currently being piloted at the UGSC).

Figure 2.6 Biomedical, physiological, psychological and situational factors in nREM parasomnias



Conclusions

Despite the limitations outlined, this study achieved its aim of providing some preliminary evidence for the implication of psychological factors in the presentation of nREM parasomnias. People experiencing these phenomena were found to experience higher levels of emotional inhibition, worry, rumination and arousability relative to a control group of good sleepers. With the exception of rumination, the study also confirmed and extended findings from previous research that those with insomnia also experience increased levels of these psychological variables relative to controls. Comparing the two sleep-disordered groups, it was found that the insomnia group reported higher levels of pre-sleep cognitive arousal. This has been considered in line with evidence that cognitive arousal is more strongly associated with insomnia complaints than somatic arousal and is indicative of the self-perpetuating cognitive

processes that maintain them. No other differences were uncovered and the implications of this was discussed with regards to the possibility that measures used in this study were not sensitive to any distinctive psychological processes that are present or that the same vulnerabilities are present in the two groups but are expressed differently. It is suggested that further investigation into the interplay between psychological, physiological and biomedical factors in contributing to nREM parasomnias is warranted. If the finding that psychological factors influence the presentation of this sleep disorder is replicated, weight is given to arguments for the development and evaluation of psychological interventions for such client groups, which could potentially provide them with an alternative, arguably preferable, treatment option to medication.

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CHAPTER THREE

Advanced Clinical Practice I Reflective Critical Account

A Reflection on the Consultative Role of Clinical Psychologists and their Contribution to Multidisciplinary Team Working

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Abstract

The catalyst for this reflective account was an interaction providing consultation to a community nurse. This experience highlighted some insecurities and assumptions I had about justifying the unique contribution that I could bring to a team as a clinical psychologist. Using aspects drawn from three models of reflection, I explore where this may have originated from and how my thoughts and feelings have changed with new learning experiences. I refer to the relevant political drivers and policy documents that have influenced the ever evolving and multifaceted role of our profession. I particularly consider the role of providing consultation to other professions, promoting psychological understanding in teams and how I can continue to develop this skill beyond qualification. This seemed like a pertinent theme for the focus of the present account because as my skills and competencies have developed through the course of training, my understanding and perspectives have changed. I conclude the account with a reflective review, considering what I have gained from the process of reflection itself and how I have found the models beneficial as a guide whilst not being restricted by rigid adherence to their structure. I also critique how my reflections may have been improved and consider the importance of continuing to make time for structured reflective practice in my work.

CHAPTER FOUR

Advanced Clinical Practice II Reflective Critical Account

Approaching the role of a newly qualified clinical psychologist: reflections on potential leadership tasks in the early years of this evolving profession

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Abstract

As I approach the end of training I reflect on how to make that transition from trainee to qualified clinician. I have observed those already in that role, inspired by the contribution they make on a regular basis to the functioning of the team and in increasing others' psychological knowledge through training and consultation. I have chosen to focus this reflective account on what I have learned through these vicarious experiences. I outline the context within which the direction of the clinical psychologist's role has moved towards undertaking these leadership tasks and describe two models that have guided my reflections. Reflections were stimulated by my observation of a recently qualified clinical psychologist who provided consultation to a colleague and later considered how she might be able to do this more efficiently within the multidisciplinary team in which we work. This brought to my awareness the apprehension I have previously had at the thought of being expected to fulfil leadership tasks at the early stages of my career. I explore how my understanding of this has changed through such observations and my resultant feelings of excitement and eagerness to partake in these tasks in my future work. I critique my approach to reflecting in this account and how I might improve future reflections by being more flexible in my approach. I consider what I have gained through the process of reflecting on this particular topic and my thoughts in relation to the political context outlined earlier in the account.

APPENDICES

APPENDIX 1.1

Guidelines for submission to psycho-oncology

Psycho-Oncology

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Peterson AC, Leffert N. What is special about adolescence? *In Psychosocial Disturbances in Young People: Challenges for Prevention,* Rutter M (ed.).Cambridge University Press: Cambridge, 1997;3-36.

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APPENDIX 1.2

Table presenting studies excluded on reading full article

Study	Reasons for exclusion
Augustsdoftir et al 2010	Emotional expression investigated as a moderator variable
Ando et al 2009	Investigating patients attending for screening, not necessarily diagnosed with cancer
Hyphantis et al 2011	Investigating emotional expression compared to other coping strategies as opposed to levels of emotional expression
Burns et al 2006	Emotional expression investigated as a moderator variable
Hann et al 2008	"Breast cancer concerns" as opposed to psychological adjustment as outcome measure
Harila et al 2011	Not measuring emotional expression as an independent variable
Ripetti et al 2008	Quality of life measured as outcome, psychological adjustment not analysed separately
Verdonck-De Leeuw et al 2007	Investigating emotional expression compared to other coping strategies as opposed to levels of emotional expression

APPENDIX 1.3

Methodological quality rating scale

Quality Criteria	Score		
	0	1	2
Study objectives… 1) Are the study objectives clearly outlined? Neither aims or hypotheses stated = 0 Aims but not hypotheses stated = 1 Aims and hypotheses stated = 2			
Study design ….. 2) What is the design of the study? Cross-sectional design = 1 Longitudinal element to design = 2			
Selection of participants… 3) Are the inclusion/exclusion criteria clearly stated? Not reported = 0 Referred to but not defined = 1 Clearly defined = 2			
4) Is the recruitment process clearly described? Not reported = 0 Partially reported = 1 Clearly reported = 2			

Participant characteristics … 5) Are participant' characteristics clearly reported? (age, gender, socioeconomic status/ethnicity, cancer type) None of the characteristics reported = 0 Some characteristics reported = 1 All characteristics reported = 2			
6) Are the main potential confounders identified and taken into account in the design and analysis? No = 0 Yes = 1			
Independent variable measurement… 7)How was emotional expression/non-expression measured? Non standardised self-report/linguistic indicator measure (or details of psychological properties not reported) = 0 Standardised self-report/measure of linguistic indicator with details of psychometric properties reported from other studies with different populations = 1 Standardised self-report/ measure of linguistic indicator with details of psychometric properties provided within the condition-specific population = 2			

Outcome measurement…. 8)How was psychological adjustment measured? Non standardised self-report measure (or details of psychological properties not reported) = 0 Standardised self-report measure with details of psychometric properties reported from other studies with different populations = 1 Standardised self-report measure with details of psychometric properties provided within the condition-specific population = 2			
Statistical analysis and results…. 9) Was a power calculation used to justify sample size? No = 0 Yes = 1			
10) Was the statistical analysis stated clearly? Not stated = 0 Stated but not appropriate to design = 1 Stated and appropriate to design = 2			
11) Were results clearly reported, with confidence intervals, effect sizes, p-values etc provided where appropriate? Not reported = 0 Partially reported = 1 Fully reported = 2			

Quality rating:

High = > 75%

Medium = > 50%

Low = < 50%

Total Quality rating score (out of a possible 21) =

Percentage = %

Quality Rating =

APENDIX 2.1

Author Guidelines for submission to *Sleep*

Full details at http://www.journalsleep.org/AuthorInfo.aspx

APENDIX 2.2

Case illustration of nREM parasomnia

Case Example

An 18 –year old white youth who resides in a rural Midwestern farming community is academically doing well as a senior in high school. The patient reluctantly presented to the Sleep Center upon the insistence of his mother, who has had increasing concerns over her only child's safety, particularly at night. According to his parents, since childhood their son has had nocturnal episodes arising within a few hours after sleep onset. Believing that these would resolve as their son grew out of adolescence and into adulthood, the parents were at first not overly concerned and were able to maintain their son's safety by remaining vigilant and subtly intervening when necessary. the patient's nocturnal activities have maintained their almost nightly regularity, but they have developed into occasionally more complex, sustained, and violent actions. The patient has grown to 77 inches tall and a weight of 225 pounds, so it is not surprising that parental interventions to quell their son's suddenly unmanageable nocturnal activities have become problematic for both parties.

The patient states that he has always been completely unaware of these episodes and has no recollection of the events the following morning. The parents are further concerned for their son's safety because he intends to enrol in a college away from home and is looking forward to living in either a dormitory or a high-rise apartment. Without the vigilance of responsible persons in college, the parents fear the worst for their son. Of course the patient, wanting to exert his independence and lacking proper insight into the gravity of his situation, clearly had become antagonistic over his parents' concerns.

The patient's continued lack of awareness in these matters coupled with his sincere denial of any difficulties with either sleep initiation or maintenance made the direct involvement of the patient's parents crucial in attaining a comprehensive history as well as a thorough clinical characterization of the patient's behaviour in sleep. According to his mother, since childhood the patient has had "sleep disturbances" almost every night. Typically, these episodes occur within the first two hours after he has gone to bed, and only rarely do they occur in the latter third of the night. The episodes are characterized by somniloquy, somnambulism, and a general "thrashing around in his bed," leaving his bedding in complete disarray. Less frequently, the patient would abruptly wake up the household with fits of "screaming and yelling at the top of his lungs." Despite his parent's efforts at reassurance and solace, the patient remained unreceptive and inconsolable. Just as these "night terrors," as the mother called them, came on suddenly, so too would they spontaneously abate.

Although the patient's nocturnal activities were unremitting in frequency over recent years, his parents began to discern a trend toward more worrisome physical behaviour. These particular "severe" episodes were punctuated by violent outbursts of punching, hitting and kicking inflicted upon a foe in the room but unseen to his parents. Never at any time were these combative actions directed towards his parents. Many times over recent years the patient was caught trying to get out through the front door although he was visibly asleep. On one occasion the mother caught her son just as he was attempting to leave through an upstairs window, having "already completely kicked out the storm window." In the last two years, it has not been uncommon for the patient to sustain bruises and superficial cuts to his extremities as a result of these nocturnal activities. Lastly, the parents note that these "severe" episodes increase in frequency when the patient is staying away from home such as in a hotel or in summer camp.

Aside from a delayed form of delayed sleep-phase syndrome and consequent volitional sleep deprivation supported by three weeks of sleep diaries, the patient has otherwise been absolutely healthy and has not suffered from any medical, neurological or mental conditions. The patient does not drink alcohol nor does he partake of illicit drugs. The patient does not take any prescribed medications, including selective serotonin reuptake inhibitors. The patient does not have a history suggesting sleep-disordered breathing or any other primary sleep disorder. Family history is devoid of any nocturnal behaviour suggestive of parasomnias.

Formal nocturnal polysomnography was undertaken using a full seizure montage. The baseline polysomnogram did not reveal any sleep-disordered breathing, nocturnal myoclonus or periodic limb movements. Sleep architecture was within normal limits and the patient attained a sleep efficiency of 99%. REM stage was attained and observed to have normal atonia. A full seizure montage showed no electrical or clinical seizure activity. Four discrete episodes of spontaneous NREM-related confusional arousals were observed and were associated with complex motor activity (fig 74-1) and overt vocalizations. These confusional arousals were not associated with consequent EEG slowing.

