



Thomson, Amy (2009) *Biased processing of sleep-related information in children 'at risk' of insomnia: a pilot study & clinical research portfolio*.
D Clin Psy thesis.

<http://theses.gla.ac.uk/1256/>

Copyright and moral rights for this thesis are retained by the author

A copy can be downloaded for personal non-commercial research or study, without prior permission or charge

This thesis cannot be reproduced or quoted extensively from without first obtaining permission in writing from the Author

The content must not be changed in any way or sold commercially in any format or medium without the formal permission of the Author

When referring to this work, full bibliographic details including the author, title, awarding institution and date of the thesis must be given

**Biased Processing of Sleep-related Information in Children
'at risk' of Insomnia: *A pilot study***

& Clinical Research Portfolio

Amy Thomson

PART ONE

(Part Two bound separately)

*Submitted in partial fulfillment of the requirements for the degree of Doctorate in
Clinical Psychology (D. Clin Psy)*

Acknowledgements

I would first of all like to thank everyone at the University of Glasgow Sleep Centre for their continued support and advice during the completion of my research project – the input has been invaluable. In particular, I would like to thank my research supervisor, Dr Jason Ellis.

I would like to thank my field supervisor, Dr Nicola Wright, for providing me with guidance, support and containment, when I needed it most.

Thanks to Samantha Rankin, for her hard work, enthusiasm and time. Thanks also to my fellow trainee, Grant Forgan for his help with recruitment- you both made those weekends at the Science Centre that bit more fun!

Thanks to the teachers and children who helped me to develop the words for my computer task. Special thanks to all the children and their parents who took part in my research – without whom this wouldn't have been possible.

Thanks to my friends and classmates, for listening to all my research stories (which I'm sure were fascinating), and providing me with a much needed distraction!

Finally, I would like to thank my mum and dad for their continued support and patience over the past 3 years. It's been hard work, and you have been great.

Table of Contents

Part One (this bound volume)

	Page
CHAPTER 1: Systematic Literature Review	4
<i>A systematic review of educational-behavioural parenting interventions for preventing sleeping problems in infants</i>	
CHAPTER 2: Major Research Project	46
<i>Biased Processing of Sleep-related Information in Children 'at risk' of Insomnia: a pilot study</i>	
CHAPTER 3: Reflective Critical Account 1 Abstract	111
<i>Small Group Interagency Teaching: perceptions of, and endeavours to overcome inter-agency resistance</i>	
CHAPTER 4: Reflective Critical Account 2 Abstract	113
<i>'It's our job to make sure everyone's all right': reflections on a role conflict</i>	
APPENDICES	115
<i>Appendix 1: Guidelines for submission to 'Behavioral Sleep Medicine'</i>	116
<i>Appendix 2: Systematic review appendix</i>	118
<i>Appendix 3: Major research project appendices</i>	119

Chapter 1

A systematic review of educational-behavioural parenting interventions for preventing sleeping problems in infants

Amy Thomson*

* Address for correspondence
c/o Section of Psychological Medicine
Division of Community Based Sciences
University of Glasgow
Gartnavel Royal Hospital
1055 Great Western Road
Glasgow G12 0XH
Email: 0002897t@student.gla.ac.uk

Prepared in accordance with requirements for submission to *Behavioral Sleep Medicine (Appendix 1)*

Submitted in partial fulfillment of the requirements for the degree of Doctorate in Clinical Psychology (D. Clin Psy)

Abstract

Bed time problems and frequent nocturnal awakenings are highly prevalent in infants and young children; often leading to adverse long-term consequences. Recent research has begun to examine the use of preventative educational-behavioural parenting interventions, designed to be implemented from infancy, to support the development of healthy sleeping patterns, and hence avoid childhood sleep problems before they arise. This review systematically evaluates the evidence for the approach. Six papers describing randomised controlled trials are identified as meeting with inclusion criteria. These papers are evaluated using a modified 'Clinical Trials Assessment Measure' (Tarriner & Wykes, 2004) and discussed in the context of their methodological strengths and weaknesses. The evidence provided by the six papers suggests that the use of preventative educational-behavioural parenting programmes appears effective in improving sleeping patterns in infancy. Further large-scale research is needed to substantiate this finding. Variables potentially involved in determining the effectiveness of the approach are suggested. The review concludes with a discussion of the applicability of the intervention in a real world context. Suggestions for future avenues of research are put forward.

Introduction

Bed time problems and frequent nocturnal awakenings are highly prevalent in young children, occurring in approximately 20-30% of infants, toddlers and pre-schoolers (Burnham, Goodlin-Jones, Gaylor & Anders, 2002; Mindell & Owens, 2003).

Longitudinal studies indicate that sleep problems first presenting in infancy often persist into pre-school and school-age years and can become chronic (Zuckerman, Stevenson & Bailey, 1987). In addition, problems with the development of settling routines can have serious negative consequences for the family as a whole. Infant night wakenings have been highlighted as a risk factor for maternal depression (Mindell, Kuhn, Lewin, Meltzer & Sadeh, 2006), disturbances in parent-child relationships (Reijneveld, Vander Wal, Brugman, Verloove Vanhorick, 2004) and child abuse (Barr, Trent, & Cross 2006). St James-Roberts (2008) discusses the implications of infant sleep problems from an economic perspective, stating that in the UK, the professional time devoted to discussing sleeping problems with parents of 1-3 month old infants costs the NHS around £66 million per year (St James-Roberts, 2008).

A significant variable affecting infant sleep is maturation. Research on the maturation of infant sleep shows that infants begin to differentiate day and night within 2 months; newborns sleep randomly for a total of 16-20 hours each day, while 2 month olds spend more of their sleeping hours during the night (Anders, Keener & Kraemer, 1985). An infant's longest sleeping episode generally doubles to about 8 hours, between birth and four months (Wolfson, Futterman & Lacks, 1992).

Frequent night-wakening is adaptive for young infants, in terms of securing the

number of feeds necessary to allow them to obtain the nutrition essential for physical development and brain growth. However, by 6 months of age infants will usually be able to sustain prolonged periods of sleep where they do not wake to feed, without any costs in terms of physical development.

The development of infant sleeping habits is complex and multi-faceted. Individual differences in infant state-regulation capacities, and in the ability to shut out stimulation, can directly affect the ease with which the infant can fall asleep without parental intervention and sustain sleep through environmental disturbances (Murray & Ramchandani, 2009). Developmental and medical factors can have an impact on infant sleeping patterns also, with disruptions often caused by teething, colic or feeding difficulties.

Alongside infant related factors, there is good evidence that parenting behaviours, particularly the strategies implemented around the time of initially getting the infant off to sleep, or in response to night wakening are important to the development of infant sleeping patterns (Ramchandani et al, 2000; Burnham et al, 2002). Overly active parental involvement with the infant during the transition to sleep may limit the development of skills that enable the infant to manage awakening and resettling independently (Murray et al, 2009). Helping infants to develop the capacity to self-regulate their state is desirable.

While there is little that can be done to alter individual differences in infant temperament or pace of development, parental practices regarding sleep, are potentially modifiable. Therefore they can lend themselves to intervention in order

to improve sleep-wake patterns in infants (St James-Roberts, 2008). The results of several reviews demonstrate convincing evidence for the efficacy of interventions designed to modify parental behaviours, in improving infant sleep (Ramchandani, Wiggs, Webb & Stores; Mindell et al, 2006).

Given the widespread nature of sleep problems in infancy and early childhood, several recent researchers have concluded that taking a preventative approach, i.e. providing parents with intervention *before* problems arise, may in fact be a superior strategy (Mindell et al, 2006; Buckalt, Wolfson & El-Sheikh, 2009). This approach may be favoured by parents, who can struggle with the initial extinction burst (increased crying and distress in their infant) when new behavioural interventions are put in place to combat an already existent problem (Mindell et al, 2006).

Over the past 15 years, research has begun to focus on the use of preventative educational-behavioural programmes, offered to parents in the latter stages of pregnancy and first 6 months post partum. These programmes vary in their particular content and mode of delivery however all are designed to teach parents behavioural strategies to help promote their baby's development of healthy sleeping patterns. They are largely based around 1) education regarding infant sleep and 2) the provision of behavioural management guidance regarding the parental role in the promotion of healthy infant sleep. Specific behavioural guidance varies between individual programmes, however typically incorporates themes of: maximising day-time night-time cues in the infant's environment, promoting independent infant sleep skills/self-soothing and increasing the length of time between the infant's nocturnal feeds. Researchers in the field stress that if a preventative intervention is found to be

effective, then the incorporation of these methods into standard ante and post natal care would prove worthwhile (St James-Roberts, 2008; Stremler, Hodnett, Lee, MacMillan, Mill, Ongcango & Willan, 2006).

This review will systematically assess the evidence for this approach, in line with the following aims:

Main Aim: to evaluate the evidence for the efficacy of educational-behavioural parenting programmes as a preventative approach to Infant Sleep Problems

Secondary Aim: to consider variables that may be involved in determining their effectiveness

Method

Search Protocol

The electronic databases, Medline (1950- May 2009), Embase (1980 – May 2009), Psychinfo (1987 – May 2009), Cochrane Register, British Nursing Index and Archive (1985 – May 2009), Maternity and Infant Care (1971 – April 2009), CINAHL (1990 – May 2009), Web of Science (1990 – May 2009) were searched for articles. The search terms: infant, infancy, neonat\$, newborn\$, perinatal, sleep disorder, sleep difficult\$, sleep problem, night wakening\$, settling problem\$, educat\$, prevent\$, promot\$, parenting intervention, were used and combined using the Boolean AND/OR commands. \$ represents the unlimited right truncation command which means that the search will return items containing all possible completions of this word stem. Available abstracts were reviewed, and suitable papers were requested along with those that could not be judged adequately from the abstract.

The search was supplemented by hand searching the reference sections of those papers which were deemed appropriate for inclusion, as well as those of relevant recent reviews (Ramchandani et al, 2000; Mindell et al, 2006; Gagnan & Bryanton, 2009; St James Roberts, 2008; Buckhalt et al, 2009;). Hand searches were performed of the journals *Sleep* and *Paediatrics*, over the past 5 years. Finally, to identify additional trials that may be awaiting publication, the authors of identified studies were contacted, where possible.

Inclusion Criteria

A set of inclusion criteria were applied, regarding study type, participant characteristics, timing of recruitment, intervention used, and focus of primary outcome measures.

- A.** Study Type: Randomised Controlled Trials*
- B.** Participants: Healthy parent-infant dyads. No current sleep difficulties observed
- C.** Time of recruitment: Antenatal period – 6 months post natal
- D.** Interventions: Behavioural and educational interventions targeting the prevention of sleep problems in infancy
- E.** Primary Outcome Measures: Focus on infant sleep patterns

**Randomised Controlled Trials (RCTs) were selected as the basis for the review for three main reasons. 1) Their designation as the 'gold standard' increases their credibility as a basis from which to draw conclusions (Armstrong, Waters & Doyle, 2009) 2) their shared methodological rigour allows comparisons to be drawn between them 3) within the realm of infant sleep, the impact of basic maturation in changing infant sleeping patterns over time stresses the importance of an intervention being evaluated against a control group, as a point of comparison. This ensures that basic developmental changes are controlled for, and not mis-labelled as treatment effects. (Wolfson, Futterman & Lacks, 1992).*

Unpublished data were excluded from the review as were articles that were not available in English language format.

Critical Appraisal of Methodological Quality

The quality of the trials was assessed independently by two reviewers using a modification of the Clinical Trials Assessment Measure (CTAM) (Tarrier & Wykes, 2004). The CTAM was chosen due to ensure the scientific rigour of the review process, due to the thoroughness of its 15 included items and its use in previous systematic reviews of randomised controlled trials (Wykes, Steel, Everitt & Tarrier, 2007). Further, the CTAM demonstrates high inter-rater reliability and good criterion related validity when compared with other scoring systems (Tarrier & Wykes, 2004).

The measure asks the rater to answer fifteen questions about the study, under the headings of: sample, allocation, assessment, control groups, analysis and active treatment. Each question is weighted and scores are summed to reach a total score out of a possible 100. The original CTAM is provided in appendix 2.1. This measure was modified to promote its sensitivity, applicability and use as a critical tool in the selected field (infant sleep interventions). Efforts were made to alter the measure as little as possible in order to maintain the internal consistency and external validity. A total of two items were removed regarding rater-blinding; both reviewers agreed that these items did not provide a significant contribution to the power of the tool when used to examine research in the selected area. Two were added regarding active treatment and assessment. A further two were re-worded to ensure their

clarity and applicability. Weightings for original items remain unchanged. The modified CTAM is provided below. The reader is directed to appendix 2.1 for a comparison with the original CTAM (TARRIER & WYKES, 2004).

Insert Figure 1 about here

Studies were categorised as high, moderate or low scoring using the arbitrary grading system:

>70% = High Scoring

40-70% = Moderate Scoring

<39% = Low Scoring

Studies were reviewed in a blinded manner. Differences in ratings were discussed, until an agreement was reached.

Results

An initial electronic search generated 174 studies. 167 of these were excluded on the basis of title or abstract. 7 full papers were requested; of these, 4 were rated as meeting the inclusion criteria. 3 studies were excluded at this stage: 2 were excluded as they did not meet inclusion criterion B (regarding participants), and 1 was excluded because it was a duplication of data published within another study. Hand searches of the relevant reference sections yielded another 4 papers, of which 2 were rated as meeting the inclusion criteria. 1 was excluded as it did not meet inclusion

criterion A (regarding study-type), and another because it was a duplication of data published elsewhere.

This left a total of 6 papers, which are included in the review. A meta-analysis was not performed due to the heterogeneity of participants, interventions and outcome measures.

Each of the 11 full papers that were obtained and considered for inclusion is identified within the references section.

Methodological Quality

There was initial agreement between the assessors for 87% of the time; disagreements were discussed between the raters until 100% agreement was reached. Three of the studies received a high scoring rating, two received a moderate scoring rating and one received a low scoring rating. The table below illustrates each study's scores across the sub-components of the CTAM.

Insert table 1 about here

The studies included in the review are united by the common theme of their evaluating behavioural-educational interventions designed to prevent sleeping problems in infants. However there is considerable heterogeneity between them, in

terms of the content, structure and delivery of the intervention evaluated, and the infant sleep outcomes measured. Due to the relatively small number of studies included in the review, it is possible to discuss each study individually. In addressing the central aim of this review: to assess the evidence for the efficacy of educational-behavioural parenting packages designed to prevent sleeping problems in infants, each study will be discussed in the context of methodological strengths and weaknesses and inherent risk of bias. This will highlight differences between the studies and will lead logically to their later comparison. Studies are initially discussed in their modified CTAM rank order. The main reported characteristics and findings of each study are tabulated below (table 2).

Insert table 2 about here

The Six Studies: Significant Features

St James-Roberts, Sleep, Morris, Owen and Gillham, (2001) (High Scoring Study - 95%)

The study evaluated the effectiveness of a parent implemented prescriptive behavioural programme. Intervention mothers (n=205) were visited at home 8-14 days post partum and given a leaflet which detailed 10 behavioural practices that they should put in place. These centred on the themes of:

- encouraging the infant's parent independence at bed-time,
- learning to discriminate infant crying from fretting,
- increasing day-time/night-time cues in the infant's environment,
- introducing 'focal feeds' (a compulsory feed between 10-12pm),
- from week 3 onwards, increasing the length of time between feeds

The study included 2 control groups. One of which – the Education group (n= 202) – received a leaflet giving information on infant sleep and making suggestions for good practices to adopt. The difference between this and the intervention group was the level of direction and prescriptiveness. The Education group were given information to use in whichever way they pleased. A further control group (n= 203) received treatment as usual. The main intervention group and the education group also received treatment as usual services; this amounted to at least one contact with a Health Visitor, as well as General Practitioner contact when required. Results from the analysis of infant sleep diaries showed no differences between the groups in terms of total sleep, mean sleep bout length and number of sleep bouts over the 24 hour period at any age. However the behavioural group slept for more than 5 hours on significantly more nights at 9 weeks and 12 weeks. Group differences were not maintained at 9 month follow up, however individuals in the intervention group were less likely to have sought medical intervention regarding their infant's sleep.

The study showed a number of methodological strengths, which explain its ranking as the highest scoring study on the modified CTAM measure. The process of randomisation used a computer-generated random schedule, and was concealed from the researcher and participant until the day of treatment implementation. The

treatment protocol was manualised and adherence was assessed. Parent's adherence to the treatment guidelines was assessed using parent sleep and behaviour diaries. This allowed the authors to draw conclusions about levels of parental adherence within the sample. Assessments of sleep diary data were carried out independent of the research team, by blind assessors. These standards of practice greatly reduce the chance of bias being introduced to the study. In scoring the study's methodology, 5 points were lost due to a reliance on self-report diary data and failing to address the potential for individuals in the control groups to access external resources and supports regarding infant sleep.

Stremler, Hodnett, Lee, MacMillan, Mill, Oncangco and Willan, (2006) (High Scoring Study – 73%)

This study evaluated the effects of a parent-implemented non-prescriptive behavioural intervention. Prior to leaving hospital with their newborn infants, individuals in the intervention group (n=15) were given a 45 minute one-one session with the researcher, during which they were given information on infant and maternal sleep and behaviour strategies for promoting healthy sleep patterns. Strategies for mothers were based on sleep hygiene principles; strategies for infants were similar to those implemented in the study above. A non-prescriptive approach was taken, and mothers were encouraged to problem solve and to tailor strategies to their own beliefs, interests and lifestyle. Mothers were contacted weekly by telephone for the first 5 weeks post partum to reinforce information, provide further guidance and ensure that the intervention was being implemented. The control group (n=15) received a ten-minute consultation with the study nurse during which basic

information about maternal and infant sleep was discussed. The control group were also contacted weekly; advice was not given about behavioural sleep practices. Information on infant sleep patterns was obtained from actigraphy recordings, supplemented by sleep diary data for a 48 hour period at week 6. At 6 week assessment, infants in the intervention group showed a longer longest nocturnal sleep period and fewer nocturnal awakenings. No other significant differences were found on infant sleep variables.

This study received a high ranking methodology score. The study was particularly strong regarding assessment of intervention effects. The use of actigraphy supplemented by sleep diary data, made this study unique within the review. All data entry was done by independent assessors who were blind to group allocation. Non specific treatment effects were controlled for and treatment adherence was checked. Further the potential for each group to access additional sleep resources and support elsewhere was acknowledged and addressed. The study's overall score was reduced due to its small sample size and constraints placed on the randomisation procedures, by the short time-scale available for completion and access to the necessary staff resources to carry out the intervention.

The study was designed as a pilot for a larger scale future Randomised Controlled Trial; the current methodology, implemented on a larger scale shows promise.

Pinella and Birch, (1993) (High Scoring Study – 70%)

This study implemented a behavioural programme that was similar in content and level of direction/prescription to that of St James-Roberts et al (2001). Mothers (n=13) were first given information and instructions on the programme in the final trimester of pregnancy. Following this they were visited by the researcher weekly for the first 8 weeks post partum, to reinforce the information given, provide support and to ensure that they were implementing the programme. The control group (n=13) were also visited weekly; the only difference between the groups therefore being the provision of the training instructions. Analysis of infant sleep diary data showed that from week 3 onwards, for the night-time period, the intervention group demonstrated higher mean total sleep, longer duration of sleep per episode and greater longest sleep episode. By 8 weeks 100% of infants in the intervention group were sleeping through the night compared with 23% in the control group.

The study followed methodology that was similarly rigorous to St James-Roberts et al (2001). Non-specific effects were controlled for; all assessments of treatment effects were carried out blind and independently; treatment was manualised and adherence was checked. The study lost a considerable number of CTAM points (16) due to their randomisation procedures. These were not described at length, however it was indicated that a process of true randomisation had not occurred; participants who dropped out of the study early on were sequentially replaced, until the pre-determined sample size had been reached. This means that for those coming to the study at a later date, their group allocation was not completely random. Despite the small sample size, the study reports an adequate a prior power calculation based on the results of previous studies.

Wolfson, Futterman and Lacks, (1992) (Moderate Scoring Study – 57%)

This study implemented an educational/behavioural programme to an intervention group (n=29) across 4 sessions: 2 prenatal and 2 postnatal, as part of their attendance at Lamaze classes. Post natal sessions were carried out when the infant was ‘settling ready’ – defined as an age of at least 6 weeks, weight of at least 9 months and good health. The content was similar to that described in the studies above. It was delivered in a group format, using a mixture of didactic teaching, question and answer sessions, role play and group discussion. The control group (n=31) attended Lamaze classes as usual. Infant sleep was assessed using sleep diary methods, at 6-9 weeks, once the infant was settling ready and followed up at 16-20 weeks. At 6-9 weeks, the infants slept for longer blocks of time, had fewer individual sleep episodes and slept for > 5 hours on more occasions. These differences were not maintained at 16-20 weeks follow-up.

This study was assessed as moderate scoring. Strengths of the study included independent assessment, adherence to protocol and descriptions of treatment. However marks were lost due to the randomisation process. The study was cluster-randomised and there are no descriptions provided as to how the randomisation was achieved. Further the report does not detail whether or not the independent assessors were blind to group allocation.

