

**THE ROLE OF COGNITION IN UNDERSTANDING THE  
SLEEP- AGGRESSION RELATIONSHIP IN A FORENSIC  
PSYCHIATRIC SAMPLE.**

**By**

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A thesis submitted in partial fulfilment for the requirements for the degree of  
Doctor of Philosophy at the University of Central Lancashire

**July 2020**

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## **ABSTRACT**

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This PhD program of work aimed to better understand the role of cognition in the sleep-aggression relationship, drawing on findings from the literature and the perspective of forensic psychiatric patients. The research aimed to develop a preliminary model to explain the potential contribution of cognition in the relationship between poor sleep and two types of aggression: outward (i.e. towards others) and inward aggression (i.e. towards the self). A theoretical framework is important to better understand why some individuals may be more susceptible to aggression following poor sleep. This may help guide clinical applications.

A systematic literature review was conducted to determine the relevant cognitions in the sleep-aggression relationship. Eighteen research papers were appraised for quality and subsequently qualitatively analysed using Thematic Analysis (Braun & Clarke, 2006). As predicted, sleep was associated with both inward and outward aggression in all eighteen studies. However, this was dependent on the type of sleep (sleep duration, sleep quality, insomnia, or nightmares) and type of aggression measured. The Thematic Analysis identified four main themes associated with cognition ((1) repetitive and negative thinking: rumination and worry and hopelessness; (2) sleep perception: beliefs about sleep and perceptions of sleep quality; (3) perceived disconnect from others; and (4) negative appraisals: situational and self-appraisal of coping ability). These findings emphasised the diverse contribution of cognition to the sleep-aggression relationship and a need to further explore this area.

Study One recruited 31 male forensic psychiatric patients to qualitatively explore specific sleep problems experienced. Using a semi-structured interview, participants explored two periods of sleep: a period of enough and a period of insufficient sleep. It was predicted that participants would report both poor sleep quality and short sleep duration. This was partially supported, with participants discussing how sleep quality

was independent from sleep duration, but that they, generally, did not sleep well. As predicted, participants also identified cognitive factors that contributed to sleep disruption including rumination and worry, but also a number of other factors that prevented sufficient sleep. Participants highlighted that poor sleep can alter behaviour, including increasing verbal aggression, yet physical aggression and inward aggression were not highlighted by participants to be a consequence of poor sleep.

Study Two involved a cross-sectional study of male forensic psychiatric patients. Forty-two participants were included. As expected, a higher number of participants experienced poor sleep quality than good sleep quality, as determined by a number of indicators of poor sleep. More participants also reported short sleep duration. However, when exploring subjective sleep quality and night-time disturbances, more participants described that they slept well and had fewer night-time disturbances. In contrast to predictions, those with poorer subjective sleep quality had fewer recorded incidents of self-harm when exploring aggressive incidents. However, poor sleep quality and increased night-time disturbances were associated with both self-reported inward and outward aggression. Participants who reported poor subjective sleep quality were more likely than those with good subjective sleep quality to make prosocial attributions. The findings indicate that perception of poor sleep may reduce the likelihood of accessing prosocial scripts and schemas.

The final study was a feasibility trial of a Mindfulness intervention intended to improve sleep from the same population as Study Two. Participants were randomly assigned to one of three interventions: Mindfulness, Sleep Education, and Treatment as Usual (control). Participants were asked to complete measures at four time points: baseline, (control) immediately following the intervention, eight weeks, and 12-weeks after the baseline measures were recorded. Attrition rates and participant characteristic were recorded to determine whether this was a feasible trial. Additionally, the effectiveness

of the sleep interventions was also explored. Small improvements to sleep quality indicators were found in both intervention groups. Cognitions, including dysfunctional beliefs about sleep and social climate evaluations, showed significant improvements in those assigned to the Mindfulness intervention, with some improvements also evident in those assigned to Sleep Education. However, only small improvements were found for trait aggression and self-harm.

The current research indicates that cognition is multifaceted in the relationship between sleep and outward and inward aggression. The research suggests that interventions should be tailored to individual needs and should consider the cognitive factors contributing to both sleep and outward and inward aggression. This thesis proposes a preliminary model that attempts to explain how experiencing poor sleep can lead to both inward and outward aggression, acknowledging the contribution of a range of cognitions.

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## ACKNOWLEDGEMENTS

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I would firstly like to thank my parents, Debra Kindon and Graham Greenwood for their unconditional love and support, not only over the last three years, but throughout my lifetime. I would also like to thank my sister, Samantha Moses, who has always been there for me.

I would like to extend my sincere thanks to my partner Matthew Williams. You have continued to support and encourage me when I needed it most. I am very grateful for your patience over the last three years.

To my work colleagues at the Ashworth Research Centre, I could not have done this without your support and cups of tea. Special thanks to Becky and Vicki for your assistance on the research and the much-needed emotional support.

I would like to thank my Director of Studies, Professor Jane Ireland. Your knowledge and wisdom are appreciated more than I can articulate. You have provided me with so many opportunities throughout my career and I will forever be thankful for your support. Also to my supervisor Professor Janice Abbott, your help and advice throughout has been so valuable at every stage of this thesis.

This research would not be possible without the participants involved and therefore special thanks are extended to those who took part.

Finally, I wish to thank Mersey Care NHS Trust for funding the research. Thank you

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## GLOSSARY

ACSS-FAD	Acquired Capability for Suicide Scale – Fearlessness About Death
ADHD-SR	Attention Deficit Hyperactivity Disorder-Self Report Scale
AERZ (ARGI)	Fragebogen zu ärgerbezogenen Reaktionen und Zielen (Anger-Related Reactions and Goals Inventory)
AHI	Apnea-Hypopnea Index
AQ	Aggression Questionnaire
ASHS	Adolescent Sleep Hygiene Scale
ASIQ	Adult Suicidal Ideation Questionnaire
ASWS	Adolescent Sleep Wake Scale
BHS	Beck Hopelessness Scale
BIS-II	Barrett Impulsivity Scale -II
CAPS	Clinician-Administered PTSD Scale
CES-D	Centre for Epidemiologic Studies Depression Scale
DASS-21	Depression, Anxiety, and Stress Scale
DBAS C-10	Dysfunctional Beliefs and Attitudes for Children and Adolescents
DDNSI	Disturbing Dream and Nightmare Severity Index
DIPC-R	Direct and Indirect Prisoner Checklist - Revised
DSI-SS	Depressive Symptom Inventory Suicidality Subscale
FSS	Fatigue Severity Scale
HIQ	Hostile Interpretations Questionnaire
HKT	Historisch Klinisch Toekomst (Historical Clinical Future)
IIS	Insomnia Impact Scale
INQ	Interpersonal Needs Questionnaire
ISI	Insomnia Severity Index
L-SASI	Lifetime – Suicide Attempt Self-Injury
MCMI	Millon Clinical Multiaxial Inventory
MFI	Multidimensional Fatigue Inventory
MSSI	Modified Scale for Suicide Ideation
NWAK	Number of nighttime awakenings

*Glossary continued*

PCL-CL	PTSD Checklist
PHQ-9	Patient Health Questionnaire
PLM	Periodic Limb Movement
PSQI	Pittsburgh Sleep Quality Index
RBVQ	revised Bully/Victim Questionnaire
RDI	Respiratory Disturbance Index
RERA	Respiratory effort- related arousal
RPQ	Reactive Proactive Questionnaire
RSQ	Response Styles Questionnaire
SBQ-R	Suicide Behaviour Questionnaire- Revised
SCS	Sleep Complaints Scale
SDL	Sleep Diagnosis List
SIQ-Jr	Suicidal Ideation Questionnaire- Jr
SOL	Sleep Onset Latency
SPS	Sleep Preoccupation Scale
SPSI-R:S	Social Problem Solving Inventory – Revised: Short
STAI	State-Trait Anxiety Inventory
SWB	Subjective Well-Being
WASO	Wake After Sleep Onset

## **CHAPTER ONE**

### **SETTING THE SCENE**

---

Consensus exists regarding the importance of gaining sufficient sleep for health (Liu *et al.*, 2017; Youngstedt & Kripke, 2004) and effective cognitive functioning (Astill, van der Heijden, van Ijzendoorn, & van Soeren, 2012; Ratcliff & van Donger, 2009). Research indicates that experiencing insufficient sleep is associated with symptoms of depression (Furihata *et al.*, 2015; Merikanto *et al.*, 2015), poor executive functioning (Anderson, Storger-Isser, Taylor, Rosen, & Redline, 2009; Tucker, Whitney, Belenky, Hinson, & van Dongen, 2010), and increased displays of aggression (Kahn-Greene, Lipizzi, Conrad, Kamimori, & Killgore., 2006; Vaughn, Salas-Wright, White, & Kremer, 2015), to name but a few.

The effects of sleep on aggression have received increased attention in recent years (Granö, Vahtera, Virtanen, Keltikangas-Järvinen, & Kivimäki, 2008; Kamphuis, Dijk, Sreen, & Lancel, 2014; Randler & Vollmer, 2013). It is evident that an association between poor sleep and increased aggression has been highlighted across various types of aggression and aggression motivation, including physical (Ireland & Culpin, 2006; Kelly & Bagley, 2017), verbal (Randler & Vollmer, 2013), psychological (El-Sheikh, Kelly, Koss, & Reuer, 2015; Kelly & Bagley, 2017), reactive, proactive, and bullying (Barker, Ireland, Chu, & Ireland, 2016; Hunter, Durkin, Boyle, Booth, & Rasmussen, 2014). Acts of aggression have been described as outward directed aggression (i.e. directed towards others). However, it has also been suggested that expressions of self-harm and suicidal behaviour are examples of inward aggression (Plutchik, 1995). Such aggression also appears associated with poor sleep with regards to non-suicidal self-injury (Liu, Chen, Bo, Fan, & Jia, 2017), suicidal ideation (Wong, Brower, & Zucker, 2011), suicide behaviours (Drapeau & Nadorff, 2017), and suicide attempts (Kim *et al.*, 2017).

The causal relationship between sleep and aggression has not been established, but literature suggests that a link exists (see Kamphuis, Meerlo, Koolhaas, & Lancel., 2012 for a review). There has been recent growing interest in the factors that may contribute to the sleep-aggression relationship. It has been hypothesised that insufficient sleep decreases an individual's ability to inhibit their self-control (Kamphuis *et al.*, 2014), which when experiencing emotive feelings, such as anger or threat, may result in aggression (Krizan & Herlache, 2016). Whilst an interesting proposition, it is argued that such a perspective is not consistent with the aggression literature, ignoring many of the factors that contribute to aggression in the absence of sleep problems. Furthermore, capturing both the sleep and aggression literature would serve to highlight the overlapping constructs that may facilitate this complex relationship. If emotional self-control contributes to the sleep-aggression relationship, there must be additional processes that result in either inward or outward aggression occurring.

Alternatively, a more cognitively informed perspective is also proposed (Krizan & Herlache, 2016), whereby sleep disruption interferes with negative interpretations of others and rational decision making in an aggressive situation, leading to unfavourable outcomes. The aggression literature (Huesmann, 1998; Anderson & Bushman, 2002) infers that firmly held beliefs, scripts, and schemas that have been learned and reinforced over time are central to an aggressive outcome. It could be suggested that disrupted sleep could make these already present cognitive biases (Beck, 1999) more accessible when provoked, decreasing the ability to access prosocial scripts and schemas (Barker *et al.*, 2016).

Krizan and Herlache (2016) also argued that the sleep-aggression relationship is reciprocal, whereby each facilitates the other via repetitive negative thinking. Increases in repetitive thought, such as rumination and worry, have certainly been highlighted as contributing to both sleep (Nota, Schubert, & Coles, 2016) and aggression (Peled &

Moretti, 2010) independently. Caprara, Manzi, and Perugini (1992) highlight that such ruminative thoughts can occur following aggression due to concerns or worries about such behaviour, and this may perpetuate sleep difficulties (Key, Campbell, Bacon, & Gerin, 2008), leading to a “self-perpetuating cycle” (Krizan & Herlache, 2016).

Given the association between sleep and aggression, it would be expected that sleep disruption could be prevalent within forensic settings, where aggression is arguably widespread, with prevalence rates of physical aggression ranging from 6% to 93% (M = 45%, see Bowers *et al.*, 2011 for a review). A systematic literature review (Dewa, Kyle, Hassan, Shaw, & Senior, 2015) found that prevalence rates of insomnia in prisons ranged from 10.8% to 80%. Their findings also revealed high levels of comorbidity between insomnia and psychiatric disorders, including depression, anxiety, and personality disorder. Further exploring sleep disruption within forensic settings, Kamphuis, Karsten, de Weerd, and Lancel (2013) found that sleep-promoting medication was a significant predictor of poor sleep in a forensic psychiatric population. There may also be factors specific to psychiatric patients, which increase the likelihood of sleep disruption beyond psychiatric diagnosis. Zust, Gruenberh and Sendelbach’s (2016), for example, found that sleep disturbances among psychiatric patients were fuelled by actual or perceived loss of social support, and night-time negative thinking about such a loss, led to a “downward spiral” of sleep problems. These findings highlight the need to address sleep problems with a psychiatric sample considering that their current environment may not necessarily support good sleep hygiene practices (e.g. using bedroom only for sleeping and getting out of bed when unable to fall asleep) (Stepanski & Wyatt, 2003).

The contribution of cognitive factors in aggression within a forensic psychiatric population is clearly important to account for. Firstly, the prevalence of both inward and outward aggression in such populations is raised, with almost 40% of patients



committing one act of aggression towards others (Bowers *et al.*, 2011) and almost 62% of patients being involved in at least one act of self-harm (Mannion, 2009). Due to the offence background of forensic psychiatric patients, aggressive scripts and schemas associated with offending samples (e.g. Gilbert, Daffern, Talevski, & Ogloff, 2013) are also likely to be present within a psychiatric population. Strongly held aggressive schemas may be more accessible when combined with psychiatric symptoms, such as paranoid beliefs and emotional dysregulation. Therefore, increased aggressive cognition may increase the likelihood of experiencing sleep problems, especially if the increase in cognition occurs at night-time, where patients may be unable to leave their bedrooms.

Current treatment for sleep problems within psychiatric care rely on medication (Rehman *et al.*, 2017). Given the range of medication many psychiatric patients are already prescribed, alternative options are likely to be more beneficial and less likely to interfere with current medication. Therapeutic treatments, such as sleep hygiene education, stimulus control therapy, and sleep restriction, may have some relevance for improving behaviour and the sleeping environment, but are unlikely to target the maladaptive cognitive mechanisms interfering with sleep. Well established treatment interventions, such as Cognitive Behavioural Therapy for insomnia (CBT-I) are time consuming and there is limited evidence to suggest that CBT-I is appropriate for a high secure institution or with patients at a high risk of aggression. Instead, using already prominent techniques, with a specific focus on improving sleep, may be beneficial for targeting sleep-related problems and improving both inward and outward aggression.

The practice of mindfulness is one intervention suggested to improve sleep disturbances (Ong, Ulmer, & Manber., 2012). Mindfulness is a technique used to place our full attention on the present moment and to limit oneself from being ‘swept away’ by thoughts and emotions (Watt, 2012). There has been increased attention of the use

of mindfulness-based therapies to improve sleep quality and quantity (Black *et al.*, 2014; Hülshager, Feinholdt & Nübold, 2015). It is suggested that mindfulness may improve sleep through a concept known as ‘decoupling’ of the self from experiences. This is altering the perspective of individuals’ experiences by learning to be aware of feelings and cognitions but accepting these in a non-judgemental way (Hülshager *et al.*, 2015). Adopting such a perspective could be beneficial for both sleep problems and aggression, with therapies incorporating mindfulness leading to a reduction in inward and outward aggression (Heppner *et al.*, 2008; Sharma, Sharma, & Marimuthu, 2016). The success of mindfulness-based therapies to improve sleep highlight the link between negative cognitions and sleep. It is therefore suggested that improvements in both sleep and aggression (inward and outward) would further highlight the cognitive link between the two.

Previous research highlights the importance of cognition in sleep and aggression independently, but less is known about the role of cognition when these two sets of principles are brought together. The current research aims to draw sleep and aggression together by examining the available literature and exploring sleep problems in a highly aggressive sample. The following chapters will expand on the available literature to further understand the contribution of cognition to sleep and to the sleep-aggression relationship, introducing several theories throughout. A systematic literature review will be presented first to explore the empirical evidence of the role of cognition in the sleep- aggression relationship. Three empirical studies will then be presented: qualitative interviews with high secure psychiatric patients; a cross-sectional study exploring the sleep-aggression relationship within high secure psychiatric patients; and a feasibility intervention study, to explore whether managing the negative cognitions associated with sleep and aggression, via mindfulness practices, are able to improve sleep and reduce aggression in high secure psychiatric patients. The research findings

and implications will be discussed throughout, with the final chapter aggregating these findings to develop a proposed model linking cognition to the sleep-aggression relationship.

## **CHAPTER TWO**

### **UNDERSTANDING SLEEP PROBLEMS AND INTERVENTIONS FOR IMPROVING SLEEP**

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#### **2.1 Structure of the chapter**

This chapter details why sufficient sleep is important, providing an overview of some of the problems experienced when insufficient sleep occurs. It provides an overview of how the “good sleeper” maintains sleep and some explanations as to why individuals may experience poor sleep. Theoretical models will be introduced, before providing a critical overview on how sleep is typically measured in order to evaluate treatment interventions. It will conclude with an overview of available treatment approaches.

#### **2.2 Introducing sleep problems**

The importance of obtaining sufficient sleep for benefits to health and wellbeing is well established. For example, Taheri, Ling, Austin, Young, and Mignot (2004) found that a shorter duration of sleep was associated with an increase in leptin and ghrelin, an indicator of obesity. Their findings remained regardless of age, sex, or Body Mass Index (BMI). Additionally, postmenopausal women with longer or short sleep duration had elevated risk of developing heart disease in comparison to those with an average length of sleep (Sands-Lincoln *et al.*, 2013). Aside from physical health problems, sleep challenges can also impact on cognitive and emotional development (see Walker, 2009, for a review), with sufficient sleep strengthening memory encoding and regulating emotions.

In the literature, the terms describing an inability to obtain sufficient sleep are used inter-changeably. Terms such as sleep disturbances, sleep quality, and sleep problems are all examples of sleep perception (i.e. an individual’s subjective view of how they experience sleep). Table 2.1 provides a list of terms and their definitions, yet all are

considered to be perceptions of sleep. Generally, sleep problems are best described as an interruption in the onset or maintenance of sleep. Whilst most will experience poor sleep to some extent over their lifetime, some individuals develop specific sleep disorders, for example insomnia, where significant disruption to sleep can result in negative mental and physical health consequences (Roth, 2007). Whilst understanding sleep disorders is important in developing effective treatments, the focus of this thesis is the perception of poor sleep. To understand the potential mechanisms contributing to poor sleep, an understanding of good sleep is first outlined.

Table 2.1 Sleep terms and definitions<sup>1</sup>

Sleep term	Definition
Sleep quality	Satisfaction or dissatisfaction with overall sleep experience
Sleep quantity/ duration	Total amount of time asleep
Sleep disturbances	Interruption to the onset of sleep or the maintenance of sleep
Sleep deprivation	Loss of sleep due to experimental manipulation or circumstance
Sleep restriction	Experimentally induced or situation reductions in total amount of time asleep

### 2.3 Regular sleep

During regular sleep the brain shifts between two states of brain activity; non-rapid eye movement (NREM) and rapid eye movement (REM). Measured by electroencephalography (EEG), NREM is divided into three stages, which range from stage one (drowsiness) to stage three (deep sleep) (Saper, Fuller, Pedersen, Lu, & Scammell, 2010). REM sleep, as the name suggests, includes Rapid Eye Movement (REM) and breathing, with an almost complete loss of skeletal muscles (Saper *et al.*, 2010). Results from EEGs determine that rather than a restful period of inactivity, the brain is highly active during sleep periods. To gain an understanding of how sleep is regulated, the *Two-Process Model of Sleep Regulation* (Borbély, 1982) can be particularly useful to account for.

<sup>1</sup> Gellman & Turner (2013)

The *Two-Process Model of Sleep Regulation* (Borbély, 1982) is a widely accepted model explaining how sleep is regulated by the interaction of two processes: circadian rhythms and sleep homeostasis. Sleep homeostasis (or ‘process S’) is the pressure for an individual to sleep. It increases during wakefulness and decreases during sleep and is considered the basic mechanism of sleep regulation (Otte & Carpenter, 2010). Slow wave sleep (SWS) activity, as measured by EEG, is a marker of a decrease in ‘processes S’. In comparison, body temperature and melatonin rhythms represent circadian rhythms (‘process C’); these are the body’s internal clock that functions across periods of approximately 24 hours (Borbély, Daan, Wirz-Justice, & Deboer, 2016). Research indicates that whilst these two processes work in synchrony under natural conditions (Harvey, Murray, Chandler, & Soehner, 2011), each process is independent of the other (Borbély *et al.*, 2016).

Applying the *Two-Process Model of Sleep Regulation* (Borbély, 1982) to sleep deficits, ‘process S’ compensates by increasing the duration and intensity of sleep, resulting in more sleepiness during waking hours and a stronger desire to achieve sleep during this time. In further understanding how insomnia develops, the *Two-Process Model of Sleep Regulation* (Borbély, 1982) has been applied to models of insomnia, which have emphasised the importance of sleep homeostasis and circadian rhythms. However, Borbély’s (1982) model does not identify additional psychological or social factors that may contribute to sleep regulation, or describe how it develops. The *Psychobiological Model of Good Sleep* (Espie, 2002) was instead proposed to include such factors and further understand how insomnia can develop. Espie (2002) aimed to account for how social and psychological factors explain how individuals sleep well.

The *Psychobiological Model of Good sleep* (Espie, 2002) incorporates the *Two-Process Model of Sleep Regulation* (Borbély, 1982) with sleep homeostasis and circadian rhythms under normal circumstances, resulting in good sleep (i.e. good sleep, not

insomnia, is the default). It recognises that sleep is an automatic, involuntary process and is flexible, meaning that an individual has the capability to adapt to variabilities in their sleep schedules (Espie, 2002). These processes are maintained by four interacting subsystems: sleep-related stimulus control, daytime facilitation of night-time sleep, sleep-related physiological de-arousal, and sleep-related cognitive de-arousal. The latter two also interact with affect regulation (Otte & Carpenter, 2010).

Gaining an understanding of how normal sleep is regulated offers some insight into the processes that may be interfering with regular sleep. Whilst Borbély (1982) has emphasised the physiological components, Espie (2002) incorporated psychological components in the model of good sleep. Attention is next focused on understanding when poor sleep occurs, drawing from theoretical perspectives of insomnia. It is noted that elements from the insomnia literature can be applied to the perception of poor sleep, yet it may not fully capture the perception of sleep.

#### **2.4 Understanding poor sleep: psychological elements**

The *Two-Process Model of Sleep Regulation* (1982) highlights the biological contributions of good sleep (e.g. how sleep homeostasis interacts with circadian rhythms). However, additional contributions must also be considered, such as behavioural, social, and cognitive factors. As described, the *Psychobiological Model of Good Sleep* (Espie, 2002) incorporates these factors, but other models are also important to consider. The *Three P Model of Insomnia* (Spielman, Caruso, & Glovinsky, 1987) is one such model.

The *Three P Model of Insomnia* (Spielman *et al.*, 1987) outlines how insomnia develops and is maintained due to social, biological, and psychological factors likely to predispose, precipitate, and perpetuate insomnia. Predisposing factors increase the vulnerability of insomnia occurring. These are often linked to biological and

psychological factors. Investigating potential risk factors for poor sleep in a large community sample (N=2001) from Canada, LeBlanc *et al.* (2009) conducted telephone interviews with participants using health-related questionnaires. Among their findings, they found that those with family history of sleep problems were 2.96 times more likely to develop such problems than those without a family history. Whilst these findings may highlight the biological factors that predispose individuals to sleep problems, their data was based on the self-report of participants, as opposed to discussing this with their family or examining family documentation about their history of sleep problems and may, therefore, not be an accurate representation. Their findings also revealed that depressive and anxiety related symptoms were more prevalent in those with sleep problems (LeBlanc *et al.*, 2009); thus supporting the *Three P Model of Insomnia* (Spielman *et al.*, 1987) in relation to the risk factors predisposing sleep problems.

Precipitating factors are categorised by the onset of physical or mental health conditions or negative life events (Perlis, Shaw, Cano, & Espie., 2011). Such a perspective fits with other models of psychiatric vulnerability, for example the *Stress-Vulnerability Model* (Zubin & Spring, 1977), which indicates that biological and stress vulnerabilities make individuals more susceptible to psychiatric disorders. Research indicates how notable stressors in an individual's life occur prior to the onset of sleep problems, with 78.3% of treatment seeking individuals experiencing at least one stressful life event prior to the onset of sleep difficulties (Bastien, Vallières, & Morin, 2004). Perpetuating factors are those maintaining sleep problems. These typically include behaviours and thinking styles that exacerbate sleep problems. For example, napping during the day may be used to overcome sleeplessness, but it maintains the sleep problems experienced at night (Spielman *et al.*, 1987). Such behaviours are likely to increase negative thoughts and beliefs about the consequences of not obtaining sufficient sleep (Spielman *et al.*, 1987).



The *Three P Model of Insomnia* (Spielman *et al.*, 1987) is one of the first to extend beyond the biological factors associated with sleep. The model proposes that sleep restriction is an effective way to eliminate the perpetuating factors. A detailed discussion of the effectiveness of sleep restriction therapy will be presented later, yet there is little evidence of sleep restriction as a stand-alone therapy (Perlis *et al.*, 2011). The model is also unable to account for instances when sleep problems may occur without the presence of one of the three factors (i.e. predisposing, precipitating, and perpetuating factors). For example, a stressful life event may trigger insomnia without the presence of predisposing factors. The model posits that each of the three Ps (predisposing, precipitating, perpetuating) must be present for insomnia to occur and be maintained, but the interaction of these three processes are not emphasised. Thus, whilst the *Three P Model of Insomnia* (Spielman *et al.*, 1987), offers some insight into the development of difficulties sleeping, it is unable to explain the transition from each of the “three Ps”.

In an attempt to overcome some of the limitations of the *Three P Model of Insomnia* (Spielman *et al.*, 1987), Morin (1993) developed the *Microanalytical Model of Insomnia* (MMI) (Morin, 1993). This integrative model aims to understand how sleep problems can become self-perpetuating, highlighting that insomnia occurs at some level due to physiological and emotional arousal but it is the impact of cognitive arousal that is stressed (Marques, Allen Gomes, Clemente, Santos, & Castelo-Branco, 2015). Such arousal (or activation) mediates the other factors within this model, namely dysfunctional beliefs about sleep (e.g. unrealistic expectations and worry over sleep loss), maladaptive habits associated with sleep (e.g. spending excessive time in bed and daytime napping), and the appraisal of the negative consequences associated with poor sleep (e.g. impairments to performance and mood disturbances) (Morin, 1993). The interaction between these factors leads to a “vicious cycle” (Ong *et al.*, 2012).

The MMI provides some insight into the role of increased cognitive activity prior to sleep onset, limiting an individual's ability from gaining sufficient sleep. It further highlights how dysfunctional beliefs and attitudes about sleep are associated with sleep. Research has highlighted the link between such cognitions and an increase in sleep problems. For example, a recent study found that in 1, 333 Chinese college students, those with poorer sleep quality reported more dysfunctional beliefs and attitudes toward sleep (Jin, Zhou, Peng, Ding, & Yuan, 2018). However, less is known about how such dysfunctional beliefs are developed. More attention has focused on how dysfunctional beliefs serve to maintain symptoms of insomnia as described in the *Cognitive Model of Insomnia* (Harvey, 2002).

The *Cognitive Model of Insomnia* (CMI, Harvey, 2002) is based on the anxiety literature outlined by Clark (1999). It argues that individuals control their anxiety due to safety seeking behaviours, attentional deployment, spontaneous imagery, emotional reasoning, memory processes, and the nature of the threat representation (Harvey, 2002). The model highlights that sleep problems are maintained by negative and excessive pre-sleep cognitive activity, whereby there is preoccupation with achieving and maintaining good quality sleep (Harvey, 2002). This concern triggers physiological arousal and emotional distress, forcing the individual into a state of anxiety. This anxiety results in the individual monitoring night-time and day-time signals, which may indicate that they have experienced poor sleep quality. For example, bodily sensations that are consistent and inconsistent with poor sleep, environmental factors, and clock monitoring (Harvey, 2002). Constant monitoring leads an individual to view disruption to their sleep as threatening. This distorts their perception of their sleep quality. For example, they may be more likely to blame poor performance at work on their poor sleep quality and may overestimate the deficiency in their sleep. Furthermore, rumination about the need to sleep increases, leading to further cognitive activity, with

sleep problems consequently maintained (Harvey, 2002).

Additionally, akin to the MMI (Morin, 1993), the CMI (Harvey, 2002) draws attention to the maladaptive beliefs about sleep (e.g. how many hours of sleep is needed to feel well rested) and safety behaviours (e.g. suppressing thoughts and imagery control) which further exacerbate negative cognitive activity. Therefore, sleep problems are maintained by the behaviours that are associated with the increase in cognitive activity, limiting an individual from rejecting their maladaptive beliefs and further increasing their level of worry.

The CMI (Harvey, 2002) differs from previous models, however, by outlining why sleep problems are maintained in some individuals but not others. For example, those with chronic insomnia are argued to experience more night-time arousal (see Bonnet & Arand, 2010, for a review). Such individuals may also be more likely to apply safety behaviours, have more unhelpful beliefs, and more excessive cognitive activity, as identified in Jansson-Frömark, Harvey, Norell-Clarke, & Linton's (2012) cross-sectional study of the general population (N=1,890). The findings highlight that these cognitive factors are relevant not only to night-time sleep but also wakefulness in the daytime. With the CMI, Harvey (2002) also considers the 'waking state', rather than focusing solely on the pre-sleep routine, which other models focus on (e.g. the MMI, Morin, 1993). Emphasis on the waking state of individuals with insomnia is as vital as their night-time experiences. Research indicates that excessive daytime sleepiness is associated with psychological well-being. Kao *et al.* (2008), for example, found in their large sample of the general population (N= 36, 743), increased sleepiness during the day was associated with decreased life satisfaction and optimism about the future. Furthermore, the CMI also aims to expand on implications for treatment, again focusing on both night-time and daytime factors (Harvey, 2002).

However, the CMI (Harvey, 2002) does not provide an explanation as to the precipitating factors of poor sleep. Whilst it is highlighted that excessive cognitive activity is the starting point in this model, unlike with other models (e.g. the *Three P Model of Insomnia*), the CMI does not outline how this begins. Causality is suggested throughout the CMI, indicating that sleep problems are a result of excessive cognitive activity, which in turn, leads to other negative effects. Cross-sectional studies highlight that those with insomnia experience more negative pre-sleep arousal, such as negatively toned cognitive activity (i.e. appraising sleep immediately upon awakening), than those who sleep well (Nelson & Harvey, 2003). However, whilst the longitudinal evidence indicates that negative pre-sleep cognitive activity can predict sleep problems 18 months later in a general population sample (Norell-Clarke, Jansson-Frömark, Tillfors, Harvey, & Linton, 2014), such longitudinal evidence is limited to this single study. Norell-Clarke *et al.* (2014) also did not indicate whether such sleep problems were single episodes or one continuous episode, making it difficult to determine whether pre-sleep arousal was the precipitator for insomnia in their participants. Nonetheless, whether an increase in negative cognitive activity is a precipitator or perpetuator to sleep problems, the *Three P Model of Insomnia*, the MMI, and the CMI, all indicate that cognition is important in understanding poor sleep. A further model, the *Psychobiological Inhibition Model of Insomnia* (PIM, Espie, 2002), which has already been outlined in relation to good sleep, also indicates how sleep problems may develop. The PIM proposes that sleep problems occur due to an inhibition of sleep homeostasis, circadian rhythms, and sleep quality that maintains good sleep (Espie, 2002). In individuals with poor sleep, such factors are inhibited by poor sleep-related stimulus control, increased daytime facilitation of night-time sleep, and increased sleep-related physiological and cognitive arousal. For example, whilst good sleepers are likely to adopt sleep stimulus control, such as regular sleep habits, poor sleepers are more likely

to have variable sleep patterns. This contributes to the experience of poor sleep (Espie, 2002).

Whilst the PIM highlights that an individual with poor sleep has a decreased ability to inhibit wakefulness due to the four interacting subsystems, the role of cognitive arousal is emphasised. Espie (2002) proposes that an increase in cognitive arousal noted at bedtime was a largely contributory factor in the maintenance of sleep problems, which is part of the PIM (Espie, 2002) and which Espie, Broomfield, MacMahon, Macphee, & Taylor (2006) termed the *Attention – Intention – Effort pathway* (AIE).

#### *Attention – Intention – Effort Pathway (Espie et al., 2006)*

The AIE pathway proposes that significant sleep problems are maintained by an increase in selective attention to sleep-related cues, which drives an individual to crave more sleep and focuses them on obtaining sufficient sleep (Espie *et al.*, 2006). When this is not achieved, the individual is more likely to direct their attention to the need for sleep, with the need for sleep becoming a threat (Espie *et al.*, 2006). Such constant monitoring of threat-related stimuli (i.e. monitoring dysfunction, which may be associated with poor sleep), may contribute to dysfunctional beliefs about sleep (Espie *et al.*, 2006). This component is suggested to be the “scanning mode”, namely inspecting for risks and threats that may interfere with sleep (Espie *et al.*, 2006).

The intention element of the AIE pathway, suggested to be the planning mode, focuses on the explicit intention to sleep (Espie *et al.*, 2006). This differs from attention, as it allows attention to be directed towards the goal (i.e. of gaining sufficient sleep). The intention to sleep for those who are considered to be good sleepers is more likely to be implicit in comparison to the explicit intention that poor sleepers are likely to have. Espie *et al.* (2006) gives the example of reading in bed; whereby a good reader will have the explicit intention of staying awake in comparison to a poor sleeper who is

likely to have the explicit intention of going to sleep. Thus, the poor sleeper is less likely to obtain sleep as they are hopeful that such a strategy would help with their difficulties (Espie *et al.*, 2006).

The final component, effort, builds on from the intention to sleep but is suggested to be the performing mode. A poor sleeper is likely to try to find a solution for their problem with initiating and maintaining sleep. As a result, they evaluate their sleep and sleep practices (Espie, *et al.*, 2006). The authors also highlight that effortful response is likely to take a direct or indirect approach. The direct approach would be the increased effort to obtain sleep, whereas the indirect response would be manipulating of the sleep setting, and as a result maladaptive sleep practices develop (Espie *et al.*, 2006).

Within the literature, there is considerable evidence to indicate that the selective attention component of the AIE pathway is associated with sleep problems (Marchetti, Biello, Broomfield, MacMahon, & Espie, 2006). For example, Woods, Marchetti, Biello, and Espie (2009) compared normal sleepers (n=22) with individuals with poor sleep (n=22) and found that those with poor sleep had increased selective attention to the bedside clock. This was monitored in terms of how long they had slept and/or how much time they had until they had to be out of bed. However, due to the ease of which selective attention can be measured, it is likely that this component has received more consideration than *intention* and *effort*. The concept of selective attention extends further than insomnia research, with the concept being prevalent in psychiatric disorders, such as eating disorders (Bauer *et al.*, 2017) and anxiety (see Cisler & Koster, 2010 for a review). The *Cognitive Model of Anxiety* (Beck & Clark, 1997), for example, suggests that anxiety is a result of cognitive biases which focus an individual to the personal threat, and in this case the perceived threat is loss of sleep. There is, however, limited research with regard to the *intention* and *effort* components in subjects with insomnia.

One small scale experimental study (Rasskazova, Zavalko, Tkhostov, & Dorohov, 2014) found that when healthy individuals (n = 22) had a high intention to sleep, as manipulated by motivational instruction, they had increased waking after sleep onset and increased awakenings in comparison to those who were not given motivational instructions. This indicated that increased intention to sleep can lead to increased awakenings. However, it did not increase sleep onset latency, thus highlighting that the intentions to sleep may be more applicable to the maintenance of sleep disturbances, rather than impact the initiation of sleep. These findings are based on experimentally induced intentions to sleep, however, and the results have not been yet applied to individuals with continuous sleep problems.

Increased effort to sleep has been applied to individuals with poor sleep (Hertenstein *et al.*, 2015), with higher sleep effort associated with higher insomnia severity. Interestingly, these findings are only applicable to those with poor sleep perceptions, as when objectively measured via polysomnography, there was no association between total sleep time and sleep effort. Taken together, the findings demonstrate that increased attention, intention, and effort may play a part in the maintenance of sleep difficulties, although more research is needed with regards to the latter two components.

The PIM, and specifically the AIE pathway associated with it, offers some direction as to how sleep problems may be maintained. It also provides an indication of what treatment could effectively target these components to improve sleep. This will be outlined later in this chapter. However, the PIM, and the other models previously described (i.e. *Three P Model of Insomnia*, Spielman *et al.*, 1994; MMI, Morin, 1993; CMI, Harvey, 2002) focus on primary insomnia, with the assertion that it is a sleep disorder. However, sleep problems do not necessarily equate to a sleep disorder. Moreover, sleep problems may represent a cognitive appraisal disorder. It is debated that it is the evaluation of the period of sleep that would indicate whether someone has

difficulties sleeping (Lichstein, 2017). This would fit with the cognitive elements described previously, such as an increased attention sleep variations and subsequent daytime functioning (i.e. CMI, Harvey, 2002; AIE, Espie *et al.*, 2006). This alternative view may also be relevant to individuals who perceive their sleep to be poor.

The term *paradoxical insomnia*, or *sleep state misperception* (Perlis & Gehrman, 2013), has received increased attention in recent years. An individual's objective measure of initiating and maintaining sleep appear normal, but the individual perceives their sleep to be of shorter duration than it is (Krahn, 2007). In a similar vein to sleep state misperception, Lichstein (2017) has recently described the term *insomnia identity*, whereby an individual is aware of the amount of sleep they have gained but perceive this to be an inadequate amount of time. The difference between paradoxical insomnia and insomnia identity is where the former is driven by a misperception, the latter is drawn by a cognitive bias. For example, an individual with sleep state misperception may obtain six hours sleep but misperceives the duration and believes that they obtained four hours sleep. An individual with insomnia identity may obtain six hours sleep, but they interpret this to be an inadequate amount.

The concept of sleep misperception was highlighted by Lundh and Broman (2000). Their review paper outlined how sleep problem may be developed and maintained due to two processes. Sleep interfering processes, namely the importance of physiological, affective, and cognitive arousal and their interaction, and sleep interpreting processes. Sleep interpreting processes are relevant to insomnia identity and sleep state misperception and include the following: (1) the perceptions of sleep obtained; (2) beliefs about sleep and the consequences of not obtaining enough; (3) cognitively appraising sleep; (4) attributions of the variation of sleep, and (5) attributing poor daily functioning to poor sleep (Lundh & Broman, 2000). They argue that it is the mutual interaction between sleep interfering and sleep interpreting processes that lead to sleep



problems. The interaction between these two processes may provide some direction in terms of treatment. Treatment could be aimed at targeting both processes, rather than just sleep interfering processes, as other models suggest.

Despite some of the limitations, the models outlined (i.e. the *Three P Model of Insomnia*, Spielman *et al.*, 1987; MMI, Morin, 1993; CMI, Harvey, 2002; AIE, Espie *et al.*, 2006) have been influential in theoretically understanding how sleep problems can be developed and maintained. They each highlight that the cognitive processes may be relevant in the development of the sleep problems, and recent research has indicated the importance of cognitive appraisal in reference to sleep (Lichstein, 2017). With this considered, in order to improve sleep, treatment should arguably target the cognitive factors associated with it. In order to understand effective treatments, however, an understanding of how poor sleep is measured needs to first be explored.

## **2.5 Measuring poor sleep**

As noted, poor sleep is defined as an inability in initiating or maintaining sleep (Marques *et al.*, 2015), with a preoccupation in gaining sufficient sleep and experiencing the negative consequences of such disruption. Whilst there are techniques used to objectively measure sleep disruption, such techniques would be more appropriate in understanding specific sleep disorders (i.e. insomnia, sleep apnea, restless leg syndrome). There are a number of self-report tools that measure an individual's perception of sleep. In order to effectively treat sleep problems and measure clinical change, the extent of an individual's sleep disturbances must be identified. To establish the efficacy of some of these measures an overview of the subjective measures of sleep is outline

### *Subjective measures*

Self-report measures are used clinically and for research purposes (Moul, Hall,

Pilkonis, & Buysse, 2004). Morin, Belleville, B elanger, & Ivers (2011) argue that whilst there are a range of measures to assess sleep problems, few are able to effectively evaluate treatment outcome. The Insomnia Severity Index (ISI, Bastien *et al.*, 2001) is one example of a measure used to effectively measure treatment outcome in research when compared with sleep diaries (Bastien *et al.*, 2001). Based on the insomnia diagnostic criteria outlined in the ICSD-3 (2014), it is able to effectively measure both disruption to night-time sleep and daytime functioning to assess insomnia prevalence (Sadeghniaat-Haghighi, Montazeri, Khajeh-Mehrizi, Nedjat, & Aminian, 2014). The ISI (Bastien *et al.*, 2001) comprises seven items broadly relating to current (i.e. within the last two weeks) insomnia severity, satisfaction with sleep, interference with daily functioning, impact on quality of life, and the distress it causes. Although subjective, this measure also allows clinicians and significant others to complete it based on the insomniac's presentation (Morin *et al.*, 2011). The ISI can also be used with all types of insomnia (e.g. psychophysiological, comorbid, idiopathic), although it does not distinguish between these. It is therefore not a measure used to assess insomnia subtypes (Bastien *et al.*, 2001). In comparison to other sleep measures, the ISI asks raters to assess the severity of their symptoms but does not consider the frequency. Therefore, the ISI is unable to assess whether symptoms were a one-off severe occasion or experienced frequently.

Another treatment outcome measure is the Pittsburgh Sleep Quality Index (PSQI, Buysse *et al.*, 1989). This differs from the ISI by including an item to assess the use of sleep promoting medication and by asking respondents to estimate their sleep onset and duration. It also asks individuals to rate the frequency of their sleep disturbances, something that is not accounted for in the ISI. The PSQI may be more relevant for determining poor sleep, rather than insomnia specifically. For example, it may identify that an individual may take more than 30 minutes to get to sleep, but that the individual

is able to maintain sleep (Buysse *et al.*, 1989). Although a global score is calculated to assess the severity of difficulties initiating and maintaining sleep, component scores can also provide valuable information about specific sleep problems. Cole *et al.* (2006) have argued that a three-factor model of the PSQI provides scoring that is more reflective of the PSQI in comparison to other models. These include “sleep efficiency”, “daily disturbances”, and “perceived sleep quality”. Identifying these three factors not only highlights the potential problems that an individual experiences in regard to night-time disturbances, but can also highlight sleep misperception or insomnia identity, as outlined earlier.

With less focus on the overall experience of night-time sleep, as with the PSQI and ISI, the Dysfunctional Beliefs and Attitudes about Sleep (DBAS, Morin, 1993) assesses sleep related cognitions. The DBAS does not ask the rater about their own experiences of sleep, rather they are asked to rate how much they agree with statements consistent with typical sleep-related beliefs. There is less emphasis on sleep quantity and quality. The DBAS is thought to be a good indicator of poor sleep (Morin, Vallières, & Ivers., 2007), with those scoring higher having more negative beliefs about the consequences of insomnia. Carney, Edinger, Manber, Garson, and Segal (2007) concluded that such negative beliefs about sleep were also evidenced in those experiencing additional mental health concerns (e.g. mood disorders), and not solely when experiencing sleep difficulties without psychiatric difficulties. Such findings further highlight the contribution of cognition to sleep problems and imply that measuring cognitive factors is of paramount importance.

In addition to self-report questionnaires, individuals may also be asked to complete sleep diaries over a specific period. Carney *et al.* (2012) describe sleep diaries as the “gold standard” with regard to subjective sleep measures, despite a lack of consensus on a standardised format. Individuals are asked to complete their sleep diaries every

morning, detailing their sleep the night before. This relies less on their memory over the past month or two weeks (Moore, Schmiege, & Matthews, 2015).

## **2.6 Improving sleep**

Considering the theoretical perspectives outlined earlier, the following section discusses some of the interventions currently available to help improve sleep. Pharmacological and psychological treatments, and their possible complications, will each be outlined in turn.

### *Pharmacological interventions*

Despite the use of medication to assist in improving sleep being widely disputed (e.g. Jacobs, Pace-Schott, Stickgold, & Otto, 2004), there are currently a range of pharmacological interventions arguably used to help with sleep problems. These include (1) benzodiazepines (BZDs); (2) Z drugs; (3) antidepressants; (4) antihistamines; and (5) antipsychotics. BZDs are the most commonly prescribed medications (Fulke & Vaughan, 2009). They produce a sedative effect (Mendelson, 2000). Research has suggested that BZDs can improve the parameters of sleep, including reducing sleep onset latency and increasing total sleep time (see Holbrook, Vrowther, Lotter, Cheng, & King, 2000 for a review). Additionally, Simon and Ludman (2006) found that global PSQI scores showed significant improvements in older adults (n = 129) who were prescribed with BZDs. However, participants were asked to retrospectively rate their sleep prior to receiving the BZDs prescriptions and may therefore have over-estimated their sleep disruption. The positive effects of BZDs may also be limited to sleep quantity, rather than quality (Simon & Ludman, 2008).

The long-term use of BZDs are thus questioned and chronic use is not recommended as the user can build up a tolerance to its sedative effects (Kurko *et al.*, 2015; Vinkers & Olivier, 2012). Users can also experience withdrawal effects, with longer average

sleep latency and more night-time awakenings after the first night of withdrawal (Bourgeois, Elseviers, Van Bortel, Petrovic, & Stichele, 2014; Poyares, Guilleminault, Ohayon, & Tufik, 2002). Long term use of BZDs has also shown a decrease in cognitive functioning, with one meta-analysis comprised of 13 studies indicating that BZDs users were more impaired than controls in all 12 of their studied variables, including problem solving and working memory (Barker, Greenwood, Jackson, & Crowe, 2004). Considering the impact of healthy sleep on cognitive functioning (Diekelmann, 2014), further impairing the effects of sleep deprivation by using BZDs appears counter-productive.

In addition to BZDs, Z-drugs mimic the effects of BZDs by enhancing GABA to induce sleepiness, but the side effects are thought less severe (Agravat, 2018). In contrast to BZDs, Z-drugs do not reduce feelings of anxiety and are primarily used for treating insomnia (Najib, 2006). Whilst the effects on sleep are similar to those of BZDs (e.g. reduce sleep onset latency, Najib, 2006), there is evidence that Z-drugs can produce some side effects, including daytime sedation, bitter taste, headaches, and cognitive impairment (Schaffer *et al.*, 2015). Z-drugs can also be addictive (Liu, Xu, Dong, Jia, & Wei, 2017), making withdrawal from the medication a difficult process.