As suspected by the clinical history and further supported by the findings on the polysomnogram, the patient's problem was diagnosed as an NREM parasomnia. The patient developed a better understanding of his problem after we replayed his findings on the video monitor. Management strategies included:

employing proper sleep hygiene and minimizing volitional sleep deprivation;
continuing to refrain from or minimizing alcohol use;
ensuring a supportive environment with appropriate responsible vigilance; provided by a team of family and friends;
ensuring safety by, among other measures , attaining housing on the ground level or basement of his chosen residence;
taking a long-acting sedative hypnotic of the benzodiapazine class every night.

Copied from Mahowald, MW & Bornemann, MAC, NREM Sleep-Arousal Parasomnias. In Kryger, MH, Roth T, Dement WC, eds. Principles of Sleep Medicine, 4th edition. Philadelphia, PA: Elsevier Saunders; 2005: 889-896.

APPENDIX 2.3

ICSD-2 Diagnostic Criteria for Insomnia and nREM Parasomnia Groups

Participants in the insomnia group met the following criteria as described in the ICSD-2 diagnostic classification system:

General Criteria for Insomnia

A. A complaint of difficulty initiating sleep, difficulty maintaining sleep, or waking up too early or sleep that is chronically non-restorative or poor in quality.
B. The above sleep difficulty occurs despite adequate opportunity and circumstances for sleep.
C. At least one of the following forms of daytime impairment related to the night time sleep difficulty is reported by the patient:
   i. Fatigue or malaise
   ii. Attention, concentration, or ,memory impairment
   iii. Social or vocational dysfunction
   iv. Mood disturbance or irritability
   v. Daytime sleepiness
   vi. Motivation, energy, or initiative reduction
   vii. Proneness for errors or accidents at work or while driving
   viii. Tension, headaches, or gastrointestinal symptoms in response to sleep loss
   ix. Concerns or worries about sleep

Participants in the NREM parasomnia group met the following ICSD-2 diagnostic criteria for Disorders of Arousal (from NREM Sleep).

Sleepwalking

A. Ambulation occurs during sleep.
B. Persistence of sleep, an altered state of consciousness, or impaired judgment during ambulation is demonstrated by at least one of the following:
   i. Difficulty in arousing the person
   ii. Mental confusion when awakened from an episode
   iii. Amnesia (complete or partial) from an episode
   iv. Routine behaviours that occur at inappropriate times
   v. Inappropriate or nonsensical behaviours
   vi. Dangerous or potentially dangerous behaviours
C. The disturbance is not better explained by another sleep disorder, medical or neurological disorder, mental disorder, medication use, or substance use disorder.

Night Terrors

A. A sudden episode of terror occurs during sleep, usually initiated by a cry or loud scream that is accompanied by autonomic nervous system and behavioural manifestations of intense fear.
B. At least one of the following associated features is present:
   i. Difficulty in arousing the person
   ii. Mental confusion when awakened from an episode
   iii. Amnesia (complete or partial) for the episode
   iv. Dangerous or potentially dangerous behaviours
C. The disturbance is not better explained by another sleep disorder, medical or neurological disorder, mental disorder, medication use, or substance use disorder

APPENDIX 2.4

UGSC Screening Interview

Participant ref no:	**Today's date:**

Source (to be answered by all participants)

How did you find out about the University of Glasgow Sleep Centre?	
Why have you contacted us?	
Method of initial contact (e.g. mobile, email)	

Personal (to be answered by all participants)

Full Name:	*Date of Birth:*	*Age:*
Telephone (home, mobile):	*Address:*	
Email:		
When is a good time to call?	*Postcode:*	
What GP practice do you attend, and who is the GP you normally see?		
Do you give your consent for us to contact your GP if necessary regarding your health?		

Do you have difficulty sleeping at the moment? (Y/N)
Are you generally satisfied with the amount of sleep you get (Y/N)
Do you work shifts, night shifts?
Are you aware of any other family members with a sleep disorder? *If yes please specify:*   *E.g. Do either of your parents have sleep difficulties (now or in the past)?* *What about brothers and sisters?* *What about extended family including grandparents?*

Health (to be answered by all participants)

Do you keep in good health physically? (Y/N)
What physical health problems do you have (if applicable)? *(Could your sleep difficulties be due to any other physical health problems or medication use?)*
What medicines do you take for your physical health? (if applicable)
Roughly, how many units of alcohol do you drink per week? *(Standard (175ml) glass of wine = 2 unit; One pint of standard lager = 2.3 units; Spirit & Mixer = 1 unit)*
Do you take recreational drugs? If so, how often? (e.g. once per week/month etc)
Do you keep in good health mentally? (Y/N)
What mental health problems do you have (if applicable)?
What medicines do you take for your mental health? (if applicable)

Screen for Possible Sleep Disorders Other Than Insomnia.
(to be answered by all participants)

1. Narcolepsy ***a. Do you sometimes fall asleep in the daytime completely without warning? (YES/NO)*** ***If Yes….*** *b. Is it literally impossible to resist 'sleep attacks' during the day?* *c. Do you have collapses or extreme muscle weakness triggered by extreme emotion?* *d. Do you have visual hallucinations, either just as you fall asleep or when you wake in the morning?* *e. Are you paralysed and unable to move when you wake up from your sleep?* *[OFFICE USE ONLY: Possible narcolepsy: 1a¼''TRUE'' AND (1b OR 1c OR 1d OR 1e¼''TRUE'')]*
2. Sleep breathing disorder ***a. Are you a very heavy snorer? (YES/NO)*** ***If Yes…*** *b. Does your partner say that you sometimes stop breathing?* *c. Do you often wake up gasping for a breath?* *d. Are you often excessively sleepy during the day or fall asleep without wanting to?* *[OFFICE USE ONLY: Possible sleep breathing disorder: 2a¼''TRUE'' AND (2b OR 2c OR 2d¼''TRUE'')]*

3. PLMS/ RLS
a. Do your legs often twitch or jerk or can't keep still in bed?(YES/NO)
If Yes…
b. Is it very difficult to get to sleep because of repeated muscle jerks?
c. Do you frequently wake from sleep with sudden jerky movements or with a compulsion to move your legs?
d. Do you simply have to get out of bed and pace around to get rid of these feelings?

[OFFICE USE ONLY: Possible PLMS/ RLS: 3a¼''TRUE'' AND (3b OR 3c OR 3d¼''TRUE'')]

4. Circadian Rhythm Sleep Disorder
a. Do you tend to sleep well but just at the ''wrong times''? (YES/NO)
If Yes…
b. Can you sleep well enough, but only if you stay up very late?
c. Are you in a very sound sleep at normal waking time and could sleep on for hours more?
d. Can you sleep well enough, but only if you go to bed very early?
e. Do you wake very early, bright and alert and no longer sleepy?

[OFFICE USE ONLY: Possible CRSD: 4a¼''TRUE'' AND EITHER (4b AND 4c¼''TRUE'') OR (4d AND 4e¼''TRUE'')]

5. Parasomnia
a. Do you have unusual behaviours, like sleepwalking, associated with your sleep that trouble you or that are dangerous?(YES/NO)
If Yes…
b. Do you sleepwalk frequently and run the risk of injuring yourself or others?
c. Do you have frequent night terrors when you are extremely distressed but not properly awake?
d. Do you act out your dreams and risk injuring yourself or others?
e. Do you have terrible recurring nightmares?

[OFFICE USE ONLY: Possible parasomnia: 5a¼''TRUE'' AND EITHER (5b OR 5c OR 5d OR 5e¼''TRUE''

If YES to b. or c.
- ***Do you currently experience these?(YES/NO)***
- ***How often in the past 6 months?***

Insomnia (if applicable)

Have you always been a poor sleeper? (Y/N)
How long have you had a sleep problem?(yr)
Do you have difficulty falling asleep? (Y/N)
How many nights per week do you have difficulty falling asleep? (out of 7)
How long does it normally take you to fall asleep?(min)
Do you experience sleep disturbance because of waking during the night?(Y/N)
How many nights per week do you have a difficulty with waking up during the night?(out of 7)
How long are you normally awake during the night, in total? (min)
What time do you normally go to bed? (time)
What time do you normally get up?(time)
How long do you normally sleep?(hr/min)

Sleepwalking (if applicable)

Do you sleep walk or carry out any other activities during sleep. Please describe any activities that occur in addition to walking (e.g. eating, sex, undressing/.dressing)?
Is it difficult to arouse you from the sleep state during these events?
Have you experienced mental confusion when awakened from an episode?
Do you have any memory of such events upon awakening?
How often do these events occur in general (e.g. once per week/once per month)? *How many in last 6 months?*
How long ago did you last experience this event?
Approximately how old were you when you first experienced an event like this?
Do you know whether this occurs at the beginning, middle or end of your sleep?

Night Terrors (if applicable)

Do you experience sudden episodes of intense terror during sleep? *Do you engage in any dangerous or potentially dangerous behaviours at these times? (if so, please describe)*
Do you have any memory of such events upon awakening?
Is it difficult to arouse you from the sleep state during these events?
Have you experienced mental confusion when awakened from an episode?
How often do these events occur in general (e.g. once per week/once per month)?
How long ago did you last experience this event?
Approximately how old were you when you first experienced an event like this?
Do you know whether this occurs at the beginning, middle or end of your sleep?

All Sleep Disorders (to be answered by those with a sleep disorder)

Does your sleep disturbance affect how you feel and function during the day (e.g. fatigue, sleepiness, concentration, memory, mood, motivation, irritable, work/social functioning etc.). If yes, specify most salient.

Other Studies (to be answered by all participants)

We are also running a lab based study. Would you be interested in being contacted about this study?
If you are not suitable for any of the studies ongoing at the moment are you happy for your details to be kept on a database so that you may be contacted in the future should a suitable study start?

APPENDIX 2.5

Participant Information Sheet

PSYCHOLOGICAL PROCESSES IN ADULTS WITH NON-REM PARASOMNIAS, INSOMNIA AND GOOD SLEEPERS

PARTICIPANT INFORMATION SHEET

My name is Katherine Hooker. I am a trainee clinical psychologist from the University of Glasgow working with Professor Colin A. Espie, Director of the University of Glasgow Sleep Centre. I would like to invite you to take part in a study looking at psychological processes in people who experience sleep walking and night terrors which are sleep disorders collectively known as non-REM parasomnias. The study will also be investigating these processes in people who suffer from insomnia as well as good sleepers.

Before you decide whether or not to take part, it is important for you to understand why the research is being carried out and what it will involve. Please take your time to read the following information carefully. If there is anything that is unclear or if you would like more information, please let me know. Take your time to decide whether or not you wish to take part.

What is the title of this project?

Rumination, worry, emotional inhibition & arousability in adults with non-REM parasomnias, insomnia & good sleepers

Why is the study important?

The current research investigating psychological processes in people with non-REM parasomnias (e.g. sleep walking, night terrors) is limited. Comparing people with non-REM parasomnias to those with Insomnia as well as good sleepers will help build on what we do know and may be relevant to developing appropriate treatments in this area.

What are the aims of this study?

The study aims to compare people with non-REM parasomnias with people suffering from insomnia and good sleepers on self-report measures of various psychological processes**.**

Who can take part in this study?