Symon, Marley, Martin and Norman, (2005) (Moderate Scoring Study - 54%)

This study evaluated a single individual 45 minute tutorial session carried out in a hospital setting 2-3 weeks post birth. The intervention group (n=137) were given educational information on infant sleep and non-directive guidance that they should encourage parent-independence at bed-time. The control group received treatment as usual from their healthcare provider. Results, taken from sleep diary data at 6 and 12 weeks, suggested that infants in the intervention group had greater mean total hours of sleep, mean hours of nocturnal sleep and mean hours of day time sleep.

The study had a large sample size, clearly described randomisation procedures and included all participants as randomised in analysis. A particular weakness regarded the assessment process, which was not carried out independently, or by individuals blind to group allocation. Treatment as usual also does not provide a control for non-specific effects of participation in the study, for example increased contact with health professionals, increased education or increased focus on infant sleep.

Kerr, Howett and Smith, (1996) (Low Scoring Study - 39%)

This study evaluated the use of a Health Education Booklet supplemented by information and advice provided by a health visitor during a single home visit. The intervention group (n=86) and control group (n=83) were recruited in the 3rd month post partum. Assessment for treatment effects was done at 9 months using a standardised interview schedule. Results suggest that the intervention group experienced significantly fewer settling difficulties and night awakenings than the controls.

This study had a large sample size, a control group and adequate randomisation procedures. Nevertheless it had several methodological flaws. The research was carried out by an individual health visitor. This researcher both implemented the intervention, and carried out assessments for treatment outcome; therefore assessments were not carried out in a blind manner and were potentially subject to considerable bias. The possibility for bias is potentiated by the absence of an objective measure of infant sleep, and the reliance on information gathered using interview methods. Analysis was not done on an intention to treat basis and there was high attrition (18% across both groups).

The evidence for the efficacy of educational-behavioural parenting programmes as a preventative approach to Infant Sleep Problems: Reaching a Conclusion

These six studies are united by their focus on the evaluation of educational-behavioural programmes to prevent infant sleeping problems. Three represent high scoring studies, two moderate scoring studies and one low scoring study. All of the studies report superior sleep in their intervention group compared to their control groups; none of the studies report improved sleep in their control group, relative to their intervention group. Thus it could be concluded that, on the basis of this relatively small number of studies, preventative educational-behavioural parenting interventions appear to be an effective method of promoting good sleeping habits in infancy. This assertion has considerable face validity. However, there are several methodological weaknesses shared by the studies that merit attention before the above assertion should be considered a conclusion.

Methodological Cautions:

The first of these criticisms centres on the use of parent-report sleep diaries as a main outcome measure, as is the case in four of the studies. Several of the authors make reference to the high reliability of infant sleep diaries when compared to video footage (Wolfson et al, 1992, Pinnella et al, 1993 and St James-Roberts et al, 2001). However, they are not without bias. This is particularly important in the studies where intervention and assessments are carried out by the same group (Symon et al, 2005). None of the studies involve the blinding of participants to their group status, hence the possibility that a desire to please the researchers may lead to a response bias when providing diary data.

The second point relates to the reporting of infant sleep data within the results sections of the papers. Each of the diary and actigraphy recordings are taken in a similar way and relate to whether the infant was asleep or awake during a defined interval (1 minute – 15 minutes). From this sleeping patterns are generated. At their outset all of the studies included in the review define their main outcome measures in relation to the sleeping patterns/performance of infants. None of the studies specify at this stage, which particular index of sleep performance they will base conclusions on; possibilities would include: longest sleep bout, number of sleep bouts, or percentage of infants sleeping through the night. Thus ‘sleeping patterns/performance’ is a somewhat vague definition, and leaves scope for substantial reporting bias. Indeed when the studies come to report their results, the definition is interpreted differently. One study defines improved sleep as an infant sleeping for a greater mean amount of time in a 24 hour period (Symon et al, 2005);

another draws conclusions based on the percentage of infants sleeping through the night (Pinella et al, 1993); others analyse number of sleep bouts, longest sleep bout, longest nocturnal sleep bouts. This is problematic for a number of reasons. Firstly it suggests considerable reporting bias within the studies; with studies choosing to draw conclusions based on their most significant result. It also makes comparisons between the results of the studies more difficult, and a meta-analysis impossible, in the absence of their raw data.

A third point that concerns each of the included studies, relates to the absence of data pertaining to any developmental or environmental factors that may have impacted on the infant's sleeping pattern. For example teething, which is a basic developmental process, is subject to considerable individual variation and is likely to have an impact on an infant's sleeping pattern in infancy (Pinella et al 1993). Medical issues, such as colic are likely also to have a significant effect (Wolfson, 1992), as are environmental factors, for example moving house or a change in family composition (Murray et al, 2009).

These would all be reflected in a sleep diary, if they were to occur during a data collection period. None of the studies provide any evidence of having measured or accounted for factors such as these. This could therefore potentially act as a considerable confound to the validity of the data.

Finally, only one of the studies (Stremler et al, 2006) discusses the possibility that individuals involved in the study may be receiving additional input, education or support regarding their infant's sleep from elsewhere. In a culture where internet use

is an inherent part of daily living, it is extremely easy for individuals to reach additional information. This may be particularly likely in the studies where treatment as usual serves as a control condition (Symon et al, 2005; Kerr et al, 1996) – through participation in the study, individuals are primed regarding the relevance of infant sleep, but then are not provided with any additional input or guidance regarding its management. This may lead to the masking of treatment effects.

With these potential methodological drawbacks highlighted, both within studies and between studies, a reasonable conclusion may be that the evidence for the effectiveness for this type of approach is promising, and that with further rigorous research, more firm conclusions may be reached.

Variables potentially involved in determining effectiveness

A more detailed examination of the interventions evaluated in each of the studies is therefore timely, as a potential route to identifying the active components that are most deserving of inclusion in future studies. The educational-behavioural information contained in the interventions is similar throughout the studies included in the review. Thus if one is to accept the tentative conclusions regarding the efficacy of the approach, then this can also serve as support for the components of its content. Education and guidance regarding: encouraging the infant's parent independence at bed-time, increasing day-time/night-time cues in the infant's environment, introducing 'focal feeds', and increasing the length of time between feeds would therefore appear to be appropriate behavioural instruction to include in future programmes. Despite their homogeneity in content, the interventions

described in the six studies are largely heterogeneous in their implementation. This difference allows comparisons to be made regarding variables that may modify their effectiveness. Three dimensions are proposed on which the interventions differ, these are: number of sessions involved, timing of intervention and how prescriptive is the guidance given.

Number of Sessions

Three of the studies evaluate an intervention that takes place in a single session (Symon et al, 2005; St James-Roberts et al, 2001, Kerr et al, 1996). Two describe an intervention that involves a single information giving session, followed up by weekly visits (Pinella et al, 1993) or telephone calls (Stremmler et al, 2006). One involves a 4 session course (Wolfson et al, 1992).

Two of the studies that describe a one-session intervention find this to be an effective method, across several infant sleep variables (Symon et al, 2005; Kerr et al, 1996). However, it must be noted that these are the two lowest scoring studies included in the review in terms of methodological rigour. Both involve assessments being carried out by internal assessors, who are not blind to treatment allocation; this introduces the possibility of considerable bias to the study. The other one-session study (St James-Roberts et al, 2001), which is the highest ranking, finds the weakest results of all of the studies included in the review.

Therefore one-session interventions have the weakest support. It would seem logical that a multi-session approach would be more effective, due to the impact of

continued contact on increasing parental adherence. This may be a useful area for future studies to focus on.

Timing of intervention

One of the studies involves an intervention when the infant is 3 months old (Kerr et al, 1996). The other five studies refer to interventions spanning the perinatal period. The study evaluating intervention at the third month shows treatment gains in the intervention group; however, this study receives the lowest quality rating (39%) and is subject to considerable bias, due to the intervention and assessment of treatment outcome being carried out by one individual, in the absence of a standardised measure. As a stand alone study, it is not sufficient evidence for the adoption of this approach. The studies supporting intervention in the perinatal period are greater in both number and methodological rigour. Hence it may be concluded that the perinatal period has the most support as a target time for intervention. Indeed this fits most convincingly with the definition of the approach as preventative.

Level of Direction in Guidance Given

Three of the studies implemented directive programmes, giving parents step by step guidance as to how to manage their infant's sleeping routines (St James-Roberts et al, 2001; Pinella et al, 1993; Wolfson et al, 1992). Two studies gave more general advice, for the parents to implement as they chose (Symon et al, 2005; Kerr et al, 1996). The final study used a tailored approach, where parents were taught the behavioural techniques and then time was spent tailoring the approach to their

particular circumstances (Stremler et al, 2006). As stated above it is difficult to draw comparisons between the studies, due to the level of disparity between the particular infant sleep behaviours on which they draw their conclusions. However, the more prescriptive approaches have a stronger evidence base, given their evaluator's comparative methodological rigour. Indeed, in the highest quality study, St James-Roberts et al, (2001) used a non prescriptive education package with one of their control groups, and found no difference between this and the treatment as usual condition. The tailored approach taken in the study by Stremler et al (2006) also produces promising results. This study was carried out as part of a pilot for a larger scale randomised controlled trial that is due to be completed this year (personal communication with Dr Stremler). The results of this should prove illuminating.

Thus the review has highlighted a number of variables which differ between the studies, and thus may serve as potential moderators of effectiveness. These points would be worthy of consideration in the development of future intervention programmes.

In the context of a comparison between the particular interventions evaluated, the question of 'active ingredients' is raised, i.e. what it is about the intervention that is leading to the apparent between group differences in infant sleeping patterns? The intervention in itself is on the face of it, very simple. It involves the sharing of leaflets, the provision of information classes and guidance regarding the promotion of health infant sleeping patterns. It may seem unlikely that an intervention this basic would have a fundamental impact. Nonetheless, each of the included studies,

across the range of methodological rigour, reported improved sleeping patterns in the experimental group relative to the controls.

Further research may be able ascertain whether or not it is the education and guidance per se, or the increased level of support and contact that is leading to the apparent treatment gains. It is essential that this research be as rigorous as possible, to make certain that any supposed treatment gains are not an artefact of bias in research procedures.

Discussion

The results of the studies identified in the review provide a preliminary indication that, in the populations studied, educational-behavioural parenting programmes appear to be effective in promoting the development of health infant sleeping habits. The area is worthy of further large-scale research, in order that this be fully substantiated; the review has highlighted potentially moderating variables and active ingredients that may merit consideration. The review will now progress to discuss the practicalities of the approach and considerations regarding its adoption in a real world context.

Ethical Considerations

The justification behind the interventions described in the six studies largely comes from a health promotion perspective (Mindell et al, 2006) in terms of the promotion of healthy infant sleeping habits, and prevention of later difficulties and adverse

consequences (St James-Roberts, 2008). From this standpoint, the approach has considerable face validity. However, when considering interventions as potential mechanisms for public health promotion it is important to address the concept of health equity (Armstrong, Waters & Doyle, 2008), which in this case relates to the accessibility and appropriateness of the approach across all levels of socio-economic status, education and social support.

Each of the 6 studies identified a socio-economic bias in the composition of their intervention and control groups. While in all cases randomisation produced equivalent and matched groups for intervention and control, the selection process either required the elimination of specific categories of participants or led to this through self selection. For example Stremmler et al, (2006) found that women in their pilot study were predominately 30 years of age or older (83%), Caucasian (77%), partnered (100%), and university educated (93%). While this over-representation is not unexpected in such a research study (Sleep et al, 2002), it has a considerable impact on the generalisability of the findings.

Indeed it could be argued that levels of education, social support and socio-economic status act as variables moderating the effectiveness of the intervention. The interventions proposed, particularly the more prescriptive approach, require a high level of effort to carry out (St James-Roberts, 2008). This may be more difficult in, for example, a single-parent family where there are multiple demands on the parent's time. Further, the behavioural style adopted in the interventions requires a high level of routine; this may be more difficult to achieve in families where life is inherently less predictable.

Thus from a public health and health promotion standpoint, this raises issues of equity and ethics. In the context of the six studies included in the review, one concern is whether by excluding people with less regulated or supported lifestyles, a potential consequence is to facilitate the introduction of interventions that are shown to enhance the well being of particular (already advantaged) groups, while providing no similar support for the less advantaged.

On the other hand, the studies are specific and clear in their account of the nature of their participants. Indeed there is a case to be made that potential good for some should not be excluded because evidence does not support practice for all (Armstrong et al, 2008). Rather, it points to the need for research and development of interventions aimed at groups in society that are perhaps less amenable to structured interventions of the kind detailed in these studies.

Promoting Adherence

A related point concerns the implementation of the programmes, in terms of participant adherence. St James-Roberts et al (2001) used parent behaviour diary data to determine level of adherence. The study found that the intervention group did not implement the focal feed and many (45%) did not follow the recommendations regarding increasing parent-independence at night time. In this study, this may have considerably reduced the efficacy of the intervention. It is easy to see why this may have been the case – parents may struggle e.g. to wake an already sleeping baby for the purpose of a focal feed, or find it difficult to leave their baby fussing in the cot during the night. Perhaps this is a reason why a thorough explanation of the rationale behind the approach is necessary, in combination with regular contact, support and ‘trouble-shooting’ (Stremmer et al, 2006).

Economic Issues

It is evident that an approach involving a number of sessions and continued support, would incur considerable cost to the National Health Service (NHS). Morris, St James-Roberts, Sleep & Gillham (2001) recognising this, carried out an economic cost-benefit analysis of the approach, based on the data included in the St James-Roberts (2001) study. Cost effectiveness was measured in terms of the incremental cost per interruption free night gained, for behavioural and educational interventions relative to the controls. Mathematically, this was calculated as the ratio of incremental costs to incremental effectiveness. Incremental costs included extra time spent by health professionals explaining the preventative intervention as well as the

cost of producing parent manuals. These were balanced against extrapolations (from control group data) of the average cost to the NHS of providing GP/health visitor intervention for infant sleep complaint. It was concluded that the behavioural intervention incurred a small additional cost, but produced significant benefit. This was in contrast with their educational intervention, which also incurred cost, but did not produce significant benefit. However, the authors note that their results must be interpreted with caution due to their use of the control group to extrapolate NHS costs of infant sleep problems. Further research into the costs of infant sleep problems, at a national level would be both valuable and timely and would provide further justification for the adoption of a preventative approach. Again, the concept of health equity would have to be considered (Armstrong et al, 2008).

Limitations of the Review

Conclusions drawn from the review should be considered tentative, due to the relatively small number of included articles. Due to time constraints, the review excluded non-published data. It is possible that this introduces an element of bias to the results, in terms of the 'file drawer problem' (Rosenthal, 1979), that is the likelihood of trials finding a statistically significant positive result to be published, where those failing to do so remain in the 'file drawer'. The limit to English language publications may also introduce an element of bias, although research relating to the importance of this factor is conflicting (Sterne, Egger & Moher, 2008).

The Clinical Trials Assessment Measure (CTAM) was chosen as a tool to critically appraise the included studies, based on its previous use elsewhere (Wykes et al,

2007), thoroughness, and high reliability and validity when compared with other tools for evaluating RCTs. The measure was modified to ensure its applicability to the current area. However, it may be that this modified CTAM still lacked the level of specificity and sensitivity required to best evaluate the included studies. Future reviews of the area may consider developing an idiosyncratic measure to ensure a focus on the most salient aspects of their identified research. Suggested items may include: does the study account for additional developmental factors? Are all socio-economic groups represented?

Conclusions and Future Directions

The review began by providing background and rationale for the adoption of an educational-behavioural preventative parenting approach in the promotion of healthy sleeping habits in infants. Six studies, all reporting results supporting the efficacy of the approach have been discussed in the context of their methodological strengths and weaknesses, as determined by their scores on the modified Clinical Trials Assessment Measure (based on Tarrrier & Wykes, 2004). The review has reached the tentative conclusion that the approach is effective in promoting healthy infant sleep patterns within the populations studied. Several variables have been discussed – number of sessions, timing of intervention, and level of direction given – which may each have a role to play in determining the effectiveness of the approach. Further rigorous research could move further towards reaching firmer conclusions on the utility of the approach, and in addition determine the particular active ingredients.

Considerations and cautions have been raised regarding the large scale adoption of the approach. More research is needed to determine its applicability across all societal groups as is the completion of a more extensive economic cost-benefit analysis.

Large scale research using well-defined outcome measures and objective measurement is currently in progress in the area (Stremler, personal communication). In addition, researchers are beginning to consider the practicalities of the national adoption of the approach and are – from an economic perspective – attempting to elucidate ways in which interventions could be targeted to meet the needs of those

infants most 'at risk' of developing sleep difficulties (St James-Roberts, personal communication). In the context of the issues raised in this review, this future research shows promise.

References

* = Full articles considered for inclusion in the review

** = studies included in the review

Adair, R, Zuckerman, Bauchner, H, Phillip, B & Levenson, S (1992), Reducing night waking in infancy: a primary care intervention, *Pediatrics*, 89, 4, 585-588

Anders, T., Keener, M., & Kraemer, H. (1985), Sleep-wake state organization, neonatal assessment and development in premature infants during the first year of life: II. *Sleep*, 8,3, 193-206

Barr, R, Trent, R, Cross, J (2006), Age-related incidence curve of hospitalised Shaken Baby Syndrome cases: convergent evidence for crying as a trigger to shaking, *Child Abuse and Neglect*, 30, 1: 7-16

Buckhalt, J. A., Wolfson, A., & El-Sheikh, M. (2009), Children's sleep and school psychology practice, *School Psychology Quarterly*, 24, 60-69.

Armstrong R, Waters E, Doyle J, (editors), Chapter 21: Reviews in health promotion and public health In: Higgins JPT, Green S, editors, *Cochrane Handbook for Systematic Reviews of Interventions Version 5.0.0 (updated February 2008)*: The Cochrane Collaboration; 2008, Available from: www.cochrane-handbook.org

Burnham, M, Goodlin-Jones, B, Gaylor E;& Anders, T (2002), Night-time sleep-wake patterns and self-soothing from birth to one year of age: a longitudinal intervention study, *Journal of child psychology and psychiatry, and allied disciplines* 43, 6:713-25.

Gagnon, AJ. & Bryanton, J, (2009), Postnatal parental education for optimizing infant general health and parent-infant relationships, *Cochrane Database of Systematic Reviews*.