Given the negative effects of long-term use of BZDs and “Z-drugs”, alternative non-sleep specific medications have been recommended. For example, antidepressants (Walsh & Engelhardt, 1992), antihistamines (Reed & Findling, 2002), and antipsychotics (Brower, 2015) have all been proposed as alternatives to BZDs and “Z-drugs”. Given the association between insomnia and depression (see Li *et al.*, 2016, for a review), it is expected that antidepressants would improve sleep quality in those with depression. In a Randomised Control Trial of 306 male and female adults with insomnia, Walsh *et al.* (1998) found that antidepressants were superior to placebo in reducing subjective sleep latency and in increasing self-reported sleep quantity.

However, their study only accounted for short term differences in sleep (over two weeks), with it noted that the long-term effects of antidepressants for sleep are rarely measured (Wiegand, 2008). Indeed, Liu *et al.* (2017) argue that although antidepressants may increase total sleep time in comparison to controls, they are also more likely to experience daytime sleepiness. Thus, antidepressants may be able to reduce de-arousal at night-time due to the sedative effects, but such de-arousing effects may last into the day.

Similarly, the sedative effects of antihistamines and antipsychotics are proposed to improve insomnia symptoms (Reed & Findling, 2002), although less is known about how such effects are produced in antihistamines (Fulke & Vaughan, 2010). Although there is some evidence of increase in total sleep time and decrease in sleep onset latency (e.g. Morin, Koetter, Bastien, Ware, & Wooten, 2005), there are complications with regards to dependency and abuse of both drugs (Coe & Hong, 2012). Antipsychotic medication, however, is only preferred when there is the presence of a mood or psychotic disorder (Brower, 2015). Therefore, whilst it may be suitable for those with difficulties with psychosis, the treatment for individuals without such difficulties is not recommended.

Overall, sleep medications appear to have some utility in improving some aspects of sleep, particularly in decreasing sleep onset latency and increasing total sleep time (Holbrook *et al.*, 2000; Najib, 2006; Walsh *et al.*, 1998). Yet, BZDs, Z-drugs, antidepressants, antihistamines, and antipsychotics also show some similarities in the negative effects that long term use can induce. This includes becoming tolerant to the effects of the medication, experiencing negative withdrawal symptoms, and becoming dependant on the use of such medications. Indeed, one study found that in 122 participants with schizophrenia, sleep problems worsened when withdrawing from antipsychotics (Chemerinski *et al.*, 2002). There is also some evidence to suggest that

whilst some medications can improve night-time sleep, the disruption to daytime functioning remains (Liu *et al.*, 2017). With the potential of overcoming these limitations, psychoeducational and therapeutic interventions are worthy of exploration.

#### *Psychoeducational and therapeutic sleep interventions*

Providing individuals with knowledge of good sleep practices, commonly referred to as sleep hygiene, may be of assistance in improving sleep. Sleep hygiene (Hauri, 1977) is the promotion of behavioural and lifestyle factors, which may be helping or hindering sleep (Li *et al.*, 2016). It aims to adhere to a set of sleeping “rules” that include lifestyle factors (e.g. regularly exercising, avoiding caffeine) and behavioural factors (e.g. regulating the room temperature, using the bedroom only for sleep) (Stepanski & Wyatt, 2003). Sleep hygiene practices may be useful in modifying some of the safety behaviours described in the *Cognitive Model of Insomnia* (CMI, Harvey, 2002). For example, insomnia sufferers may consider drinking alcohol to help them initiate sleep or feel that continuing to lie in bed, anticipating sleep onset, is helpful (Harvey, 2002). Therefore, modifying their understanding of how such practices may be maintaining their sleep problems is a relatively simple way to improve sleep (Chehri *et al.*, 2017).

Assessing the effectiveness of sleep hygiene, Kloss *et al.* (2016) randomised 120 undergraduate participants to a sleep hygiene education or sleep hygiene monitoring condition. The former included attendance to two 90 minute workshops providing sleep hygiene knowledge and aiming to target maladaptive beliefs about sleep. Those assigned to the sleep monitoring condition were provided with a sleep hygiene handout and asked to complete sleep logs. The findings revealed improvements to sleep quality regardless of condition. However, those assigned to the sleep hygiene education condition showed more improvements in maladaptive beliefs about sleep, sleep hygiene knowledge, and a decrease in sleep onset latency. Although Kloss *et al.* (2016)

refer to their workshops as sleep hygiene education, it also included cognitive therapy elements (e.g. coping with maladaptive beliefs about sleep). Such findings indicated that whilst sleep hygiene may be beneficial in improving subjective sleep quality, education alone may be insufficient.

Morin, Colecchi, Stone, and Brink (1999) suggests that sleep hygiene is rarely considered as a stand-alone treatment, and more effective interventions may combine the sleep hygiene rules with additional methods. Yet, Peach, Gaultney, and Ruggiero (2018) argue that sleep hygiene practices may be overlooked when considering sleep interventions. Undergraduate students in their study (N = 218) responded to sleep questionnaires, which included information regarding their sleep hygiene. Those who practiced good sleep hygiene were more likely to experience good sleep quality. However, the amount of knowledge individuals had did not improve their sleep duration. Few recent studies explore sleep hygiene as a stand-alone treatment. However, knowledge of sleep hygiene practices is a common feature in multifaceted sleep programmes (e.g. CBT-I, e.g. Morin *et al.*, 2006). The incorporation of sleep hygiene practices into integrated therapies emphasises the potential contribution of sleep knowledge in improving sleep, but perhaps needs further consideration as a standalone treatment.

The *Three P Model of Insomnia* (Spielman *et al.*, 1987), outlined earlier, indicates that perpetuating factors can increase the likelihood of experiencing poor sleep. For example, daytime naps to overcome daytime sleepiness are likely to result in more difficulties in obtaining sleep the following night (Spielman, 1987). Extending sleep during the day is likely to prolong time awake in the long term, leading to a mismatch in sleep opportunity and sleep ability (Perlis *et al.*, 2011). To overcome this, Spielman (1987) suggests that restricting time in bed can promote an earlier sleep onset and decrease the variability in sleep quantity (Spielman, *et al.*, 1987). Sleep Restriction



Therapy (Spielman *et al.*, 1989) limits an individual's time in bed, which is matched to their total sleep time, and therefore aims to reduce the sleep period. An individual's sleep opportunity is altered according to their sleep efficiency (i.e. sustaining a longer sleep duration and increasing quality of sleep will allow the "restriction window" to be increased) (Kyle *et al.* 2014). This increase is a result of a build-up of natural sleep pressure, which intends to stabilise circadian control of sleep and time spent awake. By stabilising circadian control of sleep, it is expected that there will be a decrease in both cognitive and physiological de-arousal (Kyle *et al.*, 2014).

It was argued that even short interventions of Sleep Restriction Therapy (Spielman *et al.*, 1987) can improve sleep parameters (Spielman *et al.*, 1987). Further research (Falloon, Elley, Fernando, Lee, and Arroll, 2015), randomised 97 adult insomnia sufferers to either a simplified sleep restriction intervention (n = 46) or sleep hygiene intervention (n = 51) and measured sleep quality at baseline, three month, and six month intervals. Those assigned to the simplified sleep restriction also received some information regarding Sleep Hygiene practices. Their findings revealed that the sleep restriction therapy was able to improve subjective sleep quality improve objective sleep onset latency and sleep efficiency. However, there were no differences between daytime sleepiness from baseline to six months. This may indicate that whilst Sleep Restriction Therapy (Spielman *et al.*, 1987) may decrease the variability of sleep, it cannot overcome the detrimental impacts of short sleep the following day.

A further study (Epstein, Sidani, Bootzin, & Belyea, 2012), also found that Sleep Restriction Therapy (Spielman *et al.*, 1987) improved sleep onset latency, improved sleep efficiency, and increased total sleep time in comparison to waitlist controls in 179 older adults. Yet, Sleep Restriction was not superior to other behavioural therapies, including Stimulus Control Therapy and a multicomponent intervention (comprising sleep restriction and stimulus control). Epstein *et al.* (2012) did not account for

daytime disturbances in their study, yet a review of Sleep Restriction Therapy (Miller *et al.*, 2014) suggested that it may increase daytime sleepiness. Thus, Sleep Restriction as an independent therapy may not be appropriate to overcome the sleep problems. Stimulus Control Therapy (Bootzin, 1972) is outlined next to explore alternative therapies.

Stimulus Control Therapy (Bootzin, 1972) contrasts to Sleep Restriction Therapy (Spielman *et al.*, 1987) by accommodating for wakefulness by restricting the sleeping environment. Such restriction can be used to allow individuals to become more aware of their cues for sleepiness, strengthen the cues for sleeping, and to help maintain a consistent sleep rhythm (Bootzin & Perlis, 2011). For example, whereas cues within the bedroom may prompt frustration or stress, limiting time in this environment may reduce such responses (Bootzin & Perlis, 2011). The principles of Stimulus Control Therapy (Bootzin, 1972) are (1) retiring to bed only when sleepy; (2) only using the bedroom for sleep and sex; (3) if unable to fall asleep within 20 minutes, leave the bedroom; (4) arise at the same time every morning; and (5) do not nap during the day.

Stimulus Control Therapy (Bootzin, 1972) is also rarely used as a stand-alone treatment and is more likely to be incorporated into Cognitive-Behavioural Therapy. Earlier research findings indicate that in comparison to controls, Stimulus Control Therapy (Bootzin, 1972) is more effective at improving sleep quality than controls (Morin *et al.*, 1999). However, recent research is limited, with less focus on independent Stimulus Control Therapy. Epstein *et al.* (2014) indicates that Stimulus Control Therapy is superior to a waitlist control group but note that it does not improve sleep quality or quantity more than Sleep Restriction Therapy (Spielman *et al.*, 1987).

Of the independent behavioural sleep interventions explored (Sleep Hygiene, Sleep Restriction, and Stimulus Control) each appears to show some benefit in improving

sleep, yet the studies explored have not identified whether there are clinically relevant changes in insomnia symptoms or whether changes can be sustained for more than one year. Although a combination of these behavioural interventions may strengthen the improvement seen in these interventions independently used, behavioural interventions alone may be insufficient to improve night-time and daytime problems with sleep. Such behavioural techniques make little attempt to target the relevant factors identified in the outlined models of insomnia. Therefore, Cognitive Behavioural Therapy for Insomnia (CBT-I) was devised to combine these behavioural techniques but also to account for the cognitive challenges demonstrated by the models of insomnia (e.g. CMI, Harvey, 2002).

### *Cognitive-Behavioural Therapy for Insomnia*

The basic premise of Cognitive-Behavioural Therapy (CBT) is to reduce psychological distress by targeting the thoughts and cognitions that are maintaining it (Beck, 1970). As described, symptoms of insomnia can be distressing and there are cognitive factors underpinning such distress (Espie, 2002; Harvey, 2002; Lundh & Broman, 2000). Cognitive Behavioural Therapy for Insomnia (CBT-I) aims to combine the behavioural interventions identified with cognitive techniques, targeting maladaptive cognitions about sleep in order to modify them to more adaptive beliefs (Williams, Roth, Vathauer & McCrae, 2013).

CBT-I has been highlighted to improve sleep across a range of populations, including those with primary insomnia (Morin *et al.*, 2006), cancer patients (Johnson *et al.*, 2016), and veterans with Post Traumatic Stress Disorder (PTSD, Margolies, Rybarczyk, Vrana, Leszczyszyn, & Lynch, 2013). Archer *et al.* (2009) found a CBT-I workshop successfully improved sleep and dysfunctional beliefs about sleep in 64 males with symptoms of primary insomnia. Their research was aimed at engaging individuals who

were unlikely to have sought help for their sleep problems. Participants were recruited via advertisements within leisure centres and libraries and did not include “insomnia” within the title. However, their research was based on pre-post scores, with no follow up and no control group, thus limiting its reliability to effectively reduce sleep problems.

The effects of CBT-I also extend to those with psychiatric disorders (Manber *et al.*, 2008; Taylor & Pruiksma, 2014). Manber *et al.* (2008) randomised 30 individuals with major depressive disorder experiencing sleep problems to an antidepressant medication, CBT-I, or a combination of the two. They measured sleep using both actigraphy watches and sleep diaries and found that with the exception of total sleep time, CBT-I showed greater improvements on the sleep parameters. However, this was only in combination with the antidepressant medication. Although it showed greater improvements to sleep than medication alone, it does highlight that CBT-I alone may be as beneficial as pharmaceutical interventions.

One meta-analysis determined that CBT-I was able to improve chronic insomnia symptoms (Trauer, Qian, Doyle, Rajaratnam, & Cunnington, 2015). Twenty included studies indicated that, with regards to sleep diary parameters, CBT-I showed improvements in sleep onset latency, wake after sleep onset, and sleep efficiency. However, duration of sleep did not significantly improve. Such findings are similar to those evident from behavioural interventions. This study was limited by its use of assessing sleep diary entries only and not considering other subjective measures. Assessing such measures of sleep may indicate similar findings to previous CBT-I interventions (e.g. Mamber *et al.*, 2008). Trauer *et al.*'s (2015) meta-analysis was also limited to primary chronic insomnia and a further understanding of the effectiveness of CBT-I could only be determined when including subjects with co-morbid sleep difficulties.

A further meta-analysis of 699 participants found that group-based CBT-I was able to show significant improvements for sleep parameters, including sleep latency, wake after sleep onset and sleep efficiency (Navarro-Bravo, Párraga-Martínez, Hidalgo, Andrés- Pretel & Rabanales-Sotos, 2015). Effectiveness was evident for both primary (Malaffo & Espie, 2007) and comorbid insomnia (see Geiger-Brown *et al.*, 2015 for a review). In comparison to pharmacological interventions, CBT-I had both short-term and long-term benefits (Jacobs, Pace-Schott, Stickgold & Otto, 2004), without any negative side effects, as seen with pharmacological interventions (Morin, 2006).

A further systematic review of 16 randomised clinical trials examining CBT-I in comorbid psychiatric disorders, determined the intervention was highly effective for a psychiatric population, which included symptoms of depression, alcohol dependence and hypnotic dependence (Taylor & Pruiksma, 2014). However, less is known about psychiatric patients with more complex needs, such as those with psychosis or schizophrenia.

There is evidence therefore, in terms of meta-analyses, to suggest that CBT-I is an intervention that can successfully improve symptoms of insomnia. The evidence indicates that CBT-I is useful for a variety of populations. However, further research has suggested that clinically relevant improvements are less likely, with only between 26% and 43% of patients experiencing clinical change (Ong *et al.*, 2014). Furthermore, up to 30% of insomnia sufferers had no response to CBT-I, indicating that such an approach may not be suitable for all insomnia sufferers (Morin *et al.*, 2009). It appears that with behavioural interventions, such as CBT-I, there is certainly positive progress, but further improvement is needed. The use of CBT-I does highlight the potential role of cognitions in relation to sleep disturbances, but perhaps alternative ways of restructuring maladaptive cognitions could be suggested. Such a technique would need to also aim to target the behavioural factors used in CBT-I, but perhaps with less of an

emphasis placed on these. CBT-I focuses on the contribution of maladaptive cognition, which are relevant in models of insomnia (e.g. CMI), yet physiological arousal may not be targeted in the same way. Considering this, relaxation therapy will be outlined, with some aimed at reducing physiological arousals and others focusing on cognitive arousal.

### *Relaxation*

An alternative approach to behavioural sleep interventions, relaxation, is consistent with insomnia models that highlight physiological arousal (e.g. Espie *et al.*, 2002). Relaxation techniques are aimed at reducing such arousal, allowing the individual to prepare the body for sleep state. Although relaxation techniques can reduce physical tension, they are also used to interrupt potential thought processes, as highlighted from the cognitive models of insomnia (e.g. CMI) (Neeru, Khakha, Satapathy, & Dey, 2015). The research examining the effectiveness of relaxation techniques, nevertheless, is varied, with sleep outcomes dependent on the mode of therapy (Neuendorf *et al.*, 2015). For example, biofeedback (i.e. a method used to measure muscle tension), which allows the user to monitor feelings of tension, was not found to improve sleep quality (Hauri, 1981). Biofeedback has also been compared with neurofeedback, where individuals receive feedback on cortical activity of the brain (Cortoo, De Valck, Arns, Breteler, & Cluydts, 2010). They found in their small sample of adults with insomnia (N=17) that whilst both biofeedback and neurofeedback improved total sleep time, only neurofeedback increased it to a significant level. Therefore, increasing awareness of physiological stressors may not necessarily be as beneficial as increasing awareness of neurological activity. The recognition of cognitive activity, therefore, appears important and strategies to decrease cognitive arousal may better improve sleep.

In contrast, cognitive relaxation strategies have been highlighted to improve sleep

(Edinger & Means, 2005). For example, the practice of guided imagery (imagining specific scenes) twice a day for four weeks improved all components of the PSQI (Buysse *et al.*, 1989) in pregnant women (Golmakani *et al.*, 2015). It could be argued that such cognitive relaxation strategies increased cognitive load, allowing for less focus on potential stressors and negative cognitions, which may be interrupting sleep. Using breathing techniques and medications also appeared to show an increase in sleep quality indicators (such as sleep efficiency, sleep onset latency, & sleep duration) (Tsai, Kuo, Lee, & Yang, 2015; Jain & Shapiro, 2013). However, only Jain and Shapiro (2013) measured daytime effects, in which meditation was able to improve daytime dysfunction. Relaxation techniques appeared to show some positive effects for improving sleep disruption and perhaps represent a step in the right direction in terms of treatment.

Relaxation, however, may not be able to target the maladaptive cognitions that CBT-I targets so effectively. Although, patients may be more likely to use techniques that do not require the skill of a trained Cognitive Behavioural Therapist. Therefore, relaxation may appeal to some individuals more so than CBT-I. To better target the cognitive processes of insomnia, mindfulness is suggested. There is increasing evidence of its use and effectiveness (Garland, Geschwind, Peeters, Wichers, 201; Larouche, Lorrain, Côté, & Bélisle, 2015; Wong, Ree, & Lee, 2016).

### *Mindfulness*

Mindfulness is the intention to bring awareness to the present moment, non-judgementally and with acceptance to thoughts, feelings and sensations (Carlson, 2012). Research suggests that practicing mindfulness can help alleviate symptoms of depression (Sipe & Eisendrath, 2012), anxiety (Hayes-Skelton & Wadsworth, 2015), and obsessive-compulsive disorder (Key, Rowa, Bieling, McCabe & Pawluk, 2017).

There is growing research in its use for insomnia and sleep-disorders. Before outlining the research on the effectiveness on mindfulness and sleep, the theoretical implications of how it can improve sleep will be outlined.

As noted, cognitive arousal is a key factor in the maintenance of sleep problems (Espie, 2002; Harvey, 2002). Ong *et al.* (2012) proposed the *Two-Level Model of Sleep-Related Arousal* that includes metacognitive processes. Metacognition is described as a consciousness of one's own thoughts and beliefs (Flavell, 1979). The *Two-Level Model of Sleep-Related Arousal* (Ong *et al.*, 2012) is described as a reformulation of existing models of insomnia and suggests that cognitive arousal occurs at two levels. At a primary level, arousal is increased by the cognitive activity that is directly related to the inability to sleep; it is the maladaptive cognitions that CBT-I aims to alter. At a secondary level, it is the relationship between these thoughts and their influence on sleep (i.e. how maladaptive cognitions are interpreted). Secondary arousal serves to amplify the rigid attachment and negative affective one may have about the maladaptive cognitions and this, in turn, promotes and maintains insomnia.

Furthermore, this additional perspective of insomnia highlights why CBT-I may not necessarily be the most appropriate technique. CBT-I may not effectively target the secondary arousal, with cognitive techniques aiming to alter the content of sleep cognitions. Alternatively, the metacognitive approach suggests that, with regards to the cognitive component of therapies, acceptance and mindfulness-based approaches are better able to reduce secondary arousal (Ong *et al.*, 2012) by increasing metacognitive awareness, changing the relationship with such thoughts, and adopting a new stance of balance, flexibility, equanimity, and commitment to values.

Contrary to CBT-I approaches, which focus on the content of sleep-related cognition, a metacognitive approach would suggest that sleep-related thoughts should be



accepted, but not attended to. In general, mindfulness trains the mind to make a choice of what to be attentive to (Williams & Penman, 2011). Mindfulness may therefore be reducing the cognitive dysfunction known to increase pre-sleep arousal (Lundh, 2005). Indeed, the evidence suggests that those with higher trait mindfulness are more likely to experience better quality of sleep (Howell, Digdon, Buro, & Sheptvcki, 2008). For example, undergraduate students (N = 334) who had higher trait mindfulness were better able to regulate their sleep quality, which also increased their social well-being (Howell *et al.*, 2008). Thus, increasing trait mindfulness via learnt mindfulness techniques may also increase the regulation of sleep.

Exploring the effectiveness of sleep in 64 adults with insomnia who had undertaken a four-week CBT-I intervention, Wong *et al.* (2016) randomised participants to receive further CBT-I or mindfulness therapy. Participants were further randomised to a four-week waiting period or to completing the additional intervention immediately follow CBT-I. Whilst no significant differences were found between additional mindfulness and additional CBT-I, both interventions were able to continue to improve sleep disturbances. This demonstrates improvements that are similar to CBT-I but are not necessarily as costly or time consuming (Garland, Zhou, Gonzalez, & Rodriguez, 2016).

Garland *et al.* (2014) found mindfulness was effective in increasing sleep duration and decreasing night-time disturbances in 111 cancer survivors (Garland *et al.*, 2014) when compared with CBT-I. Again, no significant differences were comparable between the two interventions, with an increase in total sleep time and a decrease in awakening after sleep onset. However, the authors argue that mindfulness approaches may be more beneficial to those who have an interest in such intervention, or perhaps those who are sceptical of cognitive-behavioural techniques.

Whilst the effectiveness of mindfulness-based intervention does not necessarily extend beyond the improvements shown with CBT-I, the evidence demonstrates that improvements are comparable. But there are additional benefits for using mindfulness approaches over CBT-I. For example, Black, O'Reilly, Olmstead, Breen, & Irwin (2014) developed a low-cost mindfulness awareness practice for 49 older adults experiencing sleep disturbances and reported significant improvements in sleep quality and an increase in mindfulness awareness.

Furthermore, the benefits of mindfulness also extend to improving co-morbid sleep disturbances. Foulk *et al.* (2014) found significant improvements in sleep problems, in addition to fewer ruminations, anxiety and depressive symptoms in 50 older adults presenting with anxiety and/or depression. These findings suggest that mindfulness is not only beneficial in improving sleep problems, but also extends to individuals with psychiatric disorders. Mindfulness interventions may also be more beneficial in psychiatric inpatients, as mindfulness session can be adapted to be short and can be guided by the individual (Garland *et al.*, 2016).

The evidence suggests that mindfulness meditations can significantly increase total wake time and sleep efficiency and decrease sleep onset latency (Gong *et al.*, 2016). Yet the findings are comparable to CBT-I. However, the benefits of mindfulness over CBT-I are clear; mindfulness is a technique that is more cost and time effective than CBT-I, and can be used effectively with individuals with psychiatric needs (Foulk *et al.*, 2014). Furthermore, mindfulness is simple, easy to understand, and less effortful than CBT approaches. Garland *et al.* (2016) also highlight that mindfulness interventions are more attractive for some patients, who may be treatment resistant to CBT-I. Therefore, mindfulness practices appear to hold clear advantages over other approaches, such as CBT-I.

## 2.7 Summary

Difficulties initiating and maintaining sleep can have serious consequences for physical and emotional well-being. Explanations of the onset and maintenance of sleep difficulties emphasise its cognitive components, suggesting that cognitive bias and sleep-safety behaviours continue to facilitate such problems. Furthermore, cognitive biases can lead to potential misperceptions about the amount of sleep obtained. The extent to which sleep problems are experienced can also be measured subjectively and these subjective measures are useful in understanding how some individual feels about their difficulties sleeping. There are also a range of treatments identified, each with differing benefits. Whilst CBT-I is currently seen as the “gold standard” of insomnia intervention, the introduction of Mindfulness techniques may help those who consider CBT-I to be too effortful or who are treatment resistant. Furthermore, there are additional benefits of Mindfulness over CBT-I including, the reduced cost of conducting such interventions and the added value of applying it to a psychiatric population. Further understanding how sleep disruption is relevant to maladaptive behaviour, specifically aggression, is required. Understanding the sleep-aggression relationship could determine the relevant factors contributing to the relationship, thereby adapting both sleep-focused and violence-focused therapy. The current exploration of sleep disruption has demonstrated the importance of cognition, and this may also be relevant to the sleep-aggression relationship.

## **CHAPTER THREE**

### **THE SLEEP-AGGRESSION RELATIONSHIP**

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#### **3.1 Structure of the chapter**

This chapter will discuss the relationship between sleep disruption and aggression and the possible factors underlying this association. Evidence supporting a link between sleep and aggression in distinct populations will first be discussed in relation to both aggression directed towards others (outward aggression) and aggression directed towards the self (i.e. self-injurious behaviour/inward aggression). The possible explanations for the relationship will be outlined, with a specific focus on the role of cognition as a contributor. Relevant models of both inward and outward aggression will be referred to. A working definition of aggression will be outlined to be used for the remainder of the thesis.

#### **3.2 The sleep-aggression relationship: overview**

There has been growing interest in the relationship between sleep and aggression. However, this relationship is complex due to the range of indicators used to assess sleep and the differences in definitions of aggression. This chapter will use a broad definition of aggression provided by Carlson, Marcus-Newhall and Miller's (1989) as "the intent to harm". Later in this chapter, a working definition will be presented and used for the remainder of the thesis.

Researchers have been exploring the effects of sleep deprivation on aggression from as early as the 1940's (Licklider & Bunch, 1946) and with reasonably consistent findings. One early animal study investigated the effects of sleep in white rats and noted an increase in aggression following 24-hour periods of wakefulness, in comparison to 12, 16 and 20 hours. Rats were placed on continuously moving treadmills, surrounded by water, to prolong the waking period. The majority of those assigned to 24 hours of

wakefulness died within three to 14 days of the experiment due to their fighting behaviour, whereas those with 20 hours of wakefulness were observed to be more irritable (Licklider & Bunch, 1946). These findings provided some support for the sleep-aggression relationship, however the researchers only observed aggression and irritability rather than accurately recording behaviours. Yet, these findings appear to have instigated an increase in the investigations of the sleep and aggression relationship, with more ensuing studies recording aggression.

Mollenhour, Voorhees, and Davis (1977), for example, measured the effects of REM deprivation on pain-related aggression in 36 albino rats. The periods of sleep deprivation were markedly longer than the 24-hour period enforced by Licklider and Bunches (1946), with the rats assigned to 72, 48, or 24 hours of sleep deprivation, and compared with a control (no sleep deprivation) group. The rats received an electric shock at intervals and those with a longer period of wakefulness had a higher number of recorded aggression. The pain elicited from the electric shocks may have increased the likelihood of aggression occurring, and sleep deprivation could have been an interacting factor, increasing the experience of pain.

In addition to animal studies, there is evidence to indicate that an increase in pain is associated with sleep restriction in human participants (Haack & Mullington, 2005). Forty participants were randomised to either four or eight hours of sleep per night, for 12 consecutive nights. Those restricted to four hours of sleep reported increased body, back, and stomach pain. Such findings highlighted the potential impact of poor sleep on individuals' experiences of pain but do not indicate whether pain is elevated or whether sensitivity to pain increases. However, it does provide a potential explanation, at least in part, to the role of pain in the sleep-aggression relationship.

The concept of pain is certainly a prominent feature of theoretical concepts of

aggression. For example, the *Cognitive Neoassociation Theory of Aggression* (CNTA, Berkowitz, 1989) proposes that aggression is a result of aversive events, such as pain, which increase an individual's negative affective state, such as anger. Sleep may contribute to, or represent, a negative event and therefore increase the likelihood of aggression occurring. Berkowitz (1989) not only emphasised the role of affect in the link between aggression, but also in the role of aggressive thoughts and behaviours that are linked via associative pathways in memory (Anderson & Bushman, 2002). Over time, individuals' learning experiences influence the accessibility of cognitions associated with an aversive situation, thus increasing the risk of aggressive behaviour (Berkowitz, 1989).

In an attempt to support the CNTA, Berkowitz *et al.* (1989) measured the number of rewards and punishment administered to a peer by female participants, who had immersed their hands in cold water (6°C), in comparison to those with their hands in warm water (18°C). Whilst those in the "pain" condition (cold water) were less likely to provide a reward to a peer, they were not more likely to provide them with a punishment. Furthermore, those who were also informed that their partner would be hurt and in the pain condition, were less likely to provide their partner with rewards. This perhaps does not highlight the likelihood of negative, painful events increasing aggression, but does suggest that it may reduce the likelihood of prosocial behaviour. Aside from pain, other aversive events may also have similar impacts on aggression. Sleep may be one such factor.

The CNTA asserts that aversive events impact on negative affect and points most prominently to the role of anger. With regard to sleep disruption, there is evidence to suggest that short sleep is associated with an increase in anger in a variety of populations (Baum *et al.*, 2014; Haack & Mullington, 2005; Kahn-Greene, Killgore, Kamimori, Balkin, & Killgore, 2007; Kidwell, Van Dyk, Guenther, & Nelson, 2016).

For example, Kidwell *et al.* (2016) found in their sample of 125 parents rating their children's (aged 8 to 11) anger and sleep difficulties, such as nightmares and overtiredness, that outward expressions of anger predicted the likelihood of their children experiencing sleep problems. The difficulty with examining anger in children is that it is largely rated on behaviour rather than affect. For example, the Anger Expression Scale for Children (Steele *et al.*, 2008) contains items such as "I hit things or people", which do not reflect an individual's anger tendencies. Whilst the measure does include items measuring internalised anger (e.g. "I stay mad at people but keep it secret"), these items were not found to predict sleep problems (Kidwell *et al.*, 2016).

Trying to understand further sleep disruption and anger in adolescent samples, Baum *et al.*, (2014) restricted adolescents' (N=50) sleep to 6.5 hours for five nights. They compared their mood and mood regulation across a five-night period of 10 hours of healthy sleep. Whilst there was evidence for elevated levels of anger when sleep was restricted, there were also increased levels of tension/anxiety, suggesting that anger may not be the only mood to be associated with reduced sleep. Thus, the sleep-aggression relationship may not be a result of an increase in anger but other affective states.

Individuals with specific mood disorders can provide some insight into the relationship between sleep and affect. Measuring sleep quality using the PSQI (Buysse *et al.*, 1989), O'Leary, Small, Panaite, Bylsma, and Rottenberg (2017) compared individuals with a depressive disorder (n = 60) with healthy controls (n = 35). Whilst both positive and negative affective states were evident in those with poorer sleep quality, regardless of the presence of a mood disorder, those with a depressive disorder showed more negative affective reactions and fewer positive affective reactions to everyday life events than healthy controls.

Mood disorders are relevant to aggression, with reports that those with bipolar or major depressive disorder are more likely to engage in such behaviour (Perroud *et al.*, 2011). Interestingly, mood disorders are also associated with an increase in sleep disturbances, including insomnia and increased fatigue (see Rumble, White, & Benca, 2015 for a review). Referring to Borbély's (1982) *Two Process Model of Sleep* described in Chapter Two, it is suggested that there is a deficiency in the sleep homeostasis that is unique to individuals with depression and this may increase Rapid Eye Movement sleep, but decrease Slow Wave Sleep (Rumble *et al.*, 2015). From a neurocognitive perspective, a recent systematic literature review (Palagini, Bastien, Marazziti, Ellis, & Riemann, 2018) indicated that experiencing sleep deprivation over an extended period can increase activation of the limbic system, responsible for emotional regulation. Neuroimaging studies have revealed an activation in the amygdala and also a disinhibition of the mesolimbic dopaminergic pathways, which mediate reactivity to rewarding experiences. Thus, disrupted sleep may result in an exaggeration of affective valence (i.e. both positive and negative emotions) and contribute to deficits in decision making (Palagini *et al.*, 2018).

Furthermore, there is evidence to suggest that sleep deprivation can impact on the functioning of the prefrontal cortex (PFC) responsible for affective control, planning complex cognitive behaviour, decision making, and social behaviour (Bei, Wiley, Allen, & Trinder, 2015). Therefore, sleep disruption may result in an exaggeration of negative valence via the limbic system, this subsequently impacts decision making and cognitive control via the PFC. Additionally, Bei *et al.* (2015) argues that there may be interference in an individuals' cognitive style under the conditions of poor sleep and this seemingly impacts affect.

Models of insomnia certainly highlight the potential impact of cognition on sleep (Harvey, 2002; Espie, 2002), with an emphasis on dysfunctional beliefs and cognitive



biases. Harvey (2002) argues that such beliefs are relevant to the maintenance of insomnia, rather than being the sole cause. The role of cognition is also highlighted in the development and maintenance of mood problems among adolescents and adults (see Scher, Ingram, & Segal, 2005 for a review), with negative cognitive factors emerging during stressful situations in individuals with anxiety and depression (Beck, 1967). It is suggested that negative cognitions are relevant to the development of aggression, given that the presence of a mood disorder is associated with higher rates of outward aggression. Farchione *et al.* (2007), for example, found increased levels of outward aggression in 300 children with bipolar disorder.

In addition to mood disorders, severe mental health difficulties such as psychosis, is also relevant to aggressive tendencies. Hiday (1997) outlined the complexities in the relationship between mental health and aggression that appears to extend beyond the direct model of severe mental illness leading to violence (Gerbner *et al.*, 1981). Hiday (1997) considers a biopsychosocial perspective accounting for the social context, neurobiological perspectives, co-morbidity, and psychological processes. This approach considers severe mental health as symptoms of psychosis (i.e. experiencing sensory hallucinations delusional beliefs and that divert from reality). Such, psychotic symptoms do not produce feelings of threat that lead to violence, rather the feelings of threat may lead to tense situations. The tense situations are likely to increase in intensity due to previous experiences which may make an individual more reactive. This, coupled with the individual's own environment where violence is a common occurrence, may increase the likelihood of aggression occurring.

Hiday (1997) also considers an individual's wider environment, or their social disorganisation. Social disorganisation refers to the community where the individual belongs, but such communities are often disadvantaged with limited resources (food, space, income). Individuals in are likely to experience stressful events, which may be

an indirect cause for violence. Additionally, social disorganisation can increase the likelihood of an individual being a victim of violence, further increasing the tense situation (e.g. by increasing hypervigilance) and/or increase suspiciousness and mistrust. These feelings may also exacerbate symptom of severe mental health problems.

Furthermore, substance abuse and antisocial personality disorder may further increase the risk of violence, either directly or indirectly through stressful life events or the tense situations. However, the use of substances is also likely to predispose, precipitate, and perpetuate mental health symptoms. Social disorganisation is also key to both antisocial personality disorder and substance abuse, with both being produced by poverty and disorganised communities. Hiday (1997) also draws attention to neurobiological factors, although highlights that this cannot solely explain severe mental health, despite evidence of vulnerability to schizophrenia (Cannon & Marco, 1994). The interactions between social disorganisation and neurobiological factors can affect the development of severe mental health, furthering the likelihood of aggression.

The appraisal of threat is clearly linked to aggression in individuals with severe mental health, and it is the contribution of additional factors that may be increasing this perception of threat. Difficulties sleeping may be a further factor that increases the likelihood of aggression in this population. Considering other theories of aggression, the developments of cognitive factors relevant to aggression appears noteworthy.

Social cognitive theories of aggression draw upon the formulation of learning (e.g. *Social Learning Theory*, Bandura, 1979) to demonstrate how cognitive scripts and schemas are developed and formed via social learning. Huesmann (1998) describes schemas as knowledge structures encoded in memory, which can represent the self, an event, or a belief. The formation of schemas subsequently link together to form scripts

that guide behaviour by forming sequences of events and shape how an individual expects to respond to these events (Huesmann, 1998). To understand aggression, it is argued that aggressive cognitive scripts and schemas each constellate. Specifically, Huesmann (1998) further applies social information processing theory to aggression, indicating that behaviour is dependent on biological, environmental, and situation factors via the *Integrated Model of Social Information Processing* (Huesmann, 1988). The model suggests that it is the understanding of a situation that contributes to the observed outcome. As the CNTA (Berkowitz, 1989) highlights the role of emotions, Huesmann (1998) also addresses emotions and how they relate to cognition via memory retrieval of encoded semantic information. Information is encoded into the memory system and the repetition and consideration of such information (e.g. elaborative rehearsal) ensures that such information is retained. Such information is retrieved once activated by external or internal (e.g. emotional) cues, which enhance the likelihood of recalling the encoded information.

However, with regard to sleep, it may be the role of schemas and scripts that are truly important. Huesmann (1998) further highlights that cognitive scripts and schemas influence causal attributions that are relevant to aggression (i.e. why others may do something or act in a particular way). They also influence normative beliefs, namely constant beliefs about what behaviour one believes is acceptable, which support the use of aggression. The contribution of these social cognitive processes is further influenced by emotion and environmental factors, serving to increase the likelihood of aggression. Disrupted sleep may increase the accessibility of one or more of these processes when in a potentially aggressive situation (Krizan & Herlache, 2016).

Additional theories of aggression certainly emphasise the contribution of cognition in aggressive situations. Beck (1999) supports Huesmann's (1998) view that an individual's underlying beliefs are key to both activating and maintaining violence.

Beck (1999) describes how an individual's primary beliefs of oneself, others, and the world can shape a hostile reaction. For example, an individual who has the belief that they are not be respected can trigger conscious thoughts such as "I need to show them that they can't push me around". Such thoughts are a result of the feelings related to the primary beliefs (e.g. hurt) that may be masked by anger (Beck, 1999). Such interpretations are suggested to be shared among a range of aggressive individuals. The relationship between sleep and aggression may therefore be more prominent in individuals who already hold negative primary beliefs.

Incorporating poor sleep into social cognitive theories such as these, would appear of value. For example, the *Integrated Model of Social Information Processing* (Huesmann, 1988), proposes that aggression is a specific response to the environment, which could arguably consist of a period of poor sleep. Yet, not all individuals who do not sleep well are aggressive. Thus, there may be individual differences that separate aggressive individuals in addition to the situational stimuli that an individual is presented with. There is evidence to support the inclusion of cognitive processes, such as hostile attributional biases (i.e. attributing hostile intentions to an ambiguous situation; Nasby, Hayden, & DePaulo, 1980) that are associated with aggressive tendencies (see Orobio de Castro, Veerman, Koops, Bosch, & Monshouwer, 2002 for a review). This would certainly fit with Beck's (1999) cognitive perspective of aggression and violence. It is suggested that those who display aggressive tendencies are more likely to access such hostile attributional biases when affectively aroused (Serin & Kuriyuchuk, 1994). Therefore, if sleep does increase the accessibility of such cognitive attributional biases, then individuals with more aggressive tendencies may be more susceptible to the negative effects of sleep problems.

Whilst Huesmann's (1998) perspective is influential in understanding the cognitive processes associated with aggression, research supporting it is largely limited to child

and adolescent populations, ignoring some of the more aggressive samples, such as offenders or forensic psychiatric samples. Beck's (1999) perspective, however, does incorporate findings from a variety of samples and refers to a range of aggression (e.g. intimate partner violence, genocide), but it also does not capture sleep per se. A more integrated framework, the *General Aggression Model* (GAM, Anderson & Bushman, 2002) is more appropriate for an understanding of the sleep-aggression relationship due to its link with sleep.

The GAM (Anderson & Bushman, 2002) was developed to account for both the development and presentation of aggression and is presented as structured collection of aggression models including the *Cognitive Neoassociation Theory of Aggression*, Berkowitz, 1989; *Integrated Model of Social Information Processing*, Huesmann, 1989; *Social Learning Theory*, Bandura, 1978). The model includes three core components: inputs, present internal state, and outcomes. Cognition is relevant to each component of the GAM, referring back to the *Integrated Model of Social Information Processing* (Huesmann, 1989) the GAM highlights the importance of aggressive scripts and schemas as one of the person inputs. Cognition is also relevant to the present internal state, with aggressive individuals likely to experience aggressive thoughts when faced with a potentially aggression situation. The outputs include an appraisal, and possible reappraisal, of the current situation which will inform decision making. An aggressive output may be impulsive but is considered more thoughtful if reappraisal occurs.

It is likely that sleep disruption also interferes at various points in the GAM. Evidence from Chapter Two indicates that sleep difficulties can have detrimental effects on affect (Otte & Carpenter, 2010), arousal (Walker, 2009), and cognition (Perlis & Gehrman, 2013). If an individual is then faced with an aggression provoking situation, and have experienced a lack of sleep the previous night, it is likely to impact their cognition,

affect, and physiological arousal. There is certainly evidence to suggest that individuals with higher levels of arousal are more prone to aggressive tendencies. For example, Anderson & Bushman (2001) found that all three types of arousal induced by playing violent video games showed an increase in aggression levels in their meta-analysis of 35 studies. Research has also identified that cognitive and physiological arousal can also impact sleep (Tang & Harvey, 2004). When cognitive and physiological arousal was manipulated in healthy adult good sleepers (N=54), greater increases in self-reported and objectively reported poor sleep were seen.

Sleep may also impact on the decision-making processing. As previously highlighted, reappraisal does not always occur, and that this may be dependent on cognitive load. In other words, sleep problems may affect cognitive resources that are needed to effectively reappraise a situation and therefore, sleep may limit the ability to react thoughtfully, and therefore actions become more impulsive. An association between sleep and impulsivity has certainly been highlighted within the literature. Van Veen, Karsten, and Lancel (2017), for example, found that forensic psychiatric patients with behavioural disinhibition type personality disorders (N=112) reported increased impulsivity when experiencing poor sleep, and that this was not influenced by their personality disorder. In contrast, Demos *et al.* (2016) found that manipulating sleep deprivation in 64 healthy adults was found to increase impulsive acts but did not increase impulsive decision making. The differences between these two populations may indicate that impulsive cognitive appraisal may be unique to individuals with already aggressive tendencies.

Although a widely accepted model (Gilbert, Daffern, & Anderson, 2017), it is argued that the GAM places more emphasis on cognition (scripts and schemas) and appraisal and that this is disproportionate in comparison to environmental and personal inputs. With regard to sleep, there have been limited applications of sleep to the GAM, with

more research directed toward violent media (Anderson & Bushman, 2018). However, if poor sleep can contribute to the GAM, as suggested here, it may offer theoretical implications and have clinical value in terms of developing violence targeted interventions that incorporate techniques to improve sleep.

The focus of the literature thus far has been on aggression directed towards others. It is argued that aggression is not limited to acts towards others, but also physical harm towards the self (i.e. self-injurious and suicide behaviour) (Plutchik, 1995). Plutchik (1995) draws attention not only to the overlapping risk factors between aggression and suicide (e.g. alcohol abuse, easy access to weapons, and impulsivity), but also to the overlapping protective factors (e.g. large social network and positive mood states). Plutchik (1995) outlined the *Two Stage Model of Countervailing Forces* to explain the relation between suicide and violence, which is worthy of consideration here.

The *Two Stage Model of Countervailing Forces* is based on five main assumptions: (1) aggressive impulses are theoretical inner states and the overt act of aggression is termed violence; (2) life events, such as threats, loss of social attachments, physical pain, and loss of power, increase aggression; (3) the presence of certain variables that act as risk and protective factors for aggressive impulses and the balance of these determine whether overt aggression occurs; (4) the overt act of aggression is directed toward a goal object; and (5) once an individual has engaged in the overt behaviour, they aim to re-establish the situation that existed prior to the initial triggers. Engagement in aggression is dependent on the presence of risk factors, and paucity of protective factors that are relevant to both violence and suicide, referred to as stage one. Such variables include depression, hopelessness, life problems, impulsivity, and physical symptoms, yet there are additional risk factors that determine the outcome of aggression (i.e. whether an individual will engage in violence towards others or self-harm), this is the second stage of the model. Thus, both violence and suicide are represented by the same

underlying aggressive impulses, with the presence of additional variables determining the direction. Plutchik (1995) termed suicide to be an inward impulse, and violence towards others to be an outward impulse. Hillbrand (1995) identified that individuals can also belong to a category of combined aggressors, those who report both inward and outward aggression. Given that both types of aggression are driven by the same underlying impulses, sleep may also contribute to such impulses in similar ways, namely via cognitive processes.

Although the *Two Stage Countervailing Model of Aggression* highlights that both outward and inward aggression are driven by the same underlying impulses, the model does have some limitations. Firstly, to account for high incidents of both inward and outward aggression, the data was based on a psychiatric sample, who may have additional underlying impulses that may not be generalisable to other populations. Furthermore, despite highlighting that both types of aggression have overlapping features, at stage two of the model Plutchik (1995) clearly differentiates between outward and inward aggression and does not account for instances of engaging in both behaviours.

Regardless of the potential limitations of the *Two Stage Countervailing Model of Aggression* (Plutchik, 1995), it is suggested that sleep may be relevant to aggressive impulses, and therefore contributes to the both inward and outward aggression. Theoretical contributions to inward aggression that highlight the role of cognition have also been highlighted and will be outlined.

Inward aggression has been applied to the GAM (Anderson, & Bushman, 2002). The overlap of risk factors associated with both inward and outward aggression can be applied to the relevant stage of the GAM. For example, DeWall, Twenge, Bushman, Im, & Williams (2010) found that undergraduate students participating in an online



ball-tossing game displayed decreased aggression when they felt socially accepted. The importance of social acceptance is relevant to displaying suicide behaviour as identified in the *Interpersonal Psychological Theory of Suicide* (IPTS, Joiner, 2005). This model may better explain suicidal behaviour than the GAM by combining three interpersonal cognitive constructs. Capacity to carry out a lethal act of self-injury, thwarted belongingness, and perceived burdensomeness. Thwarted belongingness is defined as “a need to be part of a social group” (Baumeister & Leary, 1995), which includes loneliness and the absence of equal care from others and perceived burdensomeness is defined by a view of burdening others and an assumption that their death is worth more than their life to others. It is highlighted that this is a perception, and these manifest into self-hatred. The likeliness of suicide is increased when these factors are combined with thoughts of hopelessness, a concept which is highlighted in other models of suicide, (e.g. *The Cry of Pain Model*, Williams, 2001). The combination of these factors lead to suicidal desire or ideation and it is the capability for suicide (e.g. fearlessness about death), that leads to a physical act of suicide.

The application of sleep disruption to IPTS proposes that social isolation may account for the relationship between sleep and suicide. One possible explanation of these findings is that disruption to sleep can limit an individual’s availability to socialise with others, for example by being awake at night when others are asleep, increasing loneliness, or by using safety behaviours during the day to “catch up” on sleep. It is also plausible that such inability for socialisation may also increase the likelihood of aggression towards others, because potential feelings of rejection from others may be projected towards the individuals that they feel rejected by.