Men and women over the age of 18 who experience sleep walking or night terrors, suffer from insomnia or consider themselves to be satisfied with the amount of sleep they get.

People who experience any other sleep disorder (for example, sleep apnoea or periodic limb movement disorder) will not be able to take part. Those whose sleep disturbance is due to a psychiatric, medical or neurological condition will not be able to take part. It will not be possible for somebody to take part if they experience both non-REM parasomnias AND insomnia. People will not be able to take part if English is not their first language. Those with significant drug or alcohol use will also be excluded.

Do I have to take part?

You do not have to take part in this study. Participation is entirely voluntary. If you do decide to take part you will be given this information sheet to keep and be asked to

sign a consent form. If you decide to take part you are still free to come out of the study at any time without giving a reason.

What does participation in this study involve?
If you decide to take part, you will be given the option of doing so in one of the following ways depending on what is more convenient for you:

- By completing a set of questionnaires which would be sent to you by post and can be returned in a stamped addressed envelope provided.
- By completing this same set of questionnaires online via a website link that would be emailed to you.
- By answering the same questions in an interview by arranging either a telephone call or a face-to-face interview at the University of Glasgow Sleep Centre.

It usually takes approximately 20 minutes to complete this set of questionnaires.

What will happen to all of the information?
All of the information collected about you during the research study will be kept ***strictly confidential.*** Personal details (such as your name and address) will not be stored on computer, so that you cannot be recognised from it. If during the study a pre-existing but previously undiagnosed condition comes to light then your GP would be informed.

Written feedback will be provided to those who request it following completion of the study.

Who is supervising for this study?
My research supervisor, Professor Colin Espie, who works for the University of Glasgow, will supervise me.

Who is paying for this study?
This study is being funded through the University of Glasgow and has been reviewed by a Research Ethics Committee. The committee has approved the research as appropriate.

What if something goes wrong?
If you wish to complain, or have any concerns about any aspect of the way you have been approached or treated during the course of this study, you can contact my supervisor, Professor Colin Espie at the University of Glasgow (Tel: 0141 232 7699), who will be able to advise you on the appropriate complaints procedure, should you wish to use this.

What should I do if I have any questions about this study?
If you would like further details about the study, you can either contact me by phone or email.

What do I do now if I want to take part in this study?
If you decide that you would like to take part in the study you can either contact me on **07788943028** or email **glasgowsleepcentre@clinmed.gla.ac.uk**. If you decide you don't want to, there is no need to reply.

You are under ***no obligation*** to take part; participation in this study is ***completely voluntary.*** You do not have to give a reason for not wanting to take part in this study**.**

I would like to take this opportunity to thank you for your time and consideration

APPENDIX 2.6

Participant Consent Form

University of Glasgow Sleep Centre

Sachler Institute of Psychobiological Research

Southern General Hospital

Participant Identification Number:

CONSENT FORM

Title of Project: Rumination, worry, emotional inhibition & arousability in adults with NREM parasomnias, insomnia & good sleepers

Name of Researcher: Katherine Hooker
Please initial box

1. I confirm that I have read and understand the information sheet dated 16th November 2010 (version 2) for the above study. I have had the opportunity to consider the, information, ask questions and have had these answered satisfactorily. ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my medical care or legal rights being affected. ☐

3. I understand that data collected during the study may be looked at by individuals from the University of Glasgow, from regulatory authorities or from the NHS Trust, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my records. ☐

4. I give consent for my GP to be contacted if an undiagnosed medical condition is suspected. ☐

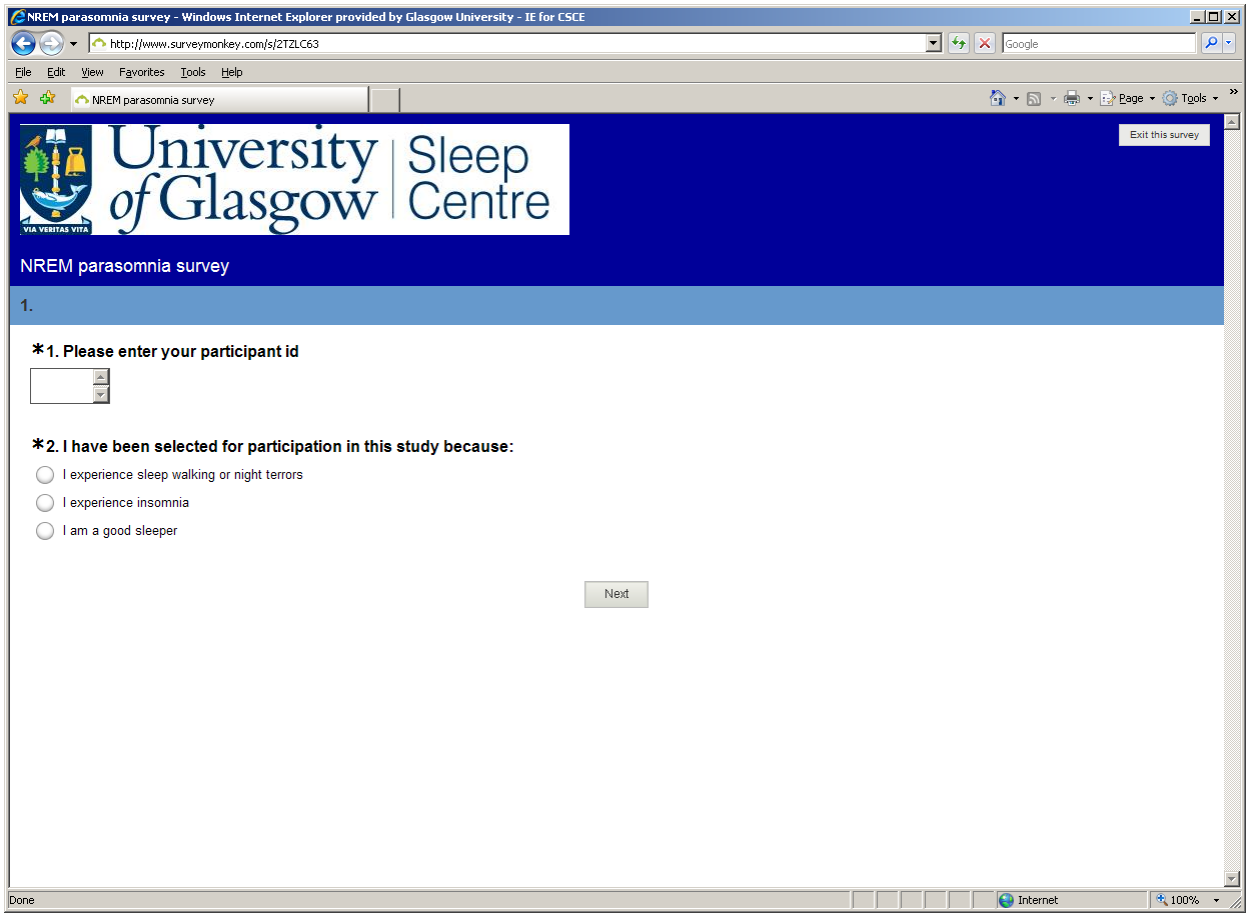
5. I agree to take part in the above study. ☐

_____	_____	_____
Name of Participant	Date	Signature
_____	_____	_____
Name of Person taking consent	Date	Signature

When completed, 1 for patient; 1 (original) for researcher site file

APPENDIX 2.7

Image of online survey site homepage



APPENDIX 2.8

Measures

Pittsburgh Sleep Quality Index (PSQI)

Instructions: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. **Please answer all questions.**

1. During the past month, what time have you usually gone to bed at night? _____
2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night? _____
3. During the past month, what time have you usually gotten up in the morning? _____
4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed.) _____

5. During the past month, how often have you had trouble sleeping because you…	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a. Cannot get to sleep within 30 minutes				
b. Wake up in the middle of the night or early morning				
c. Have to get up to use the bathroom				
d. Cannot breathe comfortably				
e. Cough or snore loudly				
f. Feel too cold				
g. Feel too hot				
h. Have bad dreams				
i. Have pain				
j. Other reason(s), please describe:				
6. During the past month, how often have you taken medicine to help you sleep (prescribed or "over the counter")?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
	No problem at all	Only a very slight problem	Somewhat of a problem	A very big problem
8. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?				
	Very good	Fairly good	Fairly bad	Very bad
9. During the past month, how would you rate your sleep quality overall?				

Sleep Condition Indicator

1. Evaluate the pattern of your sleep in the past month	a. *How many minutes has it usually taken you to fall asleep?* b. *How many minutes have you usually been awake during the night (because of your wakenings)?* c. *How many nights each week have been problem nights?*	0-15, 16-30, 31-45, 46-60,61+ 0-15, 16-30, 31-45, 46-60,61+ 0-1, 2, 3, 4, 5-7
2. Evaluate the quality of your sleep in the past month	*What has the quality of your sleep usually been like?*	0 'very satisfactory' to 4 'very unsatisfactory'
3. Evaluate the impact of your sleep on your life in the past month	a. *To what extent has poor sleep affected your mood or well-being in the daytime?* b. *To what extent has poor sleep affected your concentration or productivity?*	0 'not at all' to 4 'very much' 0 'not at all' to 4 'very much'
4. Evaluate your level of concern about sleep in the past month	*To what extent has poor sleep and its consequences been troubling you?*	0 'not at all' to 4 'very much'
5. Evaluate the history of your sleep	*For how many years have you had problems with your sleep?* If you answered 11+ years - *Did you sleep OK as a child?*	'no problem', 0-1 year, 2-5 years, 6-10 years, 11+ years Yes/ no

Use of sleeping aids (currently)	*Do you take sleeping pills prescribed by your doctor?*	Yes/ no
	Do you take other remedies that you buy at the chemist?	Yes/ no
	Do you use alcohol to help you sleep?	Yes/ no

Scoring

Add scores 1a, 1b, 1c, 2, 3a, 3b, 4, 5 (score range for 0 – 32)

Key

0=Not at all 1=A little 2=Somewhat 3=Much 4=Very much

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The Impact of Poor Sleep

Over the last month to what extent has poor sleep troubled you in general?

Not at all _____ A little _____ Somewhat _____ Much _____ Very Much _____

More specifically, to what extent has poor sleep affected……

…..your mood?

Not at all _____ A little _____ Somewhat _____ Much _____ Very Much _____

…..your energy?

Not at all _____ A little _____ Somewhat _____ Much _____ Very Much _____

…..your relationships?

Not at all _____ A little _____ Somewhat _____ Much _____ Very Much _____

……your ability to stay awake during the day?

Not at all _____ A little _____ Somewhat _____ Much _____ Very Much _____

…….your concentration?

Not at all _____ A little _____ Somewhat _____ Much _____ Very Much _____

……..your ability to get through your work?

Not at all _____ A little _____ Somewhat _____ Much _____ Very Much _____

DASS21

Name: *Date:*

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week.* There are no right or wrong answers. Do not spend too much time on any statement.