* Hiscock, H, Bayer, JK, Hampton, A, Ukoumunne, OC, Wake, M, (2008), Long-term mother and child mental health effects of a population based infant sleep intervention: Cluster-randomised, controlled trial, *Pediatrics*, 122, 3, E621-E627

** Kerr, S Jowett, S & Smith, L (1996), Preventing sleep problems in infants: a randomised controlled trial, *Journal of Advanced Nursing*, 24, 938-942

* Kerr, S, Jowett, S, Smith, L, (1997) education to help prevent sleep problems in infants, *Health Visitor*, 70, 6, 224-225

Mindell, J.A., & Owens, J.A. (2003). *A clinical guide to pediatric sleep: Diagnosis and management of sleep problems*. Philadelphia: Lippincott Williams & Wilkins

Mindell J.A, Kuhn, Lewin, B Meltzer, D & Sadeh, A (2006), Behavioural treatment of bedtime problems and night wakings in infants and young children, *Pediatric Sleep*, 29, 10, 1263-1275

Morris S, St James-Roberts I, Sleep J, Gillham G (2001), Economic evaluation of strategies for managing crying and sleeping problems, *Archives of Disease in Childhood*, 84, 15-19

Murray, L, Ramchandani, P (2009), Might prevention be better than cure? *Arch.Dis.Child*, 92:943-944

* Nikolopoulou, M & St James-Roberts, I (2003), Preventing sleeping problems in infants who are at risk of developing them, *Archives of Disease in Childhood*, 88, 2, 108-111

** Pinella, T & Birch, L (1993), Help me make it through the night: behavioural entrainment breast-fed infants' sleep patterns, *Pediatrics*, 91, 436-444

Ramchandani, P, Wiggs, L Webb, V & Stores, G (2000), A systematic review of treatments for settling problems and night waking in young children, *British Medical Journal*, 320, 209-213

Reijneveld, S, Vander Wal, M & Brugman, E (2004), Infant crying and abuse, *Lancet*, 364, 1340-1342

Rosenthal, R, (1979), The file drawer problem and tolerance for null results, *Psychological Bulletin*, 86, 638-641

* Sleep, J, Gillham, G, St James-Roberts, I, Morris S, Owen, P, (2002), A randomized controlled trial to compare alternative strategies for preventing infant crying and sleep problems in the first 12 weeks: the COSI study, *Primary Health Care Research and Development*, 3, 3, 176-183

St James Roberts, I (2008), Infant crying and sleeping: helping parents to prevent and manage problems, *Primary Care Clinics in Office Practice*, 35, 547-567

** St James-Roberts, I, Sleep, J, Morris, S, Owen, P & Gilham, G (2001), Use of a behavioural programme in the first 3 months to prevent infant crying and sleeping problems, *Journal of paediatric Child Health*, 37: 289-297

Sterne JAC, Egger M, Moher D (editors). Chapter 10: Addressing reporting biases. In: Higgins JPT, Green S (editors), *Cochrane Handbook for Systematic Reviews of Intervention*. Version 5.0.0 (updated February 2008), The Cochrane Collaboration 2008, Available from www.cochrane-handbook.org

** Stremmler, R, Hodnett, E, Lee, K, MacMillan, S, Mill, C, Oncango, R & Willan, A, (2006), A behavioural-educational intervention to promote maternal and infant sleep: A pilot randomised, controlled trial, *Sleep*, 29, 12, 1609-1615

** Symon, B, Marley, J, Martin, A, & Norman, E, (2005) Effect of a consultation teaching behaviour modification on sleep performance in infants: a randomised controlled trial, *Medical Journal of Australia*, 182, 215-218

Tarrier, N and Wykes, T (2004), Is there evidence that cognitive behaviour therapy is an effective treatment for schizophrenia: A cautious or cautionary tale?, *Behaviour Research and Therapy* 42 (2004), 1377–1401

** Wolfson, A, Futterman, A, & Lacks, P, (1992), Effects of parent training on infant sleeping patterns, parents' stress, and perceived parental competence, *Journal of Consulting and Clinical Psychology*, 60, 41-48

Wykes, T, Steel, M, Everitt, P & Tarrier N (2007), Cognitive behaviour therapy for Schizophrenia: effect sizes, clinical models and methodological rigour, *Schizophrenia Bulletin*, DOI 10:10.1093

Zuckerman, B, Stevenson, J, Bailey, V, (1987), Sleep problems in early childhood: Continuities, Predictive factors, and behavioural correlates, *Pediatrics*, 80, 5, 664-671

FIGURE 1: Clinical Trials Assessment Measure (Tarrier and Wykes 2004) – Modified

Study Evaluated (write name here)	Score Allocated
Sample (maximum 10)	
Type of Sample	
convenience = 2; geographic cohort = 5; highly selective = 0	
Sample Size	
27+ in each group or based on adequate power calculation = 5	
Allocation (maximum 19)	
True randomisation or minimisation allocation = 10	
Process of randomisation described = 3	
Process of randomisation carried out independently from research team = 3	
* Groups identical apart from intervention = 3	
Assessment (for main outcome) (maximum 26)	
Assessments/entry of sleep diary data carried out by independent assessors and not therapists = 10	
** Objective physiological sleep data obtained = 6	
Sleep diary data = 4 Standardised retrospective interview = 2	
Assessments/entry of sleep diary data carried out blind to treatment allocation = 10	
Control Groups (maximum 16)	
TAU is a control (6) and/or a control group that controls for non-specific effects or other established or credible treatment (10)	
Analysis (maximum 15)	
Appropriate to design and type of outcome measure = 5	
Includes all participants as randomised (intention to treat) = 6 and adequate investigation and handling of drop-outs from assessment if attrition exceeds 15% = 4	
Active Treatment (Maximum 14)	
Treatment adequately described = 3	
Treatment protocol or manual used = 3	
** Parent's adherence to treatment assessed = 5	
* Potential of either treatment or control group to engage additional resources addressed = 3	

Where criterion not reached for any question score = 0

Total score: maximum = 100

Deviations from standard CTAM

- Deletions: 2 items regarding rater blinding have been removed
- New items are marked with an asterix*
- Reworded items are marked with a double asterix**

TABLE 1:

Scores and score ratings allocated to each study using the modified CTAM (adapted from Tarrier and Wykes, 2004)

Study Evaluated	Sample	Allocation	Assessment	Control Groups	Analysis	Active Treatment	Total Score	Score Rating
	Max 10	Max 19	Max 26	Max 16	Max 15	Max 14	Max 100	
St James-Roberts et al	10	19	24	16	5	11	95	High
Stremler et al (2006)	2	9	26	10	15	9	71	High
Pinella et al (1993)	7	3	24	10	15	11	70	High
Wolfson et al (1992)	7	6	14	10	9	11	57	Moderate
Symon et al (2005)	7	16	4	6	15	6	54	Moderate
Kerr (1996)	7	16	2	6	5	3	39	Low

Table 2: Descriptive Summary of Included Studies (n= 6)

Study	Participants	Information provided on Intervention	Control	Outcome Measure	Reported Findings
St James-Roberts et al (2001)	610 mothers recruited in post natal wards of community hospital when infant < 1 week old	<p>Single individual session with researcher during home visit 8-14 days post birth</p> <p>Precise set of instructions given around themes of encouraging parent independence, increasing structure, increasing daytime-night-time cues, introducing a focal feed and stretching inter-feed intervals</p> <p>Structured programme given in hand-out format.</p>	<p><i>Education Group:</i> provided with a 10 page guide to baby crying and sleeping. Given general written advice and suggestions, non-prescriptive</p> <p><i>Control:</i> Treatment as Usual</p>	<p>Infant Sleep Diary Data</p> <p>Diaries kept for a 24 hour period at 3 weeks, 6 weeks and 12 weeks and 9 month follow-up</p> <p>Extracted for analysis: Nocturnal (7pm-7am) and day-time (7am-7pm):</p> <ul style="list-style-type: none"> - Minutes of sleep - Sleep bout length - No of sleep bouts - No of sleep bouts > 5 hours 	<p>For the night-time period there were no significant differences between groups in terms of total sleep, mean sleep bout length or number of sleep bouts.</p> <p>The main intervention group demonstrated significantly more nights where sleep bout lasted >5hours.</p> <p>There were no significant differences in any variable regarding day-time sleep.</p>
Stremmer et al, (2006)	30 mothers recruited in post natal wards of university hospital when infants < 1 week old All first time mothers	<p>One-one 45 minute meeting pre hospital discharge.</p> <p>Information given on maternal and infant sleep and techniques for improving both.</p> <p>Non-prescriptive approach taken, tailoring advice to needs and values of individual mothers.</p> <p>Weekly phone contact to reinforce information</p> <p>11 page hand-out given</p>	<p>10 minute meeting with study nurse.</p> <p>Basic information on maternal and infant sleep given. No guidance on management of infant sleep.</p> <p>1 page hand-out given.</p> <p>Contact with study nurse at 3 and 5 weeks</p>	<p>Infant Actigraphy Data supplemented by Infant Sleep Diary Data.</p> <p>Both measures taken over 48 hour period at 6 weeks</p> <p>Extracted for analysis:</p> <ul style="list-style-type: none"> - Nocturnal Sleep (9pm-9am) (mins) - Longest nocturnal sleep period (mins) - No of nocturnal awakenings - Daytime sleep (mins) - Longest daytime sleep period (mins) - 24 hour sleep (mins) 	<p>Relative to controls, at 6 weeks, infants in the intervention group demonstrated:</p> <p>Longest nocturnal sleep periods Fewer nocturnal awakenings</p> <p>No other significant differences found on any infant sleep variables</p>

Study	Participants	Information provided on Intervention	Control	Outcome Measure	Reported Findings
Pinilla et al (1993)	26 couples recruited via newspaper birth announcements and obstetrician's offices in last trimester of pregnancy. All first time parents	Individual consultation in final trimester of pregnancy giving information on infant sleep and prescriptive instructions on behavioural management. Reinforced during 8 weekly post partum home visits. Themes covered: encouraging parent independence, increased structure, increasing daytime-night-time cues, introducing a focal feed and stretching inter-feed intervals. Hand-out given	Treatment as Usual	Infant Sleep Diary Data Kept for 72 hour period each week, from 1 week to 8 weeks Extracted for analysis: Night-time (midnight to 5am), and 24 hour period: - total sleep - longest sleep bout - mean length of sleep bout.	For the night-time period from week 3 onwards infants in the treatment group showed longer mean total sleep, longer duration of sleep per episode, and greater longest sleep episode. At 8 weeks, 100% of the intervention group slept through the night compared with 23% of the controls Over the 24 hour period, the two groups significantly differed in terms of longest sleep episode. There were no other significant differences over the 24 hour period.
Wolfson et al, (1992)	60 couples recruited from Lamaze classes during 7 th month of pregnancy. All first time parents.	Educational-behavioural programme Delivered in group setting as part of Lamaze classes 4 sessions: 2 pre and 2 post natal. Information and behavioural guidance given focusing on encouraging 'parent independence', increased structure, increased daytime-night time cues, introducing a focal feed and stretching inter-feed intervals Didactic teaching, Q&A, group discussion, role play, hand-outs given	3 sessions: 1 pre and 2 post natal. Discussions around how to observe and report infant sleep	Infant Sleep Diary Data Kept for 21 consecutive days – assessed at end of weeks 1, 2 and 3. Kept for 7 consecutive days to follow up at 16-20 weeks Extracted for Analysis: - Total sleep - Longest sleep block - No of sleep episodes - Occasions slept > 300 min - % infants sleeping through the night (defined as continuous sleep bout between 12am and 5am)	Relative to controls at 1 week, 2 weeks and 3 weeks, intervention infants slept for longer blocks of time, had fewer individual sleep episodes and slept for >300 min on more occasions. No differences were observed on total sleep time. There were no longer significant group differences at follow-up

Study	Participants	Information provided on Intervention	Control	Outcome Measure	Reported Findings
Symon et al, (2005)	268 families recruited from newspaper birth announcements when infants < 2 weeks old.	Single individual 45 minute tutorial session in local hospital 2-3 weeks post birth Information given on infant sleep in addition to general advice to encourage 'parent independence' 50 page hand-out given	Treatment as Usual	Infant Sleep Diary Data Kept for 7 consecutive days at 6 weeks and 12 weeks Extracted for Analysis: - hours of daytime (6am-6pm) sleep, - hours of night-time (6pm-6am) sleep, - occasions total sleep >15 hours/24 hours	At 6 weeks and 12 weeks, relative to controls, infants in the intervention group had greater mean total hours of sleep, hours of night-time sleep, hours of daytime sleep and number of 24 hour periods where total sleep >15 hours.
Kerr et al, (1996)	169 families recruited by contacting parents of infants born in the local area at 3 months post partum	Information and advice regarding settling methods and the importance of routine provided by the researcher during a single home visit. Supplemented by a Health Education Booklet.	Treatment as Usual	Standardised interview schedule asking the parent to discuss their infant's sleep during previous week Infant 9 months old	The intervention group experienced significantly fewer settling difficulties and night awakenings than the control group.

Chapter 2

Major Research Project

Biased Processing of Sleep-related Information in Children ‘at risk’ of

Insomnia: a pilot study

Amy Thomson*

* Address for correspondence
c/o Section of Psychological Medicine
Division of Community Based Sciences
University of Glasgow
Gartnavel Royal Hospital
1055 Great Western Road
Glasgow G12 0XH
Email: 0002897t@student.gla.ac.uk

Prepared in accordance with requirements for submission to *Behavioral Sleep Medicine*
(Appendix 1)

*Submitted in partial fulfillment of the requirements for the degree of Doctorate in
Clinical Psychology (D. Clin Psy)*

Abstract

This study piloted methodology applied in the fields of Major Depressive Disorder, Bipolar Disorder, Panic Disorder and Alcoholism, to investigate attentional bias towards sleep-related stimuli as a factor in the predisposition of insomnia.

Following a ‘tired-state induction’ two groups of participants – ‘at risk’ children of adults with insomnia, and control children of good sleepers – completed a sleep-related Emotional Stroop task. Subsequently, they were asked to comment on the content of the Stroop words; whether or not the children reported sleep-related content was recorded. There was no evidence of attentional bias towards sleep-related stimuli in ‘at risk’ children relative to controls. However there was a trend regarding children’s reports of the words’ content; a greater percentage of the ‘at risk’ children reported sleep-related content, than controls.

These results do not provide conclusive support for the role of attentional bias in the predisposition of insomnia. The results are discussed in the context of the methodological limitations of the pilot study. Suggestions for future modifications are put forward.

Introduction

Insomnia

Insomnia is broadly defined as a persistent inability to initiate sleep, maintain sleep or acquire satisfactorily restful sleep, resulting in daytime consequences (Ellis, Hampson & Cropley, 2007). It is a prevalent health complaint, with epidemiological studies indicating that between 9% and 15% of the general population report chronic insomnia symptoms (Ohayon, 2002). Indeed it is cited as the most common health complaint, after chronic pain (Gallup, 1995). The cost/consequences of insomnia can be seen at the individual level – playing a role in the development and chronicity of a range of psychological and physiological health conditions (e.g. Depression, Coronary Heart Disease) and at a societal level – often leading to decreased social and occupational functioning (e.g. absenteeism from work, alcohol and drug dependency) (Lacks & Morin, 1992). The widespread nature and potential costs of the disorder, underscore the importance of developing our understanding of its treatment (Smith & Perlis, 2006), aetiology (Espie, 2002) and natural history (Bastien & Morin, 2000).

Conceptualising Insomnia

Various models have been constructed to explain the conditions under which insomnia develops, progresses and is maintained (e.g. Harvey, 2002; Espie, 2002). Spielman, Caruso and Glovinsky (1987) proposed a cumulative model of the progression from acute to chronic insomnia. Their framework suggests predisposing factors - intrinsic traits that render an individual vulnerable to insomnia, precipitating events – stressful

life events that trigger an initial period of sleep disturbance, and perpetuating cognitions and behaviours – that continue beyond the duration of the initial stressor and result in a cycle of chronic insomnia. This model is comparable with the cognitive ‘diathesis-stress’ models that have been constructed to explain the development of other psychological disorders e.g. depression (Beck, 1967; Teasdale, 1988) and anxiety (Clark, 1995; Wells & Pappageorgiou, 1998)

Selective attention in the *perpetuation* of insomnia

Within this framework, recent research in insomnia has focused primarily on investigating the cognitions and behaviours that potentially maintain the disorder (Espie, 2002). The concept of ‘selective attention’, towards sleep related stimuli, has garnered considerable attention in the literature (Spiegelhalder, Espie, Nissen & Rieman, 2008; Jones, MacPhee, Broomfield, Jones & Espie, 2005; Marchetti, Biello, Broomfield, MacMahon & Espie, 2006). It has been proposed that individuals with primary insomnia possess an attentional system that is highly sensitive to sleep-related information (Spiegelhalder et al, 2008). The resultant attentional bias is seen by contemporary cognitive models of insomnia (Espie, 2002; Harvey, 2002) as contributing to the maintenance of the disorder.

Recent research, using computerised cognitive probe paradigms, has provided support for this role. Taylor, Espie and White (2003) used the Emotional Stroop task with individuals with sleep problems secondary to cancer. They found both groups displayed an attentional bias towards cancer related words, but only the persistent insomnia group demonstrated an attentional bias for sleep related words. Jones, MacPhee, Broomfield,

Jones and Espie (2005) used a flicker paradigm to induce change blindness in a group of 'good sleepers', 'moderate sleepers' and 'poor sleepers'. Change detection latencies revealed a sleep-related attentional bias in poor sleepers but not in good sleepers. A possible bias in moderate sleepers was also revealed. Marchetti, Biello, Broomfield, MacMahon and Espie (2006) used the flicker paradigm with individuals with psychophysiological insomnia, individuals with delayed sleep phase syndrome and good sleepers. Change detection latencies revealed an attentional bias in the psychophysiological insomnia group, but not in the good sleepers. An attentional bias was also found in the delayed sleep phase syndrome group, although to a lesser extent. Spiegelhalder et al (2008) used a mixed modality task and an Emotional Stroop task to investigate attentional processes in patients with primary insomnia, sleep experts and controls. They found that individuals in the insomnia group demonstrated greater sleep interference scores on the Emotional Stroop task than the sleep expert group. No other significant group differences were observed on either task.

There are to date no published papers assessing attentional bias in children with sleep problems. However work is beginning in this area. Gregory and Crawford (unpublished data) used a flicker paradigm to assess attentional bias towards sleep-related information in a sample of children aged 9-11. Early analysis of this data has shown similar results to those studies carried out with adult participants - that the poor sleepers identified sleep related changes more quickly than the good sleepers. This would suggest that a sleep-related attentional bias can exist in children with sleep problems.

Thus several studies now exist to support the role of selective attention in the perpetuation of insomnia. However, it has not yet been considered, or investigated, as a potential predisposing factor. Indeed the study of factors potentially predisposing individuals to insomnia has largely lagged behind the study of the disorder's perpetuation, due to lack of an objective measure and studies being largely cross-sectional or retrospective in nature (Drake et al, 2004). There is considerable agreement in the literature that there is a need for future research to target risk factors for insomnia (Gregory et al, 2006; Drake, Richardson, Roehrs, Schofield & Roth, 2004; Espie, 2002). This is particularly timely given the current government mental health agenda, advocating health promotion and early identification and intervention for mental health problems, across children's and adult services (Layard, 2006; Layard & Dunn, 2009).

Selective attention as a *predisposing* factor for psychological disorder

Research within the realms of a number of other disorders has begun to focus increasingly on predisposing factors. It is widely accepted that many disorders affecting mental health have a strong familial link, for example depression (Garber & Robinson, 1997), bipolar disorder (Gotlib & Goodman, 1999), alcoholism (Sher & Gotham, 1999) and panic disorder (Maier, Buller & Hallmayer, 1988). With this in mind, the children of parents with these disorders are seen to be 'at risk' of developing the disorders themselves (Joordman, Talbot & Gotlib, 2007; Gotlib, Traill, Montoya, Joordman & Chang, 2005; Schneider, Unnewehr, In-Albon & Margraf, 2008; Zetteler, Stollery, Weinstein & Lingford-Hughes, 2006). Therefore the assessment of these children provides a useful route to elucidating potential vulnerability factors. This paradigm has been used to examine attentional bias as a predisposing factor for a range of disorders,

addressing the hypothesis that these children are characterised by the biased processing of disorder-related information. The paradigm involves using computerised cognitive probe methodologies to assess the attentional processes of the non-disordered children of disordered parents. Previous studies have applied the paradigm to offspring aged between 8 and 20. The majority of studies use a ‘mood induction’ with the children. The rationale for doing so is based on an aetiological diathesis-stress model, in which predisposing cognitive structures e.g. attentional biases, are seen to lie dormant until they are activated by exposure to trigger situations (Joordman et al 2007; Gotlib et al 2005; Schneider et al 2008, 2002). Thus the mood manipulation is used to activate latent cognitive structures in the children.

A recent study by Joordman, Talbot and Gotlib (2007) investigated whether the daughters of mothers who had had experienced recurrent episodes of severe depression during their daughter’s lifetime were characterised by the biased processing of emotional information. Following a negative mood induction, involving exposure to a short, sad video clip, their participants – girls aged between 9 and 14 – completed an emotional-faces dot-probe task. ‘High risk’ daughters (of mothers with severe depression) selectively attended to negative facial expressions, whereas control daughters did not. In contrast only control daughters selectively attended to positive facial expressions. The results support the hypothesis that an attentional bias towards negative information may predispose Major Depressive Disorder.

Gotlib, Traill, Montoya, Joordman and Chang (2005) applied a similar paradigm to assess vulnerability to bipolar disorder (BPD) – using a negative mood induction (short sad video clip) and Emotional Stroop with the children of parents with BPD and control

children. Children were again aged between 9 and 14. Results suggested an attentional bias in the children of BPD parents relative to controls.

Shchneider, Unnewehr, In-Albon and Margraf (2008) compared the children of individuals with panic disorder, animal phobia and normal controls, using an Emotional Stroop task. Their participants were aged between 8 and 15. Unlike Joordman et al (2007) and Gotlib et al (2005) they found no significant difference between groups in terms of an attentional bias towards anxiety-related phenomena. Schneider et al (2008) discuss this result in the context of previous work (Schneider, Unnewehr, Florin & Margraf, 2002), in which they demonstrated that children of panic disordered parents exhibit increased anxious interpretations of ambiguous stimuli, after priming with a panic-related model, relative to controls. They advocate that the priming component is imperative and that their study should be replicated using an Emotional Stroop with a priming manipulation.

In a preliminary investigative study, Zetteler, Stollery, Weinstein and Lingford-Hughes (2006) applied the paradigm to substance abuse. They found that adolescents (aged 15 to 20) with alcohol dependent parents showed an attentional bias towards alcohol-related words, relative to controls. The magnitude of this effect was correlated with higher trait and state anxiety. They concluded this attentional bias in young people 'at risk' of substance abuse was likely to reflect their concerns regarding parental drinking, but could also possibly underlie the increased risk of future alcohol dependence in children of alcohol-dependent parents.

Taken together, these findings provide preliminary support for attentional bias as a risk factor in unipolar depression, bipolar disorder, panic disorder and alcoholism. It must be noted that the studies do not make strong assertions regarding the mechanisms that may underlie the transference of attentional bias. The focus remains on establishing *whether*, before examining *how* (selective attention might transfer from parent to child). The broadness of the spectrum of disorders studied so far suggests that the extension of the paradigm into further areas may prove worthwhile.

Selective Attention as a *predisposing* factor for insomnia?

In order to implement the research paradigm, two pre-requisites are necessary. Firstly, there must be evidence that a disorder has a heritable component, thus suggesting that children of parents with the disorder are 'at risk'. Secondly, there should be a cognitive model of the disorder, in which selective attention is implicated as a maintaining factor.

As discussed earlier, recent research in the insomnia field ensures that the disorder fits with the latter criterion (Spiegelhalder et al, 2008; Jones et al, 2005; Marchetti et al, 2006)

The familial incidence of insomnia has not been as widely researched as have other disorders, such as unipolar depression and alcoholism (Dauvilliers, Morin, Cervena, Carlander, Touchon, Besset & Billiard, 2005). However, a recent study found that 72.2% of primary insomnia patients reported familial insomnia (Dauvilliers et al, 2005). Indeed previous reports have suggested that a positive family history of insomnia acts as

a potential risk marker (Bastien, 2000). Thus insomnia can be seen to meet the first criterion.