Further theoretical perspectives of suicide also highlight the role of hopelessness. The *Cognitive Model of Suicide* (CMS, Wenzel, Brown, & Beck, 2008) is a heuristic model to understand suicidal ideation and behaviour. Developing from diathesis-stress models

(e.g. Caspi *et al.*, 2003) the model posits that individuals have a dispositional vulnerability to suicide. Such vulnerabilities include impulsivity, problem solving deficits, an over-general memory style, trait-like maladaptive cognitions, and personality. Dispositional vulnerabilities also increase the likelihood of cognitions associated with both psychiatric disturbance and suicidal acts. Cognitions associated with psychiatric disturbance are dependent on an individual's underlying schema which facilitate biased information processing to the preferred pathology (e.g. a depressed schema would contain attitudes about failure). In comparison, suicidal cognitive schemas place emphasis on the role of hopelessness. Unlike the IPTS, the CMS considers both state hopelessness, reflecting the conclusion that the current situation is unchangeable and trait hopelessness, referring stable, negative future anticipations. The CMS proposed that trait hopelessness is a suicide schema that can prompt state hopelessness when activated by stress. Such state hopelessness interacts with selective attention to suicide cues and attentional fixation on suicide leading to suicide ideation and crossing the threshold of a suicide attempt (Wenzel *et al.* 2008).

The CMS offers insight into the essential role of cognition in understanding suicidal behaviour. It could be argued that the CMS places considerable emphasis on internal cognitions, somewhat ignoring the role of affect. However, the empirical evidence highlights the role of cognitive distortions in suicidal individuals. For example, Jager-Hyman *et al.* (2014) compared 111 participants with a recent suicide attempt with psychiatric controls and found that those who had attempted suicide were more likely to experience cognitive distortions. The role of cognitions cannot be ignored. Yet, both the IPTS and the CMS have focused on the mechanisms explaining suicide but do not address Non-Suicidal Self-Injury (NSSI, i.e. intentional damage to the body without suicidal intent, Nock, 2009).

NSSI would still fall under the category of aggression according to Carlson, Marcus-

Newhall, and Miller's (1989) broad definition. Theoretical models highlight the importance of emotional regulation and emotional experience (e.g. *Experiential Avoidance Model*, Chapman *et al.*, 2006), with those experiencing non-suicidal self-injury having a heightened sensitivity to emotions (Linehan, Bohus, & Lynch, 2007). Yet, Haskings, Whitlock, Voon, & Rose (2016) highlight that cognitions are just as important as emotions in learning and maintaining the behaviour. The *Cognitive-Emotional Model of Non-Suicidal Self-Injury* (C-EM, Hasking *et al.*, 2016) considers the non-suicidal self-injurious cognitions (i.e. outcome expectancies and self-efficacy expectancies). The role of rumination is also a key component of this model and is suggested to lead to non-suicidal injury if effective emotional regulation strategies are limited (Dawkins, Hasking, Boyes, Greene, & Passchier, 2018).

NSSI may be as important as suicidal self-injury with regards to sleep. Although there is limited research regarding NSSI in comparison to suicidal behaviour, a link has certainly been established (Liu *et al.*, 2017; Sami & Hallaq, 2018). For example, Sami & Hallaq (2018) found that self-reported sleep problems were associated with NSSI in 889 adolescents and young adults. Support for the link between NSSI and increased sleep difficulties may highlight the importance of cognitive distortion more relevant to psychiatric disturbance when considering *The Cognitive Model of Suicide* (Wenzel, Brown, & Beck, 2008), rather than the suicidal relevant cognitive distortions. Regardless, of intent for self-injury (suicidal or not), cognition remains an important factor to consider in the sleep-aggression relationship.

Thus far, it has been identified that cognition is an important contributing factor to both sleep disruption (as presented in Chapter Two), and inward and outward aggression. Whilst the mechanisms for both inward and outward aggression are dependent on a number of inter-related factors including mental health, neurobiology, social, and psychological factors (Hiday, 1997; Berkowitz, 1989, Williams, 2001) one particularly

salient component is cognition (Huesmann, 1989; Beck, 1999; Wenzel *et al.*, 2008). The importance of cognition is also key in contributing to sleep difficulties (Harvey, 2002; Espie, 2002; Lundh & Broman, 2000). However, what currently appears unclear is how both sleep and aggression are defined. A review of the literature in Chapter Two identifies sleep problems as a subjective experience and it is an individual's perception of their sleep experience that can lead to negative consequences (e.g. Lundh and Broman, 2000). Therefore, sleep perception is considered critical.

Furthermore, aggression is a difficult concept to define, with no consensus on what constitutes aggression (Hogg & Vaughan, 2018). Baron and Byrne (2002) define aggression as the infliction of intentional harm on others. Whilst this definition is seemingly applicable to a variety of verbal and physical acts of aggression, it does not necessarily explain all aspects. For example, consider an individual in a professional capacity, such as a dentist. The removal of a tooth is certainly the infliction of intentional harm, but this act would not be considered one of aggression.

Additionally, defining aggression by their behaviours directed towards others with the immediate intent to cause harm (Anderson & Huesmann, 2003) fails to recognise that aggression may also constitute harm towards oneself, as is suggested by (Plutchik, 1995). The many components clearly make aggression a difficult concept to define. Considering motivation (proactive or reactive), victim (others or the self), intention, extent of harm (physical, psychological), there are several comprising factors that contribute to how aggression is defined.

To overcome the potential incongruities of previous aggression definitions, a working definition will be outlined. For the remainder of this thesis, aggression will be defined as an intent to directly cause harm, be that towards the self, others, or objects. This can include displays of verbal anger and hostility (e.g. shouting at others to express

frustration), physical aggression towards objects (e.g. purposefully damaging other's possessions), physical aggression towards others (e.g. hitting or kicking and individual), or causing harm to the self (e.g. banging head against a wall). Such a definition encompasses various measures of aggression from observations of aggressive behaviour, and self-report, which other definitions may not necessarily capture.

The following section will aim to address the literature to understand the sleep-aggression relationship. Findings regarding outward aggression in children and adolescents will first be presented, followed by inward aggression in this population. Outward and inward aggression in adulthood will subsequently follow, with a later emphasis on forensic samples, where high levels of sleep disruption and aggression are expected.

### **3.3 The sleep-aggression relationship in children and adolescents**

#### *Outward aggression*

The sleep-aggression relationship appears prominent in children and adolescents. Reid, Hong, and Wang (2008) found, in a large sample of young children (N = 8,868), that aggression (as rated by their parents) was associated with an increase in night-time awakening. Although the effect sizes were small, their results indicated that the association was independent of other potential risk factors, such as parenting style. Furthermore, Bates, Viken, Alexander, Beyers, & Stockton (2002) found that preschool children (aged between four and five) with disrupted sleep schedules were more likely to have a negative adjustment to preschool and fewer positive adjustments. Their findings suggest that disruption to sleep could be decreasing the likelihood of positive adjustment to school.

However, there is also evidence to suggest that an *increase* in sleep can have negative outcomes in children. Coulombe, Reid, Boyle, and Racine (2010) found that a longer duration of sleep was associated with aggression in their secondary analysis of 1,550

primary school children. More recent evidence highlighting the role of sleep *quality* (Rubens, Evans, Becker, Fite, & Tountas, 2017) found that 285 primary school children with reduced sleep quality were higher in self-reported reactive aggression. Their findings also revealed that reactive and proactive aggression demonstrated a curvilinear relationship to total time spent in bed, indicating that high or low amounts of time in bed were associated with increased aggression. This highlights the potential optimum time spent in bed, and would fit with theoretical models of sleep such as *The Three P Model of Insomnia* (Spielman *et al.*, 1989) which demonstrated that increased time spent in bed can decrease sleep quality.

Further studies examining outward aggression in adolescents have shown no association between sleep indicators and outward aggression (Lemola, Schwarz, & Siffert, 2012), but did find that sleep problems mediated the link between parental conflict and aggression. This may suggest that strongly accepted beliefs about aggression prior to sleep disruption may be vital in predicting a relationship between sleep and aggression in adolescents. Therefore, exploring sleep and aggression in samples such as offenders, who are more likely to engage in aggression, would better illustrate this.

The only known study to examine sleep and outward aggression in adolescent offenders is that of Ireland & Culpin (2006), who found that those with higher levels of aggression had shorter sleep duration and poorer sleep quality. Their sample included male juvenile and young incarcerated offenders (n = 184) who reported that their sleep duration and sleep quality was poorer whilst in prison, in comparison to before prison. This may indicate that environmental factors are certainly salient, and that the prison environment does not compliment sleep hygiene practices. Although it may be suggested that the prison environment is a contributing factor to poor sleep, as aggression levels were not measured prior to prison, it is difficult to ascertain whether aggression levels were lower

when in the community. Therefore, it cannot be assumed that it is solely the environment that may be contributing to the sleep-aggression relationship.

### *Inward aggression*

Research examining inward aggression with a young population largely includes adolescent populations. There is certainly a need to explore suicide and self-injury in adolescents in comparison to child populations, with prevalence rates in such populations of up to 60% for non-suicidal self-injury in adolescents (Brown & Plener, 2017) and 145 recorded deaths by suicide in adolescents (aged under 20) in a single year (Rodway *et al.*, 2016). However, research also indicates that children as young as six have engaged in self-harming behaviour, with 1.8% of a community sample in Brazil engaging in deliberate self-harm (Simioni *et al.*, 2018). Considering sleep in six to twelve-year olds, Singareddy *et al.* (2013) asked parents (N = 693) to complete questionnaires regarding their children's sleep and self-harm behaviours, in addition to recording children's sleep using a polysomnogram. Whilst only a small number (n = 27) of children engaged in self-harming behaviour, those identified were more likely to have difficulty initiating sleep, maintaining sleep, and reported excessive sleepiness.

Although this research was limited by the self-harm questions asked of parents, which explored whether they had witnessed self-harm or whether their child had talked about self-harm/suicide, it did account for objective measures of sleep. The objective measures only indicated a significant difference between the two groups with regard to REM sleep, which was significantly higher in children engaging in self-harm. The authors highlighted the role of depressive symptoms in this relationship, indicating that those with suicidal behaviours were also more likely to present with depressive symptoms. The findings indicated that the potential link between sleep and self-harming behaviour in children may be explained by depressive symptoms. Sleep disturbances are certainly a symptom

of depression, however, there is also evidence to suggest that inward aggression and sleep disturbances are associated regardless of depressive symptoms (Nadorff *et al.*, 2014), suggesting that depression may only *contribute* to the sleep-inward aggression relationship.

Further research examining sleep and inward aggression in adolescents argues that disruption to sleep in adolescents is commonly caused by self-induced sleep restriction (i.e. intentionally remaining awake) (Klerman & Dijk, 2005). Lee, Cho, Cho, and Kim (2012) examined suicidal ideation in adolescents (n = 8, 530) comparing normal sleepers (> 7 hours of sleep) with those with insomnia and those who were intentionally restricting their sleep. Their findings revealed that those with shorter sleep duration had higher scores for suicidal ideation. Additionally, those identified as intentionally restricting their sleep were found to have higher suicide scores than those with and without insomnia.

The perception of the need for sleep, that is highlighted in Lee *et al.*'s (2012) study, somewhat contrast current understandings of sleep. As discussed in Chapter Two, individuals assuming to have an 'insomnia identity', whom are concerned about what they believe is a lack of sleep, report negative effects (Lichstein, 2017). Conversely, Lee *et al.* (2012) found that those who want to remain awake (and it can be assumed are not concerned about their sleep) also report negative outcomes. This could suggest that for inward aggression, the perception of sleep is not an important component. It is, however, highlighted that this is a single study, limited to adolescents and with small effect sizes. Further findings with an adolescent sample (Zschoche & Schlarb, 2015), however, was particularly valuable in that it examined both inward and outward aggression. Whilst there were no significant differences between good and poor sleepers, as assessed by the PSQI for levels of outward aggression, those with poor sleep had higher levels of suicidal tendencies. Such findings may suggest that with regard to adolescent samples, sleep problems contribute more to inward aggression than outward aggression.



The research regarding the sleep-aggression relationship in children and adolescents thus demonstrates a link between sleep and inward aggression. Whilst the studies vary in their methodologies and, consequently, reveal contradictory findings at times, sleep is associated with aggression, at least in part. There may be significant age-related differences that explain why there is a clear relationship between sleep and both inward and outward aggression and, as a result, adult populations need to be explored. Children are arguably still learning about their environment, with every potential aggressive interaction likely to increase learning, providing more opportunities for aggressive scripts and schemas to be developed. They are more dynamic in comparison to aggressive scripts in adulthood, which are far more entrenched, and potentially able to be altered with less effort in comparison to adults. Therefore, exploring adult samples is necessary to provide a clearer indication of the link.

### **3.4 The sleep-aggression relationship in adult populations**

#### *Outward aggression*

With regard to sleep duration, studies have failed to find a significant association between the sleep and outward aggression in adults (Pilcher, Ginter & Sadowsky, 1997). As argued earlier in this chapter, the link between sleep disruption and anger has been explored (e.g. Hisler & Krizan, 2017). It could be suggested that the role of sleep quality, as opposed to sleep quantity is a better predictor of aggression. For example, Vaughn *et al.* (2015) found that African American men were more likely to initiate acts of reactive aggression, with those who reported being dissatisfied with their sleep more likely to report losing their temper and engaging in physical aggression. This study was, however, limited by the use of non-validated measures of sleep, relying instead on a single question to measure sleep quality. Yet, their findings highlight the potential importance of subjectively perceived sleep quality, suggesting that this may

be more important than considering the indicators of sleep quality.

One further study (Freitag, Ireland, & Niesten, 2017) examining perceived sleep quality in 201 adults from Britain, Germany, and the Netherlands found that those with poorer subjective sleep quality reported higher levels of trait reactive aggression, but only for those from Britain. Their findings further revealed that sleep quality was a better predictor of aggression than sleep duration but only for reactive, not proactive, aggression. This highlights that perceptions of sleep quality may only be relevant to specific motivations for aggression. It could be proposed that the high emotional arousal experienced by those with trait reactive aggression could contribute to a distorted perception of sleep quality, increasing the likelihood that these individuals subjectively report poor sleep. Alternatively, an already distorted perception of poor sleep could increase the automatic access to aggressive scripts and schemas. Likewise, it may also increase the likelihood of accessing negative perceptions associated with inward aggression. Indeed, subjective sleep quality has been found to associate with suicide ideation in 98 patients with epilepsy (Wigg, Filgueiras, and Gomes, 2014), but this will be explored in more depth later.

Exploring general and student samples is beneficial in providing some understanding of the sleep-aggression relationship that are seemingly generalisable. Yet, the levels of general aggression displayed in such individuals are expected to be lower than in other populations, such as offender and psychiatric samples. Determining a relationship between sleep and high levels of outward aggression would be key in understanding the salient components of sleep where aggressive cognitions are likely to be prevalent.

Researchers also aimed to explore sleep in individuals who are more likely to display aggression. One of the few studies that included both male ( $n = 57$ ) and female ( $n = 17$ ) offenders (Alves-Ferreira, Costa, & Santos, 2012), found that total Pittsburgh Sleep

Quality Index scores positively correlated with aggression levels, as measured by the Aggression Questionnaire (Buss & Perry, 1992). These findings support those highlighted by Ireland and Culpin (2006) in adolescents, and perhaps points to a suggestion that the relationship between sleep and aggression is predominately found in those with higher levels of dispositional aggression.

One study examining forensic psychiatric patients (Kamphuis, Dijk, Spreen, *et al.*, 2014) found that both poor sleep quality and short sleep quantity predicted increased levels of self-rated aggression when measured either subjectively or objectively. In addition to providing support for the link between self-reported sleep disturbances and self-reported aggression, hostility was also found to predict sleep at both a subjective and objective level. Such findings not only highlighted the link between sleep disturbances and aggression, but also that sleep may be specifically impacting on the cognitive component of aggression (i.e. hostility). Hostility can, after all, be an affective state or cognitive state. There is certainly evidence of a relationship between sleep problems and affective hostility (Granö, Vahtera, Virtanen, Keltikangas-Jarvinen, & Kivimaki, 2008), with a relationship between increased sleep disturbances, but not duration, and increased hostile feelings. However, it is argued that cognitive hostility is more relevant to the sleep-aggression relationship.

Indeed, the Aggression Questionnaire (Buss & Perry, 1992), as utilised by Kamphuis *et al.* (2014), contains items relating to cognitive hostility. Findings among studies which included the Aggression Questionnaire (Buss & Perry, 1992) have found that higher levels of hostility were associated with poor sleep quality (Ireland & Culpin, 2006) and daytime sleepiness (Booth *et al.*, 2006). A further understanding of cognitive hostility in the sleep-aggression relationship would therefore be relevant.

Interesting findings from Barker *et al.* (2016) suggest that hostile cognition is

particularly relevant to the sleep-aggression relationship. Using as sample of 141 young male adult prisoners, they found that poor sleep quality was not associated with higher levels of hostility, but those with poor sleep quality were less likely to make prosocial attributions. Therefore, individuals may not be more hostile but are less likely expect others to behave prosocially, and this subsequently impacted on their aggression levels. Despite some general limitations of this study, such as the number of variables that were not controlled for (e.g. substances, mental health), these findings, nevertheless, provide some indication as to a potential role of cognitive processes on sleep.

Barker et al.'s (2016) findings were also interesting in that they revealed that individual's subjective perception of sleep quality was better able to predict aggression than other indicators of poor sleep quality. This finding is particularly noteworthy since it is based on the cognitive component of sleep (i.e. a perception) and is relevant to sleep misperceptions and insomnia identity (Lichstein, 2017), as described in Chapter Two. Such findings may also suggest that the overall sleep quality score may not necessarily be the best predictor of the sleep-aggression relationship and therefore separate components should be assessed.

Exploring the sleep-aggression relationship in forensic samples has highlighted a number of key contributions. Firstly, the cognitive components of aggression, hostility and reduced prosocial attributions, may be vital in understanding the role of cognition in the sleep-aggression relationship (Barker *et al.*, 2016; Kamphuis *et al.*, 2014). Furthermore, attention should focus on specific sleep components (e.g. sleep duration, sleep quality, subjective sleep quality) and their association with aggression. However, none of the studies noted have used objective measures of aggression and most failed to control for additional factors relevant to aggression such as mental health diagnosis (Kamphuis *et al.*, 2014, being the exception to this).

Accounting for such limitations, Meijers, Harte & Scherder (2015) objectively measured the sleep and aggression levels of 19 adult male prisoners experiencing psychosis. They found that aggression, as rated by observing staff, was more likely following a restless night of sleep. These findings indicated that night-time disturbances may be more relevant to the sleep-aggression relationship. It is the only known research to examine night-time disturbances and to use objective measures of sleep in forensic samples. However, despite these strengths, it was also limited by the small sample size and use of only one measure of aggression. Nevertheless, the findings provide further justification for exploring specific components of sleep in the sleep-aggression relationship.

Even accepting some discrepancies in the literature regarding salient sleep components (i.e. duration, quality, perceived quality, night-time disturbances) and their link to aggression, there is evidence to indicate that, at some level, sleep problems are associated with aggression. Inward aggression, and its relation to sleep, in adult population will subsequently be explored.

#### *Inward aggression*

With regard to community samples, an association between poor sleep quality and the number of suicides has been established (Turvey *et al.*, 2002; Fujino *et al.*, 2005). In their prospective study of suicide risk factors in older adults, the authors examined data collected as part of an Epidemiologic study of the elderly. This included 14, 456 participants. Of those, 21 had committed suicide and one factor that predicted suicide completion was sleep quality. Fujino *et al.* (2005) found similar findings in their sample of middle age adults (N = 13, 259), but found that difficulties in maintaining sleep were more predictive of suicide than other sleep factors (Fujino *et al.*, 2005).

The relationship between sleep and inward aggression is not limited to suicides,

however. Expressing suicidal ideation has also been found to increase when sleep is disturbed. For example, Kim *et al.* (2013) examined a large sample of adults (N = 15,236) in Korea, and found that those experiencing a short sleep duration of less than five hours were more likely to report suicide ideation. Furthermore, more evidence of a recent systematic literature review (Pereira, Martins, & Fernandes, 2017) from 33 studies, found that sleep duration was associated with inward aggression in adult samples. However, of those included studies that examined sleep and suicide in older adults, the relationship between the two appears unclear. There may therefore be additional processes unique to older adults that prevent sleep from contributing to suicidal ideation.

It appears that the evidence linking sleep problems, including insomnia, is much more established than that of outward aggression. Such findings are strengthened by large sample sizes and validated measures of sleep and insomnia. For example, Lin *et al.* (2018) reviewed hospital data, in Taiwan, of patients over the age of 15 (N = 159,989<sup>2</sup>) who were diagnosed with insomnia. They found that those with insomnia were more than three times as likely to be at risk of suicide than those without insomnia.

There is evidence to suggest that sleep is relevant to both inward and outward aggression, although the link between sleep and inward aggression appears more established than outward aggression.

### **3.5 Potential explanations to consider**

The previously discussed findings have indicated the importance of cognition in both sleep perception and aggression. Direction will now be focused on how the role of cognition may contribute to the relationships between the two.

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<sup>2</sup> 15,901 were aged 15-24

Krizan and Herlache (2016) suggest that sleep disruption may be increasing the negative interpretations of others. They indicate that due to an increase in sensitivity to threatening stimuli following sleep disruption (Menz *et al.*, 2013) and a decrease in ability for decision making, those with insufficient sleep are at risk of aggression. There is certainly evidence to suggest that individuals with insomnia have increased difficulty in disengaging their attention from potentially threatening cues. For example, Akram *et al.* (2018) found that when presented with pairs of neutral and tired faces, participants with insomnia had more difficulty disengaging from tired faces, compared to those without insomnia. Therefore, suggesting that individuals with poor sleep may have more difficulties disengaging from stimuli that they perceive to be a threat. This would fit with current theories of outward aggression (Hiday, 1997), but does not necessarily fit with theoretical models of inward aggression (IPTS). Hypothesising the potential link for both inward and outward aggression, sleep disruption may increase not only negative interpretations of others, but also negative interpretations of the self. Thus, aggression is directed both outwardly towards others, and inwardly toward the self. Furthermore, Krizan and Herlache (2016) also suggest that firmly held beliefs regarding aggression may be more accessible when in a potentially conflictual situation. Such normative beliefs may be as relevant to inward aggression as with outward aggression and an inability to access more prosocial scripts and schema would differentiate between the appraisal of decision making, thus leading to aggression.

Whilst they base their hypothesis on aggression and sleep literature, Krizan and Herlache (2016) have not yet tested this cognitive pathway. Furthermore, they also outline the potential role of cognitive rumination that is suggested to increase sleep problems and is evident in models of insomnia (e.g. Harvey, 2002). Insomnia models focus on rumination of sleep disturbances to specifically maintain insomnia, whereas Krizan and Herlache (2016) suggest that rumination may follow an aggressive situation

and subsequently interrupt sleep. Both inward and outward aggression certainly highlight the inability to effectively regulate emotions in a state of arousal (Paied & Moretti, 2010). Therefore, rumination may be key to increasing the likelihood of both aggressive cognitions and experiencing sleep problems and lead to a “self-perpetuating cycle”.

Although Krizan and Herlache (2012) proposed that cognition may be contributing to the sleep-aggression relationship, a clearer understanding is required. The literature has directed more focus on the role of affect and self-control (Krizan & Herlache, 2016; Kamphuis *et al.*, 2012), yet less is known about the role of cognition. A richer understanding of how cognition may contribute to the sleep aggression relationship would not only theoretically provide insight into why some individuals act aggressively following sleep disruption, but also how better to treat both sleep and aggression individually.

### **3.6 Summary**

The findings from the current chapter indicate sleep problems are relevant to both inward and outward aggression in children, adolescent, general, and forensic populations. Theoretical contributions in the aggression literature indicate that cognition is a vital contribution to inward and outward aggression independently. A theoretical understanding of the sleep-aggression relationship is beneficial in helping to direct clinical interventions for sleep and inward and outward aggression. Therefore, the current thesis aims to explore the contributing cognitive factors in the sleep-aggression relationship with the outcome of the thesis providing a preliminary model detailing the important contribution of cognition. An outline of the aims of the research is provided in the next chapter.



## **CHAPTER FOUR**

### **ADDRESSING THE RESEARCH PROBLEM**

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#### **4.1 Structure of the chapter**

This chapter describes how gaps in the literature will inform the aims and hypotheses of the thesis. Attention will be directed towards the limited research concerning the contribution of cognition to the sleep-aggression relationship. An outline of the methodology that will be used to overcome the gaps in the literature will be indicated.

#### **4.2 Aims and hypotheses**

The overarching aim of this thesis is to understand the contribution of cognition to the relationship between sleep and aggression. As indicated in Chapter Two and Three, increased cognitive arousal can increase the likelihood of sleep disruption. Aggression related scripts and schemas are more prominent in those with aggressive tendencies (e.g. Huesmann, 1998; Beck, 1999). Due to the established relationship between sleep and aggression, it is therefore proposed that cognition is a contributing factor. Whilst both insomnia and aggression models highlight a role for affect (e.g. *Psychobiological Inhibition Model*, Espie, 2002; *Cognitive Neoassociationl*, Berkowitz, 1989), it is the role of cognition that appears central to maintaining poor sleep and aggression (e.g. *Cognitive Model of Insomnia*, Harvey, 2002; the *General Aggression Model*, Anderson & Bushman, 2002). Thus, cognition may be more salient than examining decreased levels of self-control or increased negative affect in trying to understand the impact on the sleep and aggression relationship.

Despite a brief exploration of cognition (Krizan & Herlache, 2016), there has been no attempt to date to explore the literature to understand how cognition may impact on the sleep-aggression relationship. Research regarding sleep and inward aggression is growing at a seemingly faster rate than outward aggression, yet the attempt to explore

cognition in the sleep and outward aggression relationships remains limited. This is surprising since cognition is relevant to both sleep and outward and inwards aggression independently (CIM, Harvey, 2002; GAM, Anderson & Bushman, 2002). This thesis therefore aims to first systematically review the current literature to explore cognition in the sleep-aggression relationship, examining both inward and outward aggression.

### *Systematic literature review*

#### *Aims:*

1. To explore which cognitive processes account for the association between sleep problems and aggression in adults and adolescents?
2.
  - a. To understand the association between sleep quality and quantity and outward aggression in adults.
  - b. To understand the association between sleep quality and quantity and inward aggression in adults.

Based on previous findings, it is anticipated that the literature review will confirm a positive association between various aspects of poor sleep (e.g. sleep quality, sleep quantity) and both outward aggression (e.g. Barker *et al.*, 2016; Kamphuis *et al.*, 2012; Ireland & Culpin, 2006) and inward aggression (e.g. Bernert & Joiner, 2007; Bozzay *et al.*, 2016; Littlewood *et al.*, 2017).

Furthermore, after exploring the literature, it is expected that the relevant cognitive factors associated with the sleep-aggression relationship will be highlighted. This thesis will aim to explore cognitive factors further in an adult forensic psychiatric population, thus those with expected raised levels of outward and inward aggression and sleep problems. Therefore, qualitative semi-structured interviews will be conducted with individuals from this population.

### *Qualitative interviews with forensic psychiatric patients*

#### *Aims:*

1. To explore the perceptions of experiencing sleep problems in a forensic psychiatric sample.
2. To explore the perceptions of possible factors increasing the likelihood of sleep problems occurring in this population.
3. To explore the perceptions of possible consequences of poor sleep in this population.

The combination of the findings of the systematic literature review and patient interviews will identify the salient cognitive factors relevant to the sleep-aggression relationship. The research will then aim to further examine these findings by examining the associations between sleep and levels of aggression in those prone to sleep disruption and aggression.

### *Cross-sectional study of forensic psychiatric patients*

#### *Aims:*

1. To determine the prevalence of sleep disruption in a forensic psychiatric sample.
2. To explore the relationship between sleep and aggression in a forensic psychiatric sample.
3. To explore further salient cognitions that could contribute to the sleep-aggression relationship.

#### *Hypotheses:*

1. Forensic psychiatric patients will experience poor sleep quality, short sleep duration, and night-time disturbances (e.g. Kamphuis *et al.*, 2013; Meijers *et al.*, 2015).

2. Forensic psychiatric patients experiencing poor sleep quality, short sleep duration, and night-time disturbances will report higher levels of aggression than those with good sleep indicators (e.g. Barker *et al.*, 2016; Kamphuis *et al.*, 2014; Meijer *et al.*, 2015).
3. Increased evidence of cognitive factors will contribute to both sleep and aggressive outcomes (e.g. Barker *et al.*, 2016; Littlewood *et al.*, 2016).

The findings from the cross-sectional study are expected to provide further understanding of the sleep-aggression relationship and, combined with the findings from the systematic literature review and qualitative interviews, relevant cognitive factors will be determined. Attempting to improve sleep by targeting these cognitive factors is expected to also reduce levels of aggression. A mindfulness-based intervention, targeting cognition, will be compared with a sleep education intervention, to target sleep-related behaviours, and treatment as usual, as a control.

#### *Sleep interventions in forensic psychiatric patients: a feasibility study*

##### *Aim:*

1. To assess whether the delivery of two sleep interventions (Mindfulness and Sleep Education) and a comparative control is possible in a high secure psychiatric setting.
2. To examine the effectiveness of Mindfulness and Sleep Education in improving sleep in high secure psychiatric patients.
3. To examine the effectiveness of Mindfulness and Sleep Education in reducing levels of inward and outward aggression in high secure psychiatric patients.
4. To examine the effectiveness of Mindfulness and Sleep Education in reducing sleep and aggression-relevant cognitive factors in high secure psychiatric

patients.

*Hypotheses:*

The primary aim is to assess the feasibility of delivering a sleep intervention trial, and therefore no hypothesis has been made. The following hypotheses refer to examining the effectiveness of the interventions:

2. *To examine the effectiveness of Mindfulness and Sleep Education in improving sleep in high secure psychiatric patients.*

- a. The Mindfulness intervention will better improve sleep compared to Treatment As Usual in high secure psychiatric patients.
- b. The Mindfulness intervention will better improve sleep compared to Sleep Education intervention in high secure psychiatric patients.
- c. Sleep Education intervention will better improve sleep than Treatment As Usual in high secure psychiatric patients.

3. *To examine the effectiveness of Mindfulness and Sleep Education in reducing levels of inward and outward aggression in high secure psychiatric patients.*

- a. The Mindfulness intervention will be better than Treatment As Usual in reducing levels of inward and outward aggression in high secure psychiatric patients.
- b. The Mindfulness intervention will be better than Sleep Education in reducing levels of inward and outward aggression in high secure psychiatric patients.
- c. The Sleep Education intervention will be better than Treatment As

Usual in reducing levels of inward and outward aggression in high secure psychiatric patients.

4. To examine the effectiveness of Mindfulness and Sleep Education in reducing sleep and aggression-relevant cognitive factors in high secure psychiatric patients.
  - a. The Mindfulness Intervention will be better than Treatment As Usual in reducing relevant cognitive factors compared to Treatment As Usual in high secure psychiatric patients.
  - b. The Mindfulness Intervention will be better than Sleep Education in reducing relevant cognitive factors in high secure psychiatric patients.
  - c. The Sleep Education Intervention will be no better than Treatment As Usual in reducing relevant cognitive factors in high secure psychiatric patients.

The findings from this feasibility trial is hoped to provide a better understanding of the cognitive processes involved in the sleep-aggression relationship. If sleep, and subsequent aggression can be improved by targeting the relevant cognitive factors in a small-scale trial, future trials may help to further address the contribution of cognition. By establishing the contributory cognitive process, a cognitive model of the sleep-aggression relationship can be proposed.

## **CHAPTER FIVE**

### **THE ROLE OF COGNITION IN THE SLEEP-AGGRESSION RELATIONSHIP: A SYSTEMATIC REVIEW**

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#### **5.1 Structure of the chapter**

As identified in the previous chapters, the role of cognition appears vital in the link between sleep and aggression. However, in order to understand the salient cognitive processes, an exploration of the literature to date is needed. This chapter outlines a systematic review of the literature with the aim of exploring how cognitive processes are associated with the sleep-aggression relationship in various in adolescents and adults.

#### **5.2 Review aim**

The aim of this review is to systematically identify and review published studies that examine the role of cognitive processes in the relationship between sleep and aggression. The literature argues that cognitions may be hindering an individual's ability to sleep, leading to symptoms of insomnia (Harvey, 2002; Espie, 2002; Lundh & Broman, 2000). It is also indicated that with regard to both inward aggression (self-harm & suicide) and outward aggression (towards others), that an individual's perception and knowledge of a situation is likely to increase their use of aggression (Anderson & Bushman, 2002; Huesmann, 1989). It is therefore possible that cognitive processes may both interrupt sleep and increase aggression towards the self and others.

The systematic literature review therefore aimed to answer the following research question:

What cognitive processes account for the association between sleep problems and aggression in adults and adolescents?

Applying a thorough exploration of these papers, the systematic literature review also aimed to answer the following questions.

1. Do the included papers find an association between sleep and outward aggression in adults and adolescents?
2. Do the included papers find an association between sleep and inward aggression?

### **5.3 Method**

A systematic literature review was conducted, adhering to the relevant sections of the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA; Moher *et al.*, 2009).

#### *Data sources and search*

The literature search was conducted to locate all empirical studies that have measured sleep, a form of aggression (inward or outward), and include at least one measure of a cognitive process. Articles considered for inclusion in the search were any relevant articles published until October 2016. Searches were completed using the following databases: Academic Search Complete, PsycINFO, PsycARTICLES, MEDLINE, AMED, and Web of Science. The search procedure used the following abstract terms: “Sleep” OR “insomnia” AND “aggression” OR “violence” OR “self-harm” OR “self-injury” OR “suicide” AND “cognition” OR “rumination” OR “hostile” OR “attribution bias” OR “perception bias” OR “normative beliefs” OR “cognitive scripts”.<sup>3</sup>

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<sup>3</sup> Sleep terms AND aggression terms = 5, 893; sleep terms AND cognitive terms = 12,349; and aggressive terms AND cognitive terms = 13,940. Resulting in a total of 32, 182 search results. Therefore, the “AND” function was used to ensure that only articles containing sleep, aggression, and cognition were included.



The reference list of each identified article was hand searched for additional studies to be considered for inclusion. Only articles available in the English language were included in the review.

Articles were excluded if they were non-empirical (i.e. narrative and review papers). Papers were also excluded if they did not include all of the variables being explored (i.e. sleep AND aggression (inward or outward) AND cognitive processes). Cognitions were identified as thought and knowledge processes rather than cognitive ability or functioning. Additionally, studies including participants under the age of 12 were excluded, due to the large differences reported between sleep in children and adults (Hirshkowitz *et al.*, 2015). Therefore, 12 years was used as a cut-off point in order to capture adolescents but not young children.

#### *Data Extraction*

Papers identified from the literature search were screened by examining the titles and abstracts. The full text of the articles that met the inclusion criteria were subsequently screened. Of those studies meeting the inclusion criteria, data relevant to the research aims were extracted and tabulated to allow for easy interpretation. The extracted data included the following; author, country of conducted study, sample size, sample type (e.g. adult male prisoners, female undergraduate psychology students), aggression/suicide measures, sleep measures, cognitive measures, and additional measures. A brief outline of the main findings was also provided in a separate table.

#### *Study quality appraisals*

Quality appraisals were completed for each paper using the Quality Assessment Tool for Observational Cohort and Cross Sectional Studies checklist. This tool was

developed to assist reviewers in focusing on specific aspects of the study which may bias the results, and therefore are key for critical appraisal. It allows the assessor to carefully consider the methodology used to critic its quality. Assessors are advised to rate the study as good, fair, or poor but it is strongly recommended that the assessors' own judgement is included in this analysis and that scores are not determined by summing the items. The Quality Assessment Tool for Observational Cohort and Cross Sectional Studies, developed by the Agency for Healthcare Research and Quality (AHRQ), was considered an appropriate tool given the proposed research aim (i.e. to identify the role of cognitive processes on the relationship between sleep and aggression).

The checklist comprises 14 criteria concerning the research objectives, population, measures, and confounders, each of which is independently rated by two assessors. Each item is rated as “yes”, “no”, or “other”, with this including items which cannot be determined, are not applicable, and not reported.

Subsequently, all the studies screened against the inclusion criteria were independently assessed by two raters. Whilst there were minor discrepancies between the scoring of individual criteria, this was resolved through discussion. Such discrepancies included how well defined a population was in a particular study (e.g. Weis *et al.*, 2015) or whether an item was considered as “not applicable” or “not reported”. In such cases, both reviewers collaboratively looked at the individual paper to make a decision. There were no discrepancies in overall scoring.

## 5.4 Results

### 5.4.1 Literature Search

A total of 1,735 article hits were returned. Once the duplicates were removed, 1,129 article abstracts were screened for relevance. Abstracts were marked as either relevant, maybe relevant, or not relevant. Those marked as not relevant were given a code based on its reason; (1) unrelated topic; (2) children under 12; (3) secondary source/narrative/review. This resulted in 194 full text articles obtained in full copy formats and reviewed for further screening.

A more in-depth inspection of the articles was performed for each of the full text articles. In addition to the reasons for exclusion for the abstract screening, the full text articles were also marked as not being included if they: (4) did not contain any measure of aggression (inward or outward aggression), sleep, or cognitions; and (5) not available in the English language. This resulted in a total of 14 papers being identified. The references included in these 14 studies were hand-searched, resulting in a further four studies identified. This resulted in a total of 18 papers meeting the inclusion criteria for the literature review (see Figure 5.1).

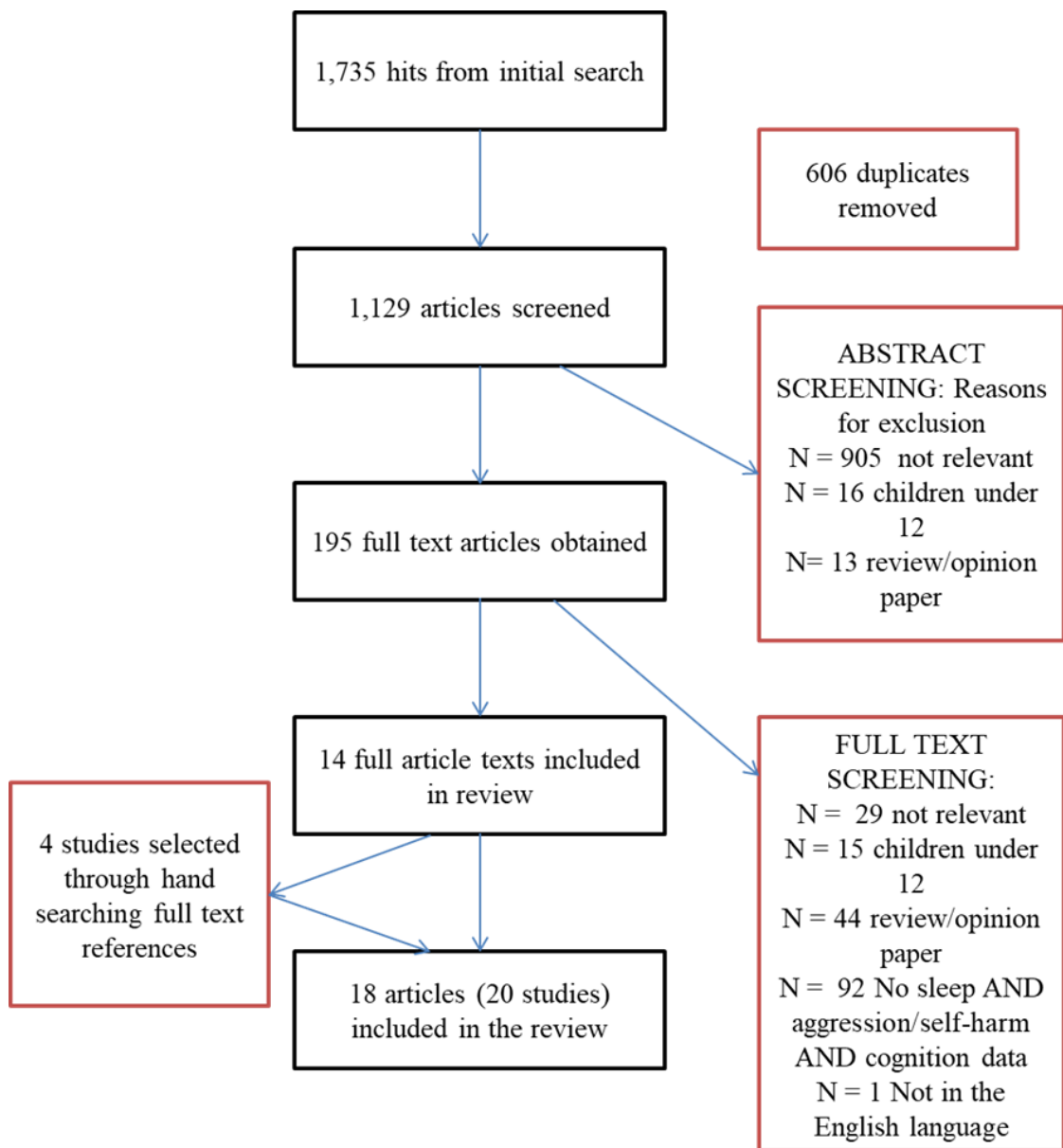


Figure 5.1: Literature search flow chart outlining the number of articles included (and excluded) at each phase of the literature search process.

#### 5.4.2 Characteristics of included studies

The study's design, country, participant demographics, constructs being measures, and the tools used to measure each construct are all reported in Table 5.1.