The rating scale is as follows:

0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree, or a good part of time
3 Applied to me very much, or most of the time

1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (eg, excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (eg, in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3
9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (eg, sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

ECQ: How we deal with our feelings

Instructions: Please indicate how you feel about each item by circling *either* "True" *or* "False". If you feel that an item is neither entirely true nor false, please choose the alternative that is *most* like you. If you haven't been in the situation described, please say how you feel you would behave in that situation.

1.	When someone upsets me, I try to hide my feelings.	True	False
2.	I remember things that upset me or make me angry for a long time afterwards.	True	False
3.	People find it difficult to tell whether I'm excited about something or not.	True	False
4.	I find it difficult to comfort people who have been upset.	True	False
5.	I generally don't bear a grudge – when something is over, it's over, and I don't think about it again.	True	False
6.	When something upsets me I prefer to talk to someone about it than to bottle it up.	True	False
7.	I get "worked up" just thinking about things that have upset me in the past.	True	False
8.	If I receive bad news in front of others I usually try to hide how I feel.	True	False
9.	I seldom show how I feel about things.	True	False
10.	I often find myself thinking over and over about things that have made me angry.	True	False
11.	If I'm pleasantly surprised, I show immediately how pleased I am.	True	False
12.	If I get angry or upset I usually say how I feel.	True	False
13.	I can usually settle things quickly and be friendly again after an argument.	True	False
14.	I don't feel embarrassed about expressing my feelings.	True	False
15.	If I see or hear about an accident, I find myself thinking about something similar happening to me or to people close to me.	True	False
16.	I think about ways of getting back at people who have made me angry long after the event has happened.	True	False
17.	I never forget people making me angry or upset, even about small things.	True	False
18.	I think people show their feelings too easily.	True	False
19.	I find it hard to get thoughts about things that have upset me out of my mind.	True	False
20.	I often daydream about situations where I'm getting my own back at people.	True	False
21.	Expressing my feelings makes me feel very vulnerable and anxious.	True	False
22.	If I see something that frightens or upsets me, the image of it stays in my mind for a long time afterwards.	True	False
23.	Thinking about upsetting things just seems to keep them going, so I try to put them out of my mind.	True	False
24.	I usually manage to remain outwardly calm, even though I may be churned up inside.	True	False
25.	If I lose out on something, I get over it quickly.	True	False
26.	I can't help showing how I feel, even when it isn't appropriate to do so.	True	False
27.	If I have to confront someone, I try not to think too much about it beforehand.	True	False
28.	Sometimes I just can't control my feelings.	True	False

AAQ-II

Below you will find a list of statements. Please rate how true each statement is for you by circling a number next to it. Use the scale below to make your choice.

1	2	3	4	5	6	7
never true	very seldom true	seldom true	sometimes true	frequently true	almost always true	always true

1.	My painful experiences and memories make it difficult for me to live a life that I would value.	1	2	3	4	5	6	7
2.	I'm afraid of my feelings.	1	2	3	4	5	6	7
3.	I worry about not being able to control my worries and feelings.	1	2	3	4	5	6	7
4.	My painful memories prevent me from having a fulfilling life.	1	2	3	4	5	6	7
5.	Emotions cause problems in my life.	1	2	3	4	5	6	7
6.	It seems like most people are handling their lives better than I am.	1	2	3	4	5	6	7
7.	Worries get in the way of my success.	1	2	3	4	5	6	7

WORRY QUESTIONNAIRE

Please use the scale below to express to what extent each statement is typical to you (write the number that represents you the best before each statement).

1	2	3	4	5
Not at all typical	A little typical	Moderately typical	Very typical	Extremely typical

_____ 1. If I do not have enough time to do everything, I do not worry about it.

_____ 2. *My* worries overwhelm me.

_____ 3. I do not tend to worry about things.

_____ 4. Many situations make me worry.

_____ 5. I know I should not worry about things, but I just cannot help it.

_____ 6. When I am under pressure I worry a lot.

_____ 7. I am always worrying about something.

_____ 8. I find it easy to dismiss worrisome thoughts.

_____ 9. As soon as I finish one task, I start to worry about everything else I have to do.

_____ 10. I never worry about anything.

_____ 11. When there is nothing more I can do about a concern, I do not worry about it any more.

_____ 12. I have been a worrier all my life.

_____ 13. I notice that I have been worrying about things.

_____ 14. Once I start worrying, I cannot stop.

_____ 15. I worry all the time.

_____ 16. I worry about projects until they are all done.

APS

This questionnaire deals with a number of common behaviours and self-perceptions. For each question you should select the response which best describes you and your behaviours.

You can select from among the following response alternatives:

Never (or almost never)
Seldom
Occasionally
Frequently
Always (or almost always)

All that you need to do is to circle the first letter which corresponds to your choice.

1. I am a calm person.	N	S	O	F	A
2. I get flustered if I have several things to do at once.	N	S	O	F	A
3. Sudden changes of any kind produce an immediate emotional effect on me.	N	S	O	F	A
4. Strong emotions carry over for one or two hours after I leave the situation which caused them.	N	S	O	F	A
5. I am restless and fidgety.	N	S	O	F	A
6. My mood is quickly influenced by entering new places.	N	S	O	F	A
7. I get excited easily.	N	S	O	F	A
8. I find that my heart keeps beating fast for a while after I have been "stirred up".	N	S	O	F	A
9. I can be emotionally moved by what other people consider to be simple things.	N	S	O	F	A
10. I startle easily.	N	S	O	F	A
11. I am easily frustrated.	N	S	O	F	A
12. I tend to remain excited or moved for a long period of time after seeing a good movie.	N	S	O	F	A

SLEEP AROUSAL SCALE (SAS) (* = cognitive subscale items)

Please describe how intensely you experience each of the symptoms mentioned below as you attempt to fall asleep or to return to sleep, by circling the appropriate number

	Not at all	Slightly	Moderately	A lot	Extremely
1.Worry about falling asleep*	1	2	3	4	5
2.Review or ponder the events of the day*	1	2	3	4	5
3.Depressing or anxious thoughts*	1	2	3	4	5
4.Worry about problems other than sleep*	1	2	3	4	5
5.Being mentally alert, active*	1	2	3	4	5
6.Can't shut off your thoughts*	1	2	3	4	5
7.Thoughts keep running through your head*	1	2	3	4	5
8.Being distracted by sounds, noise in the environment*	1	2	3	4	5
9.Heart racing, pounding or beating irregularly	1	2	3	4	5
10.A jittery, nervous feeling in your body	1	2	3	4	5
11.Shortness of breath or labored breathing	1	2	3	4	5
12.A tight, tense feeling in your muscles	1	2	3	4	5

	Not at all	Slightly	Moderately	A lot	Extremely
13.Cold feelings in your hands, feet or your body in general	1	2	3	4	5
14.Have stomach upset (knot or nervous feeling in stomach, heartburn, nausea, gas etc)	1	2	3	4	5
15.Perspiration in palms of your hands or other parts of your body	1	2	3	4	5
16.Dry feeling in mouth or throat	1	2	3	4	5

APPENDIX 2.9

Supplementary analysis: Post-hoc and ANCOVA

Post-hoc analysis

Sample characteristics: parametric

Multiple Comparisons

Age (years)

Bonferroni

(I) 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	(J) 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Good Sleeper	Insomnia	-11.020*	2.536	.000	-17.16	-4.88
	NREM Parasomnia	4.165	2.562	.319	-2.04	10.37
Insomnia	Good Sleeper	11.020*	2.536	.000	4.88	17.16
	NREM Parasomnia	15.185*	2.562	.000	8.98	21.39
NREM Parasomnia	Good Sleeper	-4.165	2.562	.319	-10.37	2.04
	Insomnia	-15.185*	2.562	.000	-21.39	-8.98

*. The mean difference is significant at the 0.05 level.

Sleep and clinical data: Parametric

Multiple Comparisons

Bonferroni

Dependent Variable	(I) 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	(J) 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	Mean Difference (I-J)	Std. Error	Sig.	97.5% Confidence Interval	
						Lower Bound	Upper Bound
PSQItransformed	Good Sleeper	Insomnia	-1.86616*	.12387	.000	-2.1975	-1.5348
		NREM Parasomnia	-1.02129*	.12515	.000	-1.3561	-.6865
	Insomnia	Good Sleeper	1.86616*	.12387	.000	1.5348	2.1975
		NREM Parasomnia	.84487*	.12515	.000	.5101	1.1796
	NREM Parasomnia	Good Sleeper	1.02129*	.12515	.000	.6865	1.3561
		Insomnia	-.84487*	.12515	.000	-1.1796	-.5101
Impacttransformed	Good Sleeper	Insomnia	-2.56299*	.22152	.000	-3.1556	-1.9704
		NREM Parasomnia	-2.18849*	.22382	.000	-2.7872	-1.5898
	Insomnia	Good Sleeper	2.56299*	.22152	.000	1.9704	3.1556
		NREM Parasomnia	.37451	.22382	.289	-.2242	.9732
	NREM Parasomnia	Good Sleeper	2.18849*	.22382	.000	1.5898	2.7872
		Insomnia	-.37451	.22382	.289	-.9732	.2242

Sleep and clinical data: non-parametric post-hoc pairwise comparisons (Mann-Whitney)

Ranks

	1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	N	Mean Rank	Sum of Ranks
SCI Score = 1a + 1b + 1c + 2 + 3a + 3b + 4 + 5 only (0 - 32)	Good Sleeper	50	25.71	1285.50
	Insomnia	50	75.29	3764.50
	Total	100		

Test Statistics[a]

	SCI Score = 1a + 1b + 1c + 2 + 3a + 3b + 4 + 5 only (0 - 32)
Mann-Whitney U	10.500
Wilcoxon W	1285.500
Z	-8.577
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia

Ranks

	1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	N	Mean Rank	Sum of Ranks
SCI Score = 1a + 1b + 1c + 2 + 3a + 3b + 4 + 5 only (0 - 32)	Insomnia	50	62.66	3133.00
	NREM Parasomnia	48	35.79	1718.00
	Total	98		

Test Statistics[a]

	SCI Score = 1a + 1b + 1c + 2 + 3a + 3b + 4 + 5 only (0 - 32)
Mann-Whitney U	542.000
Wilcoxon W	1718.000
Z	-4.684
Asymp. Sig. (2-tailed)	.000

Ranks

	1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	N	Mean Rank	Sum of Ranks
SCI Score = 1a + 1b + 1c + 2 + 3a + 3b + 4 + 5 only (0 - 32)	Good Sleeper	50	27.52	1376.00
	NREM Parasomnia	48	72.40	3475.00
	Total	98		

Test Statistics[a]

	SCI Score = 1a + 1b + 1c + 2 + 3a + 3b + 4 + 5 only (0 - 32)
Mann-Whitney U	101.000
Wilcoxon W	1376.000
Z	-7.842
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia

Ranks

	1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	N	Mean Rank	Sum of Ranks
DASS Depression Score	Good Sleeper	50	33.70	1685.00
	Insomnia	50	67.30	3365.00
	Total	100		
DASS Anxiety Score	Good Sleeper	50	31.11	1555.50
	Insomnia	50	69.89	3494.50
	Total	100		
DASS Stress Score	Good Sleeper	50	32.04	1602.00
	Insomnia	50	68.96	3448.00
	Total	100		