The suggestion that insomnia fit with this model has considerable face validity. It is reasonable to predict that the children of adults with insomnia, through observing their parent's efforts, problems and pre-occupations with sleep, would develop 'problematic sleep' schemata, in which sleep is conceived of as a cause for concern. These schemata may lie dormant; however when the individual encounters a period of acute sleep disturbance, they may be activated, galvanising the progression from acute to chronic insomnia.

This study therefore piloted the use of the research paradigm in insomnia, in order to investigate selective attention towards sleep-related stimuli as a potential predispositional factor. Children of adults with insomnia were tested, using the Emotional Stroop paradigm. In addition, following completion of the Stroop task, children were asked 'did you notice anything about the words?' Whether or not children reported the sleep-related content of the words was recorded, for use in analysis. This question was included as an adjunct to the Stroop data due to its simplicity and ecological validity as a measure of the salience of the sleep-related stimuli for the children. This secondary data also had the potential to suggest future avenues of research, regarding level of processing, awareness, memory and recall of sleep-related information (Schneider et al, 2002; 2008).

The current study included children between the ages of 9 and 12. This is a narrower aged bracket than those used in previous studies (Joordman et al, 2007; Gotlib et al,

2005; Zettler et al 2005; Schneider et al 2002). The span was reduced in an attempt to minimise the impact that developmental factors would have on the experiment. It was desirable that children be within the same Piagetian stage of cognitive development (Smith, Cowie & Blades, 1998), and at a similar stage in terms of physical sleep requirements and expected sleep routines and behaviours (Carr, 2006).

In the current study a 'state-manipulation' replaced the mood manipulations used previously. A set of relaxation exercises was used to induce a 'tired-state' in participant children. This was based on the assertions of Spielman et al (1987), of a diathesis-stress model in which insomnia develops when underlying (not specified) traits interact with an acute period of sleep disturbance to lead to the development of chronic insomnia. The tired-state was intended to mimic that which would occur during a period of acute sleep disturbance; hence to activate underlying cognitive structures.

Aims

Thus the study had two central aims. The first of which was to address the hypothesis that children of adults with insomnia would be characterised by the biased processing of sleep related information. The second was to pilot the use of the research paradigm in insomnia with a view to ascertaining the strengths, weaknesses and practicalities of the approach in this context.

Hypotheses

Central hypothesis: following a tired-state induction, ‘at risk’ children would demonstrate attentional bias towards sleep related word cues, relative to control participants.

Secondary Hypothesis: following a tired-state induction, ‘at risk’ children would be more likely than controls, to report, when questioned, that some of the words in the Emotional Stroop were sleep-related.

Method

Participants

An a priori power calculation was performed using the computerised power calculator, G-Power (Faul, Erdfelder, Lang, & Buchner, 2007). Previous studies using this paradigm (Joordman et al 2007) have reported a large effect size (Cohen's $d = 0.7$). Given the preliminary nature of this paradigm's application to insomnia, and a difference in proposed participant sampling strategies, required participant numbers were calculated using a more conservative effect size of 0.35. 44 participants in the experimental group and 44 participants in the control group were required to achieve power with a critical F of 3.96, $\alpha = 0.05$ $\beta = 0.95$.

Participant Children

Participants were 89 children, aged between 9 and 12 years of age. This age group was chosen for a number of reasons. Firstly, it was based on those used in previous studies, to ensure accurate replication of the paradigm. It was agreed that the age span be shorter than those used previously but be subsumed within the age range used in previous studies – these have used participant children aged between 8 and 15. It was felt desirable that children be within the same Piagetian stage of cognitive development and be at a similar stage in terms of their own physical sleep requirements and expected sleep patterns and behaviours. Children were required to be at least 9 years old, to ensure that they were able to comprehend task instructions and the word stimuli used in the Emotional Stroop colour naming task; 12 was set as a maximum age, to avoid the

inclusion of adolescents – for whom sleep is often problematic (Carskadon, 2002). To ensure their ability to perform the Emotional Stroop colour-naming task, included children were required to speak English as their first language and have achieved at least National Curriculum 5-14 level B for English language. Level B is usually achieved by pupils during primary 3 or 4. By age 9, all typically developing children would be expected to have achieved at least level B (www.ltscotland.org.uk). Children who were colour blind, had a diagnosis of a Learning Disability, Attention Deficit Hyperactivity Disorder (ADHD), or Dyslexia were excluded from the study, again due to potential difficulties performing the Emotional Stroop task. This also served to minimise heterogeneity in the children’s developmental stages.

Parents

Parents with insomnia were not recruited from a clinical sample. Due to the preliminary investigative nature of this study, and the short time-scale for completion, it was agreed that parents and their children should be recruited from a population sample. Sleep problems can be found in non-clinically presenting populations (Ellis & Fox, 2004); criteria were set to create a parental insomnia group that was as close to a clinically presenting population as possible. For their children to be included in the ‘at risk’ (for insomnia) group, parents were required to fulfil 3 criteria: 1) They must report being concerned about their sleep 2) Their concerns must be of at least 6 months duration 3) They must score above a clinical cut-off of 5 (i.e. 6 and above) on the Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman & Kupfer, 1989). To be included in the control group, the child’s parent had to 1) report no concerns about their sleep, their partner’s sleep or the participant child’s sibling’s sleep and 2) score 5 or less

on the PSQI. The former criterion was included to ensure that the control children were not being exposed to sources of problematic sleep from elsewhere e.g. from a sibling with whom they shared a bedroom.

Recruitment

Recruitment took place at Glasgow Science Centre over a two month period. The Science Centre is a purpose built science museum that is open to the general public; admission costs between £6.25 and £8.25 per person. Two recruitment stalls were set up side by side on the second floor of the museum. The researchers did not approach potential participants directly. Study information leaflets were available at the recruitment stall for individuals to read (appendices 3.1 & 3.2). Participants were recruited once they had read these and had approached the researchers for more information. Following their initial approach, parents were directed towards a list of inclusion and exclusion criteria (appendix 3.3). This list indicated that the children of 2 distinct groups of parents were able to take part in the study; the criteria for participation in each group were specified. It was explained that PSQI scores would be computed as part of the experiment, and that these would form the final part of group allocation. After studying the criteria for participation, parents were asked to state whether or not they would be eligible for the study; they were not asked to provide a reason. For those who were eligible, informed consent was obtained from parent and child and the study procedures were commenced.

Measures

Assessment of Parental Sleep

PSQI (Buysee et al, 1989; included in appendix 3.4): The PSQI was used as a standardised measure of parental sleep. It was chosen due to its wide use as a reliable (Cronbach's alpha = 0.83), valid (sensitivity = 89.9% and specificity = 86.5% - patients versus control subjects, Buysee et al, 1989) and standardised screening instrument for the detection of significant sleep disturbance (Jones et al, 2005; Marchetti et al, 2006; Spiegelhalder et al 2008). The PSQI is a self report questionnaire which provides a global measure of sleep quality by summing individuals' self-report scores across 7 domains of sleep: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. A cut-off score of 5 is used to discriminate good and poor sleepers; those scoring >5 are designated poor sleepers.

Parents were also asked to provide written yes/no answers to four questions regarding the inclusion and exclusion criteria:

- 1) Are you concerned about your sleep?
- 2) How long have you been concerned about your sleep?
- 3) Is your partner concerned about his/her sleep?
- 4) Does your child have a sibling with a sleep problem?

Assessment and consideration of children's sleep

Children currently experiencing sleep difficulties were not excluded from the study, as has been the case in some other applications of the paradigm (Joordman et al 2007; Gotlib et al 2005). This decision was based on the investigative nature of the study, the absence of a clinical screen regarding poor sleep in childhood and the timescale available for recruitment. Instead, using methodology employed by Zettler et al (2006) in their application of the paradigm to alcohol dependency, participant children's sleep was measured, with a view to accounting for this variable in analyses if significant differences between 'at risk' and control children were apparent. Children were asked to provide a yes/no response to the question: 'are you worried about your sleep?' Similarly parents were asked: 'are you concerned about your child's sleep?' Additionally two standardized measures of children's sleep were taken; self-report and parent report:

Child Sleep Habits Questionnaire (CSHQ; Owens, Spirito & McGuinn, 2000; included in appendix 3.4):

The CSHQ is a retrospective 45-item parent completed questionnaire that has been used in a number of studies to examine sleep behaviour in children (Gregory, Willis, Wiggs, & Harvey, 2008; Owens, Maxim, Nobile, McGuinn and Masall, 2000). Parents are asked to rate their children's sleep across 8 key sleep domains: 1) bedtime resistance 2) sleep-onset delay 3) sleep duration 4) sleep anxiety 5) night awakenings 6) parasomnias 7) sleep-disordered breathing 8) daytime sleepiness. Scores on each domain are summed to produce a total score. No clinical cut-off score is provided; total scores can range from 31-97, with higher scores indicating more problematic sleep. Reliability of

the total score has been shown to be adequate (Cronbach's alpha = 0.68 in a non-clinical sample = 0.78 in a clinical sample, Owens, Spirito & McGuinn, 2000).

Sleep Self Report (SSR; Owens, Maxim, Nobile, McGuinn & Masall, 2000; included in appendix 3.5): The SSR is designed for completion by children and sets out to assess sleep domains similar to those of the CSHQ. It is a 33-item questionnaire that is used with children aged 7-12. Total scores are created by summing responses across the domains 1) difficulty going to bed and falling asleep 2) sleep duration 3) night awakenings 4) daytime sleepiness. No clinical cut off score is provided; total scores can range from 13-39, with higher scores indicating more problematic sleep. The reliability of the measure has been demonstrated to be adequate elsewhere (Cronbach's alpha = 0.71).

Descriptor of Children's Behavioural Characteristics

Strengths and Difficulties Questionnaire – Parent version (SDQ; Goodman, 1997; included in appendix 3.4): The SDQ was included to gauge a measure of the clinical characteristics of participant children, within the 'at risk' group and the control group. The SDQ (parent version) is a brief behavioural screening questionnaire, which asks parents to rate their child on 25 attributes. These attributes form 5 subscales (hyperactivity/inattention, emotional symptoms, conduct problems, peer problems and prosocial), the first 4 of which are summed to create a total difficulties score. This score can range from 0-40, with 17 providing a clinical threshold. The current study will include children's total difficulties score, hyper-activity score and emotional symptoms score in analysis. The internal reliability of these subscales has been

demonstrated elsewhere; Cronbach's alpha = 0.82 for total difficulties, 0.75 for emotional symptoms, 0.69 for hyperactivity (Goodman, Meltzer & Bailey, 1998).

'Tired-state' Induction

A set of progressive muscle relaxation and breathing exercises were administered by the researcher to each participant child prior to their completion of the Stroop, as a tired-state induction. Progressive muscle relaxation and breathing exercises were selected for use as a 'state-inducer' due to their evidenced effectiveness when used with children at middle childhood (Silverman, Armando. Pina, & Viswesvaran, in press) and their wide use in clinical psychology practice (Carr, 2006). These were based on those detailed in the Handbook of Child and Adolescent Clinical Psychology (Carr, 2006); their administration took 10 minutes. The scripts are provided in appendix 3.6.

State Manipulation Check

Stanford Sleepiness Scale (Hoddes, Zarcone & Dement, 1972 – modified; included in appendix 3.5): The Stanford Sleepiness Scale was used to examine the effectiveness of the tired-state induction. The scale contains seven statements through which people rate their current level of alertness (e.g., 1= "feeling...wide awake" to 7= "...sleep onset soon..."). The scale is designed for use with adults, and was modified for use in this study, in the absence of a similar scale for children. To maintain the integrity of the scale, no deletions or insertions were made; however, the wording of some of the items was altered, to ensure ease of reading/understanding by participant children. For example, 'sleep onset soon' was modified to 'about to fall asleep'.

Assessment of Attentional Bias

Emotional Stroop – child version

The Emotional Stroop paradigm was chosen as a method of capturing attentional bias, due its simplicity and widely evidenced effectiveness with children at middle childhood (Gotlib et al 2005; Zettler et al, 2006; Pine et al 2005; Richards, French, Nash & Donnelly 2007, Pulifacio & Kendall, 2006). The Emotional Stroop is a modification of the original Stroop task (Stroop, 1935), which is designed to measure of cognitive interference. As with the original Stroop task, the Emotional Stroop involves asking participants to name the colour of ink that words are printed in. Unlike the words in the Stroop, Emotional Stroop words are selected to be either neutral or disorder related. The task is designed to capture attentional bias towards stimuli that represent areas of concern (Pulifacio & Kendall, 2006). It is thought that mechanisms of selective attention will drive the preferential processing of concern-related information (i.e. in the content of the word) in such a way that interferes with performance on the colour-naming task; thus individuals will take longer to respond correctly to disorder-related words.

In order to create a set of child-friendly stimuli, that is to create a set of words that were both readable and salient to participant children, a computerised Emotional Stroop that had been developed and used previously with adults with insomnia (Taylor et al, 2003) was modified. The original programme contained 20 sleep related words and 20 neutral words, which were matched in terms of number of syllables, length and frequency of occurrence in the English language.

A list of these 40 words was produced and was presented individually to 5 primary school teachers, all of whom had at least 5 years post-qualifying experience of working with the National Curriculum. Each teacher was required to examine the list and highlight any words that they judged not to be readable by a child who had achieved National Curriculum level B. Level B was selected as a level that was below what would be expected to be achieved by most children aged 9-12; this was to allow a margin for error and ensure that all words in the Emotional Stroop would be readable to each participant child. The teachers were then brought together as a group to discuss the list of words. There was 95% agreement between the teachers regarding the readability of individual words. Disagreements were resolved by discussion, until 100% agreement was reached. This resulted in the removal of 8 Sleep words and 6 Neutral words. A further 2 neutral words were removed due to the now absence of their sleep word match.

To generate words with which to replace the deletions, a group of 30 primary 5 pupils (age range 8-9) were asked to each write a list of words that they associated with sleep. Eight to nine year old children were chosen to complete this task with a view to ensuring that each word generated would be within the vocabulary of the 9-12 year old children who would complete the experiment. Attention was given to the meaning of the words, and efforts were made to ensure both sleep and neutral words ranged in terms of emotional content (e.g. nightmare, snooze; playful, set). The 8 most frequently occurring words were included in the Emotional Stroop – child version. Matched neutral words were selected using a thesaurus and a word frequencies text book (Leech, Rayson & Wilson, 2001). They were chosen on the basis of length, number of syllables

and frequency of occurrence in the English language. Table 1 shows the words used in the Stroop.

Insert Table 1 about here

Superlab software (Credus Corporation, San Pedro, Ca) was used to present the words in random order on a Toshiba Satellite Pro Laptop computer; a four-button, colour coded response box (red, green, blue, yellow) was used to record response latencies in msec. Each word was presented in large bold lettering on the centre of the screen. There was no inter-stimulus interval; as soon as the respondent pressed the correct colour-coded button, the next word appeared. Participants could make one self-correction, more than this were recorded as an error, and the next stimulus would appear. A practice trial of 20 words was used which asked participants to name the colour of the verbal representations of the numbers one, two, three, four...twenty (following Taylor et al, 2003; McNally et al, 1994). This was to ensure that participants fully understood the instructions; it was possible for participants to withdraw from the study at this stage if they were experiencing difficulty. The 40 target words were then randomly presented in each of the four colours, with the restriction that the same words or colour would not appear twice in succession (Taylor et al, 2003; McNally et al, 1994).

Setting for Emotional Stroop Administration

Two stalls were set up side by side on the second floor of Glasgow Science Centre. On the stall nearest to the wall, a laptop containing the Stroop was set up. A screen, made from 3 sections of 1.5 metre squared white board was placed around the laptop. A further 2 screens 2.5 metres by 1.5 metres were used to contain the area around the laptop. These measures were put in place to limit external visual distraction to children while completing the Stroop. A set of earphones were provided to reduce auditory stimulation.

Procedure

The researcher and research assistant remained at the stalls for a 7 hour period on both weekend days during the months of February and March. Following their recruitment, and after obtaining informed consent, children who were eligible for the study were taken individually to the computer area. They were asked to rate their level of alertness using the Stanford Sleepiness Scale. Following this, as a tired-state induction, the series of progressive muscle relaxation and breathing exercises were carried out. Children were then asked to re-rate their level of alertness. Children then turned to face the computer and the following instructions were presented.

'In this part of the experiment you will see some words shown one at a time on the computer screen. The words will be different colours. The colours will be red, green, blue or yellow. We want you to pay attention to the colour of the word, rather than the meaning of the word.

There are four colour-coded buttons for you to press. Your task is to decide what colour the word on the screen is and then to press the matching colour-coded button.

Do this as quickly as you can. A practice trial of 20 words will be presented first.

Press any key to continue.'

They were given the practice trial of 20 words to ensure that they could read the words, determine the different colours, and use the response box correctly. If these criteria were met, the 40 target words were then randomly presented in each of the four colours. Administration took approximately 10 minutes. Children were undisturbed during the

experiment; all efforts were made to ensure minimal distraction. Participants were instructed to inform the researcher when they had completed the Stroop. At this time, the researcher asked the child:

'Did you notice anything about the words?'

This was followed up, if necessary with:

'What did you notice about the words?'

The child's response to this question was noted for later analysis. A reference to sleep received a 'yes' code, no reference to sleep received a 'no' code. The researcher then administered the SSR to the child. Following this, children were asked two final questions:

1) *'Are you concerned about your sleep?'*

2) *'Are you concerned about your parent's sleep?'*

Their answers were recorded for analysis. The latter question was included to allow current levels of concern about parental sleep to be evaluated as a variable potentially impacting on group differences regarding the study hypotheses.

During this procedure, parents remained at the first stall, and completed the PSQI, SDQ, CSHQ, and provided written answers to the three questions related to their family's

sleep. They also provided details of their own and their child's age, sex and ethnic group. A researcher was available at all times to answer their questions.

Children and parents were debriefed regarding the purpose of the study and were provided with token rewards (novelty stickers) for their participation. They were given the opportunity to provide contact details, should they desire written feedback on the study.

Group allocation was confirmed post hoc, incorporating PSQI scores and written answers to the 3 questions specified above.

Ethics

The study was independently peer reviewed within the Department of Psychological Medicine at the University of Glasgow. Ethical approval was awarded by NHS Greater Glasgow and Clyde Research and Ethics Committee.

Results

Post-hoc group confirmation

A total of 94 participants were recruited to the study. An initial screen was performed, to ensure that participants in each group met the individual criteria for inclusion.

Datasets for 5 participants were excluded from analysis, as their PSQI score did not confirm their preliminary group allocation. This left 44 children in the ‘at risk’ group and 45 in the control group.

Preliminary Analyses

Reliability

Reliability analysis was undertaken for each of the self-report measures and was found to be adequate. Table 2 details Cronbach’s alpha values for each measure used in this population.

Insert Table 2 about here

Data Integrity

Box plots, histograms and descriptive statistics were examined to check the distribution of scores on each variable. Non parametric statistics are used where data do not meet assumptions of normality and where scores are comprised of a small number of contributory items, and thus at high risk of kurtosis (Pallant, 2001).

Participant Characteristics

The demographic and clinical characteristics of the two participant groups are presented in Table 3. Means and medians are reported; standard deviations and ranges are in parenthesis. Categorical variables are expressed as percentages.

Insert Table 3 about here

‘At risk’ and control groups did not differ significantly in age ($z = -1.34$ $p = 0.18$), sex ($\chi^2 = 0.01$ $df 1$ $p = 1.00$), ethnic group (both 97.8% white), SDQ total difficulties score ($z = -1.35$ $p = 0.18$), SDQ emotional symptoms score ($z = -0.44$ $p = 0.66$) or SDQ hyperactivity score ($z = -1.46$ $p = 0.15$).

‘At risk’ and control groups did not differ significantly in terms of percentage of parents reporting concerns about their child’s sleep ($\chi^2 = 0.002$ $p = 0.96$) or percentage of children reporting concerns about their own sleep ($\chi^2 = 0.96$ $p = 0.33$). Further, the groups did not differ significantly in terms of CSHQ total score ($z = -1.01$ $p = 0.31$) or SSR total score ($z = -1.1$ $p = 0.25$). Mean and median scores for both groups in the current sample were comparable with those found elsewhere in a non-clinical sample (Gregory et al, 2008). It can be concluded therefore that the groups do not differ significantly in terms of level of sleep difficulty reported in the children. Hence this variable does not require to be accounted for in subsequent analyses.

Concern about parental sleep was recorded; there were no significant differences between groups ($\chi^2 = 0.415$ $df 1$ $p = 0.52$). This would indicate that any differences between the groups regarding either the central or secondary hypothesis are not related to increased current concern over parental sleep.

Demographic and clinical characteristics of the parents of the children in each group are provided in table 4. Again, means and medians are presented; standard deviations and ranges are in parentheses. Categorical variables are expressed as percentages.

Insert Table 4 about here

Parents of 'at risk' and control children did not differ significantly in terms of relationship to child ($\chi^2 = 0.01$ df 1 $p = 1.0$) or ethnic group (both 97.8% white). There was a significant difference in terms of parental age between the two groups ($t(87) = -0.211$, $p = 0.04$). This difference amounts to a small actual value (mean age 'at risk' parents = 42.2; control parents = 40.5); there is no predicted relationship between parental age and child's attentional bias score (Joordman et al, 2007; Gotlib et al, 2005). Therefore it will not be addressed in later analyses.