Table 5.1: Characteristic of included studies

Author	Country	Study Design	Participant Demographics	Measures				Quality Appraisal
				Aggression/Suicide	Sleep	Cognitive Processes	Additional	
Barker, Ireland, Chu, & Ireland (2016) Study A	UK	Cross-sectional	N= 95, Adult Male Prisoners, Age not stated	Perpetration & victimisation of bullying - DIPC-R	Sleep Quality – PSQI	Implicit cognitive processing - The Puzzle Test	N/A	Fair
Barker, Ireland, Chu, & Ireland (2016) Study B	UK	Cross-sectional	N= 141, Adult Male Prisoners, Mean age = 19.15	Aggression motivation - RPQ	Sleep Quality – PSQI	Hostile Attribution Bias - HIQ	N/A	Fair
Booth, Fedoroff, Curry, & Douglas (2006)	Canada	Retrospective chart review	N=10, Alleged Sexual Offenders [90% Male), Age range 27-55 (M=39.40)	Trait aggression – AQ	Sleep apnea indices – PLM, AHI, RDI, RERA. Sleep architecture %. ESS	Hostility – AQ	BMI	Fair
Bozzay, Karver & Verona (2016)	Canada	Cross-sectional	N=438, Female Undergraduate Psychology Students, Age range 18-50 (M=20.4)	Suicide ideation – ASIQ	Insomnia Severity – ISI. Fatigue – MFI.	Hopelessness – BHS. Social problem solving – SPSI-R:S.	Depression, anxiety & stress - DASS-21	Good
Chu, Hom, Rogers, Ringer, Hames, Suh & Joiner (2016)	South Korea	Cross-sectional	552 College Undergraduate Psychology Students (74.5% Male), Age range 18-34 (M=21.53)	Suicide -DSI-SS	Insomnia Severity - ISI	Perceived Burdensomeness & Thwarted Belongingness - INQ	N/A	Fair

Table 5.1 continued

Author	Country	Study Design	Participant Demographics	Measures				Quality Appraisal
				Aggression/Suicide	Sleep	Cognitive Processes	Additional	
Golding, Nadorff, Winer, & Ward (2015)	USA	Cross-sectional	167 Older adults (25.7% male), age range 55-75 (M=60.64)	Suicide behaviours- SBQ-R	Insomnia severity – ISI (+ duration = single item). Nightmares – DDNSI (+ duration = single item).	Perceived Burdensomeness & Thwarted Belongingness – INQ. Fearlessness about death – ACSS-FAD.	Post Traumatic Stress Disorder – PCL-CL	Good
Hunter, Durkin, Boyle, Booth & Rasmussen (2014)	UK	Cross-sectional	5,420 School-aged Adolescents (48.8% Male), Age range 11-17	Bullying - Single item “bullied or frightened someone in this school in the past year?”	Sleep quality - Three items “felt too tired”, “had trouble getting to sleep” & “had trouble staying asleep”	Worry - Presented with a list of 20 different worries	Victimisation - Single items “been bullied in their school or elsewhere”	Fair
Ireland & Culpin (2006)	UK	Cross-sectional	186 Young and Juvenile Male Prisoners. Age range 14-20. Young Offender’s Mean Age = 19. Juvenile Offenders Mean Age = 16	Trait aggression – AQ	Sleep problems – SCS.	Hostility - AQ	Impulsivity BIS-II	Good

Table 5.1 continued

Author	Country	Study Design	Participant Demographics	Measures				Quality Appraisal
				Aggression/Suicide	Sleep	Cognitive Processes	Additional	
Kamphuis, Dijk, Spreen & Lancel (2014)	The Netherlands	Cross-sectional	96 Forensic Psychiatric Patients (96.8% Male). Age range 21 – 77 (M=36.9)	Trait aggression – AQ. Aggressive Incidents	Sleep Quality – PSQI. Diagnosed Sleep Problems – SDL	Hostility - HKT-30 Hostility score	Impulsivity BIS-11	Good
Kaplan, Ali, Simpson, Britt & McCall (2014)	USA	Cross-sectional	50 Adolescents Psychiatric Patients. (36% Male). Age range 12-17 (M=15.1)	Suicide ideation - SIQ-Jr	Sleep Quality – ASWS. Sleep Hygiene – ASHS. Nightmare severity – DDNSI	Beliefs about sleep - DBAS C-10	N/A	Fair
Kubiszewski, Fontaine, Potard & Gimenes (2014)	France	Cross-sectional	1422 School aged adolescents (57% Male), Age range 10-18 (M=14.3)	Perpetration & victimisation of bullying- rBVQ. Aggressive actions -Aggression Scale	Sleep/Wake Habits - School Sleep Habit Survey. Insomnia Severity – ISI	Social disintegration - Perceived Social Disintegration	Psychological distress & antisocial behaviour - OBVQ	Fair
Littlewood, Gooding, Panagioti & Kyle (2016)	UK	Cross-sectional	91 individuals experiencing PTSD symptoms (26% Male) Age range 18-65, M=28.56	Suicide - SBQ-R	Nightmare severity - 2 items on the CAPS	Hopelessness - BHS; 16 items scale – Defeat; 16 items scale - Entrapment	Depression diagnosis	Good

Table 5.1 continued

Author	Country	Study Design	Participant Demographics	Measures				Quality Appraisal
				Aggression/Suicide	Sleep	Cognitive Processes	Additional	
McCall, Batson, Webster, Case, Joshi, Derreberry, McDonough & Farris (2013)	USA	Cross-sectional	50 patients with a diagnosis of a depressive disorder (28% Male) (23 outpatients, 16 inpatients & 11 Emergency Department) Age range 20-84, (M=49)	Suicide - BSS	Insomnia Severity – ISI.  Nightmare Severity – DDNSI	Beliefs about Sleep – DBAS-16.  Hopelessness - BHS	Depression - PHQ-9	Good
Nadorff, Anetis, Nazem, Harris & Winer (2014) Study A	USA	Cross-sectional	747 Undergraduate Students (43% Male). Age range 18-33 years (M=18.9)	SBQ-R - Suicide Attempt History.	Insomnia Severity – ISI. Nightmare Severity – DDNSI	Perceived Burdensomeness & Thwarted Belongingness - INQ  Fearlessness about death - ACSS	Depressive symptoms – CES-D	Good
Nadorff, Anetis, Nazem, Harris & Winer (2014) Study B	USA	Cross-sectional	604 Undergraduate Students (20.5% Male) Age range 18-55, M=20.72)	Suicide attempts L-SASI	Insomnia Severity – ISI.  Nightmare Severity – DDNSI	Perceived Burdensomeness & Thwarted Belongingness - INQ  Fearlessness about death - ACSS	Depression, anxiety & stress - DASS-21	Good



Table 5.1 continued

Author	Country	Study Design	Participant Demographics	Measures				Quality Appraisal
				Aggression/Suicide	Sleep	Cognitive Processes	Additional	
Randler & Vollmer (2013)	Germany	Cross-sectional	432 university students. Mean Age = 23.8)	Aggression – AQ	Sleep variables – bed time, sleep onset time, time of awakening, time of rising.	Hostility – AQ	N/A	Good
Ribeiro, Pease, Gutierrez, Silva, Bernert, Rudd & Joiner (2012)	USA	Cross-sectional & Longitudinal (over 1 month)	311 Individuals entering treatment for suicide (82% Male) (outpatients, inpatients & Emergency Department, mean age = 22.19	Suicide ideation - MSSI	Insomnia symptoms - 2 items of BDI; Insomnia Severity –1 items of SPS	Hopelessness - BHS	Depression, Anxiety & Substance use - MCMI	Fair
Vogler, Perkinson-Gloor, Brand, Grob & Lemola (2014)	Switzerland	Cross-sectional	74 Adult Male Prisoners, Age range 21-73 (M=39.37)	Aggressive Reactions - AERZ (ARGI)	Sleep duration – Single question Insomnia Severity –ISI. Sleep Hygiene – Amount of physical exercise	Rumination - AERZ (ARGI)	Attention Deficit Hyperactivity Disorder - ADHD-SR; Physical health - PHQ15; Depressive symptoms - ADS-K; Life satisfaction - SWB	Good

Table 5.1 continued

				Measures				
Author	Country	Study Design	Participant Demographics	Aggression/Suicide	Sleep	Cognitive Processes	Additional	Quality Appraisal
Weis, Rothenberg, Moshe, Brent & Hamdan (2015)	Israel	Cross-sectional	460 Adult Community (26% Male), Age range 18-35 (M=25.6)	Suicide behaviour - SBQ-R	Sleep Quality – PSQI	Rumination – RSQ. Emotional Regulation - ERQ	Depression Severity – PHQ. Impulsivity -IS	Good
Wosley, Lichstein, Taylor, Riedel, & Bush (2014)	USA	Cross-sectional	766 Adult Community (49% male), age range 20-98 (M=53.78)	Suicide Ideation – Item 9 BDI	Sleep diary parameters – bedtime, SOL, NWAK, WASO, rising time, bedtime medication, nap. Daytime sleepiness – ESS; Daytime functioning -IIS; Fatigue – FSS	Hopelessness – Item 2 of the BDI	Anxiety - STAI	Good

Abbreviations can be found in the Glossary

Table 5.2: Main findings of included studies

Author	Main Findings
Barker <i>et al.</i> (2016) Study 1	Those <i>perceiving</i> to have poor sleep quality were more likely than those <i>perceiving</i> good sleep quality to report aggression in the past. Those <i>perceiving</i> poor sleep were more likely to report impulsive implicit aggression and effortful implicit aggression than those <i>perceiving</i> good quality sleep.
Barker <i>et al.</i> (2016) Study 2	Increased indicators of poor sleep quality were associated with lower levels of prosocial tendencies and higher levels of aggression. The quantity of sleep was not associated with hostility or aggression. Prosocial tendencies were associated with decreased levels of reactive and proactive aggression. Hostile tendencies were associated with increased levels of reactive and proactive aggression. Those <i>perceiving</i> poor quality of sleep were more likely to report higher levels of reactive and proactive aggression.
Booth <i>et al.</i> (2006)	The Epworth Sleepiness Scale correlated with anger and total aggression but no other subscales of the Buss and Perry Questionnaire prior to CPAP treatment. Following CPAP treatment, anger, hostility, verbal, and physical aggression all reduced. Individuals with high levels of REPA prior to treatment were found to have decreases in hostility and total aggression following treatment. Disrupted sleep, as evidenced by an increase in pretreatment stage 2 sleep, was associated with a decrease in verbal aggression. More disrupted sleep before the treatment was associated with greater decreases in hostility and aggression after treatment.
Bozzay <i>et al.</i> (2016)	Socio-cognitive factors were able to partly explain the insomnia and suicide ideation pathway with a significant indirect effect between insomnia and suicide ideation. Depressive symptoms appeared to account for the majority of the variance in suicide ideation. Depression severity was found to be a moderator in the relationships between social problem solving ability and hopelessness and between hopelessness and suicide ideation.
Chu <i>et al.</i> (2016)	Higher insomnia symptoms were associated with significantly higher levels of thwarted belongingness and suicidal ideation. Insomnia severity significantly predicted thwarted belongingness and thwarted belongingness significantly predicted suicidal ideation. Mediation analyses indicated that insomnia severity was not a significant mediator of the relationship between thwarted belongingness and suicidal ideation, suggesting that thwarted belongingness is the mediator of the insomnia/suicide relationship.
Golding <i>et al.</i> (2015)	Current insomnia symptoms and nightmare duration were associated with suicide risk, but <i>duration</i> of insomnia and current nightmares were not. Depressive symptoms were more predictive of suicide risk when controlling for current insomnia, nightmare and duration of nightmares. Insomnia duration was not a predictor of suicide. When considering components of the IPTS, nightmare duration was related to suicide risk independent of IPTS variables but duration of insomnia symptoms were associated with suicide risk only when thwarted belongingness and perceived burdensomeness were included.

Table 5.2 continued

Author	Main Findings
Hunter <i>et al.</i> (2014)	Both victims and bullies were twice as likely to experience sleep difficulties compared to those who were uninvolved with bullying. Those who were both bullies and victims were almost three times more likely to experience sleep difficulties. Worry about being bullied was not a significant predictor of sleep difficulties.
Ireland & Culpin (2006)	Total current hours sleep were predicted by total AQ and by the hostility subscale, with less hours sleep predicted by total aggression and increased hostility. Previous hours sleep was also predicted by total AQ scores, with reduced sleep predicted by increased aggression and increased impulsivity. Overall sleep complaints and poor sleep scores on the SCS were predicted by hostility, with overall sleep complaints and poor sleep scored predicted by increased hostility. Overall sleep complaint scores and poor sleep scores were also predicted by total AQ scores.
Kamphuis <i>et al.</i> (2014)	Sleep quality significantly predicted both self-rated aggression and impulsivity, with higher scores on the PSQI predicting higher aggression and impulsivity scores. Chronic insomnia significantly predicted subjective aggression and impulsivity, with higher SDL insomnia scores predicting higher aggression and impulsivity rates. Substance use appeared to be the only significant predictor of the confounders. Sleep quality also significantly predicted whether or not a participant was judged as severely hostile by their clinician. Objective impulsivity was not significantly predicted by the sleep parameters.
Kaplan <i>et al.</i> (2014)	With regards to the sleep measures, the only significant correlation was between the ASWS and the DDNSI, suggesting that poorer sleep quality was associated with more frequent and intense disturbing dreams and nightmares. There was a significant correlation between the ASWS and the SIQ-JR, suggesting that poorer sleep quality was associated with increased suicide ideation. The strongest correlation was between the SIQ-JR and the DDNSI, suggesting that more frequent and intense disturbing dreams and nightmares were associated with increased suicide ideation. A multiple regression model (with SIQ-JR as the dependant variable) and including all factors other than the sleep hygiene scale, independently and significantly contributed to suicide ideation.
Kubiszewski <i>et al.</i> (2014)	Bulling profiles were associated significantly with sleep parameters (other than wake-up time during the week and sleep duration at weekends. Bullies (pure bullies & bully/victims) had shorter sleep duration during the school week and higher sleep schedule variability regarding bedtimes and wake-up times. Bullies went to bed significantly later then neutrals and victims. Victims (pure victims and bully/victims) were more likely to show symptoms of sleep disorders. Bullies who had lacked sleep, who had irregular bedtimes and wake- up times displayed higher levels of aggression and antisocial behaviour than bullies who had sufficient sleep. Victims with insomnia and night-time and daytime stress had higher levels of perceived social disintegration and psychological distress.

Table 5.2 continued

Author	Main Findings
Littlewood <i>et al.</i> (2016)	Nightmares significantly predicted suicidal behaviours, independent of insomnia, this remained even when those with a diagnosis of depression were removed from the sample. Nightmares were associated with suicidal behaviours indirectly through defeat, to entrapment, to hopelessness. Nightmares were also associated with suicidal behaviours indirectly through defeat to hopelessness. Again, this remained when those with depression diagnosis were removed.
McCall <i>et al.</i> (2013)	Hopelessness was related to suicide ideation but was not significantly related to insomnia severity, dysfunctional beliefs or nightmare severity. Insomnia severity was directly related to suicide ideation, and insomnia symptoms were mediated by dysfunctional beliefs and attitudes about sleep and nightmares.
Nadorff <i>et al.</i> (2014) A	Insomnia symptoms and nightmares were positively correlated with perceived burdensomeness and thwarted belongingness. A regression analysis revealed that without the IPTS variables, insomnia was no longer associated with suicide risk, but nightmares were. When including depressive symptoms, nightmares were no longer significantly associated with suicide. Insomnia symptoms were not associated with past suicide attempts, but nightmares were even after controlling for depression.
Nadorff <i>et al.</i> (2014) B	Insomnia symptoms and nightmares were positively correlated with both INQ constructs. However, insomnia symptoms were not associated with acquired capability. Both insomnia symptoms and nightmares remained significantly associated with suicide attempts after controlling for depressive symptoms and both INQ constructs.
Randlar & Vollmer (2013)	Morningness-eveningness scores and midpoint of sleep were moderately correlated but sleep duration was not related to either of these. With regard to bivariate correlations of the aggression subscales, there were negative correlations between sleep duration and all four of the subscales, suggesting that short sleepers reported more aggression. Midpoint of sleep was not associated with hostility. The multivariate general linear model (with the aggression subscales as the independent variables), found a significant influence of sleep duration and gender on all four of the subscales. Morningness-eveningness was only negatively related to hostility and none of the other aggression subscales.
Ribeiro <i>et al.</i> (2012)	Insomnia symptoms was a significant predictor of suicidal ideation whilst controlling for hopelessness, depression, PTSD, anxiety, alcohol, and drug abuse. In addition, hopelessness was also a predictor of suicide ideation. Insomnia symptoms at baseline also predicted suicidal ideation at follow up. Insomnia was the only longitudinal predictor of suicide at follow up. Suicidal ideation at baseline was not able to predict insomnia. Insomnia symptoms (at baseline) was only able to predict suicide attempts (at follow-up), when depression and hopelessness were controlled for.

Table 5.2 continued

Author	Main Findings
Vogler <i>et al.</i> (2014)	Individuals who slept up to 6 hours daily (short sleep), reported more venting aggressively and physical health complaints and those who slept longer. Inmates with poor sleep quality reported higher levels of venting; reacting aggressively and rumination and more symptoms of ADHD and physical health complaints than good sleepers. For sleep hygiene factors, only daily caffeine consumption was associated with poorer sleep.
Weis <i>et al.</i> (2015)	Suicidal patients had higher levels of rumination, brooding and reflection compared to non-suicidal patients. They also showed greater difficulty with respect to emotional regulation and overall sleep problems. Individuals with suicidal ideation showed higher rates of nightmares, needing medications to sleep, moderate-severe daytime dysfunction due to sleepiness, poor efficiency and negative subjective appreciation of sleep. Suicidal risk was significantly correlated with sleep problems, depression, anxiety, impulsivity, emotional regulation and rumination. Sleep problems had no direct effect on suicidal risk. It had an indirect effect through sleep problems' effects on depression, emotion regulation and rumination. Emotion regulation also had an indirect effect on suicidal risk thoughts its influence on depression and rumination.
Woosley <i>et al.</i> (2012)	The relationship between insomnia symptoms and suicide was significant and the relationship between hopelessness and insomnia was significant. When controlling for hopelessness, insomnia was no longer a predictor of suicide ideation. This indicates that hopelessness was a significant mediator of the relationship between insomnia and suicide ideation.

### 5.4.3 Study quality

Quality ratings for the studies included in this review were rated as either fair (k=8) or good (k=12) quality. Individual ratings are available in Table 5.1. Studies that measured the relationship between sleep and inward aggression were more likely to control for symptoms of depression than those examining outward aggression. This is expected due to the associations between depression and suicide ideation and behaviours (Harris & Barraclough, 1992). However, arguably there are additional difficulties with mental health, aside from depression, that may also contribute to the relationships between sleep and both inward and outwards aggression.

The studies with a “fair” rating were more likely to have included fewer measures of sleep. For example, Ribeiro *et al.* (2012) only used three single items as a measure of sleep quality. This questions the extent to which participants were experiencing disruption to sleep. Furthermore, only one study (Booth *et al.*, 2006) measure sleep using objective measures, making it difficult to determine whether the study was based solely on sleep perception. Additionally, the measures of both inward and outward aggression were reliant on self-report methods. The outward aggression studies were limited to their cross-sectional design and correlation and regression analysis. Studies examining inward aggression were more likely to examine the mediating factors of the sleep-suicide relationship.

### 5.4.4 Study Design

Two of the articles included in this systematic review each comprised two studies (Barker *et al.*, 2016 and Nadorff *et al.*, 2014). For ease of interpretation, the studies included in each article will be presented separately (e.g. Barker *et al.*, 2016A or Barker *et al.*, 2016B). The majority of studies were a cross-sectional design (k = 18), with one

study including both cross-sectional and longitudinal data (Ribeiro *et al.*, 2012) and the remaining study representing a retrospective chart review (Booth *et al.*, 2006).

#### 5.4.5 Country

The papers identified were largely from Western cultures (United States of America (k=7), United Kingdom (k=5), Canada (k=2), France (k=1), Germany (k=1), The Netherlands (k=1), and Switzerland (k=1). The remaining studies were conducted in South Korea (k=1) and Israel (k=1).

#### 5.4.6 Participant Demographics

The total sample consisted of 12,112 participants, although it is highlighted that the majority of this sample was generated from two of the included studies (Hunter *et al.*, 2014 (N=5,420) and Kubiszewski *et al.*, 2014 (N=1,422). Four of the studies included a male only sample, all of which were from a forensic population (N = 496) One study included a female only sample of undergraduate students (N = 438) (Bozzay *et al.*, 2016). The remaining studies included both male and females and were from a variety of populations, including students (school-aged (k=2; N = 6,842) and undergraduate (k=4, N = 2,335), psychiatric patients (forensic inpatients (k=1), adolescent inpatients (k=1), and inpatient, outpatients, and emergency department admissions (k=2, N = 360)), community sample (k=2, N = 1,226) alleged sexual offenders (k=1, N = 10), individuals with symptoms of PTSD (k=1), and older adults (k=1). The age of the total sample ranged from 10 to 98, although the eligibility inclusion criteria for the studies was from the age of 12, one study included a secondary school sample that ranged from approximately age 10 to 17 (Hunter *et al.*, 2014). Due to the small age difference and the large sample size of the study, this study was included in the review to ensure that all of the relevant information was included.



#### 5.4.7 Sleep elements measured

The sleep elements measured included insomnia severity [k=9], sleep quality [k=7], nightmare severity [k=6], sleep duration [k=2] sleep hygiene/habits [k=3], sleep parameters [k=4], fatigue [k=2], respiratory sleep problems [k=1], and daytime sleepiness [k=3]. Each study identified included at least one measure of sleep [k=9], with eight studies including two measures, and four studies including three. The Insomnia Severity Index (ISI, Bastian *et al.*, 2007) was used in the majority of studies [k=8], with the Pittsburgh Sleep Quality Index (PSQI, Buysse, Reynold, Monk, Berman & Kupfer, 1989) and the Disturbing Dream and Nightmare Severity Index (DDNSI, Krakow *et al.*, 2002) used in more than one study [k=4 & k=5, respectively]. Two of the included studies included a single question to measure sleep duration and sleep hygiene (Vogler *et al.*, 2014) and insomnia severity (Ribeiro *et al.*, 2012). Golding *et al.* (2014) also included a single item to measure the duration that individuals experienced insomnia and nightmares. Although it is noted that all three studies also measured an additional sleep construct. Only one study used an objective measure of sleep (Booth *et al.*, 2006) by assessing respiratory sleep problems using polysomnography.

#### 5.4.8 Type of aggression

Each paper was identified as measuring outward aggression (Bullying [k=3], aggression motivation [k=1], trait aggression [k=4]), and aggressive actions/reactions [k=2]) or inward aggression (ideation [k= 6], behaviours [k=3], attempts [k=2]). One study (Kamphuis *et al.*, 2014) highlighted that it would measure both aggression towards the self and others but did not separate incidents of aggression towards others and towards the self in their analysis. None of the included studies assessed both aggression towards the self and others, and no study included a measure of non-suicidal

self-harm.

#### Outward aggression

A total of seven self-report measures and one objective measure were used to assess outward aggression. The Aggression Questionnaire (Buss & Perry, 1992) was the only measure used across more than one study (Booth *et al.*, 2006; Ireland & Culpin, 2006; Kamphuis *et al.*, 2014; Randler & Vollmer, 2013). Two studies included more than one measure of aggression (Kamphuis *et al.*, 2014 & Kubiszewski *et al.*, 2014). One study (Hunter *et al.*, 2014) used a single item to measure bullying perpetration in comparison to Barker *et al.* (2016, Study A), which included a 144 item measure of bullying perpetration and victimisation (the Direct and Indirect Prisoner Checklist– Revised, DIPC-R, Ireland 2002). Kamphuis *et al.* (2014), Vogler *et al.* (2014), and Kubiszewski *et al.* (2014) included valid measures of trait aggression, aggressive reactions, and bullying, respectively, with Kamphuis *et al.* (2014) being the only study to include an objective measure of aggression, namely recorded aggressive incidents

#### Inward aggression

A total of eight self-report measures and one interview were used across the studies. The Suicidal Behaviours Questionnaire- Revised (SBQ-R, Osman *et al.*, 2001) was the only measure used across more than one study [k=4]. Only one of the studies included more than one measure of suicide, with Nadorff *et al.* (2014A) measuring suicide attempts with a single item “How many times have you attempted suicide” in addition to the SBQ-R.

#### 5.4.9 Cognitive processes

A total of 14 cognitive processes were measured in the 21 included studies. Hostility (k=5), hopelessness (k=4), perceived burdensomeness and thwarted belongingness

(k=4), beliefs about sleep (k=2), and rumination (k=2) were the only processes to be measured across more than one study. With regards to the studies including measures of inward aggression, the cognitive measures including hostility (k=5), implicit processing (k=1), worrying (k=1), social disintegration (k=1), and rumination (k=1). For studies focusing on inward aggression, measures included hopelessness (k=4), perceived burdensomeness & thwarted belongingness (k=4), beliefs about sleep (k=2), social disintegration (k=1), rumination (k=1), defeat (k=1), entrapment [k=1], fearlessness about death (k=20), worry (k=1), and emotional regulation (k=1).

#### 5.4.10 Reported associations between each sleep element and aggression

Each of the reported sleep elements (sleep duration, sleep quality, insomnia, and nightmares) and their association with aggression (inward/outward) is presented.

##### Sleep Duration

Five of the included studies examined the associations between the number of hours slept and outward aggression, yet no studies examined the impact of sleep duration on inward aggression. There was some discrepancy with regards to the impact of short sleep duration on aggression, with Ireland and Culpin (2006), Kubiszewski *et al.* (2014), and Vogler *et al.* (2014) finding that shorter duration of sleep was associated with increased aggression and bullying. In contrast, Barker *et al.* (2016 A & B) found that sleep duration was not significantly correlated with bullying perpetration (Study A) or reactive/proactive aggression (Study B). When considering how duration of sleep is measured in each study, it is interesting to observe that Barker *et al.* (2016 A & B) use the PSQI to determine sleep duration. This measure asked participants to consider how they had slept over the past month in contrast to Vogler *et al.* (2014) who asked their sample of male prisoners “How many hours do you usually sleep on weekdays?”, without giving an indication of how long this may be occurring for. The PSQI asks

participants to consider both weekday and weekend sleep, which may result in average sleep duration to be longer, hence why it was not associated with bullying and aggression in Barker et al.'s (2016) two studies. Interestingly, Kubiszewski *et al.* (2014) found that only short duration of sleep in the weekday was able to predict bullying and short sleep duration on the weekend was not. It could be suggested that individuals' motivation for their short sleep duration was protective of aggression (i.e. if it is their own choice to have shorter sleep, they may be less aggressive).

### Sleep Quality

Barker *et al.* (2016 A) found that sleep quality was not associated with bullying perpetration in their sample of adult male prisoners. However, they did find that individual's perception of poor sleep quality was able to predict bullying perpetration, suggesting potential differences in the indicators of sleep quality in comparison to the perception of sleep quality. Barker *et al.* (2016 B) found similar findings with regards to sleep perception in their second study but found that the indicators of sleep quality were also associated with higher levels of reactive aggression.

In contrast to Barker et al.'s (2016, A) findings, regarding bullying behaviour, Hunter *et al.* (2014) found that a reduction in sleep quality was able to predict bullying, with those who were bullies twice as likely to experience sleep problems and those identified as both bullies and victims three times as likely to experience sleep problems. It is noted that there are age related differences between these samples, as Hunter *et al.* (2014) included a school aged-adolescent sample, whereas Barker *et al.* (2016 A) included adult male prisoners. One comparable study (Kamphuis *et al.*, 2014) used an adult forensic sample, although it is noted that their sample comprised psychiatric patients. Their findings suggested that poor sleep quality was able to predict higher levels of both self-rated and objective aggression.

Two studies have explored sleep quality in relation to suicide with consistent findings. Kaplan *et al.* (2014) found that poorer sleep quality was associated with increased suicide ideation. Additionally, Weis *et al.* (2014) revealed that in their sample of adults from the community, those with suicidal behaviour were more likely to have overall sleep problems. These findings reveal that in adolescent psychiatric patients (Kaplan *et al.*, 2014), and adults from the community (Weis *et al.*, 2014), poor sleep quality is associated with increased suicide ideation and behaviour.

### Insomnia

Severity of insomnia symptoms was measured in 10 studies, with eight of them exploring the insomnia-suicide relationship. Before controlling for covariates, all eight studies revealed a significant association between insomnia symptom severity and suicide (Bozzay *et al.*, 2016; Chu *et al.*, 2016; Golding *et al.*, 2015; McCall *et al.*, 2013; Nadorff *et al.*, 2014 A & B; Ribeiro *et al.*, 2012). With the exception of Golding *et al.* (2015) and Ribeiro *et al.* (2012), those studies examining insomnia and suicide considered current symptoms of insomnia. However, Ribeiro *et al.* (2012) also found in their longitudinal analysis that insomnia symptoms at baseline were predictive of suicide ideation one month later. Their findings indicate that insomnia symptoms precede suicide symptoms. In addition to considering current insomnia symptoms, Golding *et al.* (2015) also asked their sample of older adults how long they had been experiencing insomnia. Their findings revealed that the duration of insomnia was not associated with suicide risk and identify that the difference between this and previous findings is due to their older adult sample.

Two studies consider the relationship between insomnia and outward aggression (Kubiszewski *et al.*, 2014 & Vogler *et al.*, 2014). Kubiszewski *et al.* (2014) found that those identified as victims (pure victim or victim/bully) had higher scores of insomnia

in comparison to neutrals and bullies. This finding is regardless of the shorter sleep duration experienced with those identifying as a bully, indicating that insomnia symptoms are not dependant on the quantity of sleep. Vogler *et al.* (2014) found that those with a score of 10 or less on a German version of the Insomnia Severity Index reported higher levels of reacting aggressively in their sample of male prisoners. Whilst their findings indicate an association between insomnia and aggression, a cut off score of 10 does not indicate clinically significant levels of insomnia, with a score of 10 meeting the subthreshold of insomnia. Therefore, more stringent criteria for insomnia may be more relevant.

### Nightmares

Six studies examined the relationship between nightmares and distressing dreams on suicide (Golding *et al.*, 2015; Kaplan, *et al.*, 2014; Littlewood *et al.*, 2016; McCall *et al.*, 2013; Nadorff *et al.*, 2014 A & B). Each of the studies found that nightmares and disturbing dreams correlated with suicide, but the findings were mixed with regard to the role that other symptoms, such as depression had on this relationship. For example, Golding *et al.* (2015) found a stronger association between nightmares and suicide when depressive symptoms were accounted for. Furthermore, in Nadorff *et al.*'s (2014, A) first study, nightmares only correlated with suicide when depression was included, but their second study (B) revealed differing findings. Using a similar sample, but a different measure of depression, they found that nightmares were correlated with suicide attempts regardless of depressive symptoms. Littlewood *et al.*, (2016) also found that nightmares were predictive of suicide regardless of insomnia. Whilst these findings give some indication of the role of nightmares on suicide, they do not provide a full picture of the sleep-aggression relationship. It could be argued that nightmares may disrupt sleep but do not necessarily lead to problems with sleep (i.e. shorter

duration, or poor quality). For example, Littlewood *et al.* (2016) found that nightmares predicted suicide regardless of whether individuals experienced symptoms of insomnia.

#### 5.4.11 Thematic synthesis

A thematic synthesis of the included studies was conducted to answer the main research question. This included identifying patterns within the data following the techniques outlined by Braun and Clarke (2006). Six phases are proposed for a thorough thematic analysis: become familiar with the data, generate initial codes, search for themes, review the themes, define and name the themes, and produce the report. Each subtheme is followed by the percentage of articles that captured this theme. A thematic diagram is presented in Figure 5.2 to illustrate each identified theme and subtheme with the narrative of each following.

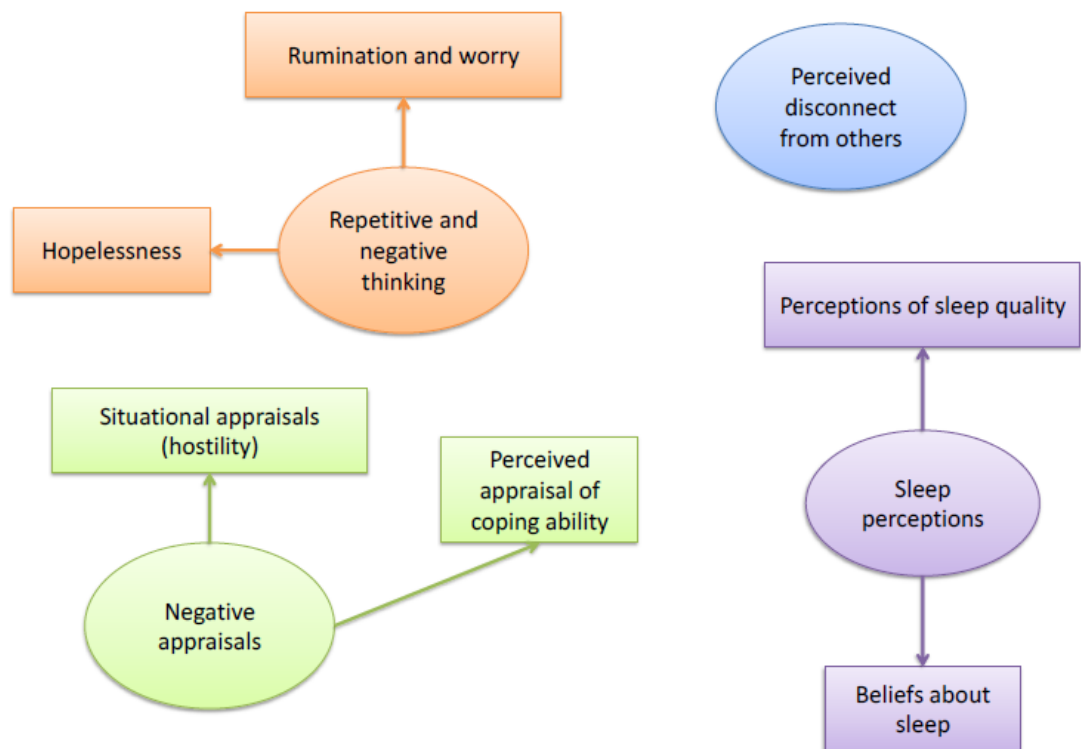


Figure 5.2: Thematic diagram illustrating each theme and its respective subtheme.

*Theme one: Repetitive and negative thinking*

Negative thinking about previous events or future events were described as contributing to the sleep-aggression relationship. An outline is provided next indicating how the literature has captured this in relationship to sleep.

Subtheme one: Rumination and worry (15%)

Rumination is defined as negative, repetitive, self-focused thinking in comparison to worrying which are repetitive thoughts about possible negative consequences (Watkins, 2004). Rumination and worry were also highlighted to influence the sleep-suicide relationship with three studies identified (Hunter *et al.*, 2014; Vogler *et al.*, 2014; Weis *et al.*, 2014). With regards to aggression towards others, Vogler *et al.* (2014) investigated sleep quality and quantity in male prisoners. They found that those who slept fewer hours (less than six hours) were more likely to experience aggression than those with a longer duration of sleep. However, the same was not found for rumination until they examined individual's sleep quality. They found that those who reported poorer sleep quality were more likely to react aggressively and were more prone to rumination. These findings give some indication as to the impact of poor sleep quality, as opposed to sleep quantity, on rumination. However, it is noted that these findings are cross-sectional and cannot determine causality, therefore rumination may increase the likelihood of individuals reporting poor sleep quality rather than sleep quality increasing negative, repetitive thoughts. Vogler *et al.*'s (2014) results do not indicate whether an increase in rumination also increases aggression, and whether rumination specifically plays a role in the sleep-aggression relationship. They do, however, suggest that such a factor is worth exploring in future research.



A further study examining rumination (Weis *et al.*, 2014) found that one potential pathway from sleep problems to suicide was via depressive rumination. An indirect pathway was also significant from sleep problems to suicidal risk via emotional regulation and rumination. The authors highlight the links between rumination and sleep and rumination and suicide separately, but their findings suggest that the link between sleep problems and suicide could be explained by increased rumination. They found that when controlling for rumination, emotional regulation, and depressive symptoms, there was no direct pathway from sleep problems to suicide.

In contrast to rumination, Hunter *et al.* (2014) explored worry in a sample of adolescents. Their research focused on victims and perpetrators of bullying, finding that those identified as a victim, or a bully were twice as likely to experience sleep difficulties than those not involved in bullying. They also found that those identified as both a bully and a victim were three times as likely to report poor sleep. The authors also examined worrying by presenting a list of worries to participants but their findings did not reveal a significant predictor. However, the authors only considered “worrying about being bullied” in their analysis and examined this with regards to victims of bullying (victims and bully-victims included). Their findings suggest worrying regarding bullying did not increase the likelihood of being a victim, or of being a bully. Although worrying about being bullied did not predict aggression (or victimisation of aggression), there may be additional worries that could interfere with sleep or that sleep could increase. Therefore, worrying may need further exploration.

Subtheme two: Hopelessness (20%)

Hopelessness is defined as generalised negative future expectations (Beck *et al.*, 1974), whereby an individual is more likely to overestimate unfortunate events occurring (Kliem, Lohmann, Mößle, & Brähler, 2018). Four studies included a measure of

hopelessness (Bozzay *et al.*, 2016; Littlewood *et al.*, 2016; Ribeiro *et al.*, 2012; Woosley *et al.*; 2014) with three of these finding that hopelessness was a mediator of the sleep-suicide relationship.

Woosley *et al.* (2014) explored the influence of hopelessness on the sleep-aggression relationship in an adult community sample. Using single item assessments of both suicide and hopelessness, derived from the Beck Depression Questionnaire, their findings revealed that hopelessness was a mediator between symptoms of insomnia and suicide ideation. All other tested models were non-significant, suggesting that the pathway is from insomnia through hopelessness to suicide ideation (as opposed to from suicide ideation to insomnia). Their findings give some indication that insomnia may increase perceptions of hopelessness. With regard to insomnia symptoms, the authors used the DSM-V classification which combined specific items from several measures relating to insomnia symptoms.

Supporting this, Bozzay *et al.* (2016) also found hopelessness to be a mediator of the insomnia-suicide relationship. Their mediation analysis included four steps (from insomnia to fatigue to social problem solving ability to hopelessness to suicide), whereby social problem solving triggered hopelessness, leading to increased suicidal ideation. Their discussion proposed that poor sleep may lead to more automatic perceptions of hopelessness and suicide is a way of resolving such perceptions. However, the findings from both Woosley *et al.* (2014) and Bozzay *et al.* (2016) still revealed a significant direct effect from insomnia to suicide despite these findings, indicating that there may still be additional pathways explaining this relationship.

Using a sample of individuals with PTSD, Littlewood *et al.* (2016) explored the role of hopelessness in the relationship between night-time severities and suicide behaviours. Their theoretically based model (The *Cry of Pain Model*, Williams, 2001) included

defeat, entrapment, and hopelessness as pathways from nightmares to suicide. Their findings revealed that nightmares were indirectly associated with suicidal behaviours via these three pathways. Littlewood *et al.* (2016) imply that hopelessness may arise from perceptions of a decreased ability to escape from defeat. Yet, the direct effect of nightmares on suicide remained significant, suggesting additional processes may maintain this relationship.

Supporting the direct relationship between sleep problems and suicide, Ribeiro *et al.*'s (2012) longitudinal study found that insomnia significantly predicted suicide ideation whilst controlling for hopelessness in military personnel. In contrast to the three other studies examining hopelessness, Ribeiro *et al.* (2012) did not include hopelessness as a mediator in the suicide-insomnia relationship and therefore cannot determine the role that hopelessness can have on the sleep-suicide relationship. Yet their findings are important for also considering the impact that other cognitive factors can have on the sleep-aggression relationship. It is worthy of note that none of the included studies examined outward aggression when considering hopelessness. It is likely that this is due to the strong associations that hopelessness already has with suicide (McMillan, Gilbody, Beresford, & Neilly, 2007).

### *Theme two: Sleep perception*

Sleep perceptions, which may relate to the perception of what is needed to obtain sufficient sleep (beliefs about sleep), or the individual's perception of their sleep quality, were highlighted as contributing to the sleep-aggression relationship.

#### Subtheme one: Beliefs about sleep (10%)

Two studies identified that the perception of what is needed to obtain sleep can contribute to the sleep-suicide relationship. Firstly, Kaplan *et al.* (2014) explored

beliefs and attitudes about sleep, nightmares, sleep hygiene, and sleep patterns in relation to suicide in psychiatric adolescent inpatients. Whilst poor sleep hygiene did not contribute to suicide behaviours, the sleep patterns, nightmares, and beliefs about sleep was associated with suicide. Such findings may indicate that poor sleep may increase the likelihood of having dysfunctional beliefs about sleep which will increase the likelihood of aggression. Again, such results must be viewed cautiously as the authors did not explore a pathway model to explain this relationship.

McCall *et al.* (2013) also explored sleep-related beliefs to explain the insomnia- suicide relationship. In contrast to Kaplan *et al.* (2014), McCall *et al.* (2013) conducted a mediation analyses to explore the relationship in individuals with depressive disorders. Their findings revealed that insomnia symptoms were mediated by dysfunctional beliefs and attitudes about sleep and also by nightmares. The direct effects of insomnia on suicide, after controlling for these were not significant. Both McCall *et al.* (2013) and Kaplan *et al.*'s (2014) studies highlight the role of beliefs about sleep but also add to the importance of nightmares, indicating that perhaps the negative effects of nightmares could also lead to more dysfunctional beliefs.

#### Subtheme two: Perceptions of sleep quality (10%)

Two of the included studies (Barker *et al.*, 2016 A&B) highlight that an individual's perception of their own sleep quality can also impact their aggression. In their first study, Barker *et al.* (2016A) divided their male prison sample into those who identified as being good sleepers and those identified as being poor sleepers, regardless of the indicators of sleep (e.g. daily disturbances, duration of sleep). They examined the differences in bullying perpetration and victimisation between them and found that those were identified themselves as being poor sleepers were more likely to be perpetrators of aggression in the past week. They also examined whether the perception

of sleep is associated with more automatic and aggressive cognitions. Their findings revealed that those with poorer sleep were more likely to report implicit (automatic) aggression than those perceiving good sleep quality.

Their second study also measured male prisoner's perception of sleep quality and explored the impact on reactive and proactive aggression. Their findings revealed that those perceiving their sleep to be poor were more likely than those perceiving their sleep to be good to report reactive and proactive aggression. What is interesting about Barker et al.'s (2016 A&B) research is that the duration of sleep was not associated with aggression in either study. Although mixed findings were evident between the two study with regard to the other indicators of poor sleep (e.g. daily disturbances) it suggests that the perception of sleep quality may be more important in predicting levels of aggression than sleep duration. Their study does have some limitations in terms of how the indicators of sleep are measured, which could be argued are also drawn upon a perception of an individual's sleep. However, objectively measuring sleep in a prison sample is often difficult due to security issues.

*Theme three: Perceived disconnect from others (20%)*

Three of the included studies examined the role of social disintegration in the sleep-suicide relationship (Chu *et al.*, 2016; Golding *et al.*, 2015; Nadorff *et al.*, 2014 A), whereas one study examined social disintegration in relation to sleep patterns and bullying (Kubiszewski *et al.*, 2014). Chu *et al.*, (2016) explored the role of Thwarted Belongingness (TB) as the link between insomnia ideation. TB is described feeling disconnected and alienated from others (Chu, Rogers, Gai, & Joiner, 2017). Their mediation model identified TB as a significant mediator of the insomnia-suicide ideation relationship, yet found that a direct relationship between insomnia and suicide was still evident. The authors suggest that insomnia may contribute to loneliness due

to an inability to maintain interpersonal relationships, have poor coping abilities, and are more reactive to stressors. This may result in more interpersonal conflicts and individuals may then feel that they do not belong in such social situations. Whilst their findings do highlight the role of loneliness in the sleep- suicide relationship, it is highlighted that they still reported a direct relationship between insomnia and suicide, suggesting that loneliness is not the only contributing factor in this relationship.

Also exploring TB, Nadorff *et al.* (2014 A) found that when controlling for TB and two other interpersonal constructs, Perceived Burdensomeness (PB) and Acquired Capability (AC), the direct effects of insomnia on suicide risk were no longer significant. They included a large sample of undergraduate students in their study and also examined the role of nightmares on suicide risk. With regard to nightmares, their findings indicated that a direct effect of nightmares on suicide risk was still significant, yet when controlling for depressive symptoms, there were no direct effects.

To examine the impact of insomnia and nightmare duration (i.e. the length of time that an individual had been experiencing nightmares) on suicide, whilst controlling for TB, PB, and AC, Golding *et al.* (2015) included two single items into their study asking participants how long they had experienced their symptoms for. Interestingly, their first findings indicated that only current insomnia symptoms and nightmare duration were significantly associated with suicide risk and insomnia duration and current nightmares were not. When controlling for TB, PB, and AC, current insomnia no longer related to suicide, yet nightmare duration remained significant, thus suggesting that the insomnia-suicide relationship may be explained by factors relevant to social isolation, yet the factors contributing to the role of nightmares and suicide need to be further explored. It is also noted that Golding *et al.* (2015) also controlled for other factors that may be relevant in the sleep-aggression relationship including symptoms of PTSD and

anhedonia, thus there may be additional psychological factors impacting this relationship and this will be discussed as a separate theme.

One study included in the review examined perceived social isolation in the relationship between sleep and aggression towards others (Kubiszewski *et al.*, 2014). Examining bullying in high school adolescents, participants answered questionnaires regarding bullying perpetration and victimisation, sleep/wake patterns, and psychosocial problems (aggression, anti-social behaviour, psychological distress, and perceived social disintegration). They found that those who were identified as perpetrators (including victim/perpetrators) had shorter sleep and higher variability in bedtimes and waking times. Victims were more likely to have symptoms of insomnia and more night-time and daytime distress. With regard to perceived social disintegration, the authors only chose to analyse this in relation to victims but found that regardless of whether an individual was a victim, perceived social disintegration was higher in those who experienced insomnia. Whilst the authors did not explore the direct effects of social disintegration in the sleep-aggression relationship, they did highlight that perceived social disintegration is related to symptoms of insomnia.

#### *Theme four: Negative appraisals*

##### Subtheme one: Situational appraisals (hostility) (25%)

Five of the included studies examined how an individual is likely to view others following disturbed sleep (Booth *et al.*, 2006; Barker *et al.*, 2016 B; Ireland & Culpin, 2006; Kamphuis *et al.*, 2014; Randler & Vollmer, 2013). Booth *et al.* (2006) explored the sleep-aggression relationship in sex offenders by examining aggression levels prior to and following sleep apnea treatment via Continuous Positive Airway Pressure (CPAP). They included the Aggression Questionnaire (Buss & Perry, 1992) which includes items of hostility and this was shown to decrease following CPAP treatment.

Those with Respiratory Event Related Arousal (RERAs) prior to sleep treatment were associated with decrease post treatment on the hostility subscale and overall aggression. However, their overall sample was small, with only 10 participants included and their findings differed when they excluded two patients with cognitive deficits. Therefore, any high correlations are likely due to their small sample size.

Ireland and Culpin's (2006) primary aim was to evaluate the sleep-aggression relationship in juvenile and young male prisoners. Using the Aggression Questionnaire (Buss & Perry, 2006), the authors found that shorter sleep duration predicted total aggression and hostility, whereas hostility was the only component to be predicted by sleep quality. The authors discussed possible explanations for the relationship, suggesting that hostility reduces the ability to sleep via rumination or poor sleep raises an individual propensity to report hostility. Ireland and Culpin's research is limited as they did not control for covariates such as mental health difficulties which are likely to have an impact on their findings (Baglioni *et al.*, 2016), particularly with the high prevalence of mental health disorders in prisons (National Audit Office, 2017).

Randler & Vollmer (2013) focused on the duration of sleep (as opposed to sleep quality) and how this can increase aggression in young adults. They predicted that those who went to sleep later, but also arose later, and had short sleep duration would display higher levels of trait aggression. Their findings revealed that shorter sleep duration predicted all components on the Aggression Questionnaire (Buss & Perry, 1992), including hostility. Yet hostility was also predicted by morningness-eveningness, suggesting that those who were more prone to staying up later in the evenings were more likely to report hostility, but not other components of aggression. It is noted that the effect sizes in these results were small and therefore these results must be handled with caution.



A further study exploring hostility (Kamphuis *et al.*, 2014) found that sleep quality, as assessed by the PSQI (Buysse *et al.*, 1989) predicted all components of the Aggression Questionnaire (Buss & Perry, 1992) in forensic psychiatric patients. However, they also included an objective measure of hostility, where data was gathered from clinical risk assessment reports to determine whether an individual was viewed as hostile. Their results confirmed that those with poorer sleep quality were more likely to be judged as hostile by their clinician, yet it is highlighted that this may not be an accurate representation of cognitive hostility and may be reflective of patient's hostile behaviour.

It is noted that the studies examining hostility did not specifically evaluate this is relation to the impact that it may have on aggression. Barker *et al.* (2016 B) explored whether poor sleep quality and short sleep duration would increase the likelihood of male prisoner's interpretation a situation with hostility (i.e. hostility attribution bias) and whether this would also increase reactive and proactive aggression. Their results revealed that whilst sleep quality was able to predict higher levels of both proactive and reactive aggression, sleep duration was not. Furthermore, none of the sleep components were able to predict higher levels of hostility yet sleep quality did predict lower levels of prosocial tendencies (i.e. individuals are less likely to see the positives in a situation).

Subtheme two: Perceived appraisal of coping ability (10%)

Two of the included studies provide some indication that sleep may be impacting on an individual's assessment of their ability to cope (Bozzay *et al.*, 2016; Littlewood *et al.*, 2016). Bozzay *et al.* (2016) found that those with poor social problem-solving skills were more likely than those who adopted more adaptive strategies, to be at risk of suicide following poor sleep. They hypothesised that the fatigue experienced following insomnia would lead to a general accessibility to poor coping strategies, but an

individual's evaluation of such strategies would be negative. This may lead to using other techniques, giving rise to the propensity to consider and attempt suicide.

Similarly, Littlewood *et al.* (2016) discussed the role of negative appraisals in their study including individuals with symptoms of PTSD. However, they focus on an individual's ability to cope with their experience of nightmares. This could suggest that it is an individual's perception of their sleep that triggers the negative appraisal of their ability to cope, and this leads to defeat, resulting in suicidal behaviours (Littlewood *et al.*, 2016). Alternatively, it could be the negative appraisal of an individual's ability to cope with suicidal thoughts and behaviour that increase at night-time, and lead to an increase in nightmares.

## **5.5 Discussion**

The systematic literature review confirmed the relationship between sleep and both inward and outward aggression. It also highlighted a multitude of cognitive factors associated with the sleep-aggression relationship. The Thematic Analysis identified four themes: (1) repetitive negative thinking, (2) sleep perception, (3) perceived disconnect from others, and (4) negative appraisals. From the range of cognitions identified, it is suggested that the contribution of cognition to the sleep-aggression relationship is not a straightforward one. Rather, there are many elements and it is difficult to ascertain which are key.

To answer the secondary research questions for this systematic literature review, sleep was associated with both outward and inward aggression. Regarding outward aggression, there were a range of outward aggressive indicators explored, with more studies measuring trait aggression than motivation or actions. Both sleep quality and quantity were associated with higher levels of trait aggression, yet it is unclear whether those with higher levels of trait aggression were more likely to experience poor sleep,

or whether poor sleep increased levels of aggression. Whilst Booth et al.'s (2006) findings indicated that trait aggression scores decreased following sleep treatment, their results were limited by the small sample size and absence of a control group. It is therefore, difficult to comment on the direction of the sleep- aggression relationship.

A positive association between sleep problems and inward aggression was also found, with the majority of studies examining insomnia symptoms in relation to suicide ideation. Studies were limited by their cross-sectional nature, with the exception of one (Ribeiro *et al.*, 2012) which indicated that insomnia symptoms preceded inward aggression. This would correspond with the *Interpersonal Psychological Theory of Suicide* (Joiner *et al.*, 2005), with sleep problems reducing the ability to form social relationships with others despite a need to belong. However, it may also be plausible that there is a reciprocal relationship between sleep problems and inward aggression.

A primary aim of the current study, however, was to explore the contribution of cognitive processes. Cognitive process, as noted, have been highlighted as contributing to the maintenance of sleep deficits (Harvey, 2002), and to increase aggression (Anderson & Bushman, 2002). From the findings of the current systematic literature review, it is evident that cognitions remain important factors in co-occurring sleep and aggression. It could be proposed that an increase in repetitive negative thinking (Vogler *et al.*, 2014; Weis *et al.*, 2014; Bozzay *et al.*, 2016; Littlewood *et al.*, 2016; Ribeiro *et al.*, 2012; Woosley *et al.*, 2014) could be contributing to misperceptions of sleep. This would fit with the current findings of this review, with ruminative thoughts increasing, as reflected in subtheme one (rumination and negative thinking). Alternatively, an individual may become hopeless, in that they believe they have not obtained sufficient sleep.