Test Statistics[a]

	DASS Depression Score	DASS Anxiety Score	DASS Stress Score
Mann-Whitney U	410.000	280.500	327.000
Wilcoxon W	1685.000	1555.500	1602.000
Z	-6.033	-6.896	-6.403
Asymp. Sig. (2-tailed)	.000	.000	.000

a. Grouping Variable: 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia

Ranks

	1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	N	Mean Rank	Sum of Ranks
DASS Depression Score	Good Sleeper	50	35.45	1772.50
	NREM Parasomnia	48	64.14	3078.50
	Total	98		
DASS Anxiety Score	Good Sleeper	50	32.96	1648.00
	NREM Parasomnia	48	66.73	3203.00
	Total	98		
DASS Stress Score	Good Sleeper	50	35.15	1757.50
	NREM Parasomnia	48	64.45	3093.50
	Total	98		

Test Statistics[a]

	DASS Depression Score	DASS Anxiety Score	DASS Stress Score
Mann-Whitney U	497.500	373.000	482.500
Wilcoxon W	1772.500	1648.000	1757.500
Z	-5.241	-6.116	-5.144
Asymp. Sig. (2-tailed)	.000	.000	.000

a. Grouping Variable: 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia

Ranks

	1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	N	Mean Rank	Sum of Ranks
DASS Depression Score	Insomnia	50	52.62	2631.00
	NREM Parasomnia	48	46.25	2220.00
	Total	98		
DASS Anxiety Score	Insomnia	50	49.06	2453.00
	NREM Parasomnia	48	49.96	2398.00
	Total	98		
DASS Stress Score	Insomnia	50	55.37	2768.50
	NREM Parasomnia	48	43.39	2082.50
	Total	98		

Test Statistics[a]

	DASS Depression Score	DASS Anxiety Score	DASS Stress Score
Mann-Whitney U	1044.000	1178.000	906.500
Wilcoxon W	2220.000	2453.000	2082.500
Z	-1.117	-.158	-2.095
Asymp. Sig. (2-tailed)	.264	.874	.036

a. Grouping Variable: 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia

Outcome variables: parametric data

Multiple Comparisons

Bonferroni

Dependent Variable	(I) 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	(J) 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	Mean Difference (I-J)	Std. Error	Sig.	98.75% Confidence Interval	
						Lower Bound	Upper Bound
PSWQtransformedlog	Good Sleeper	Insomnia	-.24788*	.05705	.000	-.4140	-.0818
		NREM Parasomnia	-.24070*	.05764	.000	-.4085	-.0729
	Insomnia	Good Sleeper	.24788*	.05705	.000	.0818	.4140
		NREM Parasomnia	.00718	.05764	1.000	-.1606	.1750
	NREM Parasomnia	Good Sleeper	.24070*	.05764	.000	.0729	.4085
		Insomnia	-.00718	.05764	1.000	-.1750	.1606
Arousal Predisposition Score	Good Sleeper	Insomnia	-3.760	1.503	.040	-8.14	.62
		NREM Parasomnia	-5.590*	1.519	.001	-10.01	-1.17
	Insomnia	Good Sleeper	3.760	1.503	.040	-.62	8.14
		NREM Parasomnia	-1.830	1.519	.691	-6.25	2.59
	NREM Parasomnia	Good Sleeper	5.590*	1.519	.001	1.17	10.01
		Insomnia	1.830	1.519	.691	-2.59	6.25
Rehearsal	Good Sleeper	Insomnia	-1.440	.620	.065	-3.25	.37
		NREM Parasomnia	-2.809*	.627	.000	-4.63	-.98

	Insomnia	Good Sleeper	1.440	.620	.065	-.37	3.25
		NREM Parasomnia	-1.369	.627	.092	-3.19	.46
	NREM Parasomnia	Good Sleeper	2.809*	.627	.000	.98	4.63
		Insomnia	1.369	.627	.092	-.46	3.19
Emotional Inhibition	Good Sleeper	Insomnia	-1.100*	.362	.009	-2.16	-.04
		NREM Parasomnia	-1.317*	.366	.001	-2.38	-.25
	Insomnia	Good Sleeper	1.100*	.362	.009	.04	2.16
		NREM Parasomnia	-.217	.366	1.000	-1.28	.85
	NREM Parasomnia	Good Sleeper	1.317*	.366	.001	.25	2.38
		Insomnia	.217	.366	1.000	-.85	1.28

Outcome variables: non-parametric post hoc pairwise comparisons (Mann-Whitney)

Ranks

	1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	N	Mean Rank	Sum of Ranks
AAQII score	Good Sleeper	50	38.94	1947.00
	Insomnia	50	62.06	3103.00
	Total	100		

Test Statistics[a]

	AAQII score
Mann-Whitney U	672.000
Wilcoxon W	1947.000
Z	-3.994
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia

Ranks

	1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	N	Mean Rank	Sum of Ranks
AAQII score	Good Sleeper	50	38.55	1927.50
	NREM Parasomnia	48	60.91	2923.50
	Total	98		

Test Statistics[a]

	AAQII score
Mann-Whitney U	652.500
Wilcoxon W	1927.500
Z	-3.901
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia

Ranks

	1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	N	Mean Rank	Sum of Ranks
AAQII score	Insomnia	50	49.73	2486.50
	NREM Parasomnia	48	49.26	2364.50
	Total	98		

Test Statistics[a]

	AAQII score
Mann-Whitney U	1188.500
Wilcoxon W	2364.500
Z	-.082
Asymp. Sig. (2-tailed)	.935

a. Grouping Variable: 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia

Ranks

	1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	N	Mean Rank	Sum of Ranks
Sleep Arousal Scale cognitive	Good Sleeper	50	28.49	1424.50
	Insomnia	50	72.51	3625.50
	Total	100		
Sleep Arousal Scale somatic	Good Sleeper	50	29.22	1461.00
	Insomnia	50	71.78	3589.00
	Total	100		

Test Statistics[a]

	Sleep Arousal Scale cognitive	Sleep Arousal Scale somatic
Mann-Whitney U	149.500	186.000
Wilcoxon W	1424.500	1461.000
Z	-7.597	-7.520
Asymp. Sig. (2-tailed)	.000	.000

a. Grouping Variable: 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia

Ranks

	1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	N	Mean Rank	Sum of Ranks
Sleep Arousal Scale cognitive	Good Sleeper	50	35.44	1772.00
	NREM Parasomnia	48	64.15	3079.00
	Total	98		
Sleep Arousal Scale somatic	Good Sleeper	50	33.80	1690.00
	NREM Parasomnia	48	65.85	3161.00
	Total	98		

Test Statistics[a]

	Sleep Arousal Scale cognitive	Sleep Arousal Scale somatic
Mann-Whitney U	497.000	415.000
Wilcoxon W	1772.000	1690.000
Z	-5.008	-5.818
Asymp. Sig. (2-tailed)	.000	.000

a. Grouping Variable: 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia

Ranks

	1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia	N	Mean Rank	Sum of Ranks
Sleep Arousal Scale cognitive	Insomnia	50	63.17	3158.50
	NREM Parasomnia	48	35.26	1692.50
	Total	98		
Sleep Arousal Scale somatic	Insomnia	50	53.88	2694.00
	NREM Parasomnia	48	44.94	2157.00
	Total	98		

Test Statistics[a]

	Sleep Arousal Scale cognitive	Sleep Arousal Scale somatic
Mann-Whitney U	516.500	981.000
Wilcoxon W	1692.500	2157.000
Z	-4.864	-1.565
Asymp. Sig. (2-tailed)	.000	.118

a. Grouping Variable: 1=Good Sleeper; 2=Insomnia; 3=NREM Parasomnia

ECQ-EI, ECQ-R, PSWQ and APS between group ANCOVA using age as a covariate

Tests of Between-Subjects Effects

Dependent Variable:Emotional Inhibition (ECQ-EI)

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	50.353[a]	3	16.784	5.087	.002
Intercept	370.784	1	370.784	112.376	.000
Age	1.040	1	1.040	.315	.575
Group	48.733	2	24.366	7.385	.001
Error	475.127	144	3.299		
Total	4839.000	148			
Corrected Total	525.480	147			

a. R Squared = .096 (Adjusted R Squared = .077)

Dependent Variable:Emotional Inhibition (ECQ-EI)

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Good Sleeper	4.616[a]	.258	4.105	5.127
Insomnia	5.642[a]	.277	5.095	6.189
NREM Parasomnia	5.960[a]	.273	5.420	6.501

a. Covariates appearing in the model are evaluated at the following values: Age (years) = 38.91.

Tests of Between-Subjects Effects

Dependent Variable:Rumination (ECQ_R)

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	193.919[a]	3	64.640	6.677	.000
Intercept	447.313	1	447.313	46.202	.000
Age	.523	1	.523	.054	.816
Group	193.169	2	96.585	9.976	.000
Error	1394.156	144	9.682		
Total	6597.000	148			
Corrected Total	1588.074	147			

a. R Squared = .122 (Adjusted R Squared = .104)

Dependent Variable:Rumination (ECQ-R)

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Good Sleeper	4.431[a]	.443	3.556	5.306
Insomnia	5.819[a]	.474	4.882	6.756
NREM Parasomnia	7.260[a]	.468	6.334	8.186

a. Covariates appearing in the model are evaluated at the following values: Age (years) = 38.91.

Tests of Between-Subjects Effects

Dependent Variable: Worry (PSWQ datatransformed)

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1.978[a]	3	.659	8.050	.000
Intercept	196.291	1	196.291	2396.132	.000
Age	.000	1	.000	.001	.970
Group	1.941	2	.970	11.845	.000
Error	11.796	144	.082		
Total	2090.641	148			
Corrected Total	13.775	147			

a. R Squared = .144 (Adjusted R Squared = .126)

Dependent Variable:PSWQtransformedlog

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Good Sleeper	3.584[a]	.041	3.504	3.665
Insomnia	3.832[a]	.044	3.745	3.918
NREM Parasomnia	3.825[a]	.043	3.740	3.911

a. Covariates appearing in the model are evaluated at the following values: Age (years) = 38.91.

Tests of Between-Subjects Effects

Dependent Variable:Arousal Predisposition Score

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	981.731[a]	3	327.244	5.884	.001
Intercept	17353.360	1	17353.360	312.028	.000
Age	181.888	1	181.888	3.271	.073
Group	818.895	2	409.447	7.362	.001
Error	8008.512	144	55.615		
Total	158120.000	148			
Corrected Total	8990.243	147			

a. R Squared = .109 (Adjusted R Squared = .091)

Dependent Variable:Arousal Predisposition Score

Group	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Good Sleeper	28.450[a]	1.061	26.353	30.548
Insomnia	33.184[a]	1.136	30.938	35.429
NREM Parasomnia	33.673[a]	1.123	31.453	35.892

a. Covariates appearing in the model are evaluated at the following values: Age (years) = 38.91.