As expected the groups differed significantly regarding Pittsburgh Sleep Quality Index total score ($z = -8.91$ $p < 0.01$) and % concerned about their sleep > 6 months. This confirms adequate group allocation and polarisation of groups.

Tired-State Induction

Table 5 presents mean and median Stanford Sleepiness Scale (SSS) scores for each group pre and post tired-state induction.

Insert Table 5 about here

A score of 2 represents: 'very awake – but not the most awake I have ever been'; a score of 3 means 'relaxed'.

There were no significant differences between groups either pre ($z = -0.73$ $p = 0.46$) or post ($z = -0.77$ $p = 0.45$) tired-state induction.

To examine the effectiveness of the state induction, a repeated measures Wilcoxon Signed Ranks test was used. This showed that the tired-state induction had been effective in both the 'at risk' group ($z = -2.10$ $p = 0.003$) and the control group ($z = -4.32$ $p < 0.001$). Children in both groups reported being significantly less alert following the state induction.

Stroop Data

Stroop response data were examined for each participant individually. Errors and outliers - reaction times of < 300 ms and > 2000 ms - were excluded from the analysis based on recommendations from previous Stroop research (e.g. Taylor et al, 2003; McNally et al, 1994).

Central Hypothesis: following a tired-state induction, ‘at risk’ children will demonstrate attentional bias towards sleep related word cues, relative to control participants.

Mean response latencies, by group and word type are shown in table 6

Insert Table 6 about here

Response latency data were submitted to a group (‘at risk’, control) x word type (sleep, neutral) repeated measures analysis of variance (ANOVA). There was no main effect of group $F(1,87) = 1.88$ ($p=0.174$), word type, Wilks’ Lambda = 1.0, $F(1,87) = 0.041$ ($p=0.84$), or group x word type interaction Wilks’ Lambda = 0.99 $F(1,87) = 0.77$ ($p=0.38$)

This indicates that the ‘at risk’ and control groups did not differ significantly in their colour naming response latencies to either sleep or neutral word types.

To provide a within subjects measure of interference due to threat, sleep interference index scores were calculated by subtracting neutral word reaction times from sleep word reaction times for each individual participant (Taylor et al, 2003; Williams & Broadbent, 1986). Mean interference index scores for each group can be seen in table 7.

Insert Table 7 about here

The negative score for the controls illustrates that these children took longer to respond to neutral words; the 'at risk' children took longer to respond to sleep words. Sleep interference scores were submitted to an independent samples t-test; this indicated no significant difference between the two groups ($t=-0.87$, $p=0.384$).

Taken together, these results indicate that hypothesis 1, that 'at risk' children would demonstrate attentional bias towards sleep related word cues, is not supported.

Secondary Hypothesis: Following a tired-state induction, 'at risk' children will be more likely than controls, to report when questioned, that the some of the words in the Emotional Stroop are sleep-related.

The majority of children (92%) reported noticing something about the words. Children detailed a variety of different word characteristics, examples included:

'They were different colours'

'One of them was tree'

'Some of them were about sleep'

'They were about bed-time'

Table 8 presents the percentages of children in each group who reported that the words were related to sleep

Insert Table 8 about here

A chi-square test for independence was used to compare the variables: group (at risk, controls) x reported sleep content (yes, no). Results did not reach statistical significance, $\chi^2 = 4.54$ df 1 $p=0.056$, hence hypothesis 2 is not supported. However, these results indicate a trend (Pallet, 2001). The data is represented graphically in figure 1.

Insert Figure 1 about here

Discussion

Despite a growing literature suggesting that children of adults with insomnia are at increased risk of developing the disorder themselves (Dauvilliers et al, 2005; Bastien, 2000), little is known about the mechanisms and markers that may underlie this risk. This study piloted methodology previously applied in the study of unipolar depression (Joordman et al, 2007) bipolar disorder (Gotlib et al, 2005) panic disorder (Schneider et al, 2008) and alcoholism (Zettler et al, 2006) to investigate selective attention to sleep-related stimuli, as a factor potentially involved in the predisposition of insomnia.

Results of the study did not provide support for the central hypothesis; that following a tired-state induction, children of adults with insomnia would demonstrate an attentional bias towards sleep-related stimuli relative to controls. There were no statistically significant differences in sleep interference effects between the ‘at risk’ and control groups. The secondary hypothesis predicted that ‘at risk’ children would be more likely than controls, to report when questioned that some of the stimulus words were sleep-related. While more children in the ‘at risk’ group reported the sleep words than controls (75% vs. 53.3% respectively); these results did not reach significance. However they were indicative of a trend (Pallant, 2001).

Interpretation of the results regarding the Central Hypothesis

Relative to control children, children of adults with insomnia did not exhibit attentional bias towards sleep-related stimuli. There are two possible explanations for this finding:

- 1) That the effects seen in depression (Joordman et al, 2007), bipolar disorder (Gotlib et al, 2005), and alcoholism (Zettler et al, 2006) do not apply in the context of insomnia
- 2) That this pilot study suffered from methodological limitations that mask an effect which may become evident, were these to be addressed.

This study from the outset was designed to answer the question of *whether* rather than *how* (selective attention might transfer from parent to child). However, in order to expand on explanation number one, the previously suggested mechanism of transference such that children develop disorder schemata through their observations of symptoms as manifest in their parent, provides a forum for further thought. From a Piagetian developmental perspective, the children included in the study are classified as being within the Concrete Operational stage of intellectual development (Smith et al, 1998). A key feature of this stage is that children have theory of mind, and can take the perspective of others. Therefore it was predicted that these children could be cognitively aware of, and subsequently currently show signs of being affected by, their parent's disorder, as has been the case in previous applications of the paradigm. However, there may be reason to suppose that this mechanism of transference does not occur in insomnia. It may be that insomnia differs from depression, panic disorder and alcoholism in that it does not impact on a parent's behaviour to an extent that would

interfere with their functioning within the family, and therefore be evident to their child. A parent's struggle to initiate and maintain sleep may be confined to late night, to a time when their children are already asleep. The daytime consequences of their disorder may perhaps be most apparent during the working day, a time when again, their children are not present. Thus their children may simply not be provided with sufficient observations of their parent's disorder, from which to develop disorder-related schemata. It is interesting to note that only a small percentage (18.2%) of the 'at risk' children report concerns about their parent's sleep, despite 100% of the parents in this group reporting concerns. Indeed this does not differ significantly from the concerns of the children in the control group (11.1%).

The above explanation for the absence of a significant finding should not be ignored and should be considered in further studies, perhaps through asking parents to rate the extent to which their sleep problem impacts on family functioning. A qualitative investigation of children's perceptions and beliefs about sleep within the context of familial insomnia may prove interesting.

Regarding explanation number two, a thorough analysis of the pilot study methodology is imperative. This is provided at length in later sections, before conclusions are reached.

Interpretation of results regarding the Secondary Hypothesis

The trend in results regarding the secondary hypothesis would indicate that the area is worthy of further study. The trend suggests that children with a parent with insomnia

were more likely than controls to report, when questioned, the sleep-related content of the words. This second hypothesis was included as an extension to the Stroop data, to provide a simple and ecologically valid additional measure of sleep-related processing bias. Given the absence of a between-group difference in attentional processing scores, it may at first appear contradictory that more ‘at risk’ children would later comment on the words’ sleep-related content. However it is a finding that may be explained through consulting the writings of Schneider et al (2002; 2008) who delineate attention bias, interpretation bias and recall bias as related but distinct cognitive processes. Within this framework, the trend may be indicative of a recall bias. In the context of anxiety, Mathews (2005) emphasises attention bias as being evident in individuals during an acute episode of the disorder, but not at other times. Interpretation and recall bias are present on a more chronic basis. Within this framework, a mood/state manipulation would be of particular importance in the activation of attentional bias. The existence of a trend in recall, but not attentional bias may therefore point to the ineffectiveness of the state-manipulation employed in the current study. This is discussed further in subsequent sections.

Analysis of pilot study methodology: a context in which to interpret results

The study, from the outset was investigative in nature; an important aim was not only to address the hypotheses, but also to pilot the use of the experimental methodology in insomnia. The illumination of practicalities, strengths and weaknesses of the paradigm – when applied in an insomnia context – was therefore a useful product of the study. A number of methodological limitations have become apparent, which merit consideration

and possibly further research. These relate to the use of the state-manipulation and the Emotional Stroop paradigm and to the recruited sample.

State-Manipulation

Previous applications of the paradigm have indicated that the inclusion of an adequate mood manipulation is paramount (Joordman et al, 2007; Gotlib et al, 2005). In the absence of a mood manipulation, Schneider et al (2008) failed to find evidence of their predicted attentional bias towards threatening stimuli in children of adults with panic disorder. This was in contrast to previous work (Schneider et al, 2002) in which an interpretation bias was evident in the children of adults with panic disorder, *following a priming manipulation*. The central importance of the manipulation is not unexpected, given the cognitive diathesis-stress model that lies at the core of the paradigm.

The present study was designed to include such a manipulation, in this instance renamed a 'tired-state manipulation. A tired-state was chosen, to mimic the experience of acute sleep disturbance described in Spielman's (1987) model of the development of insomnia. To create a tired-state, a set of relaxation exercises were used, due to their applicability and evidenced use with children at middle childhood (Silverman et al, in press, Carr, 2006). The state-manipulation check indicated that it had been effective; children reported higher levels of sleepiness on the Stanford Sleepiness Scale, post state-induction.

However, there remains the question of whether or not relaxation exercises were the most appropriate method of state-induction. The aim was to mimic the experience of a

period of acute sleep disturbance. However, as an adult develops insomnia, it may not be that tiredness is the most salient component of a period of acute sleep disturbance. It may be something else, for example increased arousal or increased anxiety about sleep (Perlis et al 1997; Harvey, 2002). Previous studies have suggested that in adults with insomnia, the key factor driving selective attention towards sleep is anxiety and the perception of sleep as threatening (Jones et al 2005; Marchetti et al, 2006). In this context, a tired-state manipulation involving relaxation exercises may be somewhat of a contradiction in terms. Further it may be that the anxiety reduction effect of relaxation (Carr, 2006) would serve not to activate, but instead to further de-activate anxiety driven ‘problematic sleep’ schemata.

In the current study, ethical considerations ruled out the possibility of inducing tiredness through sleep deprivation, or indeed inducing a perception of sleep as threatening, through priming children about the negative consequences of poor sleep. However, given the importance attached to the mood manipulation component, future studies should consider this issue at length.

In relation to the state-manipulation, it is also worth noting that the manipulation check – the modified Stanford Sleepiness Scale (based on Hoddes et al, 1972) was designed for use in this study and has not been used previously elsewhere. Therefore the reliability and validity are not determined. Future studies may consider the development of such a tool for use in paediatric sleep research.

Emotional Stroop Paradigm

The Emotional Stroop paradigm was chosen due to its simplicity and widely evidenced use with children aged 9-12 (Gotlib et al, 2005; Zettler et al, 2006; Pine et al, 2005; Richards et al, 2007). Previous studies have used the Emotional Stroop with children spanning wide age brackets (e.g. 9-14; Gotlib et al, 2005). However, recent evidence suggests that children's performance on the Emotional Stroop task changes significantly across their development (Charchat-Fichman & Oliviera, 2009), with older children performing faster, probably as a result of more developed information processing structures and capacity for attention selectivity. This may have a significant impact on those studies where participant samples are made up of children spanning a series of ages. While 9-12 is a shorter age span than those used previously (e.g. Gotlib et al, 2005), it may be the case that the 12 year old children in the current were developmentally more able to perform the Stroop task than their 9 year old counterparts. Future studies may consider reducing the current age span.

Reducing the age span would also address the issue of varying language ability and potential emotional salience of words (e.g. teddy), between the younger and older ends of the spectrum.

Finally, while carrying out the research it became clear that some of the children had completed a Stroop test before – as part of the popular 'brain training' programme on Nintendo DS (www.nintendo.co.uk). Since the development of the original Stroop paradigm, practice effects have been noted to improve performance; individuals have been shown to develop strategies to overcome the interference caused by the meaning of

the coloured word (Stroop, 1935). Thus, given that it is difficult to control for prior experience with the task, this considerably weakens the application of the Emotional Stroop as an index of attentional bias. This should be considered in future studies. The flicker paradigm (as in Jones et al, 2005; Marchetti et al, 2006), in which participants are required to detect a change in an array of stimulus materials, could be modified to a 'spot the difference' task for use with children.

Sample: deviations from previous applications of the paradigm

Three methodological drawbacks regarding the study sample selection require discussion. The first relates to the use of a non-clinical insomnia group, the second to the inclusion of children reporting their own sleep difficulty, and the third to a bias in the sample regarding demographic characteristics.

A non-clinical insomnia group:

The reason for the use of a non-clinical group of adults with insomnia was based on ease of recruitment, given the pilot nature of the project and timescale available for completion. In this way, it was effective, allowing 44 adults with non clinically presenting insomnia to be identified over an 8 week period. However, there are a number of limitations associated with this method.

The PSQI was used as the standardised basis of group allocation; the clinical cut-off of 5 was used in line with the recommendations of the authors (Buysee et al, 1989) and the use of the measure in previous research (e.g. Jones et al, 2005). However, it is clear that this distinction, when used in the context of a population convenience sample has not led to the creation of two groups representing poles on a sleep disorder continuum. The mean PSQI total score of 8.5 in the parents with insomnia group is noticeably lower than those typically included in studies of adults with insomnia (e.g. 10.8; Spiegelhalder et al, 2008); the mean PSQI score of the control group parents of 2.9 is slightly higher than those found elsewhere (e.g. 2.6; Spiegelhalder et al, 2008). Thus rather than representing two distinct poles, the groups are fused together, along a continuum of

sleep complaint. This is in contrast to previous applications of the paradigm, where two distinct groups are used; the children of clinically presenting adults or the children of adults with no history of the disorder (Joordman et al, 2007; Gotlib et al, 2005; Schneider et al, 2008). Therefore there is the potential for effects to be masked and effect sizes to be diluted.

Parents were asked to provide a written answer to the question ‘are you concerned about your sleep?’ Their answer to this question provided an additional criterion for group allocation. The rationale for this was based on the diagnostic criteria for insomnia, which require that an individual views their poor sleep as causing impairment, and further so that the group was comprised of individuals whose sleep complaints were both subjective and objective (Edinger, Fins, Glenn, Sullivan; Bastian; Marsh.; Dailey, Hope, Young, Shaw & Vasilas, 2000). While consideration of the issue of subjective sleep complaint was a strength of the study, the insomnia group remained a non-clinically presenting group. None of the parents had viewed their insomnia problems as being significant *enough* to merit medical/psychological investigation. Again, this is in contrast to previous applications of the paradigm and is likely to considerably reduce effect sizes.

These two related points could be addressed in future studies by either: 1) recruiting distinct clinically presenting/never disordered groups of parents or 2) recruiting significantly more participants to compensate for the diluted effect sizes inherent in a population sample.

Children with Sleep Difficulties:

In previous applications of the paradigm (Joordman et al, 2007; Gotlib et al, 2005; Schneider et al, 2008), children exhibiting symptoms of the disorder have been excluded to avoid the additional bias in the sample i.e. to avoid the possibility that any evident attentional bias is driven by the children's own difficulties. The current study did not exclude such children, but instead measured their sleep in order that any group differences be accounted for in analysis. This was in line with the work of Zettler et al (2006) who applied the paradigm to the adolescent children of adults with an alcohol dependency. Zettler et al (2006) did not exclude participants based on their own drinking behaviours; rather they measured their alcohol consumption and level of concern about their drinking, and then accounted for between-group differences using a covariate analysis. In the current study, no group differences were found on any measure related to the children's sleep; therefore it was concluded that it was not necessary to perform a covariate analysis (Pallant, 2001).

Nonetheless, it is possible that having a parent with insomnia would affect the cognitive processes of children with and without their own sleep difficulties in different respective ways. Therefore ideally, future studies should implement the paradigm as carried out by Joordman et al, 2007; Gotlib et al, 2005 and Schneider et al, 2008, and focus on children without evidence of current sleep complaint. A comparison between 'at risk' children with and without their own sleep difficulty may also prove interesting.

Sample Demographics:

A final point relates to the composition of the sample, in terms of ethnicity, socio-economic status (SES) and level of education. Demographic data indicated that the sample was predominantly white (97.7%). Although data was not gathered specifically regarding SES or level of education, informal qualitative data gathered during conversations between the research team and participants would suggest that the sample was largely comprised of families of high SES and education levels. This is not unexpected, given that recruitment took place within Glasgow Science Centre – a science museum for which entry costs £6.25 - £8.25. This therefore indicates that the sample was not representative of the population as a whole. Previous studies do not report their sample to be significantly biased (Gotlib et al, 2005) or do not refer to these demographic factors (Schneider et al, 2008; Joordman et al, 2007). The study would be worthy of replication with a sample more representative of the whole population.

Thus the study has fulfilled the first a priori aim; it has provided a pilot application of a research paradigm, a basis for reflection, discussion and suggestions for future directions.

Conclusions

The study did not provide evidence of an attentional bias towards sleep-related stimuli in children ‘at risk’ for insomnia. The possibility therefore that latent ‘problematic sleep’ schemata are not involved in the predisposition of the disorder should be considered. However, to reject the central hypothesis, in the context of this initial pilot

study and the methodological limitations discussed above, would be premature and perhaps in error. The trend observed in relation to the secondary hypothesis may indeed be indicative of biased processing at a level other than attentional, and merits further investigation.

The study achieved its initial a priori aim of providing a pilot application of a novel research paradigm to insomnia. From this study, reflections on the practicalities, strengths and weaknesses of the methodology when applied in an insomnia context have been possible. This has led to suggestions for future modifications and highlighted promising avenues for investigation.

In the current political and health care context, where early identification and intervention for psychological disorder remain paramount (Layard, 2006; Layard & Dunn, 2009), it is important that research continues to target factors that may render individuals 'at risk'. It would be hopeful that this study becomes one of many that shift focus to the predisposition of insomnia.

References

Bastien, C.H., & Morin, C.M. (2000), Familial incidence of insomnia, *J. Sleep Res*, 9, 49-54

Beck A.T & Clark D.A. (1988), Anxiety and depression: an information processing perspective. *Anxiety Research: An International Journal*, 1,23-36

Beck, A.T. (1967), *Depression: Clinical, experimental and theoretical aspects*. New York: Harper and Row

Broadbent, D.E. (1958). *Perception and Communication*, Oxford: Pergamon

Buysse, D.J., Reynolds, C. F., Monk, T. H., et al (1989) The Pittsburgh sleep quality index: a new instrument for psychiatric practice and research. *Psychiatric Research*, 28, 193-213

Carr, A, (2006), *The Handbook of Child and Adolescent Clinical Psychology: a contextual approach*, Hove, East Sussex: Routledge

Casrskadon, M (2002), *Adolescent Sleep Patterns: biological, social and psychological influences*, Cambridge UK: Cambridge University Press

Charchat-Fichman J, Oliviera R (2009), Performance of 119 children on the Emotional Stroop paradigm – Victoria version, *Arq. Neuro-Psiquiatr*, Vol 67: 2b

- Clark, D. A, (1995), A cognitive model of social phobia. In: R. Heimberg, M. Liebowitz, D.A. Hope, & F.R. Schneier (Eds.) *Social phobia: Diagnosis, assessment and treatment* (pp. 69–93). New York: Guildford Press.
- Dauviers, Y, Morin, C, Cervena, K, Carlander, B, Touchon, J, Besset, A, & Billiard, M. (2005), Family studies in insomnia, *Journal of Psychosomatic Research*, 58, 271-278
- Drake, C. Roehrs, T, Scofield, H, & Roth, T (2004). Vulnerability to stress-related sleep disturbance and hyperarousal, *Sleep*, 27, 285-291
- Edinger, Fins, Glenn, Sullivan; Bastian; Marsh.; Dailey, Hope, Young, Shaw & Vasilas (2000), Measuring outcomes in randomized clinical trials of insomnia treatments, *Sleep Medicine Reviews*, 7, 3, 263-279
- Ellis, J, & Fox, P, (2004), Student mental health: is there a role for sleep? *Journal for the Royal Society for the Promotion of Health*, 124 (3), 129-133.
- Ellis, J., Hampson, S.E. & Croyley, M, (2007), The role of dysfunctional beliefs in late life insomnia, *Journal of Psychosomatic Research*, 62 (1), 81-84.
- Espie, C.A. (2002), Insomnia: Conceptual issues in the development, persistence and treatment of sleep disorder in adults, *Annu. Rev. Psychol*, 53, 215-243

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioural, and biomedical sciences. *Behavior Research Methods*, 39, 175-191

Garber, J., & Robinson, N. (1997), Cognitive vulnerability in children at risk for depression, *Cognition and Emotion*, 11, 619-635

Gau, S.F. (2000), Neuroticism and sleep-related problems in adolescence, *Sleep*, 23, 495-502

Goodman R (1997), The Strengths and Difficulties Questionnaire: A Research Note. *Journal of Child Psychology and Psychiatry*, 38, 581-586.