The findings further highlighted that poorer self-reported sleep quality was associated with rumination, and specifically anger-related rumination (Vogler *et al.*, 2014). This is consistent with findings from the sleep literature, which promote the link between rumination and self-reported sleep quality (Bertelson & Monroe, 1979; Thomsen, Mehlsen, Christensen, & Zachariae, 2003). However, the potential interaction of affect cannot be ignored (Thomsen *et al.*, 2003). Specific emotions may be interacting with the cognitive components of rumination to facilitate poor sleep, yet those studies included in the systematic literature review did not explore a range of emotions. Therefore, depression or anxiety-related rumination may explain the sleep-aggression relationship in a similar way to anger-rumination (Thomsen *et al.*, 2003).

Other affective states may contribute to additional cognitive variables highlighted in the systematic literature review, such as hopelessness (Bozzay *et al.*, 2016; Littlewood *et al.*, 2016; Ribeiro *et al.*, 2012; Woosley *et al.*, 2014). Hopelessness was found to be a potential mediator of the relationship between sleep and inward aggression, yet this may be due to the role of depressive rumination. The links between symptoms of depression, sleep quality, and hopelessness have certainly been highlighted within the literature (Mystakidou, Parpa, Tsilika, Galanos, & Vlahos, 2009; Sadler, McLaren, Klien & Jenkins, 2015). However, the findings from the systematic literature review suggest that poor sleep can predict suicide ideation regardless of depressive symptoms (Littlewood *et al.*, 2016), but this does not account for depressive rumination, which may occur without a diagnosis of depression.

The current findings further draw attention to the perceptions of sleep, with poor sleep perception associated with increased aggression and fewer prosocial tendencies. Whilst none of the included studies examined the role of repetitive negative thinking on the perception of sleep quality, it is proposed that there would be value in considering this.

Independent of aggression, an increase in cognitive activity, such as rumination, is associated with increased misperceptions about sleep (Takano, Boddez, & Raes, 2016; Zoccola, Dickerson, & Lam, 2009). Such cognitive arousal may be specifically altering the perceptions of sleep as time is perceived as longer when cognitive arousal is high (Harvey & Tang, 2012). Such misperceptions about the amount of sleep obtained may have additional cognitive consequences, such as an increase in negative situational and self-appraisals.

An increase in negative appraisals, namely viewing situations with hostility, was associated with insufficient sleep and increased aggression in a variety of populations. There is evidence to suggest that specific sleep problems (such as insomnia) and periods of sleep deprivation are associated with increase in threat vigilance (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & Van Lizendoorn, 2007; Ricketts *et al.*, 2018) which may partly explain the association between negative appraisals and poor sleep that were found in the current study. Experiencing poor sleep may alter perceptions of neutral stimuli, making them more threatening, which in turn may alter how they interpret other's and their own behaviour and abilities. Such a hypothesis would be supported by the current findings for both situational and self-appraisal (Bozzay *et al.*, 2016; Littlewood *et al.*, 2016).

One potential explanation for the increase in negative appraisals when experiencing insufficient sleep could be due to the decrease in effortful cognition to fully appraise a situation. As described in the GAM (Anderson & Bushman, 2002), immediate appraisal is the automatic process, whereas reappraisal is more controlled. Poor sleep may reduce the ability for reappraisal of the situation and therefore result in an impulsive action (i.e. inward or outward aggression). Alternatively, the findings also revealed that hopelessness was a mediator of the relationship between insomnia symptoms and poor

problem solving. Therefore, negative self or situational appraisals may be increased by repetitive negative thinking, which further fuels an individual's inability to gain sufficient sleep (Littlewood *et al.*, 2016). With only cross-sectional data available, it is difficult to determine which of these two hypotheses is more likely.

Perceptions of a disconnection from others was also found associated with the sleep-aggression relationship. The *Interpersonal Theory of Suicidal Behaviour* (Joiner *et al.*, 2005) further highlights the importance of interpersonal perceptions in predicting suicide behaviour, with those who consider themselves to be a burden on others but with a desire to belong to an ingroup. It seems likely then that sleep may be impacting on the ability to experience social connections with others that are personally rewarding. For example, being awake when other are asleep and experiencing negative consequences during the day that limit effortful integration with others. None of the included studies from the current systematic literature review explored perceptions of disconnectedness from others in the relationship between sleep and outward aggression. However, there may be some benefit to considering this further. For example, those engaging in outward aggression may be expressing their need for connecting with others. Alternatively, if perceptions of disconnection from others is not associated with outward aggression, then it may indicate that this is unique to inward aggression.

This was the first known investigation of cognition in the sleep-aggression relationship. The findings reveal that there may be a number of potential cognitive contributions to the sleep-aggression relationship. This literature review was able to capture the literature to determine that the contribution of cognition is varied, however it is not without its limitations and these will be outlined next.

## **5.6 Limitations**

The current review adopted a qualitative method of synthesis in order to examine the diverse range of cognitive processes; however, more stringent methods of analysis (e.g. meta-analysis) would have been more precise in estimating the likelihood of an association by examining effect sizes. Furthermore, many of the included studies were cross-sectional, thereby limiting the likelihood of identifying causal factors. A greater number of inward aggression studies also included a pathway or mediation analysis in comparison to outward aggression studies. This may reflect a more established relationship between sleep and inward aggression. A final limitation is the language limiter applied to the search. Only articles written in the English language were included. This limited the generalisability results. Nevertheless, the current systematic literature review does highlight that there is a link between sleep and aggression and that cognitive factors contribute to this relationship.

## **5.7 Concluding comments**

The findings indicate that there is a clear contribution of cognition to the sleep-aggression relationship, but it appears complex. The primary aim of the research was to determine which cognitions were key with four themes emerging from the Thematic Analysis; repetitive and negative thinking, sleep perception, negative appraisals, and perceived disconnect from others. The findings from the current systematic literature review also highlight the clear relationship between sleep and both inward and outward aggression. Research regarding both types of aggression in complex populations is, as noted earlier, rare (Brugman *et al.*, 2018; Smeijers *et al.*, 2018). Exploring cognition and aggression in forensic patients presenting with complex psychiatric symptoms and at an increased risk for aggression is non-existent. Furthermore, investigating sleep difficulties with such individuals is justified as the psychiatric symptoms experienced

may contribute to sleep problems in addition to aggression and cognitive processes. To address this, the next study will explore the experiences of sleep problem in a sample of forensic psychiatric patients.



## **CHAPTER SIX**

### **STUDY ONE: EXPLORING RISK FACTORS AND CONSEQUENCES OF SLEEP DISRUPTION IN A FORENSIC PSYCHIATRIC POPULATION**

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#### **6.1 Structure of the chapter**

This chapter aims to extend the findings highlighted from the systematic literature review by exploring sleep disruption in a complex sample likely to experience sleep reduction and inward and outward aggression. Therefore, the potential factors that contribute to sleep disruption will be explored with forensic psychiatric patients. The consequences of sleep disruption will also be explored in relation to their thoughts, behaviours, and emotions. Both elements are expected to address all elements within this relationship by exploring cognitions, particularly when sleep and both outward and inward aggression coexist.

#### **6.2 Participants**

Participants were recruited from a high secure male psychiatric hospital in the United Kingdom between April 2017 and July 2017. Individuals who had consent from their Responsible Clinician and had a full understanding of the instructions were eligible to participate. A total of 35 participants (54% of those approached) provided written consent to participate in the study. Four of the 35 participants decided not to participate due to deterioration in mental health, leaving a total of 31 participants.

#### **6.3 Setting**

All participants were recruited from the same high secure psychiatric hospital. Patients reside in individual rooms, each with a window to provide a natural source of lighting. Most patients are allowed out of their rooms in the day between 7am and 9pm, unless they are subject to security restrictions. Some patients are also able to access the ward

garden and hospital grounds. Again, this is dependent on their security restrictions. All patients are provided with three meals a day and can purchase additional food and snacks from the hospital shop. All patients have the opportunity for daily exercise via the gym, yet this is also dependent on their security restrictions. Additionally, patients who are able to engage in off-ward activities also have access to a swimming pool and, weather dependent, can play football or basketball.

#### **6.4 Materials**

The following materials were used;

##### SORC functional assessment

The SORC (Stimuli, Organism, Responses, Consequences) functional assessment is a behavioural assessment framework accounting for antecedents (Stimuli and Organism variables) and potential factors reinforcing (Consequences) behaviour of interest (Lee-Evans, 1994). In the current study, the behaviour of interest was sleep (a period of good sleep and a period of poor sleep). Exploring both good and poor sleep would allow for a comparison to be made. Understanding good sleep can be particularly informative in assisting with the development of interventions that would be suitable for a complex population such as this. The SORC comprises setting conditions (e.g. triggers), organisms variables (e.g. beliefs, learning history); response variables (e.g. behaviour demonstrated), and consequences of the behaviour. The SORC is a way of formulating behaviour, it was considered a simple framework easy for patients to follow, whilst also gathering the relevant information in a timely manner. Open ended questions pertaining to each section of the SORC were devised (see Appendix 1) and used solely as a guide for the researcher. The researcher was able to ask the participant to elaborate further and ask follow-up questions, if necessary.

### Aggression and self-harm questions

In order to explore aspects of aggression behaviour, including both inward and outward aggression, participants were asked four questions regarding their use of aggression. These questions were designed for participants to elaborate in as much or as little detail as they felt necessary. This was in line with ethical considerations to ensure that participants were comfortable in providing personal details about possible violence and self-injurious behaviour. These questions were aligned to the working definition outlined in Chapter Three of aggression as “an intent to directly cause harm, be that towards the self, others, or objects”. They covered four main topics of aggression: verbal aggression, physical aggression toward objects, physical aggression towards others, and physical aggression towards the self (i.e. self-injury). The aggression questions can also be found in Appendix 1.

### **6.5 Ethical considerations**

Ethical approval was obtained from the UK NHS Ethics Committee (16/NW/0669) and University of Central Lancashire Ethics Committee. Participants were only approached by the researcher once written consent had been provided by their Responsible Clinician. Those who were deemed to have capacity to consent to the research by their Responsible Clinician were approached. Subsequently, the researcher attended Patient Care Team Meetings and patient community meetings to recruit participants. The exclusion criteria was minimal, with only those without the capacity to consent to the study not being eligible to participate. Participants were approached individually and provided with a verbal explanation of the study and an information sheet (Appendix 2). They were given one week to consider this information whereupon the researcher returned to obtain their written consent (Appendix 2), if they chose to participate. The researcher then agreed a time with the participant to complete the interview.

## **6.6 Procedure**

Interviews were conducted in an individual ward interview room. Participants were provided with a verbal and visual description of the SORC functional assessment template (see Appendix 1) and it was explained that the interview would explore a time when they had experienced sufficient sleep and a time when they had experienced insufficient sleep. The interviews commenced, beginning with the SORC functional assessment questions for each period of sleep and ending with the aggression questions. Due to the secure setting, interviews were not audio recorded. Responses were handwritten in each session using the SORC record form (see Appendix 2). Due to this, short-hand responses were written and typed up immediately, converting abbreviations to longer responses. Data saturation was achieved once the target sample of 30 had been reached and participants were making similar comments. Therefore, there was no new information being drawn out from each interview (Saunders *et al.*, 2018).

## **6.7 Interviews**

The approximate length of each interview session varied ( $M = 32$  minutes,  $SD = 19$  minutes), with the shortest interview lasting approximately ten minutes ( $N=1$ ), and the longest interview lasting approximately 120 minutes ( $N=1$ ). One interview was conducted over two sessions due to ward demands during the first session, with each session lasting approximately 15 minutes.

## **6.8 Data analysis**

A typed copy of each interview was produced immediately following each interview. The data were then subjected to a qualitative Thematic Analysis to address each participant's beliefs and perceptions about their sleep and aggression. The Thematic Analysis, as described in Chapter Two, adhered to the same six steps as outlined by

Braun and Clarke (2006). A Thematic Analysis approach was adopted to provide a rich and detailed account of the data.

To become familiar with the data, aside from conducting each interview, the researcher became immersed in the data by reading and re-reading it. Notes were made manually of potential codes in preparation for the subsequent phases. The interviews were then uploaded onto the qualitative data analysis software tool NVivo, a package designed for coding and organising large sets of qualitative data. This resulted in 136 initial codes, which were then organised into components relating directly to the areas of interest from the interview questions (i.e. behaviour, antecedents, and consequences). Main themes and subthemes were subsequently proposed in each of these categories. Each theme was then reviewed by re-reading all of the coded extracts to ensure that the data accurately represented its respective theme. The entire data set was re-read to identify any additional themes and to ensure that the themes accurately represented the dataset as a whole. The themes were defined and refined to determine whether each theme and subtheme was fully captured. To increase the reliability of the themes, each code was also organised by a second researcher and any discrepancies were discussed until consensus was reached.

## **6.9 Results**

Results are presented in relation to each component of the interview and the themes are described within it. The behaviour component is first presented to gain an understanding of the perception of sleep among the participants. This is followed by the antecedents, examining the factors that potentially prevent good sleep and those that maintain poor sleep. The consequences of experiencing good and poor sleep will then be presented, to gain an understanding of what thoughts, feelings, and behaviours participants were associated with experiencing good and poor sleep.

### 6.9.1 Behaviour (sleep experiences)

Participants reflected on the variation in experiencing sleep and how this can differ according to the setting. The thematic analysis resulted in two emerging themes, (1) personal experiences of poor sleep and (2) differences in sleep patterns to define poor sleep, with data extracts available in Table 6.1.

#### *Theme 1: Personal experiences of poor sleep (29%)*

Participants generally experienced what they described as poor sleep on a regular basis. One participant asked the researcher for some advice regarding sleep as they found that obtaining good sleep was difficult. Although some participants reported sleeping well, this appeared to be during the day, where they would sleep for prolonged periods, yet they were more likely to stay awake for most of the night. Participants found it difficult to discuss a time when they had slept well and many of the participants provided more detail when they had slept poorly. This is the participants' perception of poor sleep, however, and does not suggest that they have insomnia symptoms; yet they were more aware of the times that they have not slept well.

#### *Theme 2: Differences in sleep patterns to define poor sleep*

There was no consensus of what constituted poor sleep among participants. They described experiences aligned to the definitions of insomnia, whereby an individual has difficulty obtaining and maintaining sleep. Additionally, experiencing poor sleep quality was highlighted and this differed from experiencing short sleep duration.

### Subtheme 1: Difficulties initiating sleep (58%)

Participants described difficulties in initiating sleep, being awake for prolonged periods and staying up until the early hours of the morning. They discussed that when they slept well, the time taken to obtain sleep would be considerably less.

### Subtheme 2: Difficulties maintaining sleep (58%)

Some participants defined poor sleep as waking during the night regardless of how long it would take for them to return to sleep. Others contrasted this by indicating that although they awoke during the night, it was the ease in which they returned to sleep that would define whether they had slept poorly. Participants focused on the duration of time asleep, which was reduced due to early awakenings or night-time disturbances, indicating that a short sleep duration was considered poor sleep. Contrasting this, others highlighted that sleeping for too long constituted poor sleep. There appeared a contrast in whether waking up early was viewed as positive or negative.

### Subtheme 3: Sleep quality as independent of sleep duration (58%)

Participants detailed that they experienced poor sleep quality regardless of how many hours they had slept. They described how sleeping for prolonged periods would have little effect on how they perceived their sleep quality.

Table 6.1. Behaviour: Data extracts for themes and subthemes

Theme	Subtheme	Data extract
1. Personal experience of poor sleep		“[I’ve] never really had good sleep. I need to take sleeping tablets but have not been offered them... How can I improve my sleep? Never sleep well so difficult to talk about good sleep” (P2)
		“I don’t ever get a good sleep. Always feel on the cusp. Always light sleep. The more I sleep the worse I am” (P13)
		“Still get 12 hours but quality [of sleep] is not good... getting to sleep is hard... The only time I’ve slept well is when taking a sleeping tablet” (P23)
		[Discussing good sleep] “I sleep in [until] about 11 or 12 and then wake up”. (P6)
		[Discussing good sleep] “I wake [up] really alert. Still wake up four or five times when sleeping well. But wake up about 11.30am” (P14)
		“I don’t know how I know if I slept well” (P2)
	[Discussing good sleep] “You wouldn’t know how you slept” (P7)	
2. Differences in sleep patterns	1. Difficulties initiating sleep	“Haven’t slept at all. Awake all night. Sleep in the morning if I can... might not even sleep in the morning”. (P3)
		“Don’t sleep at night” (P6)
		“Sometimes I don’t sleep at all” (P8)
		“I’ve not slept in three days. Maybe an hour during the day” (P13)
		“Lying there and thinking of things - ruminating. Feel like wanting to get to sleep - can't switch off thought. I can't get to sleep at all” (P26)
		“At [my] last hospital [it took] a long time to get to sleep – about five hours” (P5)
2. Difficulties maintaining sleep		“... waking up after falling asleep [a] couple of hours after sleep... wake up with nightmares – it’s not easy to get back to sleep” (P2)
		“Rarely long sleep. I woke up in [the night] and got back to sleep” (P5)
		“Getting to sleep isn’t a problem. It’s maintaining it back to sleep straight away.” (P10)
		[Discussing good sleep] “I sleep 12 or 11 hours. Sometimes I wake up at 8am/9am and usually go straight back to sleep” (P4)
3. Sleep quality as independent of sleep duration		“Staying asleep – only for three hours. Both quality and quantity bad – but not at the same time – short – intense. Long and broken... for a period of two or three weeks”. (P12)
		“Still 12 hours [of sleep] but quality is not good”. (P23)



### 6.9.2 Antecedents

Two themes emerged as belonging to the setting and organism variables in relation to the SORC: factors preventing/maintaining poor sleep and strategies used to facilitate sleep. The first theme outlines the factors relevant to forensic psychiatric patients that prevent or maintain the respective sleep period, with four subthemes. The second theme highlights the strategies adopted to help facilitate sleep and contains three subthemes. Data extracts are available in Table 6.2

#### *Theme 1: Factors preventing/maintaining poor sleep*

These themes highlight the variation of factors relevant to a psychiatric sample, which may be preventing good sleep from occurring. Participants outlined a range of antecedents that contributed to their experience of poor sleep.

#### Subtheme 1: An increase in rumination and/or worry preventing sleep onset (74%)

This subtheme summarises participants' experiences of ruminating at the onset of sleep and how the content of such cognitive processes is unique to this population. Participants described overthinking, ruminating, and worrying at night-time. The content of these thought processes included thoughts about their criminal behaviour, being away from family and friends, repetitive thoughts related to sleep (such as the importance of obtaining sleep and thinking about how to achieve sleep), and their future prospects upon their release.

#### Subtheme 2: Physical aspects of the secure environment preventing sleep onset and maintenance (26%)

Physical aspects likely unique to the secure environment also appeared to be preventing and maintaining poor sleep for participants. These included light, temperature, and

noise, which are less able to be controlled within a secure environment. These physical aspects appear to prolong the onset of sleep or wake individuals up during the night. It was also highlighted that night-time confinement (i.e. being locked in their room from 9pm to 7am) was disrupting their sleep. In contrast, others viewed this as a trigger for bedtime.

### Subtheme 3: Exercising during the day prevents sleep onset (29%)

Exercise, such as going to the gym or playing sports, was viewed as a potential factor that hindered sleep for many participants. Exercise was largely viewed as an activity that participants expected to help them achieve good sleep, yet they found that this had the opposite effect. Some participants did highlight the positive effects of exercise, but others felt that they had more energy and were more alert, subsequently finding it difficult to obtain sleep.

### Subtheme 4: Experiencing mental health symptoms at night preventing the onset of sleep (22%)

Symptoms of mental health were found to disrupt sleep. Symptoms of major mental illness ranged from experiencing anxiety and depressive thoughts prior to sleep onset, to experiencing audio hallucinations at night-time. One participant also stated that they believe that being unable to obtain sleep was a punishment for the hallucinations they experienced. This suggested that mental health extended beyond the symptoms experienced and towards the cognitive label attached to it.

## *Theme 2: Strategies used to facilitate sleep*

The strategies used to facilitate sleep represent the range of approaches used by the participants to obtain sleep. This is not limited to times when they have slept well, but what they would do to achieve sleep when they were not sleeping well. It incorporates

potentially helpful approaches to help facilitate sleep, but also maladaptive approaches that the literature suggests is not beneficial for sleep. The current theme combines these to gain an understanding of the range of strategies used by individuals within a forensic psychiatric setting.

#### Subtheme 1: Adopting cognitive strategies can help achieve sleep (29%)

This captured the range of cognitive approaches adopted by participants. It included mindfulness and relaxation strategies, clearing the mind of unhelpful thoughts, and cognitive restructuring, namely challenging unhelpful thought patterns and beliefs in an attempt to alter maladaptive thoughts to more positive ones. Some participants described using such strategies to help facilitate sleep when they were experiencing the rumination that emerged in the subtheme one of the first theme: an increase in rumination and/or worry preventing sleep onset.

#### Subtheme 2: Substances used or avoided to facilitate sleep (58%)

This theme relates to the wide range of substances that participants would use or avoid using to help facilitate sleep. Participants referred to substances that they had access to within the hospital, such as medication and caffeine. They also referred to alcohol and illicit substances, such as cannabis, that were able to access in conditions of lower security. It appears that using substances was viewed as a potential “quick fix”, although there was some hesitance regarding sleep medication. This was perhaps due to the range of medication that those within this population are already prescribed. Although others viewed medication as the only way to achieve sufficient sleep. There was also some discrepancy as to the use of caffeine. Some participants actively avoided caffeine before bed, whereas others would purposefully drink tea and coffee in anticipation that it would facilitate their sleep.

### Subtheme 3: Reading and watching television to facilitate sleep at night-time (77%)

Participants described watching the television or reading before sleep onset. Considering the secure environment and being confined to one room from 9pm, it is understandable that watching the television and reading occur at bedtime. It is noteworthy that some of the participants would actively read and watch television in the hope of achieving sleep, although this was not always successful. Others described reading and watching television to purposefully keep themselves awake.

Table 6.2 Antecedents: Data extracts for themes and subthemes

Theme	Subtheme	Data extract		
1. Factors preventing/maintaining poor sleep	1. An increase in rumination and/or worry preventing sleep onset.	“Thoughts keeping awake – try to switch off, try to clear mind as know its keeping awake. Try to concentrate on breathing. Sometimes lying there for a couple of hours – usually eventually get to sleep.” (P26)		
		“Brain wanted me to ponder that. Torturing itself” (P12)		
		“[There’s a} pattern how I think – index offence – try to escape from it.” (P17)		
		“Disturbed flashbacks – index offence, disturbing thoughts.” (P28)		
		“Negative thoughts – thinking about family. Dreams feel real – vivid dreams – dreams are messages in my head. Thinking [about feeling] sorry about not being there for son.” (P10)		
		“Stress about tariff – I worry – worried about going back to jail” (P29)		
		2. Physical aspects of the secure environment preventing sleep onset and maintenance.		“Patients screaming – noisy – tend to sleep through.” (P8)
				“Doesn’t matter whether the room is clean or not. Room needs to be dark.” (P3)
				“Temperature needs to be right. [Sometimes] nap in the day. Watch a film. Really dark and quiet.” (P5)
				“More frustrated with night confinement. I’m always looking at the clock. Waiting for 7.15am.” (P1)
“[Talking about night-time checks] – don’t like the idea of being watched at night... Shine torch directly on you or leaving blinds open – has actually woken up in the past.” (P12)				
		“Night-time confinement. Feel like I am missing time if I don’t wind down. For example, if I want a drink, I can only have one at certain times.” (P7)		
		“Night-time confinement is boring – need to keep brain busy.” (P23)		
		“Night-time confinement has been good for sleep – wind down period.” (P26)		

Table 6.2 continued

Theme	Subtheme	Data extract
1. Factors preventing/maintaining poor sleep	3. Exercising during the day preventing sleep onset	<p>[Discussing good sleep] “Exercise – but had opposite effect – energised so had opposite effect.” (P12)</p> <p>“Training – a lot of training – should knock me out but doesn’t. Gym, swimming. Morning and night. Got to keep self-occupied to stay awake.” (P18)</p> <p>“Football makes me not sleep as well – adrenaline wires me up.” (P31)</p>
	4. Experiencing mental health symptoms at night preventing the onset of sleep	<p>“Tossing and turning leads to bad mood – [such as] hearing voices. Mental health impacts sleep.” (P2)</p> <p>“Acute anxiety, stressful, catastrophize – parents die, blown all up. Difficult to switch off – wind down process helps.” (P23)</p> <p>“Suffer from anxiety – stops sleep.” (P27)</p> <p>“Feel like I’m being punished – punished for evil voices... uncomfortable voices – disrupt sleep” (P10)</p>
2. Strategies used to facilitate sleep	1. Adopting cognitive strategies can help achieve sleep	<p>“Ambient noise CDs (rain, waves - want to get more) [these aid sleep]. Used to calm down and focus. So useful to sleep.” (P17)</p> <p>“Mind off[f] thoughts - easy to clear mind.” (P22)</p> <p>“Thoughts keeping awake - try to switch off, try to clear mind as know it’s keeping awake.” (P26)</p> <p>“Pattern how I think - ex offence - try to escape from it. [OR] Reflective - reflect on ex-offence [what I could have changed] = sleep better.” (P17)</p>
	2. Substances are used or avoided to facilitate sleep	<p>“Medication for sleep- med is like heroin addictive so stopped it.” (P28)</p> <p>“Only time slept well is when taken tablet. Got to sleep quickly and maintained sleep. Sleeping tablet ned to put head on pillow and work with it. Get past point of past therapeutic phase [or else it] will keep awake.” (P23)</p> <p>“Take medication. Fall sleep really quickly... Medication - sleepy - Clozapine.” (P10)</p> <p>“Medication makes me tired - side effect - depends how much I take - effects within half an hour. Depends what take effect people differently. Helps to stay asleep - side effects when wake up.” (P12)</p> <p>“Drugs - choosing not to sleep so don't waste money - keep self awake. Drugs - morphine, heroine, crack - not using abusing - too much or not enough...Used drugs to forget.” (P11)</p>

Table 6.2 continued

Theme	Subtheme	Data extract
2. Strategies used to facilitate sleep	3. Reading and watching television to facilitate sleep at night-time	<p>Reading in bed - concentrating. Just sends to sleep. (P12)</p> <p>Read book - make sure you finish it. can be counter-productive - grasps my interest. (P13)</p> <p>Try to read book - sleep comes better.... Read bible (P28)</p> <p>Always wake up at 3.30am. [When this happens I] lie in bed and watch films.</p> <p>Watch TV until about 12 and turn TV off [before sleeping] always.</p> <p>[Watch] shopping channels - [its] all that's on TV.</p>

### 6.9.3 Consequences

The consequences of experiencing poor sleep were captured via five themes. Participants indicated that when they do not gain sufficient sleep it increases their hostile perceptions of others, they are more likely to avoid others, they are more likely to become aggression, they experience increased symptoms of mental illness, it can disrupt their sleeping pattern, and they experience an increase in negative mood. Each theme is presented with data extracts available in Table 6.3.

#### *Theme 1: Poor sleep increases hostile perceptions of others (16%)*

This theme highlights that experiencing poor sleep may increase the likelihood that others will be viewed with hostility. Some participants highlighted that when they did not sleep well they were more easily irritated by other's actions, with a perception that others would purposefully try to anger them. This would subsequently lead to a negative reaction.

#### *Theme 2: Poor sleep alters behaviour (61%)*

Participants described how experiencing poor sleep could result in behaviour that may

not necessarily be representative of their everyday presentation. They described how experiencing poor sleep could often result in being less communicative with others, resulting in avoidance of others, and increasing verbal aggression. Such responses were suggested to be directed towards both staff and peers.

*Theme 3: Poor sleep increases symptoms of mental illness/personality disorder (19%)*

The third theme that emerged as a consequence of poor sleep suggests that experiencing poor sleep could exacerbate symptoms of mental health and personality disorder. Participants described feeling a loss of control over the symptom they experienced and an increase in the symptoms upon awakening. One participant also described how poor sleep could increase their symptoms of depression and anxiety.

*Theme 4: Poor sleep can alter ensuing sleep patterns (61%)*

Many participants described how experiencing poor sleep would result in a change in their sleeping patterns. Most participants highlighted that they would frequently sleep in the day, although this appeared to serve a range of functions. For example, some viewed daytime sleep as an opportunity to obtain the sleep that they had missed the previous night, whereas others would actively stay awake at night in order to sleep in the day. Some related this to a decrease in daytime activities and viewed sleep as a way of overcoming potential boredom.

*Theme 5: Poor sleep increases negative affect (54%)*

Participants outlined how experiencing poor sleep made them feel. In comparison to when they slept well, negative emotions were a more prominent feature. Those relating to anger, such as feeling annoyed, irritable, and “grumpy” were highlighted, along with emotions relating to sadness such as misery and unhappiness.



Table 6.3 Consequences: Data extracts for the five themes

Theme	Data extract
1. Poor sleep alters cognitive processing	<p>People try to impose own discipline and rules. Don't want to be cooperative. Default - I'm a violent person - protect self. Not physical violence. Depends on issues. No need to be aggressive for random things. If someone says something I don't like [its] harder to rationalise. Shouldn't fight fire with fire. (P12)</p> <p>Ratty with people - snap at them. A lot more short with people - things that wouldn't effect me. (P23)</p> <p>People would notice I hadn't slept well - would try to chat but wouldn't want to know. (P31)</p>
2. Poor sleep alters behaviour	<p>Thoughts- I shouldn't have woken up. Felt like missed part of the day. Don't want to face the world... Put duvet over head if still tired so don't interact with others. (P5)</p> <p>Might not want to talk to anyone - feel less sociable. (P7)</p> <p>Don't want to be disturbed. Won't communicate with people - can't be arsed. (P11)</p> <p>Tired and don't want to be around people. Bad mood - ratty and grouchy - feel pissed off with self - don't feel right or good. (P30)</p> <p>Mood in morning. Having a go at people. (P6)</p> <p>Ratty, peeved off, annoyed, doesn't take much to annoy me. Irritable. Don't have breakfast. Randy. Swear more. (P8)</p> <p>Want to sleep more. Moody - can't be arsed. Just want to sleep. Back to bed. If nothing to do. Short fuse. Tell them they should fucking leg it the fucking gob shite. (P18)</p> <p>More irritable - no sleep at all. Swearing - confrontation with staff. Think staying up all night made me more irritable - probably wouldn't have reacted in that way on these occasions. (P26)</p>
3. Poor sleep increases symptoms of mental health/personality disorder	<p>Starving brain of sleep creates problems - harder to control symptoms. More aggressive, more irritable, more callous, more cold. Tolerance levels go down. More susceptible to own disorder. Harder to fight psychopathic disorder... If slept well - can control personality disorder symptoms. (P12)</p> <p>A bit depressed as always tired when first wake = don't like talking much. (P19)</p> <p>Depressed. Increased anxiety. Feel conscious. Tired in the day - try to sleep in day but can't. (P28)</p>
4. Poor sleep can ensue sleeping pattern	<p>Feel crap - don't feel yourself - unhappy. Sometimes I feel shit - tired. Sleep [in the day] - nap- [approximately] hour. (P2)</p> <p>Nap- depends what I'm doing. No activities. (P9)</p> <p>Sleep in afternoon as I'm tired. Over sleep to get back to normal sleep. Sometimes won't get up for meds - staying up all night the next few nights. (P11)</p> <p>Want to sleep to catch up [on sleep] in the day. (P10)</p>

Table 6.3 Continued

Theme	Data Extract
5. Poor sleep increases negative mood	Feel miserable if not slept well. (P5)
	Annoyed - not having peaceful night's sleep. (P10)
	Think staying up all night made me more irritable - probably wouldn't have reacted in that way on these occasions. (P26)
	Want to sleep more. Moody - can't be arsed. Just want to sleep. (P18)

#### 6.9.4 Aggression

Three themes captured participants' perceptions of their aggression. Participants identified their motivation for aggression they had engaged in previously, linked their aggression to their mental health, and did not view themselves to currently display aggression. Each theme is presented with data extracts available in Table 6.4.

##### *Theme 1: Participants identified the various motivations for aggression*

Participants identified some of the motivations behind both outward and inward aggression and referred to both reactive and proactive motivations. It is noted that participants did not exclusively belong to one of these two group as many stated both proactive and reactive motivations for their aggression.

##### Subtheme 1: Reactive aggression (35%)

Participants stated that of the times when they did express aggression, it was when they were experiencing negative feelings due to provocation or in a way of expressing such negative feelings to others, with many participants emphasising their feelings of anger. One participant also noted that their aggression reduced when they experienced positive feelings, such as a sense of achievement. Their reactive aggression was also relevant to their inward aggression, with participants identifying that they would self-harm as a

way of relieving stress.

#### Subtheme 2: Proactive aggression (16%)

With regard to proactive aggression, participants revealed that they would engage in aggression to get their needs met, including to be heard by others or to return to prison. One participant described how they used to damage objects when they were a teenager as it was fun. Another participant also referred to using threats of physical violence to make others fearful.

#### *Theme 2: Participants' mental illness justified their aggression (25%)*

Participants referred to times when they were aggressive to be at times when they were unwell or as a reaction to their symptoms of mental health. Participant reported visual hallucinations and violent thoughts at times when they displayed both inward and outward aggression. They also referred to paranoid ideation and times when they were not compliant with their medication as time when they display physical aggression.

#### *Theme 3: Participants did not identify themselves as aggressive (65%)*

Many of the participants did not identify themselves as currently engaging in any form of aggression. Some participants stated that that had previously used aggression in the past, but it was not something that they engaged in currently. Some participants measured their aggression use by the number of incidents that they had been involved in. Participants highlighted additional characteristic that they possessed, which they believe would prove they were not aggressive (e.g. laid back, nice).

Table 6.4: Aggression: Data extracts for themes and subthemes

Theme	Subtheme	Data extract
1. Participants identified the various motivations for aggression	1. Reactive aggression	<p>“TV, DVD players - to show other that I was angry. Expressing anger” (P1)</p> <p>“Aggressive towards objects in the past - aggression is reduced when feel like [I'm] achieving things” (P5)</p> <p>“When pushed into a corner I don't know what else to do” (P8)</p> <p>“Yes, in jail. Stewing on wanting to kill someone. To release stress. Couldn't get to him. Relieving stress” (P18)</p>
	2. Proactive aggression	<p>“Not much anymore - more as a teenager - for fun” (P12)</p> <p>“Got something to say then I'll say it. I'll voice my opinion. Hate liars. Say it assertively bordering on aggressive. Say what I think” (P18)</p> <p>“Yes, smashed telly up a couple of months - wasn't getting heard - got heard afterwards” (P24)</p>
2. Participants' mental illness justified their aggression		<p>“Displays self-harm - don't know why I just like it. Hearing voices” (P2)</p> <p>“More in RSU - cut self and caught infection. Inserting things into arm. Not well at the time” (P12)</p> <p>“When unwell - not when well” (P15)</p> <p>“Yes. Hearing voices telling me to harm self. Violent thoughts. Bullying from others. More depressed” (P19)</p>
		<p>“I'm a nice person. Not aggressive” (P6)</p> <p>“Not anymore. Not aggressive to anyone apart from prison officers. Hard to have a fight in an enclosed space like this” (P11)</p> <p>“No, I'm laid back” (P14)</p> <p>“Yes - mostly in past, haven't done it for a while now” (P16)</p> <p>“When I was a kid - younger. To kill myself. Not doing it now” (P22)</p>

## **6.10 Discussion**

This study provides some evidence for the role of cognition in the sleep-aggression relationship. Exploring the behaviours, antecedents, and consequences of poor sleep in forensic psychiatric patients revealed that their understanding of sleep disturbances is not dependent on one specific sleep problem. Sleep disturbances are maintained by increased rumination and worry, and using cognitive strategies can be effective to improve sleep. The results also indicated that poor sleep can alter subsequent behaviour and increase hostile perceptions of others. The current findings also revealed that there are factors beyond cognition that can influence the causes and outcomes of poor sleep. These include physical aspects of the environment, exercise, and mental health symptoms, which can prevent sleep. The findings also revealed that forensic psychiatric patients would use and avoid specific substances, read, and watch television to help facilitate sleep, and that experiencing poor sleep led to changes in future sleep patterns, increased mental health symptoms, and negative affect. Further exploring their use of inward and outward aggression, participants reported that their motivation for aggression was both reactive and proactive, was justified by their mental health symptoms, and that they did not identify themselves as aggressive.

To address the first aim, exploring forensic psychiatric patients' perceptions of experiencing sleep problems, the first theme revealed that almost 30% of the sample experienced poor sleep on a regular basis. This identified those who reported having consistent sleep problems, whilst residing in the hospital, and some who also reported poor sleep prior to admission. The second theme identified from the behaviour component of the SORC, that when discussing poor sleep, participants had difficulties initiating and maintaining sleep. These findings not only indicate that forensic psychiatric patients reported poor sleep quality and short sleep duration, but the

findings further highlight that there are additional components to sleep, other than sleep quality and sleep duration, that need to be considered in the sleep- aggression relationship. These findings support those from the systematic review, with insomnia symptoms, sleep duration, sleep quality, and nightmares all having some contribution to the sleep-aggression relationship. The current findings highlight that sleep problems are largely subjective and the factors representing poor sleep for one individual may not be consistent in all. Additionally, almost two thirds of participants indicated that their subjective sleep quality was not a reflection of their sleep duration. Such findings provide further support for the systematic literature review and previous studies (e.g. Barker *et al.*, 2016), further highlighting the need to explore the effect of individual components of sleep on aggression.

This research also aimed to explore potential cognitive factors contributing to sleep disturbances in the current sample. The findings suggest that cognitions seemingly contributed to, and represented a consequence of, sleep disruption, addressing the third aim. Rumination and worry were identified as factors disrupting sleep in almost 80% of the sample. To identify the difference between these two processes, the content of worry reflects future thinking, in contrast to rumination, which is past focused (Brosschot, Gerin, & Thayer, 2006). Yet, it is argued that both are underpinned by the same underlying cognitive processes that serve to maintain arousal (Querstret & Cropley, 2013). This is a notable finding and fits with theoretical insomnia models, such as the *Cognitive Model of Insomnia* (CMI, Harvey, 2002), which emphasises the role of pre-sleep cognitive activity contributing to insomnia maintenance. The CMI argues that ‘negatively toned’ cognitive activity can occur both prior to sleep onset and during the day, but the content is likely to be centred around sleep (i.e. worrying about obtaining enough sleep, worrying about the consequences of sleep disturbance). The current findings, however, suggest that the content of rumination extends beyond sleep-

related worries. Participants identified that worrying about their families, ruminating on their previous offences, and worrying about returning to prison, interrupted their sleep. Rumination and worry have also been defined as ‘perseverative cognition’, whereby cognitive representations of physiological stressors are activated repeatedly (Brosschot *et al.*, 2006). This would fit with the *Three P Model of Insomnia* (Spielman *et al.*, 1989), detailing that insomnia occurs due to a stressful event that acts as a trigger, or precipitating factor, leading to insomnia. Rumination and worry, therefore may not be unique to individuals with aggressive tendencies, such as in the current sample. However, rumination and worry do appear relevant in the sleep-aggression relationship as participants also defined a change in their behaviour following poor sleep.

Sixty-one percent of participants reported that following a period of poor sleep, they would behave in a way that may not represent their usual presentation. This included a tendency to avoid others or engage in verbal aggression. The differences between these two behaviours may differentiate between those engaging in inward and outward aggression. It would also support findings that social withdrawal is associated with increased suicide risk in adolescents (Endo *et al.*, 2017). The tendency to either externalise (i.e. through aggression) or internalise (i.e. socially withdraw) may be dependent on the perception of others following sleep disruption.

Within the consequences component of the SORC, theme one represented an increase in hostile perceptions of others, following disrupted sleep. Considering aggression models, such as the *Integrated Model of Social Information Processing* (Huesmann, 1989) and the *General Aggression Model* (Anderson & Bushman, 2002), the presence of a hostile attribution bias appears to increase the risk of aggression. In the current study, participants described being more irritated by other’s actions and attributing their behaviour as an attempt to anger them, following poor sleep. As a result, an individual’s

appraisal of the situation may result in their response being aggressive, or alternatively, to socially withdraw thereby reducing the risk of aggression. Therefore, the observed behaviour may, in fact, represent a coping strategy.

According to the *Transactional Theory of Stress and Coping* (Lazarus, 1966), coping ability is dependent on an individual's appraisal of a stressor. It involves a primary appraisal of the potential threat and a secondary appraisal of current resources and the potential strategies to address the perceived threat. Coping strategies arguably fall into two categories: problem-focused orientation, attempts to modify or alter a problem, or emotional coping, regulating an emotional response (Rosas-Santiago, Marván, Lagunes-Córdoba, 2017). Accounting for this and the current results, there are two possible explanations as to why poor sleep may be increasing aggression via coping; (1) poor sleep may decrease the likelihood of thorough appraisal of an individual's coping ability, resulting in accessing emotionally-focused coping strategies; (2) Individuals may have an inherent disposition for using emotional coping strategies, which are accessed more readily when in aggression provoking situations, for example when attributing hostility in others. With either explanation, it appears that cognitive appraisals are important to consider.

A further interesting finding from the current study was the use of cognitive strategies adopted by participants. Participants reported using mindfulness, relaxation, clearing the mind of unhelpful thoughts, and cognitive restructuring.

However, despite the sizeable proportion of participants reporting rumination and worry (58%), only 29% of participants attempted to use cognitive strategies. Participants, instead, reported accessing or avoiding substances and engaging in activities, such as reading and watching television, neither of which actively targeted the cognitive components that interrupt sleep. These findings suggested that forensic



psychiatric patients were less likely to use cognitive strategies to improve their sleep. There are various explanations as to why fewer participants reported using cognitive strategies to facilitate sleep. Firstly, participants using substances may view this as a 'quick and easy' solution to their sleep problems and therefore do not see the potential benefit in using additional techniques. Participants may also be using such strategies as an attempt to distract from the ruminative and worrying thoughts occurring prior to sleep, and therefore using their own strategies to reduce or alter negative thoughts. The use of distraction techniques is supported in other areas of research including to reduce pain and anxiety (Hudson, Ogden, & Whitely, 2015), and cognitive behavioural approaches to insomnia have incorporated distraction techniques into the therapy (e.g. Teismann, Michalak, Willutzki, & Schulte, 2012). Yet, there is limited evidence of the usefulness of general distraction techniques to improve sleep problems (Harvey & Payne, 2002), and findings from the current study appear to reflect this.

In contrast to the contribution of cognition to sleep disruption in forensic psychiatric patients, the current findings emphasise the role of a number of other mechanisms that may also be influencing the sleep-aggression relationship. From the antecedent component of the SORC, three sub-themes were relevant to theme one: (1) factors preventing/maintaining sleep, namely physical aspects of the secure environment, (2) exercising during the day, and (3) experiencing mental health symptoms.

It is unsurprising that the physical environment contributes to sleep problems in a secure setting. Patients within such settings will be less likely to adopt healthy sleep hygiene practices due to restrictions placed upon them. Therefore, physical environmental factors, such as noise disturbances and temperature, may be unavoidable. However, a patient's limited knowledge of healthy sleep hygiene practices may also be relevant. It may be due to the limited knowledge of sleep hygiene

that increases the likelihood of patients experiencing the noise and light disturbances and highlighting a potential need for educational input on such practices. Likewise, the impact of exercise on sleep may also be due to the limited knowledge of the most appropriate times to exercise; adding to the knowledge of individuals may be useful to help improve sleep disturbances.

The finding that mental health symptoms can prevent sleep supports previous research, although there is some debate as to whether sleep disturbances contribute to mental health symptoms, such as psychosis (see Davies, Haddock, Yung, Mulligan & Kyle, 2017 for a review). Drawing on the *Three P Model of Insomnia* (Spielman, 1989), an acute phase of mental illness is likely to be a precipitating factor in insomnia development. Enduring mental illness is likely to represent predisposing factors, although the current findings indicate that mental health symptoms may be also be a perpetuating factor, maintaining sleep disturbances in this patient group. Mental health diagnosis was not specifically recorded in the current study, yet most of the participants' exploration of insufficient sleep occurred whilst residing in hospital, or other secure setting. Therefore, participants are likely to have discussed their long-term symptoms of mental health during this time. This would indicate that mental health symptoms are important to both the development and the maintenance of insomnia symptoms.

In addition to mental health symptoms preventing sleep, participants also highlighted that mental health symptoms and personality disorder were a consequence of sleep disturbances. Participants described how they were less able to manage their symptoms following poor sleep and this may be relevant to their use of coping strategies. As previously described, limited availability in accessing appropriate coping strategies may contribute to the sleep-aggression relationship and this was described with

reference to potentially hostile situations. However, a decreased ability to access appropriate coping strategies may also be relevant to distressing symptoms of mental health. This would support the finding that increased psychiatric symptoms are associated with more emotional coping and less problem- focused coping (Meyer, 2001; Strous, Ratner, Gibel, Ponizovsky, and Ritsner, 2005). Experiencing symptoms of mental health may therefore contribute to the sleep- aggression relationship by representing a stressful event that an individual is less able to cope with effectively.

In the current study, participants also described how poor sleep could result in negative affect. Both theories of insomnia and aggression highlight the role of affect as a contributor to aggression (the *Integrated Model of Sleep-Interfering and Sleep-Interpreting Processes*, Lundh & Broman, 2000; the *Cognitive Neoassociation Model of Aggression*, Berkowitz, 1989; the *General Aggression Model*, Anderson & Bushman, 2002). The *Integrated Model of Sleep-Interfering and Sleep-Interpreting Processes* (Lundh & Broman, 2000) proposed that emotions contribute to arousal which interferes with sleep and the cognitive appraisal of sleep experienced. However, findings from the current study suggest that sleep disruption serves to increase negative emotions. The current findings also identified that sleep disruption can also alter sleep patterns, with participants reporting increased sleep during the day when poor sleep was experienced. Models of aggression highlight that negative affect can contribute to aggressive thoughts and actions, with Berkowitz (1989) highlighting the role of anger. Experiencing poor sleep may therefore increase negative affect, which in turn increases access to negative cognitions, and potentially hostile attribution biases which increases the risk of aggression. It is evident that affect is an important component in the sleep-aggression relationship, yet what may be significant is how affect contributes to aggressive thoughts. Thus, aggressive thoughts still appear key in the sleep-aggression relationship.