APPENDIX 2.10

Ethics approval letter

WoSRES
West of Scotland Research Ethics Service

NHS
Greater Glasgow and Clyde

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Professor Colin Espie
Director of University of Glasgow Sleep Centre
University of Glasgow
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Southern General Hospital
Glasgow G51 4TF

Date 10 Nov. 10
Your Ref
Our Ref
Direct line 0141 211 2123
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E-mail Liz.Jamieson@ggc.scot.nhs.uk

Dear Professor Espie

Study Title: **Rumination, worry, emotional inhibition & arousability in adults with NREM parasomnias, insomnia & good sleepers**
REC reference number: **10/S0701/72**

The Research Ethics Committee reviewed the above application at the meeting held on 04 November 2010. Thank you for attending to discuss the study.

Ethical opinion

The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

For NHS research sites only, management permission for research ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at http://www.rdforum.nhs.uk.

Other conditions specified by the REC

1) At A17-2 the exclusion criteria states that those with a significant drug or alcohol use will be excluded. This must be clearly stated in the Participant Information Sheet.

2) If during the study an undiagnosed condition comes to light then the participant's GP must be informed. This must be clearly stated in the Participant Information Sheet and consent given to contact their GP.

A revised Participant Information Sheet and Consent Form should be submitted taking account of the above comments.

It is responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

You should notify the REC in writing once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers.

Approved documents

The documents reviewed and approved at the meeting were:

Document	*Version*	*Date*
Investigator CV		18 October 2010
Protocol	1	14 October 2010
Participant enquiry and Preliminary Screening	1	14 October 2010
Poster		
CV for Katherine E. Hooker	1	15 October 2010
REC application		19 October 2010
Questionnaire: Sleep Arousal Scale (SAS)		
Questionnaire: DASS21		
Advertisement		
Participant Information Sheet	1	14 October 2010
Participant Consent Form	1	14 October 2010
Questionnaire: The Penn State Worry (PSWQ)		
Questionnaire: Sleep Condition Indicator	1	14 October 2010
Questionnaire: AAQ-2		04 October 2006
Questionnaire: ECQ: How we deal with our feelings		
Questionnaire: Pittsburgh Sleep Quality Index		

Membership of the Committee

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

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.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document "After ethical review – guidance for researchers" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

10/S0701/72	**Please quote this number on all correspondence**

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

Yours sincerely

Liz Jamieson

Liz Jamieson
Committee Co-ordinator
On behalf of Dr Paul Fleming, Chair

Enclosures: List of names and professions of members who were present at the meeting and those who submitted written comments
"After ethical review – guidance for researchers"

Copy to: Dr Erica Packard, R&D

WoSRES
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Glasgow G51 4TF

Date 19TH November 2010
Your Ref
Our Ref
Direct line 0141 211 2123
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E-mail Liz.Jamieson@ggc.scot.nhs.uk

Dear Professor Espie

Full title of study: **Rumination, worry, emotional inhibition & arousability in adults with NREM parasomnias, insomnia & good sleepers**
REC reference number: **10/S0701/72**

Thank you for your letter of 17th November 2010. I can confirm the REC has received the documents listed below as evidence of compliance with the approval conditions detailed in our letter dated 04 November 2010. Please note these documents are for information only and have not been reviewed by the committee.

Documents received

The documents received were as follows:

Document	*Version*	*Date*
Covering Letter		17 November 2010
Participant Information Sheet	2	16 November 2010
Participant Consent Form	2	16 November 2010

You should ensure that the sponsor has a copy of the final documentation for the study. It is the sponsor's responsibility to ensure that the documentation is made available to R&D offices at all participating sites.

10/S0701/72 **Please quote this number on all correspondence**

Yours sincerely

Liz Jamieson

Mrs Liz Jamieson
Committee Co-ordinator

Copy to: Dr Erica Packard, R&D

APPENDIX 2.11

Participants removed from Good Sleeper group due to unequal sample sizes

Participant	Gender	Age
1*	Male	64
2*	Female	26
3*	Male	42
4	Female	36
5*	Male	27
6	Male	41
7*	Female	40
8*	Female	43
9*	Male	23
10*	Female	32
11	Male	25
12	Female	38

*= PSQI>5

APPENDIX 2.12

Socioeconomic status data for participants living in Scotland

Socioeconomic status		GS (N=50)	nREMp (N=30)	Insomnia (N=41)	X^2 (2)	P
		N(%)	N(%)	N(%)	N(%)	
SIMD quintile[a]						
	1	8	7	7	4.85	0.09
	2	3	5	12		
	3	8	7	3		
	4	12	6	6		
	5	19	5	13		

[a]SMID quintile = Scottish Index of Multiple Deprivaton. A quintile represents a statistical value of a data set that represents 20% of a given population. The first quartile represents the lowest fifth of the data (1-20%) (i.e. most deprived); the second quartile represents the second fifth (21%-40%) etc.

(www.scotland.gov.uk/Topics/Statistics/SIMD)

GS = Good Sleepers, nREMp = nREM parasomnia

APPENDIX 2.13

Frequency of participants within each DASS severity category

DASS severity categories (score range within category)	GS N = 50	nREMp N= 50	Insomnia N= 48
	Frequency in category	Frequency in category	Frequency in category
Depression			
Normal (0-9)	49	35	31
Mild (10-13)	1	3	4
Moderate (14-20)	0	3	10
Severe (21-27)	0	4	2
Extremely severe (28+)	0	3	3
Anxiety			
Normal (0-7)	50	24	31
Mild (8-9)	0	9	8
Moderate (10-14)	0	11	8
Severe (15-19)	0	1	1
Extremely Severe (20+)	0	3	2
Stress			
Normal (0-14)	46	35	26
Mild (15-18)	2	4	11
Moderate (19-25)	2	4	6
Severe (26-33)	0	3	7
Extremely Severe (34+)	0	2	0

GS = Good Sleepers, nREMp = nREM parasomnia

APPENDIX 2.14

Effect sizes for pair-wise comparisons of outcome measures

Outcome Measure	Pairwise comparisons	Effect size (d/*r*)	P
Emotional Inhibition			
ECQ-EI[a]	GS vs nREMp	0.69	0.001
	GS vs I	0.63	0.009
	I vs nREMp	0.12	1
AAQ-II[b]	GS vs nREMp	0.39	0.000
	GS vs I	0.4	0.000
	I vs nREMp	0.01	0.935
Rumination & Worry			
ECQ-R[a]	GS vs nREMp	0.97	0.000
	GS vs I	0.47	0.065
	I vs nREMp	0.42	0.092
PSWQ[a]	GS vs nREMp	0.92	0.000
	GS vs I	0.89	0.000
	I vs nREMp	0.07	1
Arousability			
APS[a]	GS vs nREMp	0.79	0.001
	GS vs I	0.5	0.040
	I vs nREMp	0.23	0.691
SAS cognitive[b]	GS vs nREMp	0.51	0.000
	GS vs I	0.76	0.000
	I vs nREMp	0.49	0.000
SAS somatic[b]	GS vs nREMp	0.76	0.000
	GS vs I	0.58	0.000
	I vs nREMp	0.16	0.118

[a]Effect size = Cohen's d

[b] Effect size = *r*

GS = Good Sleepers, nREMp = nREM parasomnia, I = Insomnia

APPENDIX 2.15

Correlation matrix between the five outcome measures and DASS subscales

	ECQ-EI	AAQ-II	ECQ-R	PSWQ	APS	SAS cognitive	SAS somatic	DASS Depression	DASS Anxiety	DASS Stress
ECQ-EI										
AAQ-II	.303*									
ECQ-R	.486*	.346*								
PSWQ	.423*	.475*	.671*							
APS	.413*	.530*	.607*	.668*						
SAS cognitive	.324*	.395*	.376*	.487*	.407*					
SAS somatic	.295*	.493*	.310*	.435*	.496*	.601*				
DASS Depression	.366*	.587*	.308*	.443*	.462*	.462*	.555*			
DASS Anxiety	.457*	.511*	.337*	.484*	.544*	.523*	.694*	.582*		
DASS Stress	.414*	.522*	.482*	.613*	.540*	.614*	.579*	.660*	.669*	

*Correlation is significant at the 0.01 level (two-tailed)

APPENDIX 2.16

General Structure of Parasomnia Treatment Programme

Background

Relatively little is known about the psychological profile of people with Non-REM Parasomnias, but it seems reasonable on the basis of what is known to presume that sleepwalking and night terrors are psychophysiological disorders. Therefore they may be amenable to psychological interventions. We are currently undertaking research at the University of Glasgow Sleep Centre exploring the psychological aspects of vulnerability and presentation of these patients. We also have a regular clinic for people with Non-REM Parasomnias. The Parasomnia Treatment Programme here, therefore, is based in good measure upon clinical intuition and experience. Informal evaluation of this treatment programme by looking at outcomes and subjective value to patients will also give us a better understanding of the nature of Non-REM Parasomnias.

The programme is structured as a 5 x 50 minute group session programme, in a style and format similar to the well established Glasgow CBT Programme for Insomnia. However the techniques are not by any means exclusively in the CBT tradition, but they are all influenced by psychological models of human behaviour, cognition and emotion.

Session 1: Sleep Information and Education

- Introduction to group and group members
- What is sleep?
- Sleep and human development
- Common sleep disorders
- Diagnostic features of Non-REM Parasomnia
- How Non-REM Parasomnia differs from other forms of parasomnia
- Relaxation training
- Group discussion
- Explanation of expectations of attending the group and of "boundaries"
- Recognition that parasomnia is a common and shared problem whilst the opportunity for group discussion (within above boundaries)
- Questions and answers (at the end, but also throughout)

Session 2: Sleep-Wake Optimisation Therapy and Management of Risks

- Establishing how much sleep you need
- Sleeping at the right times
- Managing napping and sleepiness
- The use of ambient light and light-boxes
- Avoiding sleep deprivation
- Place of alcohol (and medications)
- Creating a safe environment
- Involving others to minimise risk

- Group discussion
- Questions and answers

Session 3: Personal Styles and Ways of Coping

- Analysis of questionnaire data (worry, rumination, emotional expression, inhibition, etc.)
- A mindful approach to who you are
- Expressive writing tasks
- Reflection, rehearsal and planning
- Making sense of the parasomnia – a personal story
- Group discussion
- Questions and answers

Session 4: De-conditioning and Behavioural Management

- Predisposing, precipitating and perpetuating factors
- Identifying internal and external triggers
- Identifying stereo-type behaviour patterns
- Introducing discriminative stimuli to aid self-awareness and/or to direct behaviour
- Practicing extinction/de-conditioning
- Involving a partner/carer in the treatment programme
- Group discussion
- Questions and answers

Session 5: Additional Cognitive Strategies

- Cognitive restructuring
- Imagery training
- Acceptance and commitment
- Integration of the whole programme
- Relapse prevention
- Group discussion
- Questions and answers

APPENDIX 2.17

Major Research Project proposal

Rumination, worry, emotional inhibition & arousability in adults with NREM parasomnias, insomnia & good sleepers

Abstract

Background
Little is known about the psychological profiles of adults presenting with NREM parasomnias. Research indicates that a common factor associated with the onset of NREM parasomnias is stress and there has been some investigation into the presence of mood disorders such as anxiety in people with NREM parasomnias, indicating a higher prevalence compared to healthy subjects. There have been some suggestions that adults experiencing NREM parasomnias may be emotionally inhibited, however no research has directly investigated this. When considering research into sleep disorders, one turns to the topic of insomnia and finds a greater understanding of its associated psychological factors. Several studies have found a relationship between both worry and rumination and sleep quality. Research has also emphasised the role of somatic and especially cognitive arousal in insomnia.