Gotlib, I.H., Goodman, S.H. (1999), Children of parents with depression. In W.K. Silverman & T.H. Ollendick (Eds), *Developmental issues in the clinical treatment of children* (pp. 415-432). Needham Heights, MA: Allyn & Bacon

Gotlib, I.H., Traill, S.K., Montoya, R.L., Joordman, J., Chang, K. (2005), Attention and memory biases in the offspring of parents with bipolar disorder: indications from a pilot study, *Journal of Child Psychology and Psychiatry*, 46, 84-93

Gregory, A.M., Caspi, A., Moffitt, T.E., Poulton, R. (2006). Family conflict in childhood: a predictor of later insomnia. *Sleep*, 29, 1063-1067.

Gregory, A.M., Eley, T.C. (2005). Sleep problems, anxiety and cognitive style in school-aged children, *Infant and Child Development*. 14, 435-444.

Gregory A.M, Crawford M (2008) unpublished data, Goldsmiths College, University of London

Harvey, A.G. (2002a). A cognitive model of insomnia, *Behavioural Research and Therapy*, 40, 869-893

Hoddes E, Zarcone V, Dement W (1972), Development and use of Stanford Sleepiness Scale (SSS), *Psychophysiology*. 9, 150

Jansson-Frojmark, M, Linton, S.J. (2007), Is perfectionism related to pre-existing and future insomnia? A Prospective Study, *British Journal of Clinical Psychology*, 46, 119-124

Jones, B.T., MacPhee, L.M., Broomfield, N.M., Jones, B.C., Espie, C.A. (2005) Sleep-related attentional bias in good, moderate and poor (primary insomnia) sleepers, *Journal of Abnormal Psychology*, 114, 249-258

Joordman, J, Talbot, L., & Gotlib, I.H. (2007), Biased processing of emotional information in girls at risk for depression. *Journal of Abnormal Psychology*, 116, 135-143

Kimura, M, Winkelman, J. (2007), Genetics of sleep and sleep disorders, *Cellular and Molecular Life Sciences*, 64, 1216-1226

Lacks, P. and Morin, C.M (1992), Recent advances in the assessment and treatment of insomnia. *Journal of Consulting Clinical Psychology* 60, 586–594

Layard R (2006), *The Depression Report: A new deal for depression and anxiety disorders*, London School of Economics and Political Science, London

Layard R, & Dunn, J (2009), *A Good Childhood: searching for values in a competitive age*, The Children's Society, London

Leech, G, Rayson, P and Wilson, A (2001) *Word Frequencies in Written and Spoken English: based on the British National Corpus*. London: Longman

Maier, W, Buller, R, & Hallmayer, J (1999), Comorbidity of panic disorder and major depression: results from a family study; in Hand I, Wittchen HU (eds): *Panic and Phobias*, Berlin: Springer.

Marchetti, L.M., Biello, S.M., Broomfield, N.M., MacMahon, K.M.A., Espie, C.A. (2006), Who is pre-occupied with sleep? A comparison of attention bias in people with psychophysiological insomnia, delayed sleep phase syndrome and good sleepers using the induced change blindness paradigm, *J. Sleep. Res*, 15, 212-221

Mathews, A., & MacLeod, C. (2005). Cognitive vulnerability to emotional disorders, *Annual Review of Clinical Psychology*, 1, 167-195

McNally, R, Amir, N, Louro, C.G, Lukach, B.M, Riemann, B, Calamari, J.G, (1994) Cognitive processing of emotional information in panic disorder, *Behaviour Research and Therapy*, 32, 1, 119-122

Morin, C.M and Espie, C.A. (2005), *A Clinical Guide to Assessment and Treatment*. New York: Kluwer Academic/Plenum Publishers

Ohayon, M. M. (2002,) Epidemiology of insomnia: what we know and what we still need to learn. *Sleep Medicine Reviews*, 6, 97-111.

Owens, J.A, Spirito, A, McGuinn, M (2000), The children's Sleep Habits Questionnaire (CSHQ): psychometric properties of a survey instrument for school-aged children, *Sleep*, 23, 8, 1043-1-51

Owens JA, Maxim R, Nobile C, McGuinn M, Msall M (2000a), Parental and self-report of sleep in children with attention- deficit/hyperactivity disorder, *Archives of Pediatrics & Adolescent Medicine*, 154:549–555

Pallant, J (2001), *SPSS: Survival Manual*, Suffolk: St Edmundsbury Press,

- Perlis, M.L., Giles, D.E., Mendelson, W.B., Bootzin, R.R., Wyatt, J.K. (1997)
Psychophysiological insomnia: the behavioural model and a neurocognitive perspective,
J. Sleep Res., 6, 179-188
- Pine DS, Klein RG, Mannuzza S, Moulton JL, Lissek S, Guardino M, Woldehawariat G
(2005) Face emotion processing in offspring at-risk for panic disorder, *Journal of the
American Academy of Child and Adolescent Psychiatry* 44 (7): 664-672
- Puliafico, A.C., & Kendall, P.C. (2006). Threat-related attentional bias in anxious
youth: a review. *Clinical Child and Family Psychology Review*, 9, 162-173
- Richards A, French CC, Nash G, Donnelly N (2007), A comparison of selective
attention and facial processing biases in typically developing children who are high and
low in self-reported trait anxiety, *Development and Psychopathology* 19(2): 481-495
- Schneider, Unnewehr, Florin, Margraf (2002), Priming Panic Interpretations in Children
of Patients with Panic Disorder, *Journal of Anxiety Disorders*, 16: 605-624
- Schneider, Unnewehr, In-Albon, Margraf (2008), Attention Bias in Children of Patients
with Panic Disorder, *Psychopathology*, 41:179-186
- Sher, K. J., & Gotham, H. (1999), Pathological Alcohol Involvement: A Developmental
Disorder of Young Adulthood, *Development and Psychopathology*, 11, 933-956

Silverman, W. K., Armando A. Pina, and Viswesvaran, C. (in press)). Evidence based psychological treatment for phobic and anxiety disorders in children and adolescents. *Journal of Clinical Child and Adolescent Psychology*.

Smith, P, Cowie, H, Blades, M (1998), *Understanding Children's Development: third edition*, Blackwell Publishers, Oxford

Smith M.T., Perlis M.L. (2006), Who is a candidate for cognitive-behavioural therapy for insomnia? *Health Psychology*, 15–19

Spiegelhalder, K; Espie, C; Nissen, C; Riemann, D (2008), Sleep-related attentional bias in patients with primary insomnia compared with sleep experts and healthy controls, *Journal of sleep research*, 2008, 17, 2, 191-196

Spielman, A, J., Caruso, L. & Glovinsky, P. B. (1987), A behavioural perspective on insomnia, *Psychiatric Clinic North America*. 10, 541-53.

Stroop, J.R (1935). Studies of interference in serial verbal reactions, *Journal of Experimental Psychology*, 18, 643-662

Taylor, L.M., Espie, C.A., White, C.A. (2003), Attentional bias in people with acute versus persistent insomnia secondary to cancer, *Behavioural Sleep Medicine*, 1, 200-212

Teasdale, J.D. (1988), Cognitive vulnerability to persistent depression. *Cognition and Emotion*, 2, 247-274

The Gallup Organization (1995), *Sleep in America: A National Survey of U.S. Adults*, Washington, DC National Sleep Foundation

Wells, A., & Papageorgiou, C. (1998), Relationships between worry, obsessive-compulsive symptoms and metacognitive beliefs, *Behaviour Research and Therapy*, 36, 899-913

Zettler, J.I., Stollery, B.T., Weinstein, A.M., Lingford-Hughes, A.R. (2006), Attentional Bias for alcohol-related information in adolescents with alcohol-dependent parents, *Alcohol and Alcoholism*, 41, 426-430

TABLE 1: Words included in Emotional Stroop

Sleep Words	Matched Neutral Words
Tired	Study
Nightmare	Drawing
Blanket	Larger
Bed	Set
Pillow	Bottle
Sleepy	Dishes
Dream	Cream
Awake	Bridges
Dark	Turn
Yawn	Tree
Sheets	Stones
Snoring	Playful
Pyjamas	Capital
Naps	Pear
Night	Point
Silence	Favourite
Teddy	Jumper
Alert	After
Snooze	Blouse
Bedtime	Flower

TABLE 2: Reliability Analyses

Measure	Subscale	Alpha Cronbach
PSQI	Total	0.730
CSHQ	Total	0.767
SSR	Total	0.734
SDQ	Total	0.829
SDQ	Emotional Symptoms	0.761
SDQ	Hyperactivity	0.868

TABLE 3: Characteristics of Participant children

	'At risk' Group (n=44)			Control Group (n=45)		
	Mean (SD)	Median (Range)	%	Mean (SD)	Median (Range)	%
Age (years)	10.4 (1.0)	10 (9-12)		10.2 (1.1)	10 (9-12)	
Sex (% female)			56.8%			57.8%
Ethnic Group (% white)			97.8%			97.8%
SDQ Total Difficulties	9.9 (7.4)	8.5 (0-31)		7.93 (5.5)	7 (1-28)	
SDQ Emotional Symptoms	2.45 (2.7)	2 (0-10)		2.2 (2.23)	2 (0-8)	
SDQ Hyperactivity	3.80 (2.9)	3 (0-10)		2.9 (2.4)	2 (0-10)	
CSHQ Total Score	45.2 (7.0)	44 (33-64)		43.9 (6.4)	43 (34-61)	
SSR Total Score	20.0 (4.1)	19 (14-34)		19.1 (4.0)	18 (13-33)	
Concerned about own sleep (%)			15.9%			26.7%
Parent concerned about child's sleep (%)			18.2%			15.6%
Child concerned about parent's sleep (%)			18.2%			11.1%

TABLE 4: Parental Characteristics

	Parents of 'at risk' group (n=44)			Parents of control group (n=45)		
	Mean (SD)	Median (Range)	%	Mean (SD)	Median (Range)	%
Age (years)	42.4 (4.8)	42.5 (33-52)		40.5 (4.4)	40.5 (27-51)	
Relationship to child (%mother)			61.4%			62.2%
Ethnic Group (% white)			97.8%			97.8%
PSQI total score	8.5 (2.9)	7.5 (6-17)		2.9 (2.9)	3 (0-5)	
Concerned about sleep >6 months (%)			100%			0%

TABLE 5: SSS scores pre and post tired-state induction

	'At Risk' Group (n=44)	Control Group (n=45)
SSS pre state induction	Mean (SD) = 2.25 (1.14) Median = 2 (1-4)	Mean = (SD) 2.07 (1.05) Median = 2 (1-4)
SSS post state induction	Mean (SD) = 2.72 (1.42) Median = 3 (1-7)	Mean (SD) = 2.91 (1.2) Median = 3 (1-5)

TABLE 6: Mean response latencies to sleep and neutral words

	'At risk' (n=44)	Controls (n=45)
Sleep Words	932.56 (172.08)	975.97 (206.61)
Neutral Words	920.81 (154.02)	983.31 (217.01)

TABLE 7: Sleep Interference Index Scores

	'At risk' (n=44)	Controls (n=45)
Sleep Interference Index Score	11.75	-7.34

TABLE 8: Percentage of 'at risk' and controls reporting sleep related content of words.

	'At risk' n=44	Controls n=45
% Noticed Sleep	75%	53.3%
% Did not notice Sleep	25%	46.7%

Chapter 3

Advanced Clinical Practice I: Reflective Critical Account Abstract

Small Group Interagency Teaching: *perceptions of, and endeavours to overcome inter-agency resistance*

Amy Thomson*

* Address for correspondence
c/o Section of Psychological Medicine
Division of Community Based Sciences
University of Glasgow
Gartnavel Royal Hospital
1055 Great Western Road
Glasgow G12 0XH
Email: 0002897t@student.gla.ac.uk

Abstract

This account presents reflections on two related experiences of inter-agency working: telephone liaison and subsequent delivery of small group teaching to three members of a school staff. It discusses my response to my perceptions of inter-agency resistance. This response included multiple thoughts, feelings, evaluations and analyses; I have detailed and made sense of these using Gibbs' (1988) Model of Self Reflection. A future action plan, based on readings on the development of the therapeutic alliance (Ackerman and Hillsenroth, 2003), is included. The account concludes with a further discussion of the ways in which learning garnered from the experience will impact on my future professional development in relation to the key roles of a Clinical Psychologist.

Chapter 4

Advanced Clinical Practice 2: Reflective Critical Account Abstract

'It's our job to make sure everyone's all right': *reflections on a role conflict*

Amy Thomson*

* Address for correspondence
c/o Section of Psychological Medicine
Division of Community Based Sciences
University of Glasgow
Gartnavel Royal Hospital
1055 Great Western Road
Glasgow G12 0XH
Email: 0002897t@student.gla.ac.uk

Abstract

This account presents reflections on an experience encountered during my third year Neuropsychology placement. During an initial appointment with a client with an acquired brain injury, I was required to address child protection concerns. This created a considerable amount of anxiety in me, causing me to consider the potential conflict between the words 'the welfare of the child is paramount' (Children's Scotland Act, 1995) and the psychodynamic perception of the therapeutic alliance with the client as paramount. Beyond this it led me to question: who is the client? Is it the adult in isolation... or is it the entire family system? I reflect on these questions, and others, using Johns' (1994) model of reflection. Conclusions are reached through consultation with current practice guidelines regarding the rehabilitation of adults with acquired brain injury.

Appendices

Appendix 1: Authors Guidance for Submission to Behavioural Sleep
Medicine

Appendix 2: Systematic Review Appendices

2.1: Clinical Trials Assessment Measure (CTAM; Tarrier & Wykes, 2004)

Appendix 3: Major Research Project Appendices

3.1 Study Information Sheet – Child Version

3.2: Study Information Sheet – Parent Version

3.3: List of Inclusion and Exclusion Criteria

3.4: Parent-completed measures

3.5: Child-completed measures

3.6 Relaxation scripts

3.7 Major Research Project Proposal

3.8 Major Research Proposal Amendments

Appendix 1: Guidance for Submission to Behavioural Sleep Medicine

Appendix 2: Systematic Review Appendix

2.1 CTAM (Tarrrier & Wykes, 2004)

Clinical Trials Assessment Measure (CTAM)

Sample — two questions: maximum score = 10

Q1: is the sample a convenience sample (score 2) or a geographic cohort (score 5), highly selective sample, e.g., volunteers (score 0)

Convenience sample — e.g., clinic attenders, referred patients or *Geographic cohort* — all patients eligible in a particular area

Q2: is the sample size greater than 27 participants in each treatment group (score 5) or based on described and adequate power calculations (score 5)

Allocation — three questions: maximum score = 16

Q3: is there true random allocation or minimisation allocation to treatment groups (if yes score 10)

Q4: is the process of randomisation described (score 3)

Q5: is the process of randomisation carried out independently from the trial research team (score 3)

Assessment (for the main outcome) — five questions: maximum score = 32

Q6: are the assessments carried out by independent assessors and not therapists (score 10)

Q7: are standardised assessments used to measure symptoms in a standard way (score 6), idiosyncratic assessments of symptoms (score 3)

Q8: are assessments carried out blind (masked) to treatment group allocation (score 10)

Q9: are the methods of rater blinding adequately described (score 3)

Q10: is rater blinding verified (score 3)

Control groups — one question: maximum score = 16

Q11: TAU is a control group (score 6) and/or a control group that controls for non-specific effects or other established or credible treatment (score 10)

Analysis — two questions: maximum score = 15

Q12: the analysis is appropriate to the design and the type of outcome measure (score 5)

Q13: the analysis includes all those participants as randomised (sometimes referred to as an intention to treat analysis) (score 6) and an adequate investigation and handling of drop outs from assessment if the attrition rate exceeds 15% (score 4)

Active treatment — three questions: maximum score = 11

Q14: was the treatment adequately described (score 3) and was a treatment protocol or manual used (score 3)

Q15: was adherence to the treatment protocol or treatment quality assessed (score 5)

where the criterion is not reached for any question score = 0

Total score: maximum score = 100

Appendix 3: Major Research Project Appendices

3.1: Information Sheet – Child Version

Information Sheet for Children - 1

My name is Amy Thomson. I am training to be a psychologist. Psychologists work with lots of children and their Mums and Dads. Psychologists talk to children about how they can help to make their lives better.



As part of my training I am going to be doing a project about children's sleep. I will talk to you and your Mum or Dad to ask if it is okay for you to take part in this study. It is important that you and your Mum or Dad agree about meeting with me. It is OK if you decide not to take part. Even if you decide to take part, you can change your mind at any time if you do not want to take part any more.



If you decide you would like to take part in the project, then I will first of all ask you to fill in a questionnaire. Then we will practice some exercises together that can help people to relax. After this we will do a special task that is on the computer. I will also give you some more questionnaires to fill in.



I want to talk to as many children as possible about their sleep. You are one of lots of children that I am asking to take part and help me with my work.

All of the things that we talk about will be typed into a computer. The computer will keep all the things we talk about secret so only myself and my boss, Jason Ellis, can see them.



If you have any questions about what I am asking you to do, you can talk to your Mum or Dad. If they cannot answer your questions, then you can ask me. I will be at our desk and will be happy to talk to you about the project. Thank you for thinking about

helping me with my work. If you decide to take part, I look forward to meeting with you and your family soon.



Miss. Amy Thomson
Trainee Clinical Psychologist
Supervisor

Dr. Jason Ellis
Research

Appendix 3.2: Information Sheet – Parent Version

Amy Thomson
Trainee Clinical Psychologist
E-mail: 0002897t@student.gla.ac.uk

Information Sheet for Caregivers

My name is Amy Thomson and I am a trainee Clinical Psychologist. I am inviting you and your child to take part in a research study which is part of my training requirements to qualify as a Clinical Psychologist through the Medical School of the University of Glasgow. Before you decide whether or not to consent to your child and yourself taking part, it is important for you to understand why the research is being done and what it will involve. Please take your time to read the following information carefully. Please let me know anything that is not clear or if you would like more information. Take your time to decide whether or not you wish your child and yourself to take part.

What is the title of this project?

Investigating a pre-occupation with sleep in children

Why is this study important?

Current estimates suggest that between 9% and 15% of the population suffer from insomnia. Insomnia has wide-ranging effects on an individual's quality of life, often leading to difficulties at work, in relationships and in general mood. The high number of people suffering from insomnia, combined with the major effects that it can have, mean that it is very important to understand how the disorder is triggered and why some people suffer from it for many years. Recent studies have shown that people with insomnia can become pre-occupied with sleep. This pre-occupation can serve to keep their insomnia going, making it become more of a problem. Not much is yet known about what might make some people more vulnerable to insomnia than others. This study is interested in looking at possible vulnerability factors. Can a pre-occupation with sleep make some individuals more vulnerable to insomnia than others? These are important issues in terms of the prevention of and early intervention for insomnia.

What are the aims of this study?

This study aims to find out:

1) Can a pre-existing pre-occupation with sleep make some children more vulnerable to developing sleep disorders than others?

Who can take part in this study?

Children aged between 9 and 12, who speak English as their first language and have achieved Level B (5-14 curriculum) in English Language at school are invited to take part in the study.

Children who are colour blind or have a diagnosis of Attention Deficit Hyperactivity Disorder, Dyslexia, or a Learning Disability can not take part in the study. This is because these conditions would make participation in the study more difficult for your child.

This study is looking for 2 groups of children in particular:

Group 1) children with one parent who has a current significant sleep complaint of >6 months duration

Group 2) children with parents with no history of sleep disorder

Do I have to take part?

You do not have to participate 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 withdraw (come out of the study) at any time and without giving a reason.

What does participation in this study involve?

If you do decide to take part, I will ask you and your child to sign a consent form. I will give you the opportunity to ask any more questions that you might have. Following this, I will ask you to complete some questionnaires about you and your child. I will also ask your child to complete a short questionnaire. Following this, I will take your child to our computer area, which is within 1 metre of this stall and will be visible to you at all times. I will complete a short series of relaxation exercises with your child – these will involve muscle relaxation and calm breathing exercises. Following this, your child will complete a short computer based task. The task will be fully explained, and your child should not find it difficult. I will then ask your child to complete another short questionnaire. I will be with your child at all times. Your child will be able to withdraw from the study at any point and will not be put under any pressure to complete the tasks. Once we have completed all of these tasks, we will have a discussion about the purpose of the study. Your child will have another opportunity to ask any questions you may have. I will provide you with further feedback on the study.

What will happen to all of the information?

All of the information collected about both you and your child during the research study will be kept ***strictly confidential***. Any information which is stored on computer will not include any personal details such as you or your child's name, address and so fourth, so that you cannot be recognised from it. Written feedback will be offered to all families that take part at the end of the study. This feedback will also let you know where the write up of this study will be published.

Please note that when conducting the interview, questionnaires, and computer task, should the researcher have any ***significant concerns*** regarding either your own welfare, or that of your child, she is obligated to share these concerns with her supervisor. You will be informed if this is the researcher's intention.

Who is supervising this study?

I will be supervised by Dr. Jason Ellis who is my research supervisor and works for the University of Glasgow.

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 are harmed by taking part in this research project, there are no special compensation arrangements. If you are harmed due to someone's negligence, then you may have grounds for a legal action but you may have to pay for it. Regardless of this, 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, the normal National Health Service complaints mechanisms may be available to you.

What should I do if I have any questions about this study?

If you would like further details about the study, please do not hesitate to ask me. If you have any questions at a later date, then you can contact me by email.

What if I don't want to take part in this study?

If after having read this information sheet you decide that you do not want to take part in the study then this is fine. It is up to you to decide whether or not you wish yourself and your child to take part in this study. 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.

What happens next?