It was also explored whether disruption to sleep would increase both outward and inward aggression. Participants described how sleep disruption would impact on their behaviour, with some participants describing how they were more likely to verbal aggress toward others following poor sleep. However, participants did not identify that poor sleep increased their inward aggression or physical aggression. There are a number of explanations for these findings. First, when asked to consider their use of aggression, participants were less likely to identify themselves as aggressive. This was despite their current incarceration for which they are likely to be a risk to others. Therefore, participants in the current sample may have limited insight into their use of aggression. Participants also reported only being aggressive when they were unwell. They may have, therefore, related their use of aggression to their mental health symptoms rather than their sleep disruption. Furthermore, sleep disruption may be more relevant to aggressive thoughts and emotions and not to aggressive actions. This would explain why participants identified that they were more likely to avoid others and experience hostile interpretations following poor sleep.

### **6.11 Limitations**

The current study was the first known study to qualitatively explore sleep in a sample of forensic psychiatric patients. There are a number of qualities to suggest that the study can offer a meaningful contribution to the literature base, including the large sample size for qualitative data and unique access to individuals with elevated sleep problems and aggression. However, the study also had a number of limitations; the interviews were not audio recorded and therefore vital information may have been missed as the researcher was required to manually record the interview. Whilst audio recording would have been more valid, there are difficulties in using audio equipment with regard to security requirements in such settings. Participant's safety and welfare must be

accommodated before the needs of the research. An additional limitation is no information was gathered with regards to participant demographics, as ethics requirements prevented this. It would have been useful to understand the range of mental health problems that individuals were diagnosed with and the age range of participants. Furthermore, having a better understanding of the offence history of participants may have provided more insight into the type of aggressor that each is considered to be.

Additionally, there may have been potential biases into the methods used with this population. Participants in this sample may have been more likely to adopt impression management strategies (i.e. they control the way that they are perceived by others) (Leary, 2011). This is certainly likely when asked about their use of aggression and is demonstrated in the final theme of the Thematic Analysis (participants did not identify themselves as aggressive). Future research could consider asking staff members working closely with patients to explore the extent to which they use aggression and compare with the responses from patients. Alternatively, the use of observational notes may also provide an insight into individual's use of aggression and eliminate some of the potential biases in self-reported aggression by offenders. Despite these limitations, the current study identified a number of cognitive factors relevant to sleep in those with raised aggressive tendencies.

## **6.11 Concluding comments**

The aims of the current qualitative study were to explore the perceptions of sleep in forensic psychiatric patients, understand potential factors increasing sleep difficulties, and understand the potential consequences of poor sleep. Perceptions of sleep difficulty vary, with difficulties initiating and maintaining sleep vital factors in sleep perception in this population. This provides a need to further explore sleep perception and its

relation to aggression in this population. This research has highlighted the importance of cognition in the sleep-aggression relationship. However, what remains unclear is the specific types of cognitions influencing this relationship. Participants identified that rumination and worry contributed to sleep disruption, and this may be a result of a stressful situation, such as experiencing distressing symptoms of mental health or a conflict with others. There were additional lifestyle and behavioural factors that also contributed to sleep disruption in the current sample, highlighting potential difficulties in obtaining sufficient sleep in a high secure setting. Following sleep disruption, aggressive scripts and schemas may become more accessible and attributions in social situations may be more aggressive driven. Sleep may also reduce access to and appraisals of more prosocial and effective coping strategies to manage potentially aggressive situations. However, participants did not report that poor sleep increased aggression and therefore the sleep-aggression relationship may be more relevant to aggressive thoughts and not translate into behaviour.

To further understand the role of varied cognitions associated with the sleep- aggression relationship, the next chapter will describe a cross-sectional study examining self-reported sleep and objective and subjective aggression in forensic psychiatric patients. A range of cognitions will be explored in an attempt to distinguish the specific cognitions that may be important.

## **CHAPTER SEVEN**

### **STUDY TWO: EXPLORING COGNITIVE PROCESSES IN THE SLEEP-AGGRESSION RELATIONSHIP**

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#### **7.1 Structure of the chapter**

This chapter examines the sleep-aggression relationship and the potential cognitive factors that underpin it. Objective and subjective measures of aggression were utilised in this study to account for potential differences in acts of aggression and attitudes that reinforce aggression. Sleep variables focus on the overall quality of sleep in addition to three indicators of sleep; subjective sleep quality, sleep duration, and night-time disturbances as these were the salient problems that participants highlighted in the previous study. Attempts were made to capture the main cognitive themes derived from the systematic literature review and qualitative interviews.

#### **7.2 Participants**

Participants were recruited from a high secure male psychiatric hospital in the United Kingdom between September 2017 and September 2018. A total of 48 participants provided written consent to participate in the study. Six of the 48 participants decided not to participate (two became unwell and four did not disclose a reason), leaving a total of 42 consenting participants.

Regarding primary diagnoses, the majority of participants had a diagnosis of a mental health disorder (n = 35; paranoid schizophrenia n = 25; schizophrenia n = 2, hebephrenic schizophrenia n = 1; undifferentiated schizophrenia n = 1; schizoaffective disorder n = 2; schizoaffective disorder manic type n = 2; bipolar affective disorder current episode with manic psychotic symptoms n = 1; unspecified non-organic psychosis n = 1). The remaining participants (n = 7) had a primary diagnosis of personality disorder (dissocial n = 3; emotionally unstable n = 7; schizoid n = 1;

unspecified  $n = 1$ ). A total of 40 of the 42 participants were prescribed sleep promoting medication and 33 participants were prescribed sleep disrupting<sup>4</sup> medication. The two participants that were not prescribed sleep promoting medication were prescribed sleep disrupting medication, highlighting that all participants were prescribed medication that could potentially impact their sleep.

Length of admission was recorded for those with an admission time of up to five years. Eighteen of the participants had been at the hospital for five or more years, the shortest time period since admission was 140 days for one participant.

### **7.3 Setting**

All participants were recruited from the same high secure hospital as described in Chapter Six.

### **7.4 Materials**

Data were collected using self-report questionnaires, hypothetical scenarios, and collateral information. Copies of measures are available in Appendix 3, however, it is noted that some are excluded due to copyright laws.

#### **7.4.1 Self-report questionnaires**

The self-rated questionnaires were employed as follows.

##### *Aggression Questionnaire (AQ; Buss & Perry, 1992)*

This 29-item questionnaire assesses trait aggression with each item relating to one of four subscales: physical aggression, verbal aggression, anger, and hostility. Items include ‘I have become so mad that I have broken things’ (physical), ‘I can’t help getting into

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<sup>4</sup> Sleep disrupting medication was medication that had a potential side effect of insomnia or difficulty sleeping.



arguments when people disagree with me' (verbal), 'I sometimes feel like a powder keg ready to explode' (anger), and 'when people are especially nice to me, I wonder what they want' (hostility). Participants were asked to rate the extent to which each item was characteristic of them on a five-point Likert scale, with higher score indicating higher levels of trait aggression.

*Dysfunctional Beliefs and Attitudes about Sleep-16 (DBAS-16; Morin, Vallières, & Ivers, 2007)*

This is a 16-item questionnaire used to assess sleep-related cognitions relating to consequences of insomnia, worrying about sleep, expectations of sleep, and sleep medication attribution. Items included 'when I feel tired, have no energy, or just seem not to function well during the day, it is generally because I did not sleep well the night before', 'I am worried that I may lose control over my abilities to sleep', 'I need 8 hours of sleep to feel refreshed and function well during the day', and 'to be alert and function well during the day, I believe I would be better off taking a sleeping pill rather than having a poor night's sleep'. Participants were asked to rate the extent to which they agreed with each statement on a Likert scale ranging from 1 = strongly disagree to 10 = strongly agree. Items were summed to yield a total score with a maximum possible score of 160, with higher scoring suggesting more dysfunctional sleep-related cognitions. Psychometric properties of the DBAS indicate that it has a good internal consistency (Cronbach's  $\alpha = .80$ ) and moderate item-total correlations (mean  $r_s = .37$ ) (Morin *et al.*, 2007) in clinical insomnia inpatients and treatment seeking research participants. The DBAS has previously been used among psychiatric patients (Huthwaite, Miller, McCartney, & Romans, 2014).

*Essen Climate Evaluation Schema (EssenCES; Schalast, Redies, Collins, Stacey, & Howells, 2008)*

This measure was used to assess participants' perceptions of the social atmosphere of their ward. It is a 17 item measure that provides details of three essential traits of social and therapeutic atmosphere in a forensic psychiatric ward. Patient cohesion and mutual support is the extent to which patients are supportive of each other and included items such as 'the patients care for each other' and 'even the weakest patient finds support from his fellow patient'. Therapeutic hold refers to the extent to which the ward is considered to be supportive of patient's therapeutic needs and included items 'on this ward, patients can openly talk to staff about all their problems' and 'staff take a personal interest in the progress of patients'. Patient's perceptions of safety (as opposed to the threat of aggression and violence) included the items 'Some patients are afraid of other patients' and 'some patients are so excitable that one deals very cautiously with them'. Psychometric properties of the EssenCES found satisfactory internal consistency (Cronbach's  $\alpha = .76$ ) in UK sample of high secure psychiatric patients.

*Hostile Expectation Bias (Rule, Taylor, & Dobbs, 1987)*

Two hypothetical scenarios taken from Rule *et al.* (1987) were included to assess hostile expectation bias (i.e. the tendency to assume that others will react to potential conflicts with aggression). Participants were asked to freely answer what they expected to happen following two situations: the car accident (example provided) and going to a restaurant. Rule *et al.* (1987) coded each answer using content analysis including classification of frustrators, emotional states and expressions, and verbal and physical aggression. However, given the client group, responses to these

scenarios did not provide sufficient detail for such an analysis, therefore responses were rated similarly to the MJQ (i.e. hostile, prosocial, and illogical responses). The limitations to using this technique of scoring will be discussed.

Todd was on his way home from work one evening when he had to brake quickly for a yellow light. The person in the car behind him must have thought Todd was going to run the light because he crashed into the back of Todd's car, causing a lot of damage to both vehicles. Fortunately, there were no injuries. Todd got out of his car and surveyed the damage. He then walked over to the other car.

*Figure 7.1: The car accident scenario from Rule et al. (1987)*

### *Hostile Perception Bias (Srull & Wyer, 1979)*

To assess a further cognitive biases, a scenario from Srull and Wyer (1979) was used to assess hostile perception bias (i.e. perceiving general social interactions as aggressive). Participants were provided with a hypothetical scenario involving a character named Donald (example provided) and asked to indicate the extent to which twelve hostile and evaluative traits were characteristic of Donald. Examples of hostile traits included 'unfriendly', 'kind (reversed scored), and 'hostile'. The traits identified as evaluative included 'boring', 'narrow-minded', and 'dependable' (reverse-scored). Higher scores of the hostile characteristics suggest higher hostile perception bias.

I ran into my old acquaintance Donald the other day, and I decided to go over and visit him, since by coincidence we took our vacations at the same time. Soon after I arrived, a salesman knocked at the door, but Donald refused to let him enter. He also told me that he was refusing to pay his rent until the landlord repaints his apartment. We talked for a while, had lunch, and then went out for a ride. We used my car, since Donald's car had broken down that morning, and he told the garage mechanic that he would have to go somewhere else if he couldn't fix his car that same day...

*Figure 7.2: Example of scenario from Srull & Wyer (1979)*

*Making Judgements Questionnaire (MJQ from the Affective, Cognitive, and Lifestyle Questionnaire; Ireland & Ireland, 2012)*

The MJQ consists of ten hypothetical situations to assess hostile attribution biases. Participants were presented with each scenario and asked to select one response from four possible options. Of the four responses available, one answer was hostile, one answer was prosocial, and two answers were illogical. A greater number of hostile responses indicate more hostile attributions. An example of one MJQ situation available in Figure 7.3.

Katie is trying to diet and is on her third diet in the past 12 months. She desperately wants to lose weight. She has had a good week and lost 4 pounds. Her friend, Leanne, usually tries to support her and also struggles with her own weight. Leanne buys Katie a large cake, it is Katie's favourite cake. What is the most likely reason why Leanne does this?

*Figure 7.3: Example of a hypothetical scenario from the MJQ*

*Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989)*

This is a 19-item measure to assess sleep quality and quantity over the past month. The measure includes an additional five questions which are rated by the respondent's bedpartner or roommate, however, as patients have individual rooms, these five questions were disregarded. The 19 items are combined to form seven component scores (subjective sleep quality; sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction), which are rated from 0-3. Example items include "how would you rate your sleep quality overall", "how long (in minutes) does it usually take you to fall asleep each night?", and "how often have you had trouble sleeping because you wake up in the middle of the night or early morning?". The component scores are combined to yield one global score of a maximum of 21 points. Higher global scores indicate more difficulties in all areas of

sleep, although a cut-off score of 5 is suggested to differentiate between good and poor sleepers (Buysee *et al.*, 1989). The PSQI has demonstrated high internal consistency (Cronach  $\alpha = .83$ ) in a psychiatric sample (Buysee *et al.*, 1989). Previous studies have used the PSQI in a high secure psychiatric population (Chu, McNeill, Ireland, and Qurashi, 2015).

*The Perseverative Thinking Questionnaire (PTQ; Zetsche, Ehring, & Ehlers, 2009)*

The PTQ consists of 15 items representing rumination and negative thinking. Items include 'the same thoughts keep going through my mind again and again', 'I think about many problems without solving any of them', and 'I keep thinking about the same issue all the time'. Participants are asked to rate the extent to which each item applies when thinking about negative experiences or problems. Items are rated on a five-point Likert scale with the total score comprising three subscales: core features of repetitive negative thinking, unproductiveness of repetitive negative thinking, and mental capacity captured by repetitive negative thinking. Excellent internal consistencies and satisfactory test-retest reliabilities German speaking psychiatric patients (Cronach  $\alpha = .95$ ;  $rtt = .69$ ;  $p < .001$ ). Excellent internal consistencies were also found in English speaking student (Cronach  $\alpha = .95$ ) (Ehring *et al.*, 2011).

*The Social Problem-Solving Inventory –Revised: Short (SPSI-R:S; D’Zurilla & Nezu, 1990)*

This self-report instruction is used to assess an individual’s strengths and weakness in social problem solving. It comprises 25 items associated with five subscales: positive problem orientation (PPO), negative problem orientation (NPO), rational problem solving (RPS), impulsivity/carelessness style (ICS), and avoidance style (AS). PPO assesses the tendency to view problems positively; NPO assesses thoughts and behaviours preventing effective problem solving; RPS assess effective social problem

solving techniques (e.g. generating alternatives and evaluating outcomes); ICS assesses the tendency to impulsively implement skills; and AS assesses dysfunctional avoidance of the problem. These scores are combined to yield a global score, with higher score indicating poorer social problem-solving ability.

*The Suicide Behaviour Questionnaire – Revised (SBQ-R, Osman, Bagge, Gutierrez, Kopper, & Barrios, 2001)*

This is a short questionnaire comprising four items. It assesses dimension of suicidality; life suicide ideation/attempt (have you ever thought about or attempt to kill yourself?), frequency of suicide in the past 12 months (how often have you thought about killing yourself in the past year?), threat of a suicide attempt (have you ever told someone that you were going to commit suicide or that you might do it?), and likelihood of attempting suicide in the future (how likely is it that you will attempt suicide someday?). Each item is scored and summed to give a total score between three and 18, with higher scores indicating more suicide ideation. Osman *et al.* (1999) suggest a cut-off score of eight indicates suicidality among psychiatric patients.

#### 7.4.2 Review of collateral information

In addition to the self-report questionnaires, participants' collateral information was also reviewed to obtain information regarding their mental health diagnosis, medication, and incidents of inward and outward aggression.

##### Medication and diagnosis

Information regarding primary mental health diagnosis was recorded for each participant. Participants were described as having a primary diagnosis of major mental health or personality disorder. The medical files of each participant was trawled to collate information regarding prescribed medication that may have promoted or

disrupted sleep. This was identified by the side effects of the medication. Medicines with a potential side effect of insomnia or difficulties sleeping was recorded as sleep promoting and those that mentioned difficulties sleeping, or similar, as disrupting sleep. It is noted that 13 participants were prescribed benzodiazepines (9 diazepam, 3 lorazepam, 1 clonazepam), one participant prescribed a z-drug (zopiclone). However, it cannot be determined by examining the medical files whether these were prescribed solely for sleep purposes. In addition, 37 participants were prescribed anti-psychotic medication (24 clozapine, 5 olanzapine, 4 risperidone, 2 quetiapine, 1 aripiprazole, 1 lurasidone). Participants were dichotomised by medication due to the large number of medications individually prescribed. Those prescribed with at least one sleep promoting medication, that was not a PRN medication, were compared with those without sleep promoting medication. The same strategy was applied to sleep disrupting medication.

#### *Aggressive and self-harm incidents*

For each participant, the number and nature of inpatient aggressive incidents recorded over the last five years (or since their admission to the hospital if this was less than five years<sup>5</sup>) preceding the completion of the questionnaires was reviewed from the central administration. Incidents were categorised as verbal aggression (e.g. making threats, swearing at staff), physical aggression against objects (e.g. breaking objects, kicking doors), physical aggression against others (e.g. hitting, kicking, spitting), or self-harm/suicide attempts (e.g. cutting, banging head). These categories accounted for the working definition of aggression as an intent to directly cause harm, be that towards the self, others, or objects (see Chapter Three). It is noted that aggressive incidents were

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<sup>5</sup> There were no significant differences between those who had been at the hospital for more than five years and those who had been at the hospital for less than five years (Mann Whitney U tests: verbal aggression (U = 214.00, p = .96; physical aggression towards objects (U = 193.50, p = .55); physical aggression towards others (U = 502.00, p = .769); self-harm (U = 150.50, p = .06).

recorded in the time period preceding the completion of questionnaires and not immediately following completion. Therefore, the comparison between incidents and sleep duration (which is recorded over the preceding month) is concurrent and retrospective but not prospective. Only retrospective comparisons will be outlined in the current chapter.

## **7.5 Ethical considerations**

Ethical approval was obtained from the UK NHS North West Committee (16/NW/0669) and University of Central Lancashire Ethics Committee. Participants were not approached by the researcher until their Responsible Clinician had provided written consent for those whom they deemed had the capacity to consent to the study. Following this, the researcher attended patient care team meetings and patient community meetings to recruit participants for the study. All participants with written consent from their Responsible Clinician and who had a basic understanding of the English language were considered eligible. However, patients were not approached in circumstances where the researcher had been informed of a change in presentation that may put themselves, or the patient, at risk. Participants were approached individually and provided with an information sheet (Appendix 4) and given a verbal explanation of the study to consider whether they wished to participate. They were given time to consider this information and approached again to obtain their written consent (Appendix 4), if they chose to participate.

## **7.6 Procedure**

Participants had the option to complete the questionnaires themselves or if they would like the questionnaires to be read aloud by the researcher. The majority of participants requested for the researcher to read the questionnaires ( $n = 37$ ) and they were provided with separate cue cards containing the scales for each measure. This made it easier for



them to respond rather than the researcher reading the Likert scale after each item. Given the number of measures each participant was asked to complete, they were informed that they could complete the measures over two days, 29 participants completed the measures over two days and one participant completed the measures over three days.

## **7.7 Results**

This section will present the findings of the present study. The data screening process is firstly described, followed by preliminary analyses exploring self-reported sleep problems and the number of recorded incidents of aggression. The relationship between sleep and reported incidents of aggression will then be explored to determine whether those who reported poor sleep were involved in a greater number of incidents than those who reported sleeping well. The relevant sleep and aggression variables and their relationship to cognition will then be outlined. To explore the relationship between sleep and subjective aggression (i.e. trait aggression and self-reported suicide ideation), bivariate correlations are presented. The role of cognition in the relationship between sleep and subjective aggression is also outlined.

### **7.7.1 Data screening**

Data were inputted into excel and transferred into IBM SPSS Statistics 25. Missing data were identified and any data entry errors were rectified by looking at the original questionnaire. To examine patterns of missing data, a missing value analysis was performed. One hundred and forty-four variables values were identified as missing. A Little's MCAR test revealed that the data were missing at random ( $\chi^2 = .000$ ,  $df = 1754$ ,  $p > .05$ ) and therefore the data was replaced using Expectation Maximisation (EM). The exception to EM being used was when a whole measure had not been completed by the participant. In this instance, the data remained missing and that particular case was

excluded from the analysis of that measure (HEB = 5; SPSI-RS = 3; HPB = 2; HAB = 1). When examined using Mahalanobis Distance, no multivariate outliers were found. Univariate outliers were identified and deviant scores were assigned a score one unit higher (or lower) than the next most extreme score in the distribution.

Kolmogorov-Smirnov test of normality demonstrated that the DBAS and SPSI were the only measures to have a normal distribution and therefore non-parametric analyses were performed. Cronbach's alpha was used to calculate internal reliability for all measures used and are available in Table 7.1. According to the guidelines provided by George and Mallery (2003), a Cronbach's alpha of .6 or less is considered questionable and therefore the variables with a Cronbach's alpha less than .6 were not included in the analysis. It is noted, however, that the PSQI global has internal consistency of .64. This measure was included in the analysis but the limitations of this are discussed in section 7.9.

Table 7.1: Descriptive statistics and Cronbach's  $\alpha$  for all measures

Measure	Variable	N	M	SD	Observed Ranged	Potential Range	A
Aggression Questionnaire (Buss & Perry, 1992)	Total	42	61.36	19.77	31 – 99	29 – 145	.95
	Verbal	42	11.79	4.65	5 – 25	5 – 25	.84
	Physical	42	18.13	7.61	9 – 39	9 – 45	.86
	Anger	42	15.13	5.11	7 – 27	7 – 35	.77
	Hostility	42	16.90	6.20	8 – 31	8 – 40	.81
Suicide Behaviour Questionnaire (Osman <i>et al.</i> , 2001)	Total	42	8.04	3.77	3 – 16	3 – 18	.69
	Lifetime	42	3.03	1.25	1 – 4	1 – 4	-
	Frequency	42	2.00	1.28	1 – 5	1 – 5	-
	Threat	42	1.59	.85	1 – 3	1 – 3	-
	Likelihood	42	1.50	1.92	0 – 6	0 – 6	-
Dysfunctional Beliefs and Attitudes about Sleep Scale (Morin <i>et al.</i> , 2007)	Total	42	84.65	29.39	20 – 141	0 – 160	.89
	Consequences	42	27.91	12.12	5 – 50	0 – 50	.86
	Worry	42	30.19	12.44	10 – 55	0 – 60	.79
	Expectation	42	14.05	4.92	2 – 20	0 – 20	.80
	Medication	42	12.50	6.26	3 – 25	0 – 30	.38
Essen Climate Evaluation Schema (Schalast, 2008)	Total	42	29.74	6.67	13 – 42	0 – 60	.71
	Cohesion	42	11.24	4.25	0 – 20	0 – 20	.89
	Therapeutic	42	12.14	2.66	5 – 17	0 – 20	.38
	Safety	42	6.36	4.30	0 – 20	0 – 20	.84

Table 7.1 continued

<i>Measure</i>	<i>Variable</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>Observed Ranged</i>	<i>Potential Range</i>	<i>A</i>
Making Judgements Questionnaire (Ireland & Ireland, 2012)	Hostile	41	3.83	2.29	0 – 9	0 – 10	-
	Prosocial	41	5.68	2.20	1 – 10	0 – 10	-
Hostile Expectation Bias (Rule <i>et al.</i> , 1987)	Hostile	40	.80	.72	0 – 2	0 – 2	-
	Prosocial	40	1.12	.76	0 – 2	0 – 2	-
Hostile Perception Bias (Srull & Wyer, 1979)	Hostile	40	42.10	11.15	22 – 60	10 – 100	.88
	Evaluative	40	37.93	8.83	21 – 58	10 – 100	.58
Perseverative Thinking Questionnaire (Zetsche, Ehring, Ehlers, 2009)	Total	42	43.62	12.48	17 – 69	15 – 75	.95
	Core	42	27.24	8.05	11 – 44	9 – 45	.92
	Unproductive	42	8.12	2.65	3 – 13	3 – 15	.77
	Mental Capacity	42	8.26	2.76	3 – 15	3 – 15	.80
Pittsburgh Sleep Quality Index (Buysee <i>et al.</i> , 1989)	Global	42	7.17	3.35	0 – 15	0 – 21	.64
	Subjective Sleep Quality	42	1.12	.83	0 – 3	0 – 3	-
	Sleep duration	42	1.74	.94	0 – 3	0 – 3	-
	Night-time disturbances	42	1.29	.64	0 – 3	0 – 3	-

*Table 7.1 continued*

Social Problem-Solving Inventory- Revised: Short Form	Total	39	11.81	2.62	7.20 – 17.60		.73
	Positive Problem Orientation	39	11.35	4.09	3 – 20	0 – 20	.73
	Negative Problem Orientation	39	7.77	3.85	0 – 18	0 – 20	.65
	Rational Problem Solving	39	10.12	4.38	1 – 19	0 – 20	.83
	Impulsivity/carelessness Style	39	7.59	3.75	0 – 16	0 – 20	.66
	Avoidance Style	39	7.82	4.50	1 – 20	0 – 20	.73

### 7.7.2 Self-reported sleep problems

Means and frequencies of those with good and poor sleep are presented in Table 7.2, with participants being dichotomised according to the scoring instructions detailed in section 7.4 for the PSQI global. Subjective sleep quality, sleep duration, and night-time sleep disturbances were dichotomised, with good and poor sleep being defined by a score of 0 or 1 (indicating good sleep) and 2 or 3 (indicating poor sleep).

*Table 7.2: Means and frequencies of good and poor sleep*

	<b>Mean (SD)</b>	<b>Good sleep n (%)</b>	<b>Poor Sleep n (%)</b>
Pittsburgh Sleep Quality Index Global Score	7.2 (3.3)	9 (21.4)	33 (78.6)
Subjective Sleep Quality Score	1.1 (.83)	31 (73.8)	11 (26.2)
Sleep Duration Score	1.7 (.93)	17 (40.5)	25 (59.5)
Sleep Disturbances	1.3 (.64)	28 (66.7)	14 (33.3)

### 7.7.3 Recorded incidents of aggression

Means and frequencies of aggressive incidents are presented in Table 7.3. The frequencies of aggressive incidents separate those who have had at least one recorded incident in the past five years (or since admission).

*Table 7.3: Descriptive statistics of recorded incidents of aggression*

	<b>M (SD) of recorded incidents</b>	<b>Recorded incident n (%)</b>	<b>No recorded incident n (%)</b>
Verbal aggression	18.36 (30.44)	32 (76.2)	10 (23.8)
Physical aggression towards objects	4.57 (9.88)	23 (54.8)	19 (45.2)
Physical aggression towards others	3.02 (4.47)	23 (54.8)	19 (45.2)
Self-harm	4.17 (8.62)	17 (40.5)	25 (59.5)

#### 7.7.4 Sleep and reported incidents of aggression

The relationship between recorded incidents of aggression and sleep variables was explored using Spearman's rank-order correlations (see Table 7.4).

Negative correlations were found between subjective sleep quality and recorded incidents of self-harm ( $r_s(42) = .36, p = .02$ ), indicating that lower subjective sleep quality scores (i.e. individuals with better sleep quality) were associated with more reported incidents of self-harm. No further correlations were found between recorded incidents of aggression and the sleep variables (all  $r_s \leq .23$ ). In order to assess whether those reporting poorer sleep quality were more likely to have been involved in at least one incident of aggression, a Mann Whitney U test was performed. Subjective sleep quality was, again, dichotomised by a score of 0 or 1 indicating good sleep. The Mann Whitney U test revealed a significant difference ( $U = 101.00, p = .025$ ), with those with good sleep quality more likely than those reporting poor sleep quality to engage in at least one incident of self-harm.

*Table 7.4: Correlations between sleep variables and reported incidents of aggression*

Variable	1	2	3	4	5	6	7
1. Verbal aggression	-						
2. Physical aggression towards objects	.66**	-					
3. Physical aggression towards others	.79**	.69**	-				
4. Self-harm	.32*	.46**	.35*	-			
5. PSQI global	-.09	-.08	-.07	-.23	-		
6. Subjective sleep quality	-.19	-.20	-.19	-.36*	.67**	-	
7. Sleep duration	-.12	-.01	-.02	-.122	.53**	.43**	-
8. Sleep disturbances	.01	-.08	.03	.03	.16	.06	.03

\*  $p < .05$ ; \*\*  $p < .01$ ; PSQI global - Pittsburgh Sleep Quality Index Global Score

#### 7.7.5 Subjective sleep quality, cognition, and reported incidents of aggression

The findings indicate that indicators of poor sleep were not associated with the number of outwardly aggressive incidents. Subjective sleep quality was associated with incidents of self-harm, although not in the expected direction. To further understand the role of cognition in this relationship, specifically whether those who reported poor subjective sleep quality were more likely to experience negative repetitive thoughts, Mann Whitney U tests were performed with subjective sleep quality dichotomised as the independent variable and the PTQ as the dependant variables. This revealed no significant findings ( $U = 61.00$  ns).

To examine whether those with poor subjective sleep quality were more likely to view hostility in a situation than those with good sleep quality, further Mann Whitney U tests were performed using the scores from the three hostile questionnaires as the dependent variables. The only significant findings were for the prosocial hostile attribution responses on the Moral Judgements Questionnaire, with those with good sleep quality more likely than those with poor sleep quality to positively attribute the presented situations ( $U = 85.00$ ,  $p = .03$ ).

Further Mann Whitney U tests were performed to determine whether those with at least one reported incident of self-harm were more likely than those without an incident to positively attribute the hypothetical situation, revealing no significant findings ( $U=199.00$  ns).

Sleep related cognitions were also explored using further Mann Whitney U tests. Those with more sleep-related negative cognitions, as determined by the DBAS, were less likely to rate their sleep quality as good ( $U = 71.500$ ,  $p= .004$ ). However, there were no significant differences in DBAS score between those involved in at least one incident of self-harm and those no involved in an incident of self-harm ( $U -139.500$  ns).



#### 7.7.6 Sleep and trait aggression

To explore whether poor sleep quality was associated with aggressive attitudes, bivariate Spearman's rank-order correlations between the four sleep variables (PSQI Global, subjective sleep quality, sleep duration, and sleep disturbances) and the AQ and SBQ scores were performed (see Table 7.5).

Table 7.5: Correlations between sleep variables and trait aggression variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Aggression Questionnaire Total	-												
2. Aggression Questionnaire Verbal Aggression	.86**												
3. Aggression Questionnaire Physical Aggression	.86**	.73**											
4. Aggression Questionnaire Anger	.92**	.74**	.79**										
5. Aggression Questionnaire Hostility	.90**	.70**	.62**	.77**									
6. Suicide Behaviour Questionnaire Total	.48**	.60**	.48**	.41**	.35*								
7. Suicide Behaviour Questionnaire Lifetime	.23	.34*	.34*	.21	.07	.70**							
8. Suicide Behaviour Questionnaire Frequency	.38*	.40**	.33*	.32*	.31*	.71**	.32*						
9. Suicide Behaviour Questionnaire Threat	.18	.15	.22	.21	.20	.38*	.24	.24					
10. Suicide Behaviour Questionnaire Likelihood	.46**	.58**	.46**	.40	.33*	.80**	.41**	.45**	.05				
11. Pittsburgh Sleep Quality Index Global	.03	.01	.07	.05	.06	.30	.09	.42**	.09	.20			
12. Subjective sleep quality	.15	.13	.06	.14	.22	.25	.09	.30	-.153	.18	.68**		
13. Sleep duration	-.13	-.13	-.14	-.17	.01	.17	.06	.24	.18	-.03	.73**	.42**	
14. Sleep disturbances	.31*	.16	.34*	.29	.28	.33*	.16	.38*	.08	.34*	.17	.06	.02

\*p < .05, \*\* p<.01

Sleep disturbances were correlated with five aggression variables: total aggression, physical aggression, total suicide, suicide frequency, and suicide threat. PSQI Global correlated with suicide frequency but did not correlate with any other aggression variable (all  $r_s \leq .30$ ). There were no further significant correlations between sleep and aggression variables (all  $r_s \leq .29$ ).

#### 7.7.7 Sleep disturbances, trait aggression, and cognition

As highlighted with the bivariate correlations, sleep disturbances were associated with more aggression variables than the other indicators of sleep. Therefore, to compare individuals who experiences more night-time disturbances than those who experienced fewer night-time disturbances, Mann Whitney U tests were performed with each measure of cognition. Again, sleep disturbances were dichotomised and entered as the independent variable. No significant differences were found ( $U = 33.00 - 56.00$  all ns).

### 7.8 Discussion

The aim of the current study was to determine the prevalence of sleep disruption in a forensic psychiatric sample. The findings from the current study found high prevalence of sleep disturbances, with almost 80% of participants experiencing sleep problems according to the PSQI cut-off scores. Such findings are consistent with previous research with individuals in forensic settings reporting poor sleep quality (Kamphuis *et al.*, 2013; 2014; Meijers *et al.*, 2015).

The high number of sleep disturbances in a forensic psychiatric population could potentially be explained by an increase in repetitive negative thinking that is more prominent in this population. Such a hypothesis would be consistent with previous research suggesting that individuals with mental health symptoms such as depression

and psychosis experience increased rumination (Nolen-Hoeksema, 2000; Vorontsova, Garety, & Freeman, 2013). Alternatively, it may be a result of unfavourable conditions in the physical environment in which they reside. Within secure settings there are psychosocial and socio-cultural factors that may contribute to sleep challenges (Elger & Sekera, 2009; Ireland & Culpin, 2006). For example, using the bed for activities other than sleeping would be incompatible with good sleep hygiene practices, and it may be such behaviours that limited participants' ability to gain sufficient sleep.

A further aim of this study was to explore the sleep-aggression relationship within this sample of forensic psychiatric patients. As noted, the analyses revealed that those defined as poor sleepers (using PSQI cut-off scores) were not more likely than good sleepers to have been involved in an incident of aggression. This contrasts previous literature which indicates that objective levels of aggression were associated with poor sleep (Kamphuis *et al.*, 2014). Yet, when participants were separated by their subjective sleep quality (i.e. whether they rated their sleep quality as good or poor), those with poor sleep quality were less likely to be involved in an incident of self-harm than those with good sleep.

One possible explanation for this contradictory finding could be that individuals' subjective sleep quality may not correspond with their night-time sleep, but may be defined by their daytime sleep. Shifts in circadian rhythm are reported in individuals with schizophrenia (Martin, Jeste, & Ancoli-Israel, 2005), and this is reflected in an individual's tendency to be awake at night and sleep during the day (Krystal, 2012). Considering that a high proportion of the participants in the current study have a primary diagnosis of schizophrenia (67%), it would be reasonable to assume that many participants slept during the daytime. Therefore, how they viewed their sleep quality during the day may be different to how it is perceived during the night.

The findings revealed relationships between sleep and aggression that are more consistent with the literature when considering self-reported aggression. Higher PSQI scores were associated with higher levels of suicidal thoughts within the past year. Such findings appear unsurprising considering the vast amount of literature suggesting that poor sleep is associated with suicide ideation (see Littlewood *et al.*, 2017 for a review). These findings could give some indication to the role of sleep in the relationship between suicidal thoughts specifically, but there may be factors preventing a suicidal act. This could be explained by the secure setting, where patients are closely monitored and where there is a quick response to suicidal intent, despite some of the problems highlighted from the process of observations (Bowers & Park, 2001). Sleep problems may therefore be most relevant to cognitive elements of suicide, but are not relevant to the physical act.

Night-time sleep disturbances was the only sleep indicator to positively correlate with outward aggression, with correlations between both total AQ scores and physical AQ scores. These findings may suggest that night-time disturbances may be more relevant to the sleep-aggression relationship than originally predicted. To date, there are no known published studies that have separated PSQI night-time disturbances to compare aggression scores in forensic samples. However, Meijers *et al.* (2015) supports the findings using objective measures of sleep, with nocturnal restlessness associated with increased objective aggression. However, the differences between the findings from the current study is that night-time disturbances did not predict incidents of aggression. Therefore, self-reported night-time disturbances may be a better predictor of participants' self-perceptions of their aggression. The findings also revealed that night-time disturbances correlated with the threat of suicide and likelihood of future suicide. The findings here may highlight that those experiencing night-time disturbances are more likely to be what Hillbrand (1995) defined as the combined aggressor (i.e.

engaging in both inward and outward aggression).

In line with the second hypothesis, that those with poor sleep quality, short sleep duration, and night-time disturbances will report higher levels of aggression, the findings revealed that those with overall sleep difficulties showed some increases in both inward and outward aggression. However, the findings did not reveal any significant differences for objective outward aggression scores. It is important to highlight that only four of the sleep components were analysed in relation to aggression scores, as these predictions were driven by the literature (Barker *et al.*, 2016; Kamphuis *et al.*, 2014; Meijers *et al.*, 2015).

The final aim of this study was to explore the relevant cognitions that could contribute to the sleep-aggression relationship. The findings revealed that those with good subjective sleep quality were more likely to make prosocial attributions in an ambiguous situation than those with poor sleep quality. These findings are in line with those found by Barker *et al.* (2016), and further illustrate how perceptions of good sleep may be protective for aggression. However, it is argued that it may not be protective over aggression actions, but the aggressive thoughts. The current results indicate that subjective sleep quality rated as good was associated with an increase in recorded incidents of self-harm. Therefore, there may be additional cognitive processes that interfere with the potential protective factor of good subjective sleep that helps to increase positive attributions. For example, those who rated their sleep quality as poor were more likely than those rating it as good to have dysfunctional beliefs about sleep. Alternatively, attribution biases may not be relevant to self-harming behaviour and therefore positive attributions do not override the need to display inward aggression. The current findings revealed that those who reported self-harm were not more likely to positively attribute a situation or have dysfunctional beliefs about sleep, and

therefore the latter is more likely.

## **7.9 Limitations**

This is the first study to explore the range of cognitions that may be contributing to the sleep-aggression relationship. The use of objective measure of aggression and validated self-report measures in a unique sample of forensic psychiatric patients represent the strengths of the current research. However, it is not without its limitations. Due to the cross-sectional nature of the study, causality of the sleep- aggression relationship cannot be established and therefore cannot give any direction as to whether the relevant sleep variables contribute to aggression or whether aggressive traits increase the likelihood of night-time disturbances. Additionally, the scoring procedures of the Hostile Expectation Bias questionnaire do not adhere to the scoring instruction provided by Rule *et al.* (1989) as participants in the current setting would be unable to generate a large range of answers for this question. If participants were able to report a range of answers for each of the questions, the differences between scores may be more sensitive to the analysis. Additionally, the PSQI had a weaker reliability coefficient than what would be expected, and that has been found in previous studies (Buysse *et al.*, 1989). Therefore, current findings must be interpreted with caution. Finally, to better understand the impact of cognition on the sleep-aggression relationship, a mediation analysis would be appropriate such an analysis would identify the true manipulation of the cognitive variables on the sleep- aggression relationship. However, such an analysis was not possible due to the small sample size.

## **7.10 Concluding comments**

The findings from this cross-sectional study highlight that participants in this sample had difficulties sleeping. In relation to trait aggression, but not observed aggression, sleep difficulties were associated with an increase in aggression. The role of cognition

is also highlighted in relation to subjective sleep quality, with more prosocial attributions in individuals rating their subjective sleep quality as good. There is some support for previous findings that highlight the relationship between sleep and aggression and the potential role of cognition. In order to explore this further, the next chapter outlines research aimed at addressing cognitive factors in an attempt to increase sleep quality and reduce subsequent aggression in individuals with expected high levels of sleep problems and aggression.

If cognition is relevant to the sleep-aggression relationship, using a mindfulness intervention which aims to adapt maladaptive thoughts by experiencing them in a non-judgemental way, should improve sleep and a decrease in aggression will also be evident. Alternatively, speculating from the results in the current study, additional behavioural factors may better explain the sleep-aggression relationship, and if cognition is not important, then a sleep education-based intervention is likely to improve sleep and reduce aggression.

There were no differences between night-time disturbances and any of the cognition variables. This highlights that the salient factor in the sleep-aggression relationship are the prosocial tendencies as highlighted. Given that the cognitions explored were driven by the systematic literature review and results from study one, it is surprising that none of the cognitions were relevant to night-time disturbances. One potential explanation for this is that previous literature that includes the PSQI often use the global score only (Kamphuis *et al.*, 2014; Weis *et al.*, 2015) or subjective sleep quality (Barker *et al.*, 2016). Sleep disturbances may contribute to aggression via other cognitive processes or factors beyond cognition that have not been explored.



## **CHAPTER EIGHT**

### **STUDY THREE: INVESTIGATING THE FEASIBILITY OF A RANDOMISED CONTROL SLEEP INTERVENTION TRIAL IN HIGH SECURE PSYCHIATRIC PATIENTS.**

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#### **8.1 Structure of the chapter**

The present study will explore the feasibility of a mindfulness intervention intended to improve sleep in a high secure psychiatric population. This feasibility study will compare a brief mindfulness intervention, aimed at overcoming the cognitive factors of sleep, with a sleep education intervention and treatment as usual control. The primary aim of this study is to explore whether a mindfulness intervention can be successfully conducted with forensic psychiatric patients. The secondary objective is to assess the effectiveness of the intervention on sleep, aggression and cognition. Mindfulness is expected to reduce cognitions and inward and outward aggression and improve sleep. Sleep Education is also expected to show some benefit in comparison to treatment as usual, but reductions in cognitions are not expected.

This chapter will outline the methods, results and discussion of the feasibility study.

#### **8.2 Feasibility Trial design**

The study adopted a three-arm parallel feasibility trial, with participants randomly assigned to mindfulness, sleep education, or treatment as usual (control) in a 1:1:16 ratio<sup>6</sup>. Participants were randomised prior to completing baseline measures. Randomisation was conducted using Excel to generate a random sequence order for the interventions. Ethical approval was obtained from the UK NHS North West Committee (16/NW/0669) and University of Central Lancashire Ethics Committee. Evaluators and participants were not blinded to intervention type.

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<sup>6</sup> This reflects an equal allocation ratio per intervention.

### **8.3 Participants**

Participants were recruited from a male only, high secure psychiatric service in the North West. The hospital is an inpatient service, providing care for patients who require treatment for Major Mental Health and/or Personality Disorder. All participants with consent from their Responsible Clinician and who had a basic comprehension of the English language were eligible to participate. The researcher attended Patient Care Team meetings and patient community meetings, to inform care team members and patients about the study. To ensure the safety of participants and researchers, if the researcher was informed of a significant change in presentation, the participant was not approached on that day. Participants were approached individually, provided with an information sheet, and given a verbal explanation of the study. They were given time to consider the information and, if they chose to participate, they were approached again to gather their written consent.

The sample consisted of 48 male patients. No previous trials of Mindfulness or Sleep Education were available to perform a power calculation. However, the sample size was felt to be adequate considering the primary aim was to establish feasibility.

### **8.4 Setting**

The same high secure psychiatric hospital outlined in Chapter Six and Seven was used in the current feasibility study.

### **8.5 Interventions**

#### *Mindfulness*

Mindfulness is a way of training the mind to focus on the here and now, rather than being distracted by our thoughts (Williams & Penman, 2011). Each participant was provided with three mindfulness sessions. The first included an introduction to the concept of mindfulness and practicing a mindfulness of sounds technique. Participants were asked

to evaluate the use of this technique by discussing their experience with the facilitator. The second session included two mindfulness practices: mindfulness of an object, and mindfulness of the soles of the feet. Again, participants were asked to reflect on their experiences. This session also included additional information outlining the usefulness of practising mindfulness on their thoughts. The final session was a refresher where participants were afforded the opportunity to ask for clarification of the mindfulness techniques or any other concerns they had regarding mindfulness. Participants were asked to practice the learnt techniques outside of these sessions. The first two sessions lasted approximately 45 minutes and the refresher session, approximately 15 minutes. Figure 8.1 provides an example of mindfulness of sounds technique. A full session plan is available in Appendix 5. The lead researcher received mindfulness training prior to the study commencing. All mindfulness sessions were delivered by them.

We are going to do a mindfulness practice. During this exercise I will guide you to focus on a particular item or experience. As you are following the instructions your mind is likely to wander. This is perfectly normal. When you notice that your mind has wandered, gently return it to the task.  
Do this as many times as you need to. When you do this you are being mindful.

In this exercise we are going to pay attention to sounds. Now, when we listen to sounds our minds usually add a description or label; so if we hear “dring dring” our mind says, “that’s a telephone ringing”. It’s quite an automatic process and we can’t stop our minds doing that. But in this exercise we are just going to be open to the *experience* of sound – allowing ourselves to experience any thud and hum that comes into our ears without trying to discern what the sound is (but if you find yourself labelling automatically don’t judge yourself, just notice and bring your mind back to the next experience of sound). We will do this exercise for two minutes and I will indicate when to start and when to stop.

Figure 8.1: Mindfulness of sounds technique

### *Sleep Education*

As with the mindfulness session, participants attended three sleep education sessions. The first session provided an introduction to sleep education and an exercise was used for participants to generate factors that could be helping and hindering their sleep. The focus for the remainder of this session was the sleeping environment. This included generating a discussion on potential ways of improving the sleeping environment that would adhere to sleep practices such as making the room as dark as possible and ensuring the room is

a comfortable temperature. The second session included an exercise used to highlight potential maladaptive lifestyle factors that would suggest poor sleep. A discussion was generated as to how these lifestyle factors could be avoided, such as exercising at appropriate times and napping during the day. The final third session was a refresher session where participants were afforded the opportunity to ask for clarification of the sleep education techniques or any other concerns that they had regarding sleep education. The first two sessions lasted approximately 45 minutes and the refresher session, approximately 15 minutes.

Figure 8.2 provides an example of information discussed with participants about the food and drink they consume and how this affects their sleep. A full session plan is available in Appendix 6. Five of the sleep education interventions were co-facilitated by the research lead and a research assistant.

- 1. Food and drink**

  - **How do you think food will affect your sleep?**
    - Going to bed too full
    - Going to bed hungry
    - Eating lots of carbohydrates, fatty foods or sugary foods.
    - Drinking lots of caffeine – particularly before bed.
    - Drinking fizzy drinks before bed
  - **What do you think you can work on to avoid this?**
    - Participants should come up with their own examples. They need to be manageable and realistic. Small goals are important.
    - Examples include – not drinking caffeine after 5pm, not eating after 8pm (although remember these are subjective to the time that they go to sleep).  
Improving their diet.

*Figure 8.2: Lifestyle factors used to generate discussion about healthy eating and drinking*

### *Treatment As Usual*

Those in the treatment as usual condition were not required to attend any sessions. However, to avoid withholding potentially valuable treatment for sleep, those assigned to this condition were offered the most effective treatment following completion of the research phase.

## 8.6 Outcomes

### 8.6.1 Primary outcome

The primary outcome was to explore the feasibility of the intervention. Outcomes were measured by uptake and attendance of therapy and evaluation phases. An attrition rate of 25% was anticipated based on similar randomised control trials for treatment with forensic psychiatric patients (see MacInnes & Masino, 2019, for a review)<sup>7</sup>.

### 8.6.2 Secondary outcome

The secondary outcome was to examine treatment effectiveness. Each participant completed self-report questionnaires and a review of their collateral information was undertaken.