Aims
The study proposed is an investigation into these psychological factors in adults who experience NREM parasomnias.

Methods
A cross-sectional study with a primary index NREM parasomnia group, a parallel sleep disorder group of adults with insomnia and a control group of good sleepers. The three groups will be compared for differences on self-report measures of emotional inhibition, worry, rumination and arousal.

Applications
Gaining a deeper understanding of some of the psychological processes in adults experiencing NREM parasomnias could prove useful for clinicians when providing assessment and intervention with people presenting with these phenomena.

Introduction

What are NREM parasomnias?

The group of sleep disorders collectively known as parasomnias are characterised as "undesirable physical or behavioural phenomena occurring during the sleep period" (Wills & Garcia 2002). Common parasomnias include REM (Rapid Eye Movement) sleep behaviour disorder, nocturnal seizures, rhythmic movement disorders, bruxism and Non REM (NREM) sleep-arousal disorder (Wills et al 2002). The study proposal described below will focus on NREM sleep-arousal disorders, also referred to as "NREM parasomnias". Overall characteristics of NREM parasomnias are that they tend to arise from stages 3 and 4 of NREM sleep (slow wave sleep) and in the first

third of the sleep cycle (Mahawold & Bourneman 2005). The episode generally occurs in the first half of the night and the individual has near-total or total amnesia following the event (Vaughn & O'Neil 2007). This category of parasomnias includes night terrors, sleepwalking and confusional arousals (Mahawold et al 2005). Confusional arousals present as periods of mental confusion occurring upon arousal or awakening from sleep (Ohayon, Guilleminault & Priest 1999). Night or "sleep" terrors are episodes of extreme terror associated with intense vocalisation and body motility and high levels of autonomic discharge (Kales, Cadieux, Soldatos & Kales 1982). The individual is completely fixated on this frightening experience and, whilst awareness is restricted as such, can not be reassured (Crisp 1996). Sleepwalking or "somnambulism" is characterised by ambulatory activity during NREM sleep. Sleepwalking and night terrors have been reported in some cases to occur together (Ohayon et al 1999).

These NREM parasomnias are described in the International Classification of Diseases (ICD-10) (World Health Organisation 1992) and the International Classification of Sleep Disorders (ICSD2) (American Academy of Sleep Medicine, 2005). In addition to the three main types described, more specific forms of NREM parasomnias have been reported including sleep-related eating disorder and sleep sex (Mahawold et al 2005).

Prevalence of NREM parasomnias

Incidents of confusional arousals, night terrors and sleepwalking are all more common in children than adults and usually decrease in frequency with increasing age (Mahawold et al 2005). However their prevalence in adults has been found to be higher than is often assumed (Bornemann, Mahowald & Schenck, 2006). In a study based on self-report data in a sample from the UK general population, Ohayon and colleagues found that night terrors were reported by 2.2% of the participants, sleepwalking by 2% and confusional arousals by 4.2% (Ohayon et al 1999). In the same study no gender differences were found in any of the arousal disorders, however some studies have reported that sleepwalking is around twice as common in males compared to females (Crisp 1996).

Why study NREM parasomnias?

Most often people who experience NREM parasomnias live out their lives without coming to the attention of researchers or sleep professionals. Professionals are only likely to become involved when harm is caused to the individual, the disorder becomes an inconvenience to others (such as the bed partner), it causes interruptions to sleep, or when secondary complications such as alcohol dependence arise (Crisp 1996). In severe cases incidents of homicide, filicide and suicide have been reported (Bornemann et al 2006). Increasingly, experts in the field of these disorders are asked to give their opinion in legal cases where violent or injurious behaviours have purported to have arisen from sleep (Mahowold & Schenk 2005).

Given the potential harmful, in some cases lethal, consequences of NREM parasomnias and the possible impact on an individual's quality of life, it is important to find out about the characteristics of those who experience them. In particular it is important to delineate those factors that predispose, precipitate and perpetuate these

behaviours with the ultimate aim being to intervene where possible to reduce or eliminate their occurrence.

What do we know about NREM parsomnias and when they occur?

A common factor found to be associated with the onset of NREM parasomnias is stress (Pressman 2007). In the study described above by Ohayon and colleagues higher rates of stressful life events and mental stress in the past year were reported in the group who experienced NREM parasomnias compared with those experiencing no such behaviour (Ohayon et al 1999). Sleep deprivation and alcohol consumption have also been reported to be associated with NREM parasomnias (Pressman 2007). Investigating what factors were associated with the three main NREM parasomnias separately and controlling for possible effects of sleep deprivation, life stress and mental and sleep disorders, Ohayan found that factors associated with NREM parasomnias were shift work, daytime sleepiness and daily smoking. A subjective sense of choking or blocked breathing at night, alcohol consumption at bedtime and nightmares at least one night per month were associated with night terrors. Sleepwalking was also associated with a subjective sense of choking or blocked breathing at night as well as being involved in a road accident in the past year.

There has been some investigation into a possible relationship between psychopathology and NREM parasomnias. Interestingly Kales and colleagues found more intense clinical manifestations and high levels of psychopathology in adult-onset sleepwalkers compared with adults who had been sleepwalkers in childhood (Kales, Soldatos, Caldwell, Kales, Humphrey & Charney 1980). Ohayon found a high percentage of subjects with NREM parasomnias had concurrent mood or anxiety disorders, specifically mood disorders were found in 30.4% of those with night terrors and 14.6% with sleepwalking compared with only 5.7% in healthy subjects (Ohayon et al 1999).

In a study investigating personality and psychoneurotic characteristics of adults with either sleepwalking or night terrors, Crisp and his colleagues found a normal psychological profile apart from exceptionally high scores on hysteria in both groups and high anxiety scores in the night terrors group (Crisp, Matthews, Oakey & Crutchfield, 1990). Crisp notes that questions within the hysteria scale most often responded to positively were those to do with enjoying acting, dramatic situations, being the centre of attention and in the case of night terrors, being excessively emotional, but that few of these patients displayed such behaviour in wakefulness (Crisp 1996). In reviewing literature on night terrors, Carlson et al (Carlson, White & Turkat, 1982) similarly points to a tendency of people with night terrors to "*react with fear and apprehension and inhibit outward expression"*. Concurrent with this is the finding that sleepwalking and night terrors are more common in good, compliant children who do not show their emotions (Klackenberg 1982). Despite these findings there has been no research directly investigating emotional expression or coping styles in adults presenting with arousal disorders.

Turning to Insomnia

When considering research into sleep disorders, one can turn to the topic of insomnia and find a greater understanding of its associated factors. Increasing age, female sex and psychiatric, in particular anxiety and depression, and medical disorders are all consistently found to be risk factors for insomnia (Edinger & Means, 2005). As has

been found with NREM parasomnias, various studies have shown that negative or stressful life events are often associated with insomnia (Morin, Rodrigez & Ivers 2003). In light of this some studies have investigated the role of appraisal of stressful events and coping in mediating between stress and insomnia. Morin and colleagues reported that the frequency of daily minor stresses was comparable for good and poor sleepers but the perceived impact of those stressors was higher for insomniacs. It was suggested that it is the appraisal process rather than the stress itself that is implicated in the presentation of insomnia. Vela-Bueno found that poor sleep quality was associated with rumination and emotional inhibition and that emotional inhibition acts as a mediating factor between rumination and sleep quality (Vela-Bueno, Fernandez-Mendoza, Vgontzas, Ramos-Paton, Bixler, Olaverrieta-Bernardino & Dela Cruz-Troca, 2008). In another study investigating links between rumination and sleep, Thomsen and colleagues found a significant association between rumination and subjective sleep quality even after controlling for negative mood (Thomsen, Mehlsen, Christensen & Zachariae, 2003). An experimental study inducing rumination about a negative event in the pre-sleep period established a causal link whereby high-trait ruminators allocated to a rumination condition reported poorer sleep quality than those assigned to a distraction condition. Low-trait ruminators did not differ according to condition (Guastella & Moulds 2003). Research has also shown a link between insomnia and the concept of "worry" which tends to be associated with anxiety (Harvey & Greenall, 2003). Further research highlights the role of cognitive hyperarousal or arousability as a causal factor for insomnia (Coren, 1988). There have been a number of research studies demonstrating a link between physiological arousal and insomnia (Monroe, 1967, Bonnet & Arand, 1995). However, Lichtsein and Rosenthal showed that insomniacs experienced their sleeping difficulties to be caused more by cognitive arousal than by somatic arousal (Lichtsein & Rosenthal, 1980). Nicasso and colleagues later developed the Pre-Sleep Arousal Scale encompassing both cognitive and somatic manifestations of arousal (Nicasso, Mendlowitz, Fussell & Petras, 1985). They found that whilst both cognitive and somatic arousal was related to insomnia, cognitive arousal showed a stronger relationship

Aims and hypotheses

Aims

In light of what has been found out thus far with regards to people who experience NREM parasomnias, the proposed study aims to profile these phenomena in relation to a number of the psychological variables introduced above, namely emotional inhibition, worry, rumination and arousal. A further objective would be to uncover any specificity of these variables to NREM parasomnias relative to another sleep disorder. A cross-sectional study is therefore proposed with an index group of interest being the NREM parasomnia group, a parallel sleep disorder group of people with insomnia and a control group of good sleepers.

Hypotheses

The study aims to test the following hypotheses:

- It is first hypothesised that, confirming findings from previous research, people with insomnia will have levels of a) Emotional inhibition, b)Worry, c)Rumination and d) Arousal that are elevated relative to good sleepers.
- It is hypothesised that, relative to good sleepers, the group experiencing NREM parasomnia, also a psychophysiological disorder, will also have higher levels of: a) Emotional inhibition, b) Worry, c) Rumination and d) Arousal.

Research questions

It is not clear, however, whether there will be any differences on these variables between the NREM parasomnia and insomnia group and in what direction this may be. There are therefore several research questions with regards to these two clinical groups:

- Are there differences between the insomnia and NREM parasomnia group in the nature or degree of a) Emotional inhibition, b) Worry, c) Rumination and d) Arousal?

Plan of Investigation

Participants

Participants allocated to the NREM parasomnia group and Insomnia will be selected based on criteria outlined in the (ICSD2) (American Academy of Sleep Medicine, 2005) for NREM parasomnia and insomnia respectively. Criteria for admission to the control group will include not meeting criteria for insomnia or NREM parasomnias and reporting satisfaction with the amount of sleep obtained, meeting research design criteria for good sleep.

Inclusion Criteria

- Participants to be included in the NREM parasomnia group must meet criteria for experiencing NREM parasomnias based on criteria outlined in the ICSD2
- Participants to be included in the Insomnia group must meet criteria for primary Insomnia based on criteria outlined in the ICSD2
- Participants to be included in the control group will include not meeting criteria for insomnia of NREM parasomnias and reporting satisfaction with the amount of sleep obtained.
- For inclusion into each group, participants must be over 18 years of age and report English as their first language.