Amy Thomson will explain the first step in the study to you. You can approach her if you would like to take part. I would like to take this opportunity to thank you for your time and consideration.

Amy Thomson
Trainee Clinical Psychologist

Jason Ellis
Research Supervisor

Appendix 3.3: Major Research Project Inclusion and Exclusion Criteria

Criteria for Taking Part in the Study:

We are looking for children and parents to take part in the study together

We need two groups of **parents**:

- | | |
|-----------------|--|
| Group 1) | Report Concerns about their sleep
Concerns >6 months duration
Score > 5 on our questionnaire measure |
| Group 2) | Are not concerned about their sleep
Are not concerned about their partner's sleep
Are not concerned about their participant child's siblings sleep
Score < 5 on our questionnaire measure |

We are looking for **children** who are:

- Aged between 9 and 12
- Speak English as their first language
- Have achieved their level B in English language (5-14 curriculum)

Children who are colour blind, have a diagnosis of Attention Deficit Disorder (ADHD), Dyslexia or a learning disability may struggle with the experiment, and therefore are not eligible to take part.

Please come and discuss these criteria with the research team – we are happy to give you more information

Appendix 3.4: Parent-completed Measures

Pittsburgh Sleep Quality Index (PSQI; Buysse et al, 1989)

Child Sleep Habits Questionnaire (CSHQ; Owens et al, 2000)

Strengths and Difficulties Questionnaire (SDQ; Goodman et al, 1997)

Demographic Information Sheet

Additional Questions for Parents

Pittsburgh Sleep Quality Index

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* the questions by shading the circle [●] where appropriate.

1. During the past month, when have you usually gone to bed at night?
USUAL BED TIME: _____

2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?

NUMBER OF MINUTES: _____

2b. How long have you usually been awake during the night?

NUMBER OF MINUTES: _____

3. During the past month, when have you usually got up in the morning?

USUAL GETTING UP TIME: _____

4. During the past month, how many hours of *actual* sleep did you get at night? This may be different to the number of hours you spend in bed.

HOURS OF SLEEP PER NIGHT: _____

4b. How many nights per week do you usually have difficulties sleeping?

NUMBER OF NIGHTS PER WEEK: _____

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 and use the bathroom				
(d) Cannot breathe comfortably				
(e) Cough or snore loudly				
(f) Feel too cold				
(g) Feel too hot				

(h) Had bad dreams				
(i) Have pain				

(j) Other reason(s), please describe _____

How often during the past month have you had trouble sleeping because of this?

Not during the past month — Less than once a week — Once or twice a week — Three or more times a week —

6. During the past month, how would you rate your sleep quality overall?

Very good — Fairly good — Fairly bad — Very Bad —

7. During the past month, how often have you taken medicine (prescribed or 'over the counter') to help you sleep?

Not during the past month — Less than once a week — Once or twice a week — Three or more times a week —

8. During the past month, how often have you had trouble staying awake while driving, eating meals or engaging in social activity?

Not during the past month — Less than once a week — Once or twice a week — Three or more times a week —

9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

No problem at all — Only a very slight problem — Somewhat of a problem — A very big problem —

10. Do you have a bed partner or room-mate?

No bedpartner or room-mate — Partner/room-mate in other room — Partner in same room, but not same bed — Partner in same bed —

If you have a roommate or bed partner, ask him/ her how often in the past month you have had:

(a) Loud snoring

Not during the past month	——	Less than once a week	——	Once or twice a week	——	Three or more times a week	——
---------------------------------	----	-----------------------------	----	----------------------------	----	----------------------------------	----

(b) Long pauses between breaths while asleep

Not during the past month	——	Less than once a week	——	Once or twice a week	——	Three or more times a week	——
---------------------------------	----	-----------------------------	----	----------------------------	----	----------------------------------	----

(c) Legs twitching or jerking while you sleep

Not during the past month	——	Less than once a week	——	Once or twice a week	——	Three or more times a week	——
---------------------------------	----	-----------------------------	----	----------------------------	----	----------------------------------	----

(d) Episodes of disorientation or confusion during sleep

Not during the past month	——	Less than once a week	——	Once or twice a week	——	Three or more times a week	——
---------------------------------	----	-----------------------------	----	----------------------------	----	----------------------------------	----

(e) Other restless while you sleep; please describe

Not during the past month	——	Less than once a week	——	Once or twice a week	——	Three or more times/wk	——
---------------------------------	----	-----------------------------	----	----------------------------	----	---------------------------	----

Demographic Information

Child's age	
Child's sex	
Child's ethnic group	
Parent's age	
Parent's relationship to child	
Parent's ethnic group	

Additional Questions for Parents

- 1) Are you concerned about your sleep?
- 2) How long have you been concerned about your sleep?
- 3) Is your partner concerned about his/her sleep?
- 4) Does your child have a sibling with a sleep problem?
- 5) Are you concerned about your child's sleep?

Appendix 3.5: Child-completed measures

Modified Stanford Sleepiness Scale (adapted from Hoddes, 1973)

Sleep Self Report (SSR; Owens et al, 2000)

Additional Questions for Children

Modified Stanford Sleepiness Scale

From the list below please write down ONE number that best describes how sleepy you feel right now

.....

LEVEL OF SLEEPINESS

1. Feeling wide awake – the most wide awake I could ever be
2. Very awake – but not the most wide awake I have ever been
3. Relaxed
4. A little foggy
5. Foggy, beginning to lose track, difficulty in staying awake
6. Sleepy, would prefer to lie down, woozy
7. About to fall sleep

Additional Questions for Children

Did you notice anything about the words?

What did you notice about the words?

Are you worried about your sleep?

Are you worried about your mum/dad's sleep?

Appendix 3.6: Relaxation Scripts

Breathing Exercises (Carr, 2006)

Progressive Muscle Relaxation Exercises (Carr, 2006)

Breathing exercises

Tummy Breathing:

1. Place one hand on your chest and one hand on your tummy (just below your rib cage)
2. Notice how your hands rise and fall as you breathe – which hand moves more? If you are relaxed, the hand on your tummy should move more
3. Take a slow deep breath through your nose – send the air as low as you can, right down to the very bottom of your lungs
4. Practice until the hand on your tummy is moving more than the hand on your chest
5. Once you are able to do this ‘tummy breathing’, try to slow it down. Breathe in very slowly and out very slowly.

Slow Breathing:

Remember to keep breathing from your tummy.

1. Breathe in through your nose slowly to a count of five (one...two...three...four...five)
2. Pause, and hold your breath to a count of five (one...two...three...four...five)
3. Breathe out slowly to a count of five (one...two...three...four...five)
4. When you have breathed out all the air, take two breaths in your normal way
5. Then repeat steps 1-3
6. Keep the exercise up for 3-5 minutes. Remember to take two normal breaths between each cycle.

Muscle Relaxation

Area

Exercise

Hands

Close your hands into fists, then allow them to open slowly. Notice the change from tension to relaxation in your hands and allow this change to continue further and further so your hands become more and more relaxed

Arms

Bend your arms at the elbow and touch your shoulders with your hands. Then allow them to return to rest. Notice the change from tension to relaxation in your arms and allow this change to continue further and further so your arms become more and more relaxed

Shoulders

Hunch your shoulders up to your ears. Then allow them to return to rest. Notice the change from tension to relaxation in your shoulders and allow this change to continue further and further so your shoulders become more and more relaxed

Legs

Point your toes upwards. Then allow them to return to rest. Notice the change from tension to relaxation in your legs and allow this change to continue further and further until your legs become more and more relaxed.

Stomach

Take a deep breath and hold it in your stomach, tensing your muscles as you do so. Then breathe out slowly. Notice the change from tension to relaxation in your stomach and allow this change to continue further and further until your stomach becomes more and more relaxed.

Face

Clench teeth tightly together. Then relax. Notice the change from tension to relaxation and allow this change to continue further and further until your muscles in your jaw become more and more relaxed.

Wrinkle up your nose. Then relax. Notice the change from tension to relaxation and allow this change to continue further and further until the muscles in your face become more and more relaxed.

Shut your eyes tightly. Then relax. Notice the change from tension to relaxation in the muscles around your eyes and allow this change to continue further and further so the muscles around your eyes become more and more relaxed.

Appendix 3.7 Major Research Project Proposal

**‘Biased Processing of Sleep-related Information in
Children ‘at risk’ for Insomnia: *an investigation*’**

0002897

Research Supervisor: Dr Jason Ellis

Word Count: 3411

Submission Date: 04/08/08

Abstract

Researchers have noted that children of adults with insomnia are at elevated risk of developing the disorder themselves. However little is known about the mechanisms underlying this risk. This study, using methodology recently applied in the fields of Major Depressive Disorder (MDD) and Panic Disorder (PD), will investigate selective attention towards sleep-related stimuli as a potential predispositional factor for insomnia.

Three groups will be included in the study: twenty-two never-disordered children of adults with chronic insomnia, twenty-two children with current sleep difficulties and twenty two never-disordered control children of good sleepers. Children's group allocation will be verified using actigraphy. All children will complete a computerised Emotional Stroop Task - a 'Sleep Stroop', containing both sleep-related and neutral words. A 'tired mood' induction will be created by engaging children in 15 minutes of sleep-related relaxation exercises prior to running the Sleep Stroop.

Main hypothesis: there will be an attentional bias towards sleep-related stimuli, for children with parents with insomnia, compared with children who have parents with no sleep disorder (2-tailed). Group two, the 'current sleep difficulties' children are included in the study for purpose of comparison and later analysis. Supplementary hypothesis:

Children with current sleep difficulties will show an attentional bias towards sleep-related stimuli.

Introduction

Selective Attention in the *perpetuation* of Affective Disorders

Over the past 20 years, research has targeted the role of cognition in the development and maintenance of depression (Beck, 1967; Teasdale 1988) and anxiety (Beck and Clark, 1988; Clark and Wells, 1995). The concept of *selective attention*, which is common to widely accepted cognitive conceptualisations of anxiety and depression, has garnered the most attention in the literature (Puliafico and Kendall, 2006; Mogg and Bradley, 1998; Whitehouse, Turanski and Murray, 2000). Proponents of the concept posit that depressed individuals will attend to negative stimuli and filter out positive stimuli, whereas anxious individuals focus on information suggestive of threat (Joordman, Talbot and Gotlib 2007).

Selective attention has been measured objectively using methods pioneered in the field of information processing. Evidence suggests that stimuli that are salient are likely to attract attention, because of an information processing bias, or *attention bias* (Broadbent, 1958; Posner, 1980). Such biases can be measured through the use of computerised cognitive probe tasks involving both salient and neutral stimuli, with information processing speed, or reaction time, an index of selective attention. Studies using this paradigm have widely yielded results that would implicate an attentional bias in the perpetuation of anxiety (Mogg et al, 1998) and depression (Mathews and MacLeod, 2005).

Selective attention as a *predisposing* factor for Affective Disorders

Recent research has begun to focus more and more on factors associated with increased *risk* of developing affective disorders. Cognitive theorists posit that biases in attention precede the onset of depression (Garber and Robinson, 1997), and therefore should be evident in vulnerable individuals *before* they have experienced a first episode. The children of parents with affective disorders are known to be at heightened risk of developing psychopathology themselves (Gotlib and Goodman, 1999; Morrison, 1983). Therefore the assessment of these children provides a useful route to elucidating potential vulnerability factors.

A recent study by Joordman, Talbot and Gotlib (2007) investigated whether never-disordered daughters whose mother's had experienced recurrent episodes of severe depression during their daughter's lifetime are characterised by the biased processing of emotional information. Following a negative mood induction – involving exposure to a short, sad video clip, their participants – 41 girls, aged 9-14 - completed an emotional-faces dot-probe task. High risk daughters, but not control selectively attended to negative facial expressions, control daughters did not. In contrast only control daughters selectively attended to positive facial expressions. The results support the hypothesis that attentional biases towards negative information not only perpetuate, but also predispose Major Depressive Disorder.

Gotlib, Traill, Montoya, Joordman and Chang (2005) applied a similar paradigm to assess vulnerability to bipolar disorder (BPD) – using a negative mood induction (short sad video clip) and Emotional Stroop with 16 non-disordered children – aged 9-14 – of

parents with BPD and 16 control children. Results again suggested an attentional bias in the non-disordered children of BPD parents relative to controls.

Shchneider, Unnewehr, In-Albon and Margraf (2008) compared the children – aged 8-15 – of individuals with panic disorder, animal phobia and normal controls, using an Emotional Stroop task. Unlike Joordman et al (2007) and Gotlib et al (2005) they found no significant difference between groups in terms of an attentional bias towards anxiety-related phenomena. Schneider et al (2008) discuss this result in the context of previous work (Schneider, Unnewehr, Florin and Margraf, 2002), in which they demonstrated that children – aged 8-15 – of panic disordered parents exhibit increased anxious interpretations of ambiguous stimuli, after priming with a panic-related model, relative to controls. They advocate that the priming component is imperative and that their study should be replicated using an Emotional Stroop with a priming manipulation.

Taken together, these findings suggest that selective attention, a factor traditionally studied in the perpetuation of affective disorders *may* also have a role to play in predisposing some individuals to psychopathology. Due to the wide ranging clinical applications of this hypothesis, in terms of both the prevention of, and early intervention for affective disorders, it merits further investigation.

Insomnia

Insomnia is a prevalent health complaint; epidemiological studies indicate that between 9% and 15% of the general population report experiencing chronic insomnia symptoms (Ohayon, 2002). Indeed it is cited as the most common health complaint, after chronic

pain (Gallup, 1995). The cost/consequences of insomnia can be seen at both the individual and societal level (Ellis, 2007). The potential costs of insomnia underscore the importance of developing our understanding of its treatment (Smith and Perlis, 2006), aetiology (Espie, 2002) and natural history (Bastien and Morin, 2000).

Conceptualising Insomnia

Various models have been constructed to explain the conditions under which insomnia develops, progresses and is maintained. Spielman, Caruso and Glovinsky (1987) proposed a cumulative model of the progression from acute to chronic insomnia. Their framework suggests predisposing factors - intrinsic traits that render an individual vulnerable to insomnia, precipitating events – stressful life events that trigger an initial period of sleep disturbance, and perpetuating cognitions and behaviours – that continue beyond the duration of the initial stressor and result in a cycle of chronic insomnia. However recent research has tended to focus primarily on investigating the cognitions and behaviours that potentially maintain the disorder (Espie, 2002)

Selective attention in the *perpetuation* of insomnia

Several recent studies have applied cognitive probe tasks to assess attentional bias in the perpetuation of insomnia.

Jones, MacPhee, Broomfield, Jones and Espie (2005) used a flicker paradigm to induce change blindness in a group of 'good sleepers' and 'poor sleepers'. Change detection latencies revealed a sleep-related attentional bias in poor sleepers but not in good sleepers. Marchetti, Biello, Broomfield, MacMahon and Espie (2006) used the flicker paradigm with individuals with psychophysiological insomnia, individuals with delayed sleep phase syndrome and good sleepers. Change detection latencies revealed an attentional bias in the psychophysiological insomnia group, but not in the good sleepers. Interestingly an attentional bias was found in the delayed sleep phase syndrome group, although to a lesser extent.

Taylor, Espie and White (2003) used the Emotional Stroop task with individuals with sleep problems secondary to cancer. The inclusion of an acute sleep disturbance and persistent insomnia group allowed them to investigate the issue of *when* an attentional bias develops in relation to insomnia. They found both groups displayed an attentional bias towards cancer related words, but only the persistent insomnia group demonstrated an attentional bias for sleep related words. Taylor et al (2003) suggest that the onset of an attentional bias plays a role in the transition from acute insomnia to chronic insomnia. However, in the absence of a control group or a within subjects design, this assertion is not fully substantiated.

There are to date no published papers assessing attentional bias in children with sleep problems. However work is beginning in this area. Gregory and Crawford (unpublished data) used a flicker paradigm to assess attentional bias towards sleep-related information in a sample of children aged 9-11. Early analysis of this data has shown similar results to those studies carried out with adult participants - that the poor sleepers identified sleep related changes more quickly than the good sleepers. This would suggest that a sleep-related attentional bias can exist in children with sleep problems. Further study and publication in this area is planned by Alice Gregory and the STEPS team in 2008/2009.

Predisposing Insomnia

Thus several studies now exist to support the role of selective attention in the perpetuation of insomnia. However it has not yet been considered, or investigated as a potential predisposing factor.

Indeed, the study of potentially predisposing factors to insomnia has largely lagged behind the study of its perpetuation, due to lack of an objective measure and studies being largely cross-sectional, or retrospective in nature (Drake et al, 2006). Personality characteristics have received the most attention in the literature. Using cross-sectional methodologies, traits such as neuroticism, perfectionism and anger have all been identified in clinical insomniac populations (Ellis and Fox 2004). Research, again using cross-sectional methodologies, has begun to point to cognitive factors as having a role in vulnerability to insomnia (Gregory and Eley, 2005; Drake, Richardson, Schofield and Roth, 2004; Lundh and Broman, 2000). Further, recent research examining pre-sleep

arousal in children, has suggested that cognitive factors may play a role in the predisposition and perpetuation of childhood sleep problems (Gregory, Wills, Wiggs and Harvey, in press).

Thus the volume of evidence supporting the role of personality factors in the predisposition of insomnia is convincing, and the emerging studies of cognitive factors show promise. However, each of these studies was cross-sectional, demonstrating *association* rather than *causality* (Gregory, Capsi, Moffit and Poulton, 2006).

Recent researchers have recognised this problem and attempted to address it using prospective studies with general population samples (Jansson-Frojmark and Linton, 2007; Vahtera, Kivmaki, Hublin, Korkeila, Suominen, Paunio and Koskenvuo, 2007) However, these studies have encountered their own intrinsic methodological drawbacks based on their reliance on self-report data and their lack of clarity surrounding the definition of ‘insomnia’.

There appears considerable agreement that future research should highlight additional risk factors for insomnia (Gregory et al, 2006; Drake, Richardson, Roehrs, Schofield and Roth 2004; Espie, 2002).

Selective Attention as a *predisposing* factor for insomnia?

A recent study (Dauvilliers, Morin, Cervena, Carlander, Touchon, Besset and Billiard, 2005) found that 72.2% of primary insomnia patients reported familial insomnia. This suggests that a positive family history of insomnia may act as a potential risk marker

(Bastien, 2000). Hence the study of the offspring of individuals with the disorder could prove useful – as has been the case with several other psychological disorders (Joordman et al 2007; Gotlib et al 2005; Schneider et al 2008; Zettleman et al 2006).

This study will investigate selective attention towards sleep-related stimuli as a potential predispositional factor for insomnia; testing the non-disordered children of adults with insomnia, using the Emotional Stroop paradigm. A group of children currently experiencing sleep difficulties will also be tested, for purpose of comparison and later analysis.

Aims

The present study aims to investigate whether never-disordered children of individuals with chronic insomnia are characterised by the biased processing of sleep-related information.

Hypotheses

Main hypothesis: Non sleep disordered children of parents with insomnia will exhibit an attentional bias towards sleep-related stimuli, relative to children who have parents with no sleep disorder

Supplementary hypothesis: Children with current sleep difficulties will show an attentional bias towards sleep-related stimuli.

Plan of Investigation

Design: The study will assume an experimental mixed design, based largely on that of Joordman et al (2007). The emotional stroop paradigm will be employed to test 22 never-disordered children of adults with chronic insomnia, 22 children currently experiencing difficulty initiating and maintaining sleep and 22 never-disordered children of good sleepers. A 'tired mood' induction will be created by performing a short series of relaxation exercises.

Participants:

Group (1) 22 never-disordered children with one parent diagnosed as having chronic insomnia

Group (2) 22 children currently experiencing difficulties initiating or maintaining sleep

Group (3) 22 never-disordered control children with both parents good sleepers

Joordman et al (2007) report a large effect size of 0.7 (mixed ANOVA). Given the preliminary nature of the application of the research methodology to insomnia, a more conservative effect size of 0.5 was entered into the online power calculator – G-power, to estimate the number of participants required with alpha = 0.05, and beta = 0.95 and a critical f of 3.142. 22 participants in each group are required.

Inclusion Criteria

To be included in the study, participants must be aged between 9 and 12. Those in groups one (the ‘at risk’ group) and three (the controls) must have no current or historical problems with their own sleep, as assessed by clinical interview (Morin and Espie, 2003), and actigraphy recordings over a five night period. Individuals in group two (the ‘current sleep difficulties’ group) must be experiencing current problems initiating and maintaining sleep – assessed again by clinical interview (Morin and Espie, 2003) and actigraphy recordings over a five night period. Parents of participants in the

‘at risk’ group must meet DSM-IV criteria for chronic insomnia, as assessed by the Pittsburgh Sleep Quality Index (PSQI), the Insomnia Severity Index (ISI) and clinical interview. Parents of the control children must be ‘good sleepers’ as assessed by the PSQI and clinical interview. Participant children should have English as their first language.

Exclusion Criteria:

A series of exclusion criteria, based on previous research in the field (Ellis, personal communication) are proposed, to limit confounding factors in the sample.

- Presence of an axis 1 disorder (in child or parent)
- Substance abuse (in child or parent)
- Neurological illness (in child or parent)
- Chronic Illness (in child or parent)
- Brain Injury (in child or parent)
- Learning Disability (in child or parent)
- Sibling with sleep disturbance

For the ‘at risk’ and ‘controls’:

- Any sleep disturbance in child since aged 2

Recruitment Procedures:

Three recruitment strategies are proposed.

Main recruitment drive

Participants will be recruited through the Glasgow Sleep Centre. A recruitment consultant has recently been hired to recruit and allocate participants to the larger research studies taking place within the centre. Participants for the current project will be filtered from those taking part in an ongoing study examining the transition from acute to chronic insomnia. This study includes adults with acute insomnia, chronic insomnia and a control group of good sleepers. Participants for the current study will be recruited from the latter two groups. Those identified as having a child in the 9-12 age bracket will be asked if they are willing to participate in a further piece of research involving their child. They will then be asked a short series of questions regarding their child's sleeping habits. Those participants whose children do not show any evidence/history of sleep disturbance will be invited to join the 'at risk' and 'control' groups. Those whose children are currently experiencing sleep disturbance will be asked to form part of the 'current sleep problem' group.

Supplementary recruitment drive - schools

If the first recruitment strategy does not provide sufficient participants, a supplementary recruitment drive is proposed for the recruitment of controls. This will involve contacting parents of 9-12 year old children via a local primary school. A letter outlining the purpose of the study, inclusion/exclusion criteria and proposed procedures

will be sent to all the parents of children in primaries 5 to 7 – asking them to make contact if they wish to participate.

Supplementary recruitment drive – Sleep Scotland

A second supplementary recruitment drive is proposed for the recruitment of children with sleep difficulties. This will be done by placing an advert on the ‘Sleep Scotland’ website, asking participant families to make contact if they wish to participate.

Measures included:

The Emotional Stroop

The Emotional Stroop paradigm is selected as a method of capturing attentional bias – due its simplicity and widely evidenced effectiveness with children (Gotlib et al 2005; Pine et al 2005; Richards, French, Nash, Donnelly 2007). The Emotional Stroop has been shown to yield similar effect sizes to the dot probe (Gotlib et al, 2005; Zettler et al 2005) therefore this digression should not affect the power of the study.

Superlab Software (Credus Corporation, San Pedro, CA, USA) will be used to generate a computerised ‘Sleep Stroop – child version’. The sleep laboratory’s existing ‘Sleep Stroop’ will be used as a basis for the child version, modified to include only words rated as readable by children aged 8 and above (Carroll, Davies and Richman, 1971). Sleep-related and Neutral words will be matched in terms of syllables, word length and frequency of occurrence in the English language.

The computerised Emotional Stroop will be saved on a lap top, and therefore will be portable.

Actigraphy Watches

Children in all groups will be asked to wear actigraphy watches for five consecutive nights in the week prior to completing the study. This will be used as an objective measure of current sleep, and will inform their group allocation.

Self-report Questionnaire Measures:

A selection of self-report measures will be obtained from parents and children, to establish fit with inclusion/exclusion criteria, and for the purpose of later analysis.

Parent completed:

- **The Pittsburgh Sleep Quality Index (PSQI)** (Buysse, Reynolds, Monk, Berman and Kupfer, 1989)
- **The Insomnia Severity Index (ISI)** (Morin, 1993)
- **Hospital Anxiety and Depression Scale (HADS)** (Zigmond and Snaith, 1983)

- **Strengths and Difficulties Questionnaire** (Goodman, 1997) – a 25 item questionnaire addressing elements of their child’s behaviour and mental health

Child completed:

The following measures will be administered to all children, modified to ensure their readability and accessibility.

- **The Stanford Sleepiness Scale (modified)** will be administered to children immediately following their completion of the Sleep Stroop. This is included to measure the effectiveness of the bed-time related short passage and relaxation exercise as a mood manipulation.
- **The Parental Bonding Index (modified)** (Parker, 1990) will be administered to all children. This is a self-report questionnaire measuring the child’s recollections of parental affection and control.
- **Dysfunctional Beliefs about Sleep -16 (modified)** (Morin, Valliers, Ivers, 2007) will be administered to all children.

Clinical Interview

Parents will be interviewed in a short telephone interview, to establish their/their child’s fit with inclusion/exclusion criteria (Morin and Espie, 2003).

Relaxation Exercises

Sleep-related relaxation exercises will be used to induce tired mood in participants, acting as the 'prime' suggested by Joordman et al (2007); Gotlib et al (2005) and Schneider (2008). Children will take part in two relaxation exercises, based on those suggested in child cognitive behavioural therapy text, 'Think good Feel Good' (Stallard, 2003). The first of these will be based on progressive muscle relaxation, and the second on breathing control.

Procedure:

Main recruitment Drive – *via larger sleep study*

Those identified as willing to take part in the study will be telephoned, and briefly interviewed by the investigator to establish their/their child's fit with the inclusion/exclusion criteria. Those who are eligible to take part in the study will then be sent an information pack, detailing the purpose of the study, and the proposed procedures. Children will be sent a similar pack. The information provided in the packs will encourage parents to discuss potential participation with their children. The information packs will also include consent forms for both parent and child, and stamped addressed envelopes for their return to the laboratory. Families will be asked to complete and return the forms if they wish to take part. Upon receipt of these forms, families will again be telephoned, and a meeting arranged at the sleep laboratory for the following week. During this phone call the experimenter will explain the study's use of actigraphy watches. The experimenter will then send a copy of the Strengths and

Difficulties Questionnaire for the parents to complete, and an actigraphy watch with instructions for its use. These will be collected from participants when they attend the sleep laboratory for the arranged meeting the following week.

Structure of meeting:

Parents recruited via the larger sleep study will have previously completed:

- Pittsburgh Sleep Quality Index
- Insomnia Severity Index
- HADS

Therefore it will not be necessary to complete these again. Permission will be sought to obtain their scores on these measures from the Sleep Laboratory database.

When participants arrive at the laboratory, the experimenter will spend the initial 5 minutes with parent and child together, discussing their participation, and answering any potential questions. The children will then be taken to the experimental room. The experimenter will spend 15 minutes practicing sleep-related guided imagery and progressive muscle relaxation with the child. Following this tired mood induction, the Emotional Stroop task will be explained and their understanding will be checked. The experimenter will then start the Emotional Stroop, and remain quiet for its duration. Once the child has completed the Emotional Stroop task, the experimenter will administer the Stanford Sleepiness Scale, as a manipulation check regarding the tired

mood induction. The child will then complete the PSQI and DBAS-16. The child will be offered debriefing one-one.

Following this parent and child dyads will be brought back together. The purpose of the study will be explained and discussed. The child will then receive a small token reward for their participation.

School Recruitment Drive

The procedure will be different for those control participants who are recruited independent of the larger sleep study. The first step in this process will be a telephone interview with parents volunteering to participate. Their own/their child's eligibility re: inclusion/exclusion criteria will be checked. Those meeting the criteria will be sent an information pack regarding the study along with a 'consent to participate' form. Upon receipt of the completed consent form the families will be sent the battery of parent-completed assessment measures as well as an actigraphy watch and instructions for using the actigraphy watch. Parents will be provided with a stamped, addressed envelope for returning the completed measures. Simultaneously, the researcher will contact the child's school to arrange a meeting with the child, to take place at school, the following week. At this meeting, the procedure for administering the Emotional Stroop /assessment measures to the child will mirror that described above. Parents will be telephoned at a later date for feedback on their participation.

Sleep Scotland Recruitment Drive

These participants will be recruited through an advertisement on the Sleep Scotland website, in which they will be asked to make contact with the chief investigator if they wish to take part in the study. Participant families' fit with inclusion/exclusion criteria will be checked via phone interview. Those eligible will be sent an information pack and consent forms for both parent and child. Upon receipt of consent forms, the chief investigator will telephone parents to arrange a meeting at the Glasgow Sleep Centre for their child. They will be sent actigraphy watches with instructions for their use. They will also be sent the series of parent-completed questionnaire measures and instructed to return these on the day of the meeting. On the day of the meeting, procedure will follow that described above.

Data Analysis

All data will be analysed using SPSS. Analysis is likely to involve MANOVA and logistic regression.

Practical Applications

If children ‘at risk’ for insomnia are found to be characterised by the biased processing of sleep-related information, this will have wide-ranging implications in terms of the prevention of, and early intervention for insomnia.

Health and Safety Issues

Researcher Safety issues

No threats to researcher safety are predicted. Experimental procedures do not involve any physically dangerous equipment. Testing will be carried out during the working day in the sleep laboratory or in a local school – no home visits will take place.

Participant Safety Issues

No threats to participant safety are predicted. Experimental procedures do not involve any physically dangerous equipment. Testing will be carried out during the working day in the sleep laboratory or in a local school – participants will not be in an unfamiliar environment.

Ethical Issues

The study will involve working with children. All efforts to maintain their integrity will be taken. Children will receive an age-appropriate information sheet based on the template suggested by COREC. Their written informed consent will be sought.

Following completion of experimental tasks they will be debriefed regarding the purpose of the study and will receive a small token reward for their participation.

In the event that the study uncovers an ‘at-risk’ attentional bias in a child, this will be discussed with their parents and they will be given a copy of a preventative resource pack, which is currently being developed in the department.

Parents will also receive an information sheet that follows the COREC template. Their written informed consent will be sought and they will be debriefed following the experimental procedures.

Data obtained in the study will be stored for 5 years on non-networked computers – access will be password protected.

Financial Issues

The computer software required for the experiment is currently available within the Sleep Laboratory; this will not incur any further costs. All questionnaire measures are also available.

Additional expense will involve printing costs, paper, envelopes, travel expenses and token reward ‘stickers’.

Ethical and Management Approval Submissions

COREC

Glasgow City Council Education Authority

Timetable

Submission to ethics: August/September 2008

Ethical Approval by: October 2008

Recruitment: October 2008 – April 2009

Data Analysis: April 2009 – May 2009

Write-up: May 2009 – July 2009

Submission – July 2009

References

- Bastien, C.H., Morin, C.M. (2000), Familial incidence of insomnia, *J. Sleep Res*, 9, 49-54
- Beck A.T, Clark D.A. (1988) Anxiety and depression: An information processing perspective. *Anxiety Research: An International Journal*, 1,23-36
- Beck, A.T. (1967). *Depression: Clinical, experimental and theoretical aspects*. New York: Harper and Row
- Broadbent, D.E. (1958). *Perception and Communication*. Pergamon, Oxford
- Buysse, D.J., Reynolds, C. F., Monk, T. H., et al (1989) The Pittsburgh sleep quality index. A new instrument for psychiatric practice and research. *Psychiatric Research*, 28, 193-213
- Carroll, J.B., Davies, P., & Richman, B. (1971) *Word Frequency Book*. New York: American Heritage.
- Clark and Wells (1995), A cognitive model of social phobia. In: R. Heimberg, M. Liebowitz, D.A. Hope, & F.R. Schneier (Eds.) *Social phobia: Diagnosis, assessment and treatment* (pp. 69–93). New York: Guildford Press.

Dauviers, Y, Morin, C, Cervena, K, Carlander, B, Touchon, J, Besset, A, Billiard, M. (2005), Family studies in insomnia, *Journal of Psychosomatic Research*, 58, 271-278

Drake, C.G., Roehrs, T, Scofield, H, Roth, T. (2004). Vulnerability to stress-related sleep disturbance and hyperarousal, *Sleep*, 27, 285-291

Ellis, J. & Fox, P. (2004). Student mental health: is there a role for sleep? *Journal for the Royal Society for the Promotion of Health*, 124 (3), 129-133.

Ellis, J., Hampson, S.E. & Croyley, M. (2007). The role of dysfunctional beliefs in late life insomnia. *Journal of Psychosomatic Research*, 62 (1), 81-84.

Ellis, J.G., Mitchell, K, Fox, P. (2005) Personality in the interpretation of late-life insomnia: Introducing the sleep discrepancy index, *Sleep*, 28, A243-A243

Espie, C.A. (2002), Insomnia: Conceptual issues in the development, persistence and treatment of sleep disorder in adults, *Annu. Rev. Psychol*, 53, 215-243

Garber, J., & Robinson, N. (1997). Cognitive vulnerability in children at risk for depression. *Cognition and Emotion*, 11, 619-635

Gau, S.F, (2000), Neuroticism and sleep-related problems in adolescence, *Sleep*, 23, 495-502

Goodman R (1997) The Strengths and Difficulties Questionnaire: A Research Note. *Journal of Child Psychology and Psychiatry*, 38, 581-586.

Gotlib, I.H., Goodman, S.H. (1999). Children of parents with depression. In W.K. Silverman & T.H. Ollendick (Eds), *Developmental issues in the clinical treatment of children* (pp. 415-432). Needham Heights, MA: Allyn & Bacon

Gotlib, I.H., Traill, S.K., Montoya, R.L., Joordman, J., Chang, K. (2005), Attention and memory biases in the offspring of parents with bipolar disorder: indications from a pilot study, *Journal of Child Psychology and Psychiatry*, 46, 84-93

Gregory, A.M., Caspi, A., Moffitt, T.E., Poulton, R. (2006). Family conflict in childhood: a predictor of later insomnia. *Sleep*, 29, 1063-1067.

Gregory, A.M., Eley, T.C. (2005). Sleep problems, anxiety and cognitive style in school-aged children. *Infant and Child Development*. 14, 435-444.

Gregory, Wills, Wiggs, Harvey (in press), Pre-sleep arousal and sleep disturbances in childhood, submitted to *Sleep*

Gregory A.M, Crawford M (2008) unpublished data, Goldsmiths College, University of London

Harvey, A.G. (2002a). A cognitive model of insomnia. *Behav. Res. Ther.*, 40, 869-893

Jansson-Frojmark, M, Linton, S.J. (2007), Is perfectionism related to pre-existing and future insomnia? A Prospective Study, *British Journal of Clinical Psychology*, 46, 119-124

Johns MW (1991). A new method for measuring daytime sleepiness: the Epworth sleepiness scale, *Sleep* 14 (6): 540–5.

Jones, B.T., MacPhee, L.M., Broomfield, N.M., Jones, B.C., Espie, C.A. (2005) Sleep-related attentional bias in good, moderate and poor (primary insomnia) sleepers. *Journal of Abnormal Psychology*, 114, 249-258

Joordman, J., Talbot, L., & Gotlib, I.H. (2007). Biased processing of emotional information in girls at risk for depression. *Journal of Abnormal Psychology*, 116, 135-143

Kimura, M, Winkelman, J. (2007), Genetics of sleep and sleep disorders, *Cellular and Molecular Life Sciences*, 64, 1216-1226

Koukkari W, Sothorn RB (2006) *Introducing Biological Rhythms*, Springer, NY

Lundh, L.G., Broman, J.E. (2000), Insomnia as an interaction between sleep-interfering and sleep-interpreting processes, *Journal of Psychosomatic Research*, 49, 299-310

Lundh, L.G., Broman, J.E., Hetta, J., & Saboonchi, F. (1992). Perfectionism and insomnia. *Journal of Sleep Research*, 1, Supplement 1, 138.

Lundh, L-D, Froding, A, Gyllenhammer, L, Broman, J.K., Hetta, J. (1997), Cognitive bias and memory performance in patients with persistent insomnia. *Scand. J. Behav. Ther.*, 26, 27-35

Marchetti, L.M., Biello, S.M., Broomfield, N.M., MacMahon, K.M.A., Espie, C.A. (2006), Who is pre-occupied with sleep? A comparison of attention bias in people with psychophysiological insomnia, delayed sleep phase syndrome and good sleepers using the induced change blindness paradigm, *J. Sleep. Res*, 15, 212-221

Mathews, A., & MacLeod, C. (2005). Cognitive vulnerability to emotional disorders. *Annual Review of Clinical Psychology*, 1, 167-195

Mogg, K., & Bradley, B.P. (1998). A cognitive-motivational analysis of anxiety. *Behavioural Research Therapy*, 36, 809-848

Morrison, H.L. (Ed). (1983). Children of depressed parents: Risk, identification, and intervention. New York: Grune & Stratton

Morin, C.M and Espie, C.A. (2005), *A Clinical Guide to Assessment and Treatment*. Kluwer Academic/Plenum Publishers, New York 2003.

Morin CM, Vallieres A, Ivers H (2007) Dysfunctional beliefs and attitudes about sleep (DBAS): Validation of a brief version (DBAS-16) *Sleep* 30(11): 1547-1554

Neitzert, S.C., Harvey, A.G. (2007), An experimental investigation of daytime monitoring for sleep-related threat in primary insomnia, *Cognition and Emotion*, 21, 146-161

Ohayon, M. M. (2002,) Epidemiology of insomnia: what we know and what we still need to learn. *Sleep Medicine Reviews*, 6, 97-111.

Parker S (1990), The Parental Bonding Instrument, *Social Psychiatry and Psychiatric Epidemiology* 25(6), Editorial

Perlis, M.L., Giles, D.E., Mendelson, W.B., Bootzin, R.R., Wyatt, J.K. (1997) Psychophysiological insomnia: the behavioural model and a neurocognitive perspective, *J. Sleep Res.*, 6, 179-188

Pine DS, Klein RG, Mannuzza S, Moulton JL, Lissek S, Guardino M, Woldehawariat G (2005) Face emotion processing in offspring at-risk for panic disorder, *Journal of the American Academy of Child and Adolescent Psychiatry* 44 (7): 664-672

Posner, M.I., (1980), Orienting of attention. *Q. J. Exp. Psychol*, 32, 3-25

Puliafico, A.C., & Kendall, P.C. (2006). Threat-related attentional bias in anxious youth: a review. *Clinical Child and Family Psychology Review*, 9, 162-173

Richards A, French CC, Nash G, Donnelly N (2007), A comparison of selective attention and facial processing biases in typically developing children who are high and low in self-reported trait anxiety, *Development and Psychopathology* 19(2): 481-495

Salkovskis, P. M. & Kirk, J. (1997). Obsessive-compulsive disorder. In D. M. Clark and C. G. Fairburn (Eds.), *Science and Practice of Cognitive Behaviour Therapy* (pp. 179-208). Oxford: Oxford University Press.

Schneider, Unnewehr, Florin, Margraf (2002), Priming Panic Interpretations in Children of Patients with Panic Disorder, *Journal of Anxiety Disorders*, 16: 605-624

Schneider, Unnewehr, In-Albon, Margraf (2008), Attention Bias in Children of Patients with Panic Disorder, *Psychopathology*, 41:179-186

Shin, C, Jinyoung, K, Hyeryeon, Yi, Lee, H, Lee, J, Shin, K. (2005), Relationship between trait-anger and sleep disturbances in middle-aged men and women, *Journal of Psychosomatic Research*, 58, 183-189

Smith M.T., Perlis M.L. (2006), Who is a candidate for cognitive-behavioural therapy for insomnia? *Health Psychology*, 15–19

Spielman, A, J., Caruso, L. & Glovinsky, P. B. (1987), A behavioural perspective on insomnia, *Psychiatric Clinic North America*. 10, 541-53.

Stallard P (2003), *Think Good-Feel Good: a cognitive-behaviour therapy workbook for children and young people*, John Wiley and Sons, Chichester

Stepanski, E, Koshorek, G, Zorick, F, Glinn, M, Roehrs, T, Roth, T. (1989), Characteristics of individuals who do not seek treatment for chronic insomnia, *Psychosomatics*, 30, 421-427

Taylor, L.M., Espie, C.A., White, C.A. (2003), Attentional bias in people with acute versus persistent insomnia secondary to cancer, *Behavioural Sleep Medicine*, 1, 200-212

Teasdale, J.D. (1988), Cognitive vulnerability to persistent depression. *Cognition and Emotion*, 2, 247-274

The Gallup Organization (1995), *Sleep in America: A National Survey of U.S. Adults*. Washington, DC National Sleep Foundation

Vahtera, J, Kivimaki, M, Hublin, C, Korkeila, K, Suominen, S, Paunio, T, Koskenvuo, M, (2007), Liability to anxiety and severe life events as predictors of new-onset sleep disturbances, *Sleep*, 30, 1537-1546

Whitehouse, W.G., Turanski, W.L., & Murray, L.A. (2000). Cognitive processing anomalies in depressive mood disorders. In F Columbus (Ed.), *Advances in psychology research* (Vol. 1, pp. 111-125). Hauppauge, NY: NOVA Science Publishers

Zettler, J.I., Stollery, B.T., Weinstein, A.M., Lingford-Hughes, A.R. (2006), Attentional Bias for alcohol-related information in adolescents with alcohol-dependent parents, *Alcohol and Alcoholism*, 41, 426-430

Zigmond and Snaith (1983), The Hospital Anxiety and Depression Scale, *Acta Psychiatr Scand*, 67(6):361-370

Appendix 3.8: Amendments to the Original Research Proposal

Following further discussion with a range of colleagues at the University of Glasgow Sleep Centre, it was concluded that the initial proposal design was on a scale that was too large for completion within the time constraints of the Doctorate in Clinical Psychology course.

Therefore the design was amended such that participants could be recruited and take part in the research within one time slot. Contact was made with the Glasgow Science Centre, and it was agreed that an area would be made available for the research to take place on their site, over a series of weekends. For practical reasons, this change resulted in the removal of some experimental procedures, for example actigraphy recordings were replaced with questionnaire measures of children's sleep. Procedural substitutions were made on the recommendations of senior colleagues working in the area.

The changes had the resultant effect of significantly reducing participant burden, as was appropriate, given the pilot nature of the study.

All amendments were approved by the NHS Greater Glasgow and Clyde Research and Ethics Committee.