#### Self-report questionnaires

Self-report measures, outlined fully in Chapter Seven, were completed at four time points: one week before the intervention (baseline), one week after the final session of the intervention/four weeks after baseline (post), eight weeks after baseline (follow up 1), and twelve weeks after baseline (follow up 2). They included the following:

Aggression Questionnaire (AQ; Buss & Perry, 1992); Dysfunctional Beliefs and Attitudes about Sleep (DBAS-16; Morin, Vallières, & Ivers, 2007); Essen Climate Evaluation Schema (EssenCES; Schalast, Redies, Collins, Stacey, & Howells, 2008); Hostile Expectation Bias (Rule, Taylor, & Dobbs, 1987); Hostile Perception Bias (Srull & Wyer, 1979); Making Judgement Questionnaire (MJQ from the Affective, Cognitive, and Lifestyle Questionnaire; Ireland & Ireland, 2012); Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989); The Perseverative Thinking Questionnaire (PTQ; Zetsche, Ehring, & Ehlers, 2009); The Social Problem-Solving

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<sup>7</sup> This is based upon a systematic literature review of psychological and psychosocial interventions offered to forensic mental health inpatients.

Inventory –Revised: Short (SPSI-R:S; D’Zurilla & Nezu,1990); The Suicide Behaviour Questionnaire – Revised (SBQ-R, Osman, Bagge, Gutierrez, Kopper, & Barrios, 2001). The Mindfulness Attention Awareness Scale (MAAS; Brown & Ryan, 2003).

This 15-item measure is designed to assess dispositional mindfulness (i.e. the core characteristic of being attentive and aware). Participants are asked to respond to the frequency in which they experience each item on a six-point Likert scale. Example items include “I break or spill things because of carelessness, not paying attention, or thinking of something else”, “I tend not to notice feelings of physical tension or discomfort until they really grab my attention”, and “I find myself listening to someone with one ear, doing something else at the same time”. Following guidelines outlined by Black, Sussman, Johnson, and Milam (2012) one item was modified to make it applicable to high secure psychiatric patients; the item “I drive places on ‘automatic pilot’ and then wonder why I went there” was modified to “I go places on ‘automatic pilot’”. Lower scores on this measure indicate higher levels of trait mindfulness. Cronbach’s  $\alpha$  found the MAAS to be reliable ( $\alpha = .85$ ).

Participants were given the option to complete all questionnaires individually or with the researcher reading them aloud with the cue cards containing each scale. Thirty-seven (88%) of participants chose the latter.

#### Review of collateral information

Participant collateral information was reviewed. This included examining participants’ clinical observations of recorded incidents, diagnosis, and medication list. The same criteria as outlined in Chapter Seven were used for mental health diagnosis and medication. Whilst the criteria for aggressive incidents remained the same, they were limited to the four weeks prior to the first session of the sleep intervention in the first instance. Following this, incidents were recorded in the four weeks prior to each phase:

post, follow up 1 (8 weeks), and follow up 2 (12 weeks).

## **8.7 Data Analyses**

Analyses were conducted on Microsoft Excel and IBM SPSS Statistic 25. Data screening is described first, followed by attrition rates. Participant characteristics are then presented. A comparison of baseline scores in each intervention is then presented, followed by the post and follow up scores and any differences between them. Wilcoxon Signed-Rank Tests were performed to explore whether any differences between baselines to post, eight-week follow up, and 12-week follow-up intervention scores reached significant levels.

### **8.7.1 Data screening**

Missing data were identified and any data entry errors were rectified. To examine patterns of missing data, a missing value analysis was performed. Sixteen values were replaced using Expectation Maximisation (EM). Any whole measure that was not completed was excluded from the analysis. Multivariate outliers were examined using Mahalanobis Distance; no multivariate outliers were identified. The decision was made not to replace the univariate outliers due to the method of analysis employed. A cautious approach must therefore be taken when interpreting the means and standard deviations due to the potential influences of these outliers.

## **8.8 Results**

### **8.8.1 Attrition**

The original sample of patients that consented to participating in the study was 48. However, two participants<sup>8</sup> (4.2%) were withdrawn due to deterioration in mental health. Four participants (8.3%) withdrew as they did not wish to complete the baseline measures

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<sup>8</sup> The two participants removed had been allocated to Mindfulness and Treatment as Usual.

(1 Sleep Education, 3 Treatment As Usual). Following completion of the baseline measures, a further two participants (4.2%), both allocated to the mindfulness intervention, withdrew from the study without participating in the first intervention session due to one participant becoming unwell and another declining to participate. A further participant attended the first mindfulness session but became unwell prior to the second session and was therefore withdrawn from the study. Two participants in the control condition declined to participate in the post-evaluation questionnaires. This resulted in a total of 38 (81.3% of the original sample) participants who had both baseline and post-evaluation measures completed (12: 30.7% mindfulness; 15: 38.5% sleep education; 11:28.2% treatment as usual).

Regarding follow-up measures, at the first follow up one participant from each intervention (Mindfulness, Sleep Education and Treatment As Usual) declined to complete the follow-up measures. This was due to one participant being discharged from the hospital (Mindfulness) and two declining to engage further in the study. At the final follow up stage, one participant assigned to Mindfulness and one participant assigned to Treatment As Usual withdrew from the study and a further two participants (Treatment As Usual) were discharged from the hospital. This resulted in a final sample of 31 participants (10: 31% mindfulness; 14: 45.2% sleep education; 7: 22.5% treatment as usual).

To summarise, the rate of attrition from baseline to post-intervention was 7.1%, from baseline to eight-week follow-up was 14.3%, and from baseline to twelve-week follow-up was 26.2%. A flow-chart of participant recruitment is presented in Figure 8.3.



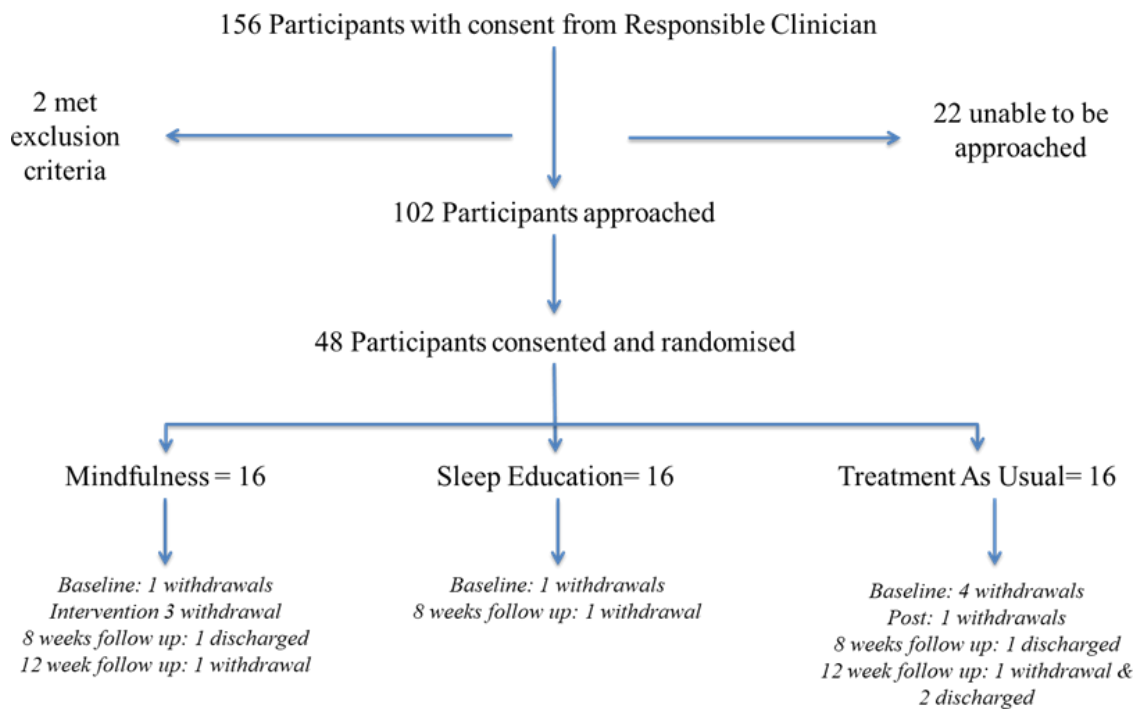


Figure 8.3: Participant recruitment

### 8.8.2 Participant characteristics

The primary diagnosis and current use of sleep promoting and sleep disrupting medication for each patient was recorded (Table 8.1). This included the 42 participants with baseline data available. No participant characteristics were collected for those who had not participated in the baseline measures. Length of admission was recorded for those with an admission time of up to five years. Eighteen of the participants had been at the hospital for five or more years, the shortest time period since admission was 140 days for one participant.

*Table 8.1: Participant Characteristics*

<b>Primary Diagnosis</b>	<b>Total N (%)</b>	<b>Mindfulness n (%)</b>	<b>Sleep Education n (%)</b>	<b>Treatment as Usual n (%)</b>
Paranoid Schizophrenia	25 (59.5)	11 (68.8)	7 (46.7)	7 (63.6)
Dissocial Personality Disorder	3 (7.1)	0	1 (6.6)	2 (18.2)
Emotionally unstable personality disorder	2 (4.8)	1 (6.3)	1 (6.6)	0
Schizoaffective Disorder (Manic Type)	2 (4.8)	0	2 (13.3)	0
Schizophrenia (unspecified)	2 (4.8)	2 (12.5)	0	0
Schizoaffective Disorder	2 (4.8)	0	1 (6.6)	1 (9.1)
Bipolar affect disorder current episode with manic psychotic symptoms	1 (2.4)	0	1 (6.6)	0
Hebephrenic Schizophrenia	1 (2.4)	1 (6.3)	0	0
Personality disorder (unspecified)	1 (2.4)	1 (6.3)	0	0
Schizoid personality disorder	1 (2.4)	0	0	1 (9.1)
Undifferentiated schizophrenia	1(2.4)	0	1 (6.6)	0
Unspecific nonorganic psychosis	1 (2.4)	0	1 (6.6)	0
<b>Sleep promoting medication</b>				
Prescribed	40 (95.2)	15 (93.8)	15 (100.0)	10 (90.9)
Not prescribed	2 (4.8)	1 (6.3)	0	1 (9.1)
<b>Sleep disrupting medication</b>				
Prescribed	33 (78.6)	13 (81.3)	10 (66.7)	10 (90.9)
Not prescribed	9 (21.4)	3 (18.8)	5 (33.3)	1 (9.1)

### 8.8.3 Treatment effectiveness

#### *Baseline differences between intervention allocations*

Kruskal-Wallis H analysis of variance were conducted to indicate whether there were any differences in sleep, aggression, and cognition scores for each condition; Mindfulness, Sleep Education, and Treatment as Usual. Significant differences were found between

groups for total aggression ( $X^2(2) = .93, p = .014$ ), hostile ( $X^2(2) = 6.96, p = .031$ ) and prosocial ( $X^2(2) = 8.99, p = .011$ ) of the Hostile Expectation Bias Questionnaire (Rule, Taylor, & Dobbs, 1987). Mann Whitney U tests were performed to determine which group differed and found that those in the Mindfulness condition reported significantly lower levels of trait aggression than those in Sleep Education ( $U = 44.50, p = .013$ ) and Treatment As Usual ( $U = 28.00, p = .011$ ). Hostile responses were significantly lower ( $U=31.500, p = .011$ ) and prosocial responses were significantly higher ( $U = 22.00, p = .002$ ) in those assigned to the Treatment As Usual condition compared to those assigned to Sleep Education.

*Frequencies of aggressive incidents at each time point*

The number of participants involved in at least one incident of aggression are presented in Table 8.2. It is noted that there were no reported incidents of physical aggression towards objects for any participant at any time point. Therefore this has not been included in Table 8.2. Given the small number of participants involved in at least one incident of aggression, change scores were not calculated.

*Table 8.2: Frequencies of aggressive incidents in each condition*

	Baseline n (%)	Post n (%)	8 weeks follow up (1) n (%)	12 weeks follow up (2) n (%)
<b>Verbal aggression</b>				
Mindfulness	2 (15.4)	0	1 (7.7)	1 (7.7)
Sleep Education	1 (6.7)	3 (20)	1 (6.7)	3 (21.4)
Treatment as usual	3 (9.1)	2 (18.2)	3 (27.3)	0
<b>Physical aggression towards others</b>				
Mindfulness	0	0	0	0
Sleep Education	0	1 (6.7)	2 (13.3)	3 (20.0)
Treatment as usual	0	0	0	0
<b>Self-harm</b>				
Mindfulness	0	1 (7.7)	0	0
Sleep Education	1 (6.7)	1 (6.7)	0	0
Treatment as usual	1 (9.1)	0	1 (9.1)	0

### *Differences in scores from baseline to each time point*

The group differences for each variable are presented at each time point (see Table 8.3). Differences in scores from baseline to post-intervention Wilcoxon Signed-Rank Tests were performed to explore the differences between baseline to post-intervention score. Those assigned to the Mindfulness intervention had significantly lower PSQI scores following the intervention than at baseline [ $z=-2.167$ ,  $p=.03$ ,  $r=.42$ ]. Participants in the Sleep Education condition also showed significant improvements [ $z=-2.613$ ,  $p = .009$ ,  $r=.49$ ]. There were no significant improvements from baseline to post- intervention scores for those assigned to the Treatment As Usual condition.

Significant differences were found for those assigned to the Mindfulness intervention for both the DBAS [ $z=-2.936$ ,  $p=.003$ ,  $r = .58$ ] and EssenCES [ $z=-2.63$ ,  $p=.009$ ,  $r=.52$ ], with scores reflecting improvements in both. Those assigned to Sleep Education also showed an increase in scores on the EssenCES from baseline to post-intervention [ $z=-2.609$ ,  $p=.009$ ,  $r=.49$ ]. No further significant differences were found from baseline to post-intervention.

### *Differences in scores from baseline to eight-week follow up*

The only significant differences found at the eight week follow up phase were for those assigned to Mindfulness. Scores on the PSQI significantly decreased at eight week follow up [ $z=-2.422$ ,  $p=.02$ ,  $r=.52$ ] and AQ (trait aggression) scores significantly decreased [ $z=-2.041$ ,  $p=.04$ ,  $r=.44$ ]. Scores on the DBAS also showed significant decrease from baseline to the eight week follow-up phase [ $z=3.066$ ,  $p=.002$ ,  $r=.65$ ]. No further significant differences were found.

Table 8.3: Reported outcomes for baseline, post, and follow up measures

Measure	Baseline	Post	Difference		Follow up (8 weeks)	Difference		Follow up (12 weeks)	Difference	
	M (SD)	M (SD)	M (SDpooled)	r	M (SD)	M (SDpooled)	r	M (SD)	M (SDpooled)	r
<b>Aggression Questionnaire</b>										
M	48.77 (13.50)	46.69 (13.66)	2.08 (-.16)	.31	41.62 (15.16)	7.15 (7.17)	.44	44.73 (12.49)	4.04 (5.17)	.22
S	67.68 (23.16)	63.39 (17.84)	4.28 (5.33)	.18	64.07(25.24)	3.61 (12.10)	.03	65.86 (23.99)	1.82 (8.82)	.01
T	70.00 (20.04)	64.73 (19.87)	5.27 (.17)	.35	63.45 (24.41)	6.55 (11.11)	.29	66.50 (24.24)	3.50 (7.79)	.12
<b>Suicide Behaviour Questionnaire</b>										
M	7.08 (3.57)	6.85 (3.26)	.23 (.31)	.26	7.42 (3.32)	-0.34 (1.72)	.00	7.64 (2.80)	-0.56 (1.32)	.14
S	8.60 (3.81)	8.00 (3.64)	.60 (.17)	.11	7.36 (3.05)	1.24 (1.72)	.08	7.43 (3.13)	1.17 (1.38)	.05
T	8.68 (4.65)	10.36 (5.28)	-1.69 (-.63)	.40	8.40 (5.50)	0.28 (2.54)	.04	7.00 (4.56)	1.68 (1.80)	.15
<b>Dysfunctional Beliefs and Attitudes about Sleep</b>										
M	86.72 (31.98)	78.08 (28.91)	8.64 (3.07)	.58	75.08 (29.44)	11.63 (15.36)	.65	74.00 (28.39)	12.72 (11.83)	.57
S	79.47 (28.55)	71.57 (28.08)	7.90 (.46)	.56	69.14 (27.78)	10.32 (14.08)	.23	66.29 (29.90)	13.18 (10.66)	.31
T	81.62 (27.40)	80.35 (27.50)	1.26 (-.10)	.09	79.90 (22.78)	1.72 (12.55)	.12	68.67 (21.82)	12.95 (9.99)	.15
<b>Essen Climate Evaluation Scale</b>										
M	31.69 (5.48)	40.92 (11.35)	-9.23 (-5.86)	.52	32.66 (5.76)	-0.97 (2.81)	.38	32.50 (5.72)	-0.81 (2.07)	.52
S	27.53 (6.75)	33.71 (6.23)	-6.18 (.52)	.07	28.86 (6.14)	-1.33 (3.22)	.16	29.86 (4.77)	-2.33 (2.49)	.24
T	29.73 (7.73)	31.45 (12.05)	-1.73 (-4.32)	.09	27.60 (5.06)	2.13 (3.20)	.09	27.33 (6.41)	2.39 (2.73)	.09
<b>Making Judgements Questionnaire (Hostile Responses)</b>										
M	3.31 (2.02)	3.69 (2.50)	-.38 (-.48)	.17	3.17 (2.08)	.14 (1.02)	.03	3.36 (2.29)	-.06 (.76)	.18
S	4.47 (1.92)	3.40 (2.03)	1.07 (-.11)	.32	3.86 (1.79)	.61 (0.93)	.25	4.00 (2.04)	.47 (.71)	.15
T	3.55 (3.11)	3.00 (2.79)	.55 (.32)	.32	2.90 (2.60)	.65 (1.43)	.30	2.67 (2.66)	.88 (1.13)	.21

M Mindfulness; S Sleep Education; T Treatment As Usual

Table 8.3 Continued

Measure	Baseline	Post	Difference		Follow up (8 weeks)	Difference		Follow up (12 weeks)	Difference	
	M (SD)	M (SD)	M (SDpooled)	r	M (SD)	M (SDpooled)	r	M (SD)	M (SDpooled)	r
<b>Making Judgements Questionnaire (Prosocial Responses)</b>										
M	6.15 (1.63)	5.77 (2.20)	.38 (-.58)	.17	6.67 (2.02)	-.51 (.91)	.23	6.45 (2.21)	-.30 (0.63)	.15
S	4.87 (1.85)	5.07 (2.66)	-.20 (-.81)	.06	5.79 (1.97)	-.92 (.95)	.24	5.64 (2.13)	-.78 (0.70)	.19
T	6.18 (3.09)	6.73 (2.83)	-.55 (.26)	.32	6.70 (2.95)	-.52 (1.51)	.21	7.00 (3.35)	-.82 (1.15)	.05
<b>Hostile Expectation Bias (Hostile Responses)</b>										
M	1.08 (.95)	.69 (.75)	.38 (.20)	.25	0.58 (0.67)	.49 (.41)	.30	.60 (.70)	.48 (.34)	.32
S	1.00 (.39)	1.00 (.39)	.00 (.00)	.48	0.79 (0.58)	.21 (.24)	.21	.50 (.52)	.50 (.16)	.40
T	0.36 (.50)	0.55 (.52)	-.18 (-.02)	.21	0.20 (0.42)	.16 (.23)	.30	.17 (.41)	.20 (.18)	.41
<b>Hostile Expectation Bias (Prosocial Responses)</b>										
M	0.92 (0.95)	1.31 (0.75)	-.38 (.20)	.25	1.33 (.78)	-0.41 (.43)	.25	1.20 (.63)	-.28 (.35)	.18
S	0.79 (0.43)	1.46 (0.52)	-.68 (-.09)	.48	1.14 (.53)	-0.36 (.24)	.27	1.43 (.51)	-.64 (.17)	.44
T	1.64 (0.50)	1.27 (0.65)	.36 (-.14)	.30	1.80 (.42)	-0.16 (.23)	.30	1.83 (.41)	-.20 (.18)	.41
<b>Hostile Perception Bias (Hostile Responses)</b>										
M	43.08 (12.20)	42.77 (12.21)	.31 (-.01)	.09	44.83 (9.52)	-1.76 (5.43)	.36	42.60 (9.47)	.48 (4.41)	.02
S	39.9 (12.31)	40.23 (11.09)	-.30 (1.22)	.05	39.93 (9.34)	0.00 (5.41)	.12	39.29 (9.42)	.65 (4.43)	.21
T	43.80 (9.24)	43.45 (8.31)	.35 (.92)	.15	43.60 (7.66)	0.20 (4.22)	.03	42.17 (8.70)	1.63 (3.36)	.32
<b>Hostile Perception Bias (Expectation Responses)</b>										
M	41.38 (8.12)	47.00 (24.19)	-5.62 (-16.07)	.12	39.75 (10.23)	1.63 (4.59)	.04	40.40 (9.19)	.98 (3.18)	.15
S	36.47 (11.31)	37.62 (9.90)	-1.15 (1.42)	.01	37.93 (9.08)	-1.46 (5.10)	.10	39.79 (8.79)	-3.32 (4.10)	.22
T	39.20 (9.69)	40.91 (8.47)	-1.71 (1.23)	.24	39.20 (7.07)	0.00 (4.19)	.10	39.83 (9.66)	-0.63 (3.47)	.31

M Mindfulness; S Sleep Education; T Treatment As Usual

Table 8.3 continued

Measure	Baseline	Post	Difference		Follow up (8 weeks)	Difference		Follow up (12 weeks)	Difference	
	M (SD)	M (SD)	M (SDpooled)	r	M (SD)	M (SDpooled)	r	M (SD)	M (SDpooled)	r
<b>Mindfulness Attention and Awareness Scale</b>										
M	54.46 (14.78)	55.77 (15.51)	-1.31 (-.73)	.04	57.67 (15.12)	-3.21 (7.47)	.14	58.82 (14.90)	-4.36 (5.56)	.32
S	48.57 (9.94)	53.93 (12.98)	-5.36 (-3.04)	.18	55.50 (13.61)	-6.93 (5.89)	.19	56.71 (13.58)	-8.14 (3.96)	.27
T	54.69 (10.81)	52.93 (11.81)	1.77 (-.99)	.38	53.20 (12.76)	1.49 (5.89)	.22	55.50 (14.73)	-0.81 (4.18)	.43
<b>Perseverative Thinking Questionnaire</b>										
M	37.77 (11.31)	33.46 (10.60)	4.31 (.71)	.31	33.67 (12.72)	4.10 (6.01)	.18	32.30 (14.28)	5.47 (4.33)	.16
S	47.47 (11.92)	45.50 (12.38)	1.97 (-.46)	.31	44.71 (12.70)	2.75 (6.15)	.27	42.86 (12.95)	4.61 (4.52)	.40
T	43.73 (13.26)	41.36 (10.14)	2.37 (3.12)	.40	40.90 (10.32)	2.83 (5.90)	.17	40.67 (12.11)	3.06 (4.79)	.08
<b>Pittsburgh Sleep Quality Index</b>										
M	8.00 (3.58)	6.69 (3.86)	1.31 (-.28)	.42	6.33 (3.60)	1.67 (1.80)	.52	7.09 (4.41)	0.91 (1.34)	.38
S	7.00 (2.90)	5.19 (2.98)	1.80 (-.08)	1.23	6.14 (2.82)	.85 (1.43)	.33	5.36 (2.50)	1.64 (1.08)	.52
T	6.73 (4.24)	8.27 (4.94)	-1.55 (-.70)	.22	6.00 (2.36)	.73 (1.65)	.06	6.83 (4.02)	-.11 (1.47)	.18
<b>Social Problem- Solving Inventory - Revised: Short form</b>										
M	12.23 (2.29)	11.47 (2.86)	.76 (-0.57)	.12	11.70 (2.72)	.53 (1.25)	.01	12.10 (3.26)	.13 (0.89)	.03
S	10.57 (3.62)	10.39 (2.86)	.18 (.76)	.01	10.13(2.55)	.44 (1.54)	.34	9.59 (2.48)	.98 (1.29)	.40
T	12.94 (2.64)	12.64 (2.88)	.30 (-.24)	.24	11.96 (2.95)	.98 (1.40)	.10	12.27 (2.24)	.67 (1.01)	.00

M Mindfulness; S Sleep Education; T Treatment As Usual

### *Differences in scores from baseline to twelve week follow up*

Again, significant differences from baseline to twelve week follow up were only found with those assigned to either Mindfulness or Sleep Education. However, only those assigned to Sleep Education showed improvements on the PSQI [ $z=-2.772$ ,  $p=.006$ ,  $r=.52$ ].

Participants in the Sleep Education intervention also showed significant differences from baseline to twelve week follow up in both hostile [ $z=-2.121$ ,  $p=.03$ ,  $r=.40$ ] and prosocial [ $z=-2.333$ ,  $p=.02$ ,  $r=.44$ ] responses to the Hostile Expectancy Bias questionnaire, with fewer hostile responses and more prosocial responses. Those assigned to Sleep Education also showed significant improvements in scores on the PTQ [ $z=-2.135$ ,  $p=.03$ ,  $r=.40$ ] and SPSI-R:S [ $z=-2.333$ ,  $p=.02$ ,  $r=.40$ ].

Individuals assigned to the Mindfulness intervention showed significant improvements on the DBAS [ $z=2.536$ ,  $p=.01$ ,  $r=.57$ ] and the EssenCES [ $z=-2.316$ ,  $p=.02$ ,  $r=.52$ ] from baseline to 12 week follow up. There were no further significant differences.

### *Summary*

Conducting a trial of Mindfulness and Sleep Education interventions showed some promising results in this feasibility study. The rate of attrition was slightly elevated at twelve-week follow up, with more than a quarter of the sample withdrawing/discharged. Both Mindfulness and Sleep Education showed improvements in sleep immediately following the intervention, with improvements seen in those assigned to Mindfulness continuing to the eight-week follow-up, and improvements in those assigned to Sleep Education at 12-week follow-up. Both interventions also showed some improvements to cognition, including dysfunctional cognitions about sleep and negative views of the social



environment. However, the only significant differences found for aggression were with those assigned to Mindfulness at the eight-week follow-up.

## **8.9 Discussion**

The primary outcome of the current study was to assess whether delivery of two sleep interventions and a comparative control was possible in a secure setting with participants with complex mental health difficulties. The secondary aim was to examine the effectiveness of each intervention in relation to improving sleep, aggression, and altering potential negative thoughts.

As identified in Chapter Two, there is increasing evidence of using mindfulness, often combined with cognitive-behavioural therapy, with the aim of improving sleep (Garland *et al.*, 2014, Wong *et al.*, 2016). Mindfulness is also increasingly being used within psychiatric settings (see Shapero, Greenberg, Pedrelli, de Jong, & Desbordes, 2018 for a review). However, to date, there has been no study comparing the use of mindfulness to improve sleep in high secure psychiatric patients. The current study highlights the potential for a larger scale mindfulness intervention study.

The findings from this feasibility trial suggest that whilst there were relatively small rates of attrition from baseline to post-evaluation, attrition rates from baseline to the later final follow up were above the expected 25%. The high rates of attrition, over a relatively short period of time (12 weeks), could be explained by several factors. Firstly, participants were required to complete a large battery of measures four times, within the 12 weeks. A larger scale study may consider applying fewer measures at the follow-up phases, monitoring only improvements to sleep at each time point.

Furthermore, those in the control condition may have discontinued their involvement as they were not benefitting from any intervention. Additionally, those who had received

either mindfulness or sleep education may have withdrawn from the study following the post-evaluation phase as they could have believed they no longer received the benefit they had from the intervention.

With regards to compliance with the therapy phases, three participants were unable to continue with the Mindfulness intervention, with two in this condition showing deterioration in mental health. In comparison, there was full compliance from all participants in the sleep education intervention. It is possible that practicing of the mindfulness techniques could have at least contributed to mental health difficulties, although mindfulness is considered associated with increasing, and not decreasing mental wellbeing (e.g. Sipe & Eisendrath, 2012). Yet, this finding may be unique to the current population and it is recommended that this is further explored to understand the potential hindering impact of mindfulness on mental health in a forensic psychiatric population. However, monitoring of mental health was not an aim of the current study. A larger scale study may wish to consider the impact of both Mindfulness and Sleep Education interventions on mental health, to determine if deterioration in mental health was a random finding.

The secondary aim was to explore the effectiveness of the Mindfulness and Sleep Education on sleep, aggression, and cognition. In line with the hypothesis that Mindfulness and Sleep Education would improve sleep, the findings indicate that both Mindfulness-based intervention and the Sleep Education intervention showed some improvements to sleep from baseline to post-intervention. These findings support previous research indicating that mindfulness can improve sleep quality (Black, Luders, Breen *et al.*, 2014; Hülshager, Feinholdt, & Nübold, 2015). Whilst there were small effect sizes, this small-scale study indicates the potential for improving sleep quality in high secure psychiatric patients. These findings are interesting as they suggest that both

cognitive and behavioural strategies alone are sufficient to improve subjective sleep quality in some participants. Yet, there may be alternative risk factors hindering improvement, suggesting a more complex relationship.

Both Mindfulness and Sleep Education interventions showed some improvements to sleep, however, only Mindfulness showed some improvements in trait aggression. Mindfulness was used to target potential maladaptive cognitions experienced by participants, however, Sleep Education also appeared to impact cognition. This indicates that there may be additional factors that Mindfulness alters that Sleep Education does not, thus leading to lower levels of trait aggression. A review (Krizan & Herlache, 2016) highlight affect and self-control as potential contributors to the sleep-aggression relationship, and these factors could also be explored in future research. Mindfulness may impact participants affect and/or ability to inhibit their impulses for aggression in ways that Sleep Education cannot. The literature certainly highlights the importance of affect and self-control on aggression (Finkenauer, Engels, & Baumeister, 2005; Situ, Li, & Dou, 2016), and recent literature also suggests that Mindfulness meditation can increase self-control by increasing the likelihood that an individual will acknowledge their own thoughts and feelings in a given situation (Elkins-Brown, Teper, & Inzlicht, 2017). This may give some indication as to the other processes that may have reduced aggression in those assigned to Mindfulness. However, it is also noted that improvements in trait aggression were only seen at the eight-week follow-up. Therefore, there may be unidentified processes that impact the ability to sustain these improvements.

Whilst it was predicted that Mindfulness-based techniques would be superior to behavioural techniques, the Sleep Education intervention was still effective in altering some cognitive components of sleep (e.g. dysfunctional beliefs about sleep). This may be due to a potential overlap in interventions. For example, participants discussed what

techniques they could apply to overcome potential worries that occur prior to sleep, in both interventions. In the Sleep Education intervention, the researcher discussed behavioural techniques, such as writing down worries, yet this may be considered closely related to the cognitive techniques applied in Cognitive Behavioural Therapy for Insomnia. However, it is noted that this is one discrete technique and many other behavioural techniques were discussed with participants during the Sleep Education Intervention. Nevertheless, participants may have found writing down their worries to be the most beneficial. This is an area that a larger scale study could perhaps explore.

Further findings from this study revealed that both Mindfulness and Sleep Education interventions reduced repetitive negative thinking in forensic psychiatric patients. With regard to the Perseverative Repetitive Thinking Questionnaire, there was no indication of the timeframe in which negative thinking occurred. Therefore, any improvements in the Sleep Education intervention may be better explained by a reduction in night-time rumination due to the observed improvements to sleep. The research certainly suggests that night-time rumination, and not day-time rumination, is associated with sleep disturbances (Lancee, Eisma, van Zanten, & Topper, 2017). Therefore, both Sleep Education and Mindfulness interventions may reduce night-time rumination, whereas Mindfulness may also be target daytime rumination. However, this is speculative and there was no measure of the time of day that participants experienced negative repetitive thoughts. Therefore, further investigation is needed to explore patterns of rumination. Continued daytime rumination would certainly fit with various cognitive models of insomnia (e.g. *The Cognitive Model of Insomnia*, Harvey, 2002).

## **8.10 Limitations**

The findings from this feasibility study highlight the potential for conducting a larger scale study investigating how Mindfulness and Sleep Education can be compared with

Treatment As Usual to improve sleep. It is not, however, without limitations. Firstly, the study is based on a small sample size and attrition rates were higher than expected. The strategy for recruitment may have limited the number of patients that were informed about the study. For example, those who did not attend the patient meetings may not have had opportunity to be informed of the study. Additionally, those who may have seen the most benefit from a sleep intervention may be those unavailable because they were spending considerable periods sleeping in the day, when recruitment and data collection occurred, and not at night.

Exploring the feasibility of the study was measured by examining attrition rates, providing numerical values for dropout rate. It did not, however, explore with patients their reasons for withdrawing from the study, aside from those who had been discharged from the hospital. Likewise, the acceptance and compliance of both the Mindfulness and Sleep Education interventions was not measured. This would have allowed for a more thorough evaluation of the interventions used, how often the participants adhered to the skills, and how beneficial they considered the interventions to be.

This study was also limited by the inability to blind participants, researchers, or the additional facilitator from the intervention. Due to the educational nature of the study, blinding was not possible to the researcher. As with other trials of nonpharmacological treatments, blinding participants and facilitators to the intervention was not feasible (Boutron, Altman, Moher, & Schulz, 2017). However, a larger scale study may certainly benefit from blinding to study conditions.

Furthermore, all participants were prescribed medication that could potentially impact their sleep in some way, either by promoting sleep or disrupting it. Medication can produce unwanted side effects that differ from individual to individual. The current study did not consider the genuine impact of medication on each participant; rather it identified

which medications may affect sleep. Examining the individual impact of medication on participants, in future studies, would help to identify whether medication, and not cognition, is interrupting sleep. A larger scale longitudinal study would be of value in this regard.

The use of objective measures of aggression, rather than relying solely on self-report, would have been a study strength. Yet, due to the small frequencies of aggression displayed over the assessment period, this is considered a limitation to the current study. One potential way of overcoming this in future research could be to extend the follow-up period to a year.

Finally, the study also did not include a screening phase, to identify those with significant disruption to sleep. It instead offered participants the opportunity to improve their sleep. Future research may take this into consideration when considering eligibility criteria.

### **8.11 Concluding comments**

The current study attempted to evaluate the feasibility of providing high secure psychiatric patients with techniques aimed at improving their sleep. Mindfulness was compared with a Sleep Education intervention and Treatment As Usual control, with attrition rates of 26.2%, indicating that a trial of this type is feasible but would require additional considerations. This includes revising the recruitment technique, considering fewer measures at follow-up time points, and monitoring the effects of medication. This provides valuable insight into how future trials within a high secure setting would explore the effects of a Mindfulness intervention on sleep. In addition, the current study also explored the effectiveness of both Mindfulness and Sleep Education on sleep, aggression, and cognition. Small improvements were noted for both interventions with regard to sleep and cognition, providing some understanding of importance of cognition to sleep quality, as highlighted in previous models (e.g. *The Cognitive Model of Insomnia*, Harvey, 2002).

The contribution of this will be discussed in the final chapter.

## CHAPTER NINE

### GENERAL DISCUSSION

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#### 9.1 Structure of the chapter

This chapter will begin by discussing the overall findings of this thesis. It will conclude by outlining a proposed model to explain the contribution of cognition to the sleep-aggression relationship, followed by the limitations of the research and recommendations for future research.

#### 9.2 Overall findings

The aim of this research was to understand the contribution of cognition to the relationship between sleep and aggression. Considering the working definition of aggression outlined in Chapter Three, the findings from the current research indicate that sleep may be an important component to an individual's expression of intentionally harming themselves or others. However, the findings have demonstrated the diversity of cognition impacting the sleep-aggression relationship. The importance of perception of sleep quality, dysfunctional beliefs and evaluation of others, and the environment, all appear relevant. However, their contribution is complex, with each influenced and influencing different types of aggression and sleep problems. The findings from the systematic literature review, and three empirical studies suggest that there may be additional factors that serve to increase aggression when sleep problems occur. These need to be explored in future research. This will be outlined later.

The findings from the current research emphasise the variation in cognition and determined that the perception of sleep quality may be a key in the sleep-aggression relationship. First highlighted in the systematic literature review, sleep perception may be more relevant to aggression than the indicators of poor sleep. Despite recent literature highlighting that insomnia may be more than a sleep disorder, and instead should be considered a cognitive appraisal disorder (Lichstein, 2017), there has been little research addressing the cognitive component of sleep. Findings from the systematic literature review revealed that those with a *perception* of poor sleep quality were less likely to prosocially attribute ambiguous situations and were more likely to be perpetrators of bullying in prison settings.



It was also determined in the current research that an individual's perception of sleep quality did, in fact, differ from the potential indicators of poor sleep in those with aggressive tendencies. The results from study one emphasised that forensic psychiatric patients recognised that their view of their sleep quality was not always dependent on their duration of sleep. This finding is novel; most measures exploring sleep quality, such as the Pittsburgh Sleep Quality Index (PSQI, Buysse, 1989), explore a range of factors to provide an overall score concerning the quality of sleep. However, quality in its essence is a subjective concept. Therefore, providing an overall score of the quality of sleep is redundant if an individual's view is not considered. It is therefore unsurprising that the perception of poor sleep is relevant to the sleep-aggression relationship.

What appears particularly important to consider is the development of a poor sleep perception. The cross-sectional study determined that a higher proportion of forensic psychiatric patients had poor sleep indicators compared to good sleepers, whereas few had subjective poor sleep. The *Integrated Model of Sleep-Interfering and Sleep-Interpreting* (Lundh and Broman, 2000) addresses the concept of sleep misperception. Whilst arguing that these two processes (sleep interfering and sleep interpreting) interact to maintain insomnia, these two processes may, in fact, be separate. Sleep processes may be subjective, with some individuals having a stronger sleep interfering process, and others having a stronger sleep interpreting process. Those with a strong sleep interpreting process may be more susceptible to poor sleep perception. Lundh and Broman (2000) argue that individuals prone to misinterpreting their sleep have distorted or dysfunctional thinking styles relevant to sleep, hold inaccurate beliefs about sleep, and attentional biases. The findings from the current study suggest that those with poor sleep indicators do not necessarily interpret their sleep to be poor. Therefore, certain cognitive processes may only be relevant to sleep interpreting processes, resulting in an increased likelihood of perceiving poor sleep quality.

The link between the perception of sleep and objective incidents of aggression was an interesting one. Findings from study three were interesting in that it revealed that with regard to recorded

incidents of self-harm, those who rated their sleep as good were more likely to have been involved in an incident of self-harm. This was contrary to the prediction that poor sleep quality would be associated with increased inward aggression. In the current study, self-harm incidents were recorded within a five-year period. Perceived sleep quality, however, was evaluated over the past month. Therefore, the findings may not reflect that good subjective sleep quality increases incidents of self-harm. Moreover, previous self-harm may predict future good sleep quality. These findings are speculative since no analysis was possible regarding the time points of aggression. It may be the case that there was an increased number of self-harm incidents within the past month, therefore preceding reported subjective sleep.

Regardless, perceptions of sleep quality appear important in the sleep-aggression relationship, which is consistent with prior research (Barker *et al.*, 2016). As noted, the findings from the current research indicate that perceptions of sleep quality differ from the actual indicators of sleep. Perceptions of sleep quality are perhaps better termed a Sleep Attribution Bias (SAB). Terming this a SAB would fit more appropriately with Lichstein (2017) terming insomnia as a cognitive appraisal disorder. However, this may not be appropriate for all individuals with insomnia. Lichstein's (2017) definition of insomnia as a cognitive appraisal disorder includes dysfunctional beliefs and attitudes about sleep, indicating that those with insomnia are more likely to believe that they need to obtain a certain amount of sleep and are more likely to take sleeping medication. The current research indicates that the short version of the Dysfunctional Beliefs and Attitudes About Sleep questionnaire (DBAS-16, Morin *et al.*, 2007) also showed some improvements when sleep quality improved, but only in those assigned to the Mindfulness condition. This may indicate that Mindfulness may be able to overcome dysfunctional cognitions to improve sleep but a Sleep Education intervention cannot. This further highlights the contribution of dysfunctional beliefs about sleep to the SAB.

Both the Mindfulness-based intervention and the Sleep Education intervention were able to improve sleep, although due to the small sample sizes and feasibility nature of the study, it is difficult

to determine whether the Mindfulness Intervention showed improvements above and beyond the Sleep Education intervention. However, what is key to note from the feasibility study, is that those assigned to Treatment As Usual did not demonstrate significant improvements to their sleep. These findings are interesting as they suggest that both cognitive and behavioural strategies alone are sufficient to improve subjective sleep quality in participants. Whilst it was predicted that mindfulness-based techniques would be superior to behavioural techniques, the Sleep Education intervention was still effective some altering the cognitive components of sleep. For example, those assigned to Sleep Education intervention were found to show significant improvements in their evaluation of the ward environment on the EssenCES. The potential explanation for this may be due to a potential overlap in interventions. For example, participants discussed what techniques they could apply to overcome potential worries that occur prior to sleep. The researcher discussed behavioural techniques, such as writing down worries, yet this may be too closely related to the cognitive techniques applied in CBT-I. It is noted that this is one discrete technique and many other behavioural techniques were discussed with participants. Yet, participants may have found this the most beneficial and this is an area that future research could perhaps explore.

In addition to dysfunctional beliefs about sleep and evaluations of the ward environment, repetitive negative thinking also appears key. Repetitive negative thinking was highlighted in three of the four studies presented within this research. The systematic literature review indicated that repetitive negative thoughts, such as rumination, worry, and hopelessness were also relevant to the sleep-aggression relationship. Rumination appeared more relevant to sleep quality than other indicators of sleep, such as sleep duration and increased outward and inward aggression. Interviews with psychiatric patients also revealed that the content of worry and rumination was diverse. It ranged from rumination about obtaining sufficient sleep to ruminating about their previous offence and their family. The content of such repetitive negative thinking could be relevant to a range of affective states (anger, depressive, anxiety), which was not specifically explored in the current research.

It is clear, from both the systematic literature review and interviews with forensic psychiatric patients, that negative affect is particularly relevant in the sleep-aggression relationship. However, it is unclear which affective states are salient in influencing this relationship. Affect is clearly key in understanding the role of rumination (Wakins, 2004). The *General Aggression Model* (Anderson & Bushman, 2002) also emphasises the interaction between present cognitive states and affect during a potentially aggressive situation and with the *Cognitive Neoassociation Model of Aggression* (Berkowitz, 1989) identifying emotion as a significant factor influencing an aggressive outcome. Therefore, negative affect may moderate the contribution of rumination on the sleep-aggression relationship, and this is something to be considered for future research.

However, findings from the feasibility study revealed that neither Mindfulness nor Sleep Education interventions showed significant reductions in repetitive negative thinking in forensic psychiatric patients. This finding is an interesting one as it does not fit with models of insomnia. For example, the *Metacognitive Model of Insomnia* (Ong *et al.*, 2012) proposed that mindfulness-based interventions reduce secondary arousal by increasing metacognitive awareness. Specifically, mindfulness should reduce rumination because the thoughts attached to it are accepted and considered non-judgementally. There are two possible explanations for the current findings. First, adopting a non-judgemental and accepting stance on repetitive thoughts may be difficult for those in the current population. The mindfulness interventions were brief, with a total of three sessions; participants were encouraged to practice these techniques out of the session. More frequent sessions may have increased the likelihood of learning acceptance. Second, participants may be of the view that rumination is positive and therefore are reluctant to use techniques that may reduce it. To understand this further, attention is directed towards the *Metacognitive Model of Depression* (Papageorgiou & Wells, 2003), which proposes that individuals who engage in depressive rumination do so as a coping strategy, which is viewed positively. Whilst either explanation is plausible, further investigation is needed and there may be additional factors relevant to how well mindfulness can be applied to decrease unwanted thoughts.

Supported by the systematic literature review and the cross-sectional study with forensic psychiatric patients, the current study supports findings that sleep may lead to aggression by reducing the likelihood of accessing prosocial scripts and schemas when in potentially aggressive situations. This is also consistent with the findings of Barker *et al.*, (2016). The results from the cross-sectional study indicated that subjective sleep quality rated as good was associated with an increase in recorded incidents of self-harm, which was contrary to expectations. However, the findings also revealed that those with good subjective sleep quality were more likely to make positive attributions to ambiguous situations. It is therefore suggested that having a positive Sleep Attribution Bias may increase positive attribution biases, which could potentially be protective for outward aggression. Fewer positive attributions and increased hostile attributions are typical in aggressive individuals (Anderson & Bushman, 2002), yet hostile responses were not associated with the sleep-aggression relationship. Given that many of the participants reported good subjective sleep quality, it is speculated that this made prosocial attributions more accessible, highlighting the potential for positive SAB to reduce aggression. Again, this should be explored in future research.

Further understanding the contribution of cognition on the sleep-aggression relationship, negative appraisals presented as a recurrent theme in the current research. This may also be relevant to the perceptions of the environment and of threats. For example, findings from the qualitative interviews with forensic psychiatric patients, noted a reported change in their behaviour. They reported becoming more aggressive, but more avoiding of others. This warranted further exploration into how they evaluated their current environment.

The inclusion of the Essen Climate Evaluation Schema in study three revealed that both improvements and recoveries in positively evaluating the ward environment were evident in those assigned to either sleep intervention. This suggests that following an improvement in both sleep indicators and subjective sleep quality, participants were more likely to positively view their current social environment. Perceptions of the social environment are key in the aggression literature (the

*General Aggression Model*, Anderson & Bushman, 2002; Hiday, 1997) and the current study extends their relevance to the sleep literature. Environmental triggers are suggested to act to increase the likelihood of aggression. For example, provocation is one such environmental factor likely to increase aggression, yet sleep problems may increase the likelihood of interpreting that they are being provoked, where those with good sleep may not interpret it in this way. Moreover, the perception of threat within the environment is also relevant, as sleep disruption can increase the perception of threat (Menz *et al.*, 2012) and the perception of threat increases aggressive tendencies. In the cross-sectional study and feasibility intervention study, the perception of threat may have been further increased by the presence of severe mental health symptoms, fitting with current understanding of violence in psychiatric patients (Hiday, 1997). The perception of threat that may have been already heightened by mental health symptoms is likely to also have interacted with the perceptions of the environment and any further neurological inputs (e.g. antisocial personality traits) (Hiday, 1997). Whilst the role of hostility was highlighted, a further understanding of additional environmental triggers may also be relevant.

As suggested, hostility is a key factor in understanding aggression and previous literature has repeatedly highlighted the potential role of hostility in the sleep-aggression relationship (Krizan & Herlache, 2016). However, the findings outlined in Chapters Seven and Eight do not support this. The measures of hostility required participants to respond to hypothetical scenarios, however, and may not necessarily represent how they would react in a true situation, but how they believe others would react. This would indicate that those with aggressive tendencies, such as those in current research, are aware of non-aggressive outcomes but may not necessarily apply these to themselves. Furthermore, the hypothetical scenarios did not include situations that participants in the current sample could perhaps easily relate to in their current setting, increasing their likelihood to choose an answer that may not necessarily reflect their own view. Therefore, further exploring the role of hostility in the current environment may be appropriate.

This thesis, overall, has highlighted the importance of cognition in the sleep-aggression relationship. Its distinct contribution to the literature is perhaps in noting the diversity of cognition that is relevant. Such cognitions include rumination, worry and hopelessness, and dysfunctional beliefs about sleep. The current findings highlight that a Sleep Attribution Bias exists and positively attributing good sleep may be protective for aggression. The role of repetitive negative thinking is also key in understanding how sleep problems are maintained but further research is needed to identify the appropriate techniques needed to improve sleep. Findings further indicated that positive sleep attributions may help to increase access to prosocial attributions, which, in turn, may also lead to more positive views of the environment, reducing aggression. Proposed next is a model outlining a theoretical understanding of the role of cognition in the sleep-aggression relationship that incorporates core findings from the current programme of research.

### **9.3 The current proposed model**

The current proposed model is influenced not only by the current findings, but also draws upon the *General Aggression Model* (Anderson & Bushman, 2002) and insomnia models such as the *Cognitive Model of Insomnia* (Harvey, 2002). However, such models do not capture upon the diversity in sleep or the range of potentially relevant cognitions, which the current research has demonstrated. Independently, insomnia models highlight dysfunctional cognitions, the role of rumination, and misperceptions of sleep but do consider a multifaceted approach to cognition. Consequently, the treatment recommendations for sleep difficulties arguably do not target all the relevant cognitions. This could explain why some individuals are treatment resistant: the cognitive factors relevant to their sleep disruption are simply not being targeted. This would also explain why Mindfulness and Sleep Education appeared to improve some cognitive factors (such as evaluations of the ward environment and dysfunctional beliefs about sleep) but not others (e.g. repetitive negative thinking). The proposed model attempts to explain how experiencing poor sleep can lead to both inward and outward aggressive thoughts, acknowledging the contribution of a range of

cognition types. It attempts to explain how cognitive errors, or unhelpful cognitive patterns, in evaluating one's sleep can contribute to an increase in aggression via two sleep pathways: experienced problems sleeping and having a negative Sleep Attribution Bias. The model also highlights a potential protective pathway, whereby cognitively intervening to reduce repetitive negative thoughts serve to increase prosocial scripts and schemas and positive views of the environment, thereby decreasing aggression.

The illustrated model is represented as a Knowledge Integration Map (KIM)<sup>9</sup>, a concept map that organises and represent connections between ideas. The KIM consists of concepts and arrows, which are each labelled to describe the relationship between variables. The proposed model, named the *Cognitive Sleep Model for Inward and Outward Aggression* (CSM-IOA) is presented in Figure 9.1.

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<sup>9</sup> A KIM includes a network of ideas and connections that are organised with labelled concepts and arrows to indicate the relationship between such ideas (Schwendimann, 2014).



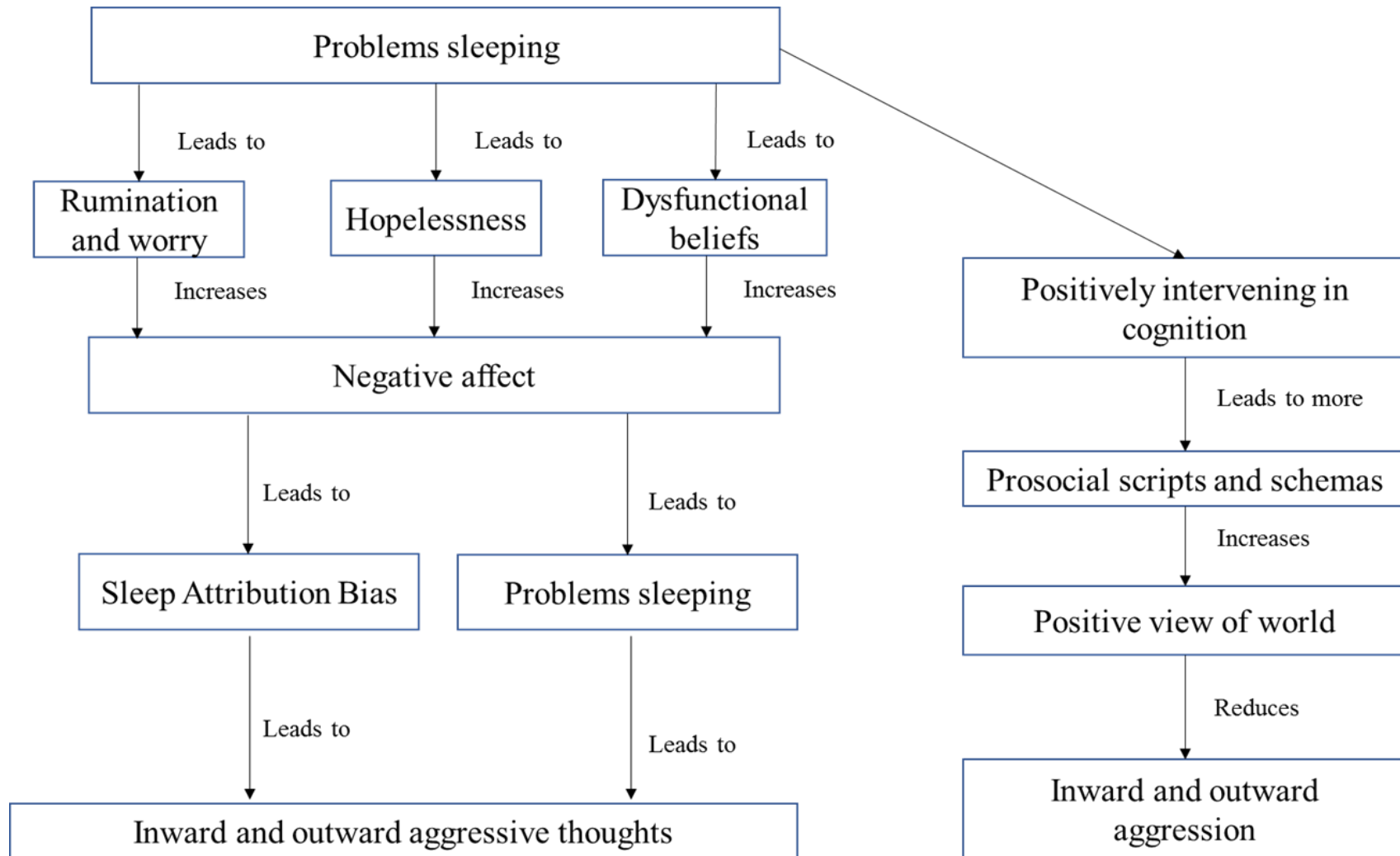


Figure 9.1: The Cognitive Sleep Model of Inward and Outward Aggression

#### **9.4 Limitations**

The current research is unique in its approach to understanding the sleep-aggression relationship. It identifies diversity in cognitive components of sleep that may be more significant to the sleep-aggression relationship than previously thought. The model, and the current research is not without its limitations, however. Each empirical study only included forensic psychiatric patients; therefore, the results may not be generalisable to other populations, particularly when the role of mental health is a factor which is known to exacerbate both sleep disruption and aggression (Anderson, 2013), and yet was not captured.

The current study was also unable to capture women due to the absence of women in high secure psychiatric services. The findings from the empirical studies can therefore not be applied to women. Arguably, women are more likely than males to experience sleep disturbances (Mallampalli, & Carter, 2014). Consequentially, understanding the contribution of cognition in the sleep-aggression relationship within a sample of women would be beneficial.

Only a small number of patients participated in the second study. Due to the small sample size and the non-parametric data, the analysis completed was not the preferred one, but was appropriate given these factors. Completing mediation analysis to understand the salient cognitive variables in the sleep-aggression relationship would determine their true influence on such, but the sample size would not allow for this. It could represent an aim for future research.

There was also no comparison of differences between wards in the current study. The high secure hospital where the research was conducted includes a variety of medium and high dependency wards, which are also separated by diagnosis (i.e. personality disorder and mental illness). Whilst primary diagnosis was controlled for in studies two and three,

study one did not account for differences in primary diagnosis. Similarly, additional data was not obtained in the current research, for example there was no information regarding previous offences. Therefore, participants' use of aggression prior to hospital admission was not accounted for. This may have found significant differences in aggression levels.

Additionally, whilst objective measures (staff recorded) of aggression were recorded, the levels of aggression over the past 12 weeks were minimal and this limited the ability to analyse such data. Future research could compare levels of objective aggression via other means, for example using risk assessment scores (e.g. HCR-20; Kamphuis et al.'s,2014). This would provide an understanding of whether more dynamic clinical indicators of violence improve when individuals are engaged in sleep interventions.

A further criticism of the current research it is reliance on the use of self-report measures. Whilst each study explored the sleep quality of patients either qualitative or quantitatively, there was not attempt to measure sleep objectively. Given that the current research highlights the importance of sleep perception, without a thorough investigation of the actual sleep experienced, it is difficult to determine whether the indicators of sleep are merely a perception. The use of the PSQI was further hindered by a poorer reliability coefficient.

The use of subjective measures for other elements within this research is also highlighted as a limitation. For example, participants' views of their trait aggression are subject to biases and impression management, decreasing the accuracy of the data collected. Perhaps including a measure of impression management in the current study may have eliminated such biases (Leary, 2011).

Whilst prior use of mindfulness techniques was recorded in study three, the adherence to both mindfulness and intervention was not recorded. The researcher encouraged participants to practice the technique outside of the sessions and discussed their use of the

techniques in subsequent sessions. However, no attempt was made to ensure that such techniques were applied. This could have been overcome by incorporating out-of-session workbooks for participants to complete, although this may have deterred patients from participating.

Furthermore, whilst the primary aim of the final study was to measure feasibility of the Mindfulness and Sleep Education trial, there were a number of factors that would be worth considering in future research that have limited the trial. Firstly, the short follow up period, which was perhaps not a sufficient amount of time to account for long term changes, could have been extended. For example, a follow up period of one year would demonstrate whether each intervention had long term benefits. Considering the offence of each participant was also a factor that could have been considered in the feasibility study. This may highlight any potential confounding factors in aggression and may have allowed for a comparison between offence type (e.g. violent versus non-violent index offence).

There were also limitations to both the Sleep Education and Mindfulness interventions used in the feasibility study. Firstly, the Sleep Education sessions, which contained some cognitive elements (e.g. writing down worries), could have diluted these elements, which would provide a better understanding of how behavioural changes alone may improve sleep. The mindfulness intervention would have also benefitted from guided practice of the techniques. For example, using a CD to encourage participants to practice mindfulness which would also increase their confidence in the techniques. Taking accurate recordings of the compliance with practice of these techniques would have also been beneficial. This would have further identified the adherence to the rules outlined in the Sleep Education and practice of Mindfulness.

With regards to the proposed model (CSM-IOA), an attempt has been made to incorporate

the specific cognitions and describe their contribution. However, there are also elements where cognition appears key but the current study was not able to capture its full contribution. For example, it is proposed that Sleep Attribution Biases lead to increased aggressive thoughts, but it is unclear how this occurs. It is emphasised that the CSM-IOA is a preliminary model and adjustments and revisions are likely. The model would certainly benefit from revision following continued research and is presented here as nothing more than provisional.

### **9.5 Directions for future research**

The current research draws upon models of sleep and aggression to propose a framework concerning the contribution of a range of cognitions in the sleep-aggression relationship. However, the current research also indicates that a number of other factors are relevant to the sleep-aggression relationship such as environmental and lifestyle factors, which are unique to a secure setting. Further exploring this contribution would be relevant. This is also likely to have implications for the interpretation of the environment, further emphasising the role of cognition.

This thesis explored dynamic factors relevant to the sleep-aggression relationship (i.e. cognition). With time and effort, cognitions can be potentially adapted and changed but there may be additional static factors that contribute to the sleep-aggression relationship and future research should consider this. Furthermore, static factors, such as personality and background may be preventing any change in cognition that could reduce sleep disruption and aggression.

Findings further suggest a possible ‘protective pathway’, indicating that positive attributions of both sleep and the environment could reduce aggressive outcomes. However, there may be further protective factors that have not been considered in the current research. Further understanding potential protective elements of the sleep-

aggression relationship are useful in considering treatment approaches.

The limitations previously outlined regarding the feasibility intervention study highlight the need for future research of sleep intervention trials in this population. Future research would benefit from accurately recording the offending history of participants to further understand how this may have impacted their sleep and their aggression. In addition, it is also suggested that future research not only consider the type of medication prescribed to each patient, but the impact that this may also have on participants. Medication was identified as disrupting or promoting sleep based on the side effects for each. However, side effects are not an accurate portrayal of how medication affects each individual. Therefore, including subjective responses of the side effects of medication would further identify the impact of medication.

Future research examining the use of sleep interventions within a psychiatric population would also benefit from recording compliance with each intervention. The current study did not attempt to formally record compliance with each intervention. Accordingly, comparison of additional treatment approaches should be addressed. It is reasonable to assume that specific cognitions can be altered and shaped by specific interventions. The current study highlighted that the Mindfulness intervention improved dysfunctional beliefs about sleep, however repetitive negative thoughts were not addressed. Treatments such as Cognitive Behavioural Therapy for Insomnia may better target repetitive negative thoughts. In considering alternative treatment options, future research should also consider assessment and tailor treatment to the outcome. Additionally, there was no attempt to blind participants or the researcher. A more comprehensive trial would, at a minimum, blind the researcher to each intervention.

Furthermore, whilst there is extensive research examining the effectiveness of Cognitive Behavioural Therapy for insomnia (e.g. Taylor & Pruiksma, 2014) and such an

intervention is considered the “Gold Standard” for sleep, there is considerably less research examining Mindfulness intervention. The Mindfulness intervention in the current research was aimed at improving sleep, but the techniques outlined were not specifically designed to be implemented at night-time. This may have impacted effectiveness. Therefore, future research should consider how Mindfulness, and indeed, Sleep Education, is specifically implemented to determine their effectiveness on sleep. Furthermore, research would also benefit from future trial of Mindfulness aimed to overcome aggressive tendencies.

Finally, the model is a preliminary model, which needs to be tested and needs to consider other populations. Additional population could include prisoners (who may have less difficulties with mental health symptoms), non-forensic psychiatric patients (who may have fewer aggressive cognitions), and the general population. Furthermore, the intervention study did not aim to test this model; instead it contributed to its development. Thoroughly testing and revising the model is important in further understanding the diversity of cognition in the sleep-aggression relationship.

## **9.6 Implications for clinical practice**

Current models of insomnia have guided clinical practice to develop interventions aimed to target insomnia. Recommendations for treatment are largely dependent on whether a patient is experiencing primary or secondary insomnia. Whilst Cognitive Behavioural Therapy for Insomnia may be recommended for individuals experiencing increased cognitive arousal, such intervention may not be beneficial for all insomnia sufferers. The current research suggests that insomnia treatment should be tailored to individual needs. For example, individuals experiencing increased night-time rumination may benefit from a mindfulness-based intervention or use of effective distraction techniques. Those who are noted to experience dysfunctional beliefs about sleep may benefit from CBT-I.

Likewise, an individual who experiences night-time disturbances due to behavioural or lifestyle factors (e.g. sleeping in a bright room), would be provided with sleep education information. Whilst multicomponent approaches have shown to be more effective than individual components (e.g. Epstein *et al.*, 2012), if individual components are well targeted to the individual, improvements may be evident.

Additionally, further understanding of the sleep-aggression relationship allows for the incorporation of sleep intervention components into aggression therapies. Some violence-focused intervention currently incorporates sleep-hygiene practices, for example Life Minus Violence- Enhanced (Ireland *et al.*, 2009) provides one session of sleep-focused information. However, further incorporating mindfulness and other cognitive techniques specifically aimed at sleep may further reduce the likelihood of violent reoffending.

Similarly, further understanding the individual sleep difficulties in offenders would be useful is forensic risk assessment. Currently, established risk assessments do not incorporate sleep difficulties, other than in reference to the presence of a mood disorder. The current research perhaps suggests that sleep could be integrated in a protective risk assessment tool (e.g. Structured Assessment of Protective Factors for violence risk, (SAPROF, de Vries Robbé, de Vogel, & de Spa, 2011), as the current findings demonstrate that perception of good sleep can increase the likelihood of making prosocial attributions which, in turn, reduces the risk of aggression.

## **9.7 Concluding comments**

The current research aimed to understand the contribution of cognition to the sleep-aggression relationship. Whilst the findings provided some insight to the complex and multifaceted role of cognition in this relationship, there is certainly more to know to fully understand the contribution. What the research has established is that cognition extends further than decreased cognitive ability following sleep disruption. A preliminary



Cognitive Sleep Model of Inward and Outward Aggression was developed and whilst this needs refining, it demonstrates the variation in the cognitive contribution to the sleep-aggression relationship. The findings from the three empirical studies indicate that sleep may contribute more to aggressive thoughts than physical displays of aggression and self-harm and future research is encouraged to explore this further. The potential for experiencing good sleep quality, specifically with regards to having a perception that good quality sleep was obtained, may be a protective factor for aggression and therefore may be useful in incorporating into forensic assessments tools. Furthermore, the current research demonstrates a unique contribution to the current literature via the development of a multifaceted cognitive model contributing to the sleep-aggression relationship.

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## **APPENDICES**

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Appendix 1: Study 1: Interview schedule (SORC)

## **SORC Functional Assessment Proforma**

(Lee-Evans, 1994: Background to Behavioural Analysis, in M. McMurrin and J. Hodge (Ed.) The Assessment of Criminal Behaviours of Clients in Secure Settings, Jessica Kingsley Publishers: London (pg 6 - 33))

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A SORC will be completed in relation to one period of insufficient sleep and one period of sufficient sleep. SORC represents an approach to gathering information designed to explore the functions of behaviour. It is based on behavioural analysis and explores the antecedents, consequences and setting conditions for behaviour.

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### **SORC interview prompts for patients.**

#### **INTERVIEWER TO READ OUT TYPE NOT IN BOLD**

##### Introduction

This interview will explore with you two different times; a time where you have felt that you did experience a good nights' sleep and a time where you felt you did not experience a good nights' sleep. We are interested in when you experience good and poor sleep and why you feel you have or haven't slept well. You can choose to describe any time you would like to, the choice is up to you. We will be asking for a summary of:

- Anything that happened before you experienced good/poor sleep
- Anything that you did during the time when you could/couldn't get to sleep to help you get to sleep
- How you felt and behaved after experiencing good/poor sleep
- Why you think that you had experienced good/poor sleep.

It is hoped that this will provide some useful information on why poor sleep is experienced and why sufficient sleep is experienced. We also want to know how they affected you the following day.

If you feel that you do not want to discuss something, please just say. You do not have to give a reason. You can also end this interview at any time, again you do not have to give a reason. Also, you do not have to answer all questions put to you, you can choose not to answer some questions and this is fine.

#### **INTERVIEWER TO SHOW PATIENTS WHAT A BLANK SORC PROFORMA LOOKS LIKE AND TO BRIEFLY TALK THROUGH EACH SECTION**

This interview will go through with you each section to gather some information about when you have experienced good and poor sleep. You can decide what to talk about first; a period of good sleep or a period of poor sleep.

#### **INTERVIEWER TO PROCEED WITH PARTICIPANT'S CHOICE**

## **Completing the SORC proforma – PERIOD OF GOOD SLEEP**

### **INTERVIEWER TO COMMENCE WITH ‘BEHAVIOR’ SECTION**

We will start by looking at the behaviour.

**INTERVIEWER TO COVER THESE AREAS:**

- **What does a period of good sleep mean to you?**
- **How long did you sleep for?**
- **How would you describe the quality of sleep?**

### **INTERVIEWER TO EXAMINE “SETTING CONDITION” SECTION**

We will now explore what you think happened before this period of good sleep.

**INTERVIEWER TO COVER THESE AREAS:**

- **What happened immediately before you went to bed?**
- **Did you do anything in bed?**
- **How long were you in bed before you went to sleep?**
- **What were you thinking immediately before you went to sleep?**
- **How were you feeling immediately before you went to sleep?**
- **Did you go to sleep hungry/too full?**
- **What type of mood were you in?**
- **Had you done any exercise that day?**

### **INTERVIEWER TO EXAMINE “CONSEQUENCES” SECTION**

We will now explore what you think happened the next morning after a period of good sleep.

**INTERVIEWER TO COVER THESE AREAS:**

- **How did you feel immediately after you woke up?**
- **How did you feel sometime later?**
- **What thoughts did you have immediately after you woke up?**
- **What thoughts did you have sometime later?**
- **How did you behave immediately after you woke up?**
- **How did you behave sometime later?**
- **How did you feel sometime later?**
- **How did you view others immediately after you woke up?**
- **How did you view others sometime later?**

### **INTERVIEWER TO EXAMINE “ORGANISM VARIABLES” SECTION**

We will now explore what you think contributed to this period of good sleep

**INTERVIEWER TO COVER THESE AREAS:**

- **What environmental factors made it easier for you to sleep?**
- **What thoughts and feeling do you think made it easier for you to sleep?**
- **What made it ‘okay’ to deal with the situation in this way?**



## **Completing the SORC proforma – PERIOD OF POOR SLEEP**

### **INTERVIEWER TO COMMENCE WITH ‘BEHAVIOR’ SECTION**

We will start by looking at the behaviour.

#### **INTERVIEWER TO COVER THESE AREAS:**

- **What does a period of POOR sleep mean to you?**
- **How long did you sleep for?**
- **How would you describe the quality of sleep?**

### **INTERVIEWER TO EXAMINE “SETTING CONDITION” SECTION**

We will now explore what you think happened before this period of poor sleep.

#### **INTERVIEWER TO COVER THESE AREAS:**

- **What happened immediately before you went to bed?**
- **Did you do anything in bed?**
- **How long were you in bed before you went to sleep?**
- **What were you thinking immediately before you went to sleep?**
- **How were you feeling immediately before you went to sleep?**
- **Did you go to sleep hungry/too full?**
- **What type of mood were you in?**
- **Had you done any exercise that day?**

### **INTERVIEWER TO EXAMINE “CONSEQUENCES” SECTION**

We will now explore what you think happened the next morning after a period of poor sleep.

#### **INTERVIEWER TO COVER THESE AREAS:**

- **How did you feel immediately after you woke up?**
- **How did you feel sometime later?**
- **What thoughts did you have immediately after you woke up?**
- **What thoughts did you have sometime later?**
- **How did you behave immediately after you woke up?**
- **How did you behave sometime later?**
- **How did you feel sometime later?**
- **How did you view others immediately after you woke up?**
- **How did you view others sometime later?**

### **INTERVIEWER TO EXAMINE “ORGANISM VARIABLES” SECTION**

We will now explore what you think contributed to this period of poor sleep

#### **INTERVIEWER TO COVER THESE AREAS:**

- **What environmental factors made it harder for you to sleep?**
- **What thoughts and feeling do you think made it harder for you to sleep?**

## INTERVIEWER TO EXAMINE AGGRESSIVE BEHAVIOUR

The researcher would like to ask you a few questions to briefly explore your aggressive behaviour.

- **Would you describe yourself as a verbally aggressive person? i.e. do you insult others verbally, shout at others, threaten others?**
- **Would you describe yourself as physically aggressive to objects? i.e. breaking objects, kicking objects**
- **Would you describe yourself as a physically aggressive person? i.e. do you hit, slap, punch, kick others?**
- **Have you ever deliberately hurt yourself? i.e. cut, severely scratched, burned, swallowed dangerous substances or objects, on purpose?**

### Ending the interview

Thank you for taking the time to discuss this with me. Is there anything that you would like to add?

**INTERVIEWER TO CONCLUDE THE INTERVIEW BY ASKING THE PATIENT ABOUT GENERAL ISSUES TO DISTRACT FROM THE CONTENT OF THE INTERVIEW E.G. WHAT ARE THEIR PLANS FOR THE REST OF THE DAY, WHAT WORKSHOPS ARE THEY ATTENDING AT THE MOMENT ETC.**

## **ANTECEDENTS**

What did you do before  
you went to bed?

## **BEHAVIOUR**

How do you sleep?

## **CONSEQUENCES**

What happened the next  
morning?

## **ORGANISM VARIABLES**

What do you think  
contributed to how you  
slept?

## Appendix 2: Study 1: Research information sheets and consent forms

**Research Title: Sleep and aggression: understanding and intervening – Study 1a**  
**Interviews**  
**Responsible Clinician (RC) Information Sheet**

**Introduction**

The proposed study aims to evaluate the role of cognitions associated with sleep disturbances and increased aggression in forensic patients. This will involve interviewing patients about their sleep using a functional assessment (SORC, Lee- Evans, 1994). The SORC will serve as a guide to explore the antecedents (what they do the night before they sleep), consequences (how they feel after they have slept) and setting conditions (personal and environmental factors that contributed to their sleep). Patients will also be asked briefly about their aggression towards others and deliberate self-harm. These questions will give an insight into the impact of sleep on their behaviour. Those who agree to participate will be asked to attend one interview which is expected to last approximately 45 minutes.

**What am I being asked to consent to?**

**You are being asked to give your consent for the researcher (Leah Greenwood) to approach a patient to ask for their consent to complete an interview. The researcher will interview them about their sleep and briefly about their aggressive behaviour.**

**Who is doing the research?**

A PhD student and Stage II BPS Forensic Psychologist in Training, Leah Greenwood (University of Central Lancashire, Mersey Care NHS Trust honorary contract) will complete the research, including all interviews. This research will contribute to Leah's PhD thesis and Stage II BPS Forensic Psychologist qualification.

**Who is supervising the research?**

This research will be completed under the supervision of Professor Jane L. Ireland (University of Central Lancashire and Psychological Services, Ashworth Hospital) and Professor Janice Abbott (University of Central Lancashire).

**Risks and Benefits**

During the interview, patients will be asked about possible engagement in aggressive and self-injurious behaviour which they may find distressing. Patients will be advised to inform the researcher immediately if they experience any distress and the interview will be stopped. Additionally, patients may benefit from participating in this study as they gain insight into their own sleeping patterns and behaviour.

**Anonymity**

All patients who take part will be given a 'research number' which will appear on all information to replace their name. Only the researcher will know which number matches to which name, a key will be used to store this information and it will be destroyed on completion of the study. The information collected is purely for research purposes. Patients will not be identified in any formal write up of the results, it is totally anonymous.

## **Exceptions to anonymity**

Information provided by patients during the consent or data collection process may be disclosed to staff if it includes anything indicating a threat to themselves or others. For example, if they report information about a previously unreported crime, about a possible or future crime or if they report an active intent to self-harm. In these instances this information will be disclosed to staff. No information will be disclosed to other patients.

## **Security of information obtained**

Any identifying information will be kept securely on site in a locked filing cabinet. Once this information is anonymised, it will be held on the university system which is password protected. Mersey Care NHS Trust or Research Ethics Committee – North West-Preston may audit the information that we hold (e.g. checking that the researcher has written consent from everyone who has agreed to take part), but this is focused on protecting research participant and checking that researcher have completed everything that they have agreed to.

## **Further information**

Further information on this study can be obtained at any time from the following.

### **Researcher**

Leah Greenwood. PhD Student Department of Psychology, University of Central Lancashire and & Stage II BPS Forensic Psychologist in Training; Ashworth Research Centre, North Admin, Ashworth Hospital, Parkbourn, Maghull. Tel: (0151) 472 2618 Email [leah.greenwood@merseycare.nhs.uk](mailto:leah.greenwood@merseycare.nhs.uk)

### **Supervisors**

Professor Jane L. Ireland, Chartered Forensic Psychologist, Professor in Forensic Aggression, Department of Psychology, University of Central Lancashire, Preston; and Violence Treatment Lead, Psychological Services, Ashworth Hospital, Parkbourn, Maghull Tel: (0151) 472 4525; Email [jane.ireland@merseycare.nhs.uk](mailto:jane.ireland@merseycare.nhs.uk)

Professor Janice Abbott, Chartered Psychologist, Professor of Psychology, Department of Psychology, University of Central Lancashire, Preston. Email [jabbott@uclan.ac.uk](mailto:jabbott@uclan.ac.uk)

If you wish to contact someone independent of the research regarding this study, please contact the University Officer for

Ethics:OfficerForEthics@uclan.ac.uk. Please remember this is not an NHS email and so do not forward anything that is confidential.

**RESEARCH CONSENT FORM (PATIENT'S RC: RESEARCHER'S COPY)**

**PATIENT NAME: \_\_\_\_\_ HOSP NO: \_\_\_\_\_**  
**RESEARCH TITLE: SLEEP AND AGGRESSION: UNDERSTANDING  
AND INTERVENING – STUDY 1A**  
**Researcher: Leah Greenwood**  
**Supervisors: Professor Jane L. Ireland & Professor Janice Abbott**

I.....RC to .....,  
hereby give my approval to the involvement of the above-named patient in the research  
projected conducted by **Leah Greenwood (University of Central Lancashire and  
Ashworth Research Centre – Mersey Care NHS Trust)**.

**I have received a written explanation of the study and** I am also satisfied that the  
participant is capable of giving his consent for his involvement in the study.

Signed .....

Date.....

**Research Title: Sleep and aggression: understanding and intervening – Study 1a**  
**Interviews Patient Information Sheet**

**Introduction**

The current research study is interested in exploring how well you sleep and what factors might be helping or hindering your sleep. You are being asked to take part in this research which will involve you attending one interview which will last approximately 45 minutes. During this interview the researcher will ask you to describe a time where you have slept well and a time when you have not slept very well. You will also be asked some short questions about your aggression and any deliberate self-harm.

Please note that you do not have to engage in this research – the decision to do this is completely up to you. You do not have to decide right now; you will be given at least one week to make a decision. If you choose to take part, all personal information will be made anonymous and you will not be identified.

**What am I being asked to consent to?**

**You are being asked to consent to take part in an interview about your sleep which will last approximately 45 minutes. This researcher will ask you questions about when you have slept well and when you have not slept well. You will also be asked about your aggression and deliberate self-harm.**

**Who is doing the research?**

A PhD student and stage II BPS Forensic Psychologist in Training, Leah Greenwood (University of Central Lancashire, Mersey Care NHS Trust honorary contract) will complete the research, including all interviews. This research will contribute to Leah's PhD thesis and stage II BPS Forensic Psychologist qualification.

**Who is supervising the research?**

This research will be completed under the supervision of Professor Jane L. Ireland (University of Central Lancashire and Psychological Services, Ashworth Hospital) and Professor Janice Abbott (University of Central Lancashire).

**Risks and Benefits**

During the interview, you will be asked about possible engagement in aggressive and self-injurious behaviour and this may be distressing. If you experience any distress, please tell the researcher immediately and the interview will be stopped. You are also likely to benefit from this research as it may give you an insight into your own sleeping patterns and behaviour.

**Consenting to take part**

You do not have to take part in this study. If you do agree to take part and you then change your mind, please could you inform the researcher before the end of the interview so that



we can make sure that we take you out of the sample? The information that you provide will be anonymised and it will not be possible for us to locate you after the interview is completed.

You do not have to agree now. The researcher will agree a time with you to come back and speak to you should you decide that you are thinking about taking part.

### **Anonymity**

Any notes made will be completely anonymous. Everyone who takes part will be given a 'research number' which will appear on the information that we collect instead of your name. A key will then be used so only the researcher will know which number matches to which name. This key will be destroyed once the research is completed to completely protect your identity. You will not be identified in any formal write up of the results, it is totally anonymous.

### **Expectations to anonymity**

Information provided by you during the consent or data collection process may be disclosed to staff if it includes anything indicating a threat to yourself or others. For example, if you report information about a previously unreported crime, about a possible or future crime or if you report an active intent to self-harm. In these instances, this information will be disclosed to staff. No information will be disclosed to other patients.

### **Security of information obtained**

Any identifying information will be kept securely on site in a locked filing cabinet. Once this information is anonymised, it will be held on the university system which is password protected. Mersey Care NHS Trust or the Research Ethics Committee – North West-Preston may audit the information that we hold (e.g. checking that the researcher has written consent from everyone who has agreed to take part), but this is focused on protecting research participants and checking that the researcher has completed everything that they have agreed to.

### **Further information**

Further information on this study can be obtained at any time from the following

#### **Researcher**

Leah Greenwood. PhD Student Department of Psychology, University of Central Lancashire and & Stage II BPS Forensic Psychologist in Training; Ashworth Research Centre, North Admin, Ashworth Hospital, Parkbourn, Maghull. Tel: (0151) 472 2618 Email [leah.greenwood@merseycare.nhs.uk](mailto:leah.greenwood@merseycare.nhs.uk)

#### **Supervisors**

Professor Jane L. Ireland, Chartered Forensic Psychologist, Professor in Forensic Aggression, Department of Psychology, University of Central Lancashire, Preston; and Violence Treatment Lead, Psychological Services, Ashworth Hospital, Parkbourn, Maghull Tel: (0151) 472 4525; Email [jane.ireland@merseycare.nhs.uk](mailto:jane.ireland@merseycare.nhs.uk)

Professor Janice Abbott, Chartered Psychologist, Professor of Psychology, Department of Psychology, University of Central Lancashire, Preston. Email [jabbott@uclan.ac.uk](mailto:jabbott@uclan.ac.uk)

**RESEARCH CONSENT FORM (PATIENTS: RESEARCHER'S COPY)**

**PATIENT NAME: \_\_\_\_\_ HOSP NO: \_\_\_\_\_**  
**RESEARCH TITLE: SLEEP AND AGGRESSION: UNDERSTANDING AND INTERVENING – STUDY 1A**  
**Researcher: Leah Greenwood**  
**Supervisors: Professor Jane L. Ireland & Professor Janice Abbott**

I have read and understood the information sheet dated 4th October 2016 for the above study and have had the opportunity to ask questions. I also understand that I do not have to agree immediately, but I can consider the information that I have received and ask the researcher to come and see me at a later date.

..... (Patients initial)

I understand that my participation is voluntary and that I am free to withdraw up until the end of the interview, without giving any reason, without my medical care or legal rights being affected.

..... (Patients initial)

I understand that no personal information obtained during the course of the study relating to myself, will be disclosed to other patients.

..... (Patients initial)

I understand that direct quotes may be used in the write up of this study; however, I also understand that these quotes will be anonymised and no identifying information regarding myself or any other individual will be included.

..... (Patients initial)

I understand that all information relating to myself obtained as part of this study will remain anonymous to everyone other than the researcher, and that I will not be personally identified in the final report of the study. However, I understand that if I report information indicating a threat to myself or others e.g. if I disclose a previously unreported crime, possible or future crime or intent to self-harm, then this information will be disclosed to the appropriate personnel.

..... (Patients initial)

I understand that this consent form may be seen by responsible individuals from Mersey Care NHS Trust for the purposes of monitoring research procedures. I understand that this is for audit purposes only to ensure that my consent has been sought.

..... (Patients initial)

I understand that relevant sections of my medical notes and data collected in the study may be looked at by regulatory authorities or by persons from the Trust where it is relevant to my taking part in this study. I give permission for these individuals to have access to this information

..... (Patients initial)

I.....agree to be involved in the study carried out by **Leah Greenwood (University of Central Lancashire and Ashworth Research Centre – Mersey Care NHS Trust)** and I am satisfied that the purpose and procedure of the study have been fully explained to me by **Leah Greenwood**.

Signed ..... (patient)      Date .....

Signed ..... (researcher)      Date .....

## Appendix 3: Study 2 & 3: Self Report Questionnaires<sup>10</sup>

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<sup>10</sup> The Social Problem Solving Inventory (*D'Zurilla & Nezu, 1990*) has not been included due to copyright restrictions.

## Patient Questionnaire Pack

### Contents

- PSQI
- AQ
- SBQ-R
- ACL-H
- HEB
- HPB
- PTQ
- DBAS-16
- MAAS
- ESSEN CES

**PSQI**

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

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

**For each of the remaining questions, check the one best response. Please answer all questions using the following scale.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>Not during the past month</b>	<b>Less than once a week</b>	<b>Once or twice a week</b>	<b>Three or more times a week</b>

5. During the past month, how often have you had trouble sleeping because you...					
a)	...cannot get to sleep within 30 minutes	1	2	3	4
b)	...wake up in the middle of the night or early morning	1	2	3	4
c)	...have to get up to use the bathroom	1	2	3	4
d)	...cannot breathe comfortably	1	2	3	4
e)	...cough or snore loudly	1	2	3	4
f)	...feel too cold	1	2	3	4
g)	...feel too hot	1	2	3	4
h)	...had bad dreams	1	2	3	4
i)	...have pain	1	2	3	4
j)	Other reason(s) please describe				
	How often during the past month have you had trouble sleeping because of this?	1	2	3	4

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 to help you sleep?	Not during the past month	Less than once a week	Once or twice a week	3+ times a week
8.	During the past month, how often have you had trouble staying awake while eating meals or engaging in social activity?	Not during the past month	Less than once a week	Once or twice a week	3+ 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?	Not a problem at all	Only a very slight problem	Somewhat of a problem	A very big problem

AQ						
Below are a number of statements about how people might behave. You are asked to rate yourself in relation to each one according to the following scale:						
	1	2	3	4	5	
	Never/hardly ever applies to me	Usually does not apply to me	Sometimes applies to me	Often applies to me	Very often applies to me	

1.	I get into fights a little more than the average person	1	2	3	4	5
2.	There are people who push me so far that we have come to blows	1	2	3	4	5
3.	Sometimes I fly off the handle for no good reason	1	2	3	4	5
4.	I can think of no good reason for ever hitting a person	1	2	3	4	5
5.	I often find myself disagreeing with people	1	2	3	4	5
6.	Some of my friends think I'm a hothead	1	2	3	4	5
7.	Given enough provocation, I may hit another person	1	2	3	4	5
8.	I am sometimes eaten up with jealousy	1	2	3	4	5
9.	I have threatened people I know	1	2	3	4	5
10.	When people are especially nice, I wonder what they want	1	2	3	4	5
11.	When people annoy me, I may tell them what I think of them	1	2	3	4	5
12.	I am suspicious of overly friendly strangers	1	2	3	4	5
13.	Other people always seem to get the breaks	1	2	3	4	5
14.	I flare up quickly but get over it quickly	1	2	3	4	5
15.	If I have to resort to violence to protect my rights, I will	1	2	3	4	5
16.	I wonder why I feel so bitter about things	1	2	3	4	5
17.	I sometimes feel like a powder keg ready to explode	1	2	3	4	5
18.	I know that friends talk about me behind my back	1	2	3	4	5
19.	I am an even-tempered person	1	2	3	4	5
20.	I tell my friends openly when I disagree with them	1	2	3	4	5
21.	When frustrated I let my irritation show	1	2	3	4	5
22.	I have trouble controlling my temper	1	2	3	4	5
23.	I can't help getting into arguments when people disagree with me	1	2	3	4	5
24.	At times I feel I have gotten a raw deal out of life	1	2	3	4	5
25.	I sometimes feel that people are laughing at me behind my back	1	2	3	4	5
26.	Once in a while I can't control the urge to strike another person	1	2	3	4	5
27.	I have become so mad that I have broken things	1	2	3	4	5
28.	My friends say I'm somewhat argumentative	1	2	3	4	5
29.	If somebody hits me, I hit back	1	2	3	4	5

ACL-H

You are going to read through some scenarios involving interesting situations for you to think about. Your aim is to choose one response from a selection of options. You have one minute per scenario and I will tell you when your time is up.

1.) Jessica usually hands her homework in on time. Her first classes are biology, chemistry and history and she always hands this work in on time without fail. However, she always hands in her English homework late. What is the most likely reason why she does this?	A. Jessica is a member of the netball team.
	B. Jessica does not like her English teacher so she must be showing she does not care about their class.
	C. Jessica is in her third year at high school.
	D. Her English class is the last one and so she leaves the homework until last.
2.) Samuel is very friendly. He works in a small office with five other employees. He always buys coffee for them on a Monday morning. This Monday he only buys four coffees. What is the most likely reason why he does this?	A. One of the employees has been horrible to him and by not buying them coffee he is showing the others how awful this employee is.
	B. Samuel is wearing a new jumper.
	C. One of the employees has given up caffeine for a week and Samuel is trying to help them with this.
	D. The office is right next to the canteen.
3.) Katie is trying to diet and is on her third diet in the past 12 months. She desperately wants to lose weight. She has had a good week and lost 4 pounds. Her friend, Leanne, usually tries to support her and also struggles with her own weight. Leanne buys Katie a large cake, it is Katie's favourite cake. What is the most likely reason why Leanne does this?	A. Katie is saving up for a new dress.
	B. Leanne is proud of Katie's achievement and thinks she should celebrate it.
	C. Leanne and Katie live near one another.
	D. Leanne is jealous of Katie's achievement and wants her to put the weight back on
4.) Terry has been unemployed for 12 months. His lodger, Philip, has been unemployed for 3 months. They both apply for the same job but only Terry gets an interview. Terry's job application was better than Philip's, Philip only did his at the last minute and he rushed it. Philip offers to drive Terry to the interview but on the way there runs out of petrol. What is the most likely reason why this has happened?	A. Philip is disorganised and this is just typical of him.
	B. Philip is jealous of Terry and has done this deliberately.
	C. Philip and Terry have lived together for two years.
	D. Philip and Terry both work in the same industry.



6.) Kelly has just bought a new car. It is a top of the range model. She has been constantly showing off to her work colleagues about it. This has been irritating them, particularly Keith who does not like Kelly anyway. The following day Kelly works late, when everyone else has gone home. Kelly gets into her car and sees a scratch on her car door. What is the most likely reason why this has happened?	A.	Kelly works late most nights.
	B.	Keith has done it to get back at Kelly.
	C.	It will just be an accident, Kelly will have parked too close to another car.
	D.	Kelly needs to work harder so she does not have to work late.
7.) Luke and Penny have been together for about 6 months. Luke really likes Penny. However, this night Luke says something negative about what Penny is wearing. He does not really mean it. Later, when Penny goes home at 11pm, Luke feels bad about what he has said and so texts Penny goodnight and to say he is sorry. He does not get a text back from Penny. What is the most likely reason why Penny does not text back?	A.	Penny will have gone to bed and turned her phone off.
	B.	Penny and Luke will move in together in about 12 months.
	C.	Luke does not have any brothers or sisters but Penny has two brothers.
	D.	Penny is upset at what Luke has said and so does not text back to teach him a lesson.
8.) Patrick lives in a block of flats. His neighbour, Heather, has a pet dog. The dog has been barking for 20 minutes. Patrick knocks on Heather's door and tells her that the noise is disturbing him and can she keep the dog quiet. Heather tells him that there is not much she can do as the dog is only young. The dog continues to bark. Patrick puts his music on really loud and this can be heard clearly in Heather's flat. What is the most likely reason why he does this?	A.	The dog is a Scottish Terrier.
	B.	Patrick is trying to drown out the noise of the dog barking.
	C.	Patrick is trying to make Heather feel uncomfortable to 'get back at her'.
	D.	Heather wants to get a cat.
9.) Angela tells her teenage son, Thomas, that he has to tidy his room. Thomas does not want to as he is just about to go out with his friends and his mother knows this. His mother tells him that he has to at least tidy up his clothes off the floor before he goes out. Thomas does this but he is not happy about it as it means he is going to be 30 minutes late in meeting his friends. He hates his mother asking him to tidy his room. His mother then tells him that he has to be home for tea by 5.00pm which Thomas thinks is too early. Thomas gets home for 5.30pm. What is the most likely reason why Thomas comes home late?	A.	Thomas thinks he deserved to spend more time with his friends and he is showing his mother how unreasonable she was being.
	B.	His mother likes to cook his tea.
	C.	Thomas is just disorganised and being a typical teenager.
	D.	Thomas is saving up for a car.
10.) Wayne and Lynn plan to go and see Lynn's parents this weekend. Wayne has to go into work this weekend as well. He is feeling quite stressed at trying to fit everything in. He also does not really get on with Lynn's parents as he thinks they are very critical of him. Lynn rings Wayne at work and tells him they have to leave at 4.00pm to get to their parents in time for tea. Wayne does not get home until 4.45pm. What is the most likely reason why Wayne is late home?	A.	Wayne is stressed and just could not get away from work in time.
	B.	Wayne really does not want to go to Lynn's parents and is trying to communicate this to Lynn.
	C.	Wayne and Lynn are celebrating their anniversary next month.
	D.	It is Lynn's turn to buy the food shopping this week.

Carefully read the following paragraphs and write what you think would happen next in the space below.  
Please answer these questions based on how you are feeling today.

The Car Accident

Todd was on his way home from work one evening when he had to brake quickly for a yellow light. The person in the car behind him must have thought Todd was going to run the light because he crashed into the back of Todd's car, causing a lot of damage to both vehicles. Fortunately, there were no injuries. Todd got out of his car and surveyed the damage. He then walked over to the other car.

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Going to a Restaurant

Jane had worked hard all day long, cleaning her apartment. She was tired but decided to reward herself with a meal in one of the restaurants down the street. Upon entering the restaurant, she was seated in a comfortable chair and given a menu. After reading it over, Jane decided upon a Caesar salad, French onion soup, and a steak. Some 15 minutes later, a waiter came around to take her order. Time slowly passed and Jane was getting hungrier and hungrier. Finally, about 45 minutes after her order had been taken, Jane was about to leave when she saw the waiter approaching with her food

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**HPB**

**Please read the following and you will be asked about the personality traits of the character.**

I ran into my old acquaintance Donald the other day, and I decided to go over and visit him, since by coincidence we took our vacations at the same time. Soon after I arrived, a salesman knocked at the door, but Donald refused to let him enter. He also told me that he was refusing to pay his rent until the landlord repaints his apartment. We talked for a while, had lunch, and then went out for a ride. We used my car, since Donald's car had broken down that morning, and he told the garage mechanic that he would have to go somewhere else if he couldn't fix his car that same day. We went to the park for about an hour and then stopped at a hardware store. I was sort of preoccupied, but Donald bought some small gadget, and then I heard him demand his money back from the sales clerk. I couldn't find what I was looking for, so we left and walked a few blocks to another store. The Red Cross had set up a stand by the door and asked us to donate blood. Donald lied by saying he had diabetes and therefore could not give blood. It's funny that I hadn't noticed it before, but when we got to the store, we found that it had gone out of business. It was getting kind of late, so I took Donald to pick up his car and we agreed to meet again as soon as possible.

**Using the following scale, rate Donald from**

**1 ("not at all") to 10 ("extremely")**

**on the following personality traits. Please answer these questions based on how you are feeling today.**

1. Hostile	1	2	3	4	5	6	7	8	9	10
2. Unfriendly	1	2	3	4	5	6	7	8	9	10
3. Dislikeable	1	2	3	4	5	6	7	8	9	10
4. Kind	1	2	3	4	5	6	7	8	9	10
5. Considerate	1	2	3	4	5	6	7	8	9	10
6. Thoughtful	1	2	3	4	5	6	7	8	9	10
7. Boring	1	2	3	4	5	6	7	8	9	10
8. Selfish	1	2	3	4	5	6	7	8	9	10
9. Narrow-minded	1	2	3	4	5	6	7	8	9	10
10. Dependable	1	2	3	4	5	6	7	8	9	10
11. Interesting	1	2	3	4	5	6	7	8	9	10
12. Intelligent	1	2	3	4	5	6	7	8	9	10

## PTQ

In this questionnaire, you will