Exclusion Criteria

- Exclusion criteria for all groups would be (a) Symptomatic evidence of another sleep disorder (e.g. sleep apnoea or periodic limb movement disorder); (b) Sleep disturbance attributed to a psychiatric/medical condition or neurological disorder; (c) significant drug or alcohol use.
- People meeting criteria for both a NREM parasomnia and insomnia will be excluded from the study.

Recruitment Procedures

Participants will be recruited from the general population through the media, advertisements and clinical referrals in a manner consistent with the UGSC experience and operational procedures. Advertisements may be placed, for example, in publications e.g. newspapers or the UGSC newsletter, in public spaces e.g. in hospitals, and on the internet e.g. on the UGSC website. Participants may also be identified via an existing database held at the UGSC which has details of participants who have not been suitable for previous research and have agreed to be contacted for future studies. Additionally, some potential participants may be identified through the parasomnia clinic which is ongoing at the UGSC. This study is planned to be part of a larger programme of research and recruitment may come directly as well as via a parallel study (Sarah Young). Suitable participants recruited into the parallel study will be offered the opportunity to take part in this study and vice versa.

It is expected that people interested in participating in the study will contact the UGSC to declare an interest. Potential participants would be screened via telephone using a standard screening interview administered to all participants intending to be involved in research at the UGSC in addition to screening interviews for insomnia and NREM parasomnias and specific health and demographic questions. This would be administered by staff members at the UGSC who are not involved in conducting the proposed study. If deemed suitable, they will be sent an information sheet on this and the parallel study and a consent form through which participants can consent to this study and indicate if they would like to be contacted regarding the parallel study. Approximately one week after being sent this information, they will receive a phone call asking them if they wish to participate. If they agree at this stage to participate in the study, they will be asked if they would like to participate via email, telephone/face-to-face interview or to receive the set of questionnaires by post.

Design

A between-groups cross-sectional study is proposed.

Research Procedures

It is expected that people interested in participating in the study will contact the UGSC to declare an interest by telephone or by email. Potential participants would be screened via telephone interview which will include the following:

Standard screening interview which is administered to all potential research participants at UGSC, with additional questions relating to health and sociodemographic factors and International Classification of Sleep Disorders II (ISCD-II) diagnostic criteria for insomnia and NREM parasomnias.

*Pittsburg Sleep Quality Index (PSQI)(*Buyesse, Reynolds III, Monk, Berman & Kupter, 1989): A self-report questionnaire which measures estimated sleep quality and disturbance over 1 month. This will provide a quantitative measure of sleep disturbance as an addition to the above interview. A global PSQI score of >5 has a reported sensitivity of 89.6% and specificity of 86.5% in distinguishing those with clinically significant sleep disturbance from those without. The PSQI has been shown to have a satisfactory level of internal consistency ($\alpha = 0.83$).

Depression Anxiety Stress Scales(21 items) (DASS21) (Henry & Crawford, 2004): A 21-item self-report measure of depression, anxiety and stress. The DASS21 has been selected because it includes a specific stress scale and a large amount of data has been accumulated on this measure at the UGSC. Internal consistency for the scales are satisfactory with α=0.93 for the total scale, and α=0.88 and α=0.82 and α=0.90 for the depression, anxiety and stress scales respectively.

Sleep Conditioner Indicator (SCI) (Espie 2009): An unpublished measure which has been developed at the UGSC and for which data has thus far been collected on nearly 2000 people. The SCI is a self-report questionnaire in which participants are asked to report on the pattern of their sleep over the past month in addition to the quality of their sleep, the impact any poor sleep has had on their life and the level of concern they have had about their sleep. Participants are also asked about the history of sleep problems.

If deemed suitable according to the inclusion/exclusion criteria defined, they will be sent information sheets on this and a parallel study along with two separate consent forms.

Approximately one week after being sent this information, they will receive a phone call asking them if they have considered participating in either of the research projects.

If they agree at this stage to participate in this particular study, they will be asked if they would like to participate via email, telephone/face-to-face interview or to receive the set of questionnaires by post. Depending on the preference indicated, an appointment will be arranged with participants for a telephone or face-to-face interview, they will be emailed a link to a website designed using survey monkey where they will be able to complete the questions online or they will be sent the questionnaires by post. The questionnaires described below will be completed by each participant.

<u>Questions on Emotional Inhibition</u>
Emotion Inhibition Subscale of the Emotion Control Questionnaire (ECQ-R) (Roger & Najarian, 1989). Participants are asked to rate 14 statements and situations as generally "true" or "false". E.g. "people find it difficult to tell if I'm excited about something or not". The Emotion Inhibition Subscale has been shown to have good internal consistency (α=0.77) and test retest reliability (r=0.71) (Roger et al 1989).

Acceptance & Action Questionnaire – II (AAQ-II) (Hayes et al 2009): A 9-item questionnaire that measures experiential avoidance. Questionnaire has good psychometric properties.*

<u>Questions on Rumination</u>
The Rehearsal Subscale of the ECQ-R. Participants are asked to rate 14 statements and situations as generally "true" or "false". Eg "I get worked up just thinking about things that have upset me in the past" "I remember things that upset me or make me angry for a long time afterward". The Rehearsal Subscale has been shown to have high internal consistency (α=0.86) and test re-test reliability (r=0.80) (Roger et al 1989).

Questions on Worry

Penn State Worry Questionnaire (PSWQ) (Meyer, Miller, Metzger & Borkovec, 2004): A 16 item self-report instrument which measures the trait of worry. The PSWQ has strong internal consistency (α=0.95) and test re-test reliability (r=0.93).

Questions on Arousability

Arousal Predisposition Scale (APS) (Coren & Mah,1988): A 12-item self-report measure of arousability. The APS has a split-half reliability of 0.83 and has been shown to predict individual differences in physiological arousal (Coren et al 1988).

The Sleep Arousal Scale (Nicasso, Mendlowitz, Fussell & Petras,1985): A 16-item self-report measure which comprises both cognitive and somatic manifestations of arousal. Internal consistency for somatic (8 items) and cognitive (8 items) are good (α=0.81 and α=0.76 respectively).

It is anticipated that it should take approximately 20 minutes for a participant to complete this set of questionnaires. For participants who have opted for the face-to-face or telephone interviews, these will take place at the UGSC between 9am and 4pm on working week days. Participants completing the online and postal questionnaires will be asked to complete these by a specified date allowing time for data analysis and write-up. All participants will be asked to return a signed consent form.

Justification of sample size

No previous studies investigating any of the variables of arousal, emotional inhibition, worry and rumination in relation to a NREM parasomnia population have been identified on which to base an estimated effect size. However studies investigating insomnia groups compared to controls have yielded large effect sizes. For example, using data from a study by Harvey & Greenall, 2003, an effect size of d=1.07 was found between an insomnia group compared to good sleepers on measures of worry, which would correspond to a large effect size according to Cohen's (1988) effect size conventions. In answering its final research question, the proposed study is investigating possible differences between two clinical populations and it is likely that sufficient power will be required to detect a more conservative, medium effect size. *A priori* sample size calculations were conducted using the G*Power 3 software program (Faul, Erdfelder, Lang & Buchner, 2007) for an independent samples t-test (two-tailed). With a significance level set at 0.05, a standard power of 0.8 and a medium effect size of d=0.5, it was calculated that a sample size of 64 would be required in each group. I would aim to recruit up to 100 participants per group. It is expected that obtaining this sample size would be sufficient to detect any significant differences between the two clinical groups, in addition to differences between the clinical and control groups.

Settings and Equipment

All research procedures will take place at the UGSC. Equipment required will be a computer, printer, paper and envelopes (including freepost) and a telephone.

Data Analysis
Data will first be summarised to provide descriptive statistics. Before conducting formal analysis, all variables will be checked for normal distribution. The intention would be to use a parametric approach and therefore use ANOVA models. If the data are not normally distributed, the data will be transferred to normative data or non-parametric tests would be used. Group comparisons will be made using ANOVA to check that the three groups do not differ with respect to age, gender and socioeconomic status. To investigate group differences with regard to the dependent variables (Emotional inhibition, worry, rumination and arousal), a series of ANOVA will be used. If significant differences are found, a Bonferroni correction for multiple comparisons will be applied and the ANOVAs will be repeated. Any variance of age, gender and socioeconomic status will be taken into account using ANCOVA. Relationships between the variables will be explored using correlations.

Health and Safety Issues

Researcher Safety Issues
No researcher safety issues have been identified

Participant Safety Issues
If concerns are identified regarding a participants physical or mental health at any stage of the study, this will be reviewed by a clinical psychologist and an appropriate health professional will be contacted with the participants consent. Participants will also be given the opportunity to receive advice regarding their insomnia or NREM parasomnia

Ethical Issues (including where submissions will be made)

NHS ethical approval and R&D approval will be sought from the Greater Glasgow & Clyde and Ayrshire & Arran Health Boards. Once this is passed, the study protocol will be shared with the Woolcock Institute in Sydney. Should the Woolcock Institute be interested in recruiting for the study, they would have responsibility for gaining ethical approval via local procedures. This is likely to be through the Royal Prince Alfred Hospital in Sydney. Completion of the proposed study is dependent on recruitment from Glasgow and the United Kingdom alone and any recruitment from the Woolcock Institute will be supplementary to this.

Financial Issues
Equipment costs, travel etc
Financial aid for paper, printing and photocopying. Envelopes, stamps/freepost envelopes will be required to send out questionnaires and have them returned. Subscription to survey monkey. A full costing summary will be submitted separately for approval.

Timetable

Date	**MRP Progress/Tasks**
April 2010	MRP Proposal submitted Costing form submission Completion of health and safety form
May – September 2010	MRP research supervision agreement Start research logbook Ethics approval Research & Development approval Site preparation Ordering materials and administration supplies
October 2010	Research Progress Meeting 1
October – December 2010	Start data collection
January – March 2011	Complete data collection Research Progress Meeting 2
April – May 2011	Complete data analyses Research Progress Meeting 3
June – July 2011	Submit drafts to supervisor
July 2011	Loose bind and submit
August 2011	Viva preparation
September 2011	Viva
September – November 2011	Submit corrections (if required)

Practical Applications

It is hoped that the outcome of this study would inform the assessment and treatment of clinically presenting cases with NREM parasomnias.

References

Only those not included in MRP project paper

Munroe, L., 1967, Psychological and physiological differences between good and poor sleepers, Journal of Abnormal Psychology, 72, 255-264

Voss, U., Kolling, T & Heidenreich, T. (2006). Role of monitoring and blunting coping styles in primary insomnia. *Psychosomatic Medicine*, 68, 110-115.

Voss, U., Muller, H., Schermelleh-Engel, K, (2006) Towards the assessment of adaptive vs. rigid coping styles: Validation of the Frankfurt monitoring blunting scales by means of confirmatory factor analysis, *Personality and Individual Differences*, 41 295-306

*Minor change to major research project: Used revised 7-item version of Acceptance and Action Questionnaire – II (AAQ-II), with improved psychometric properties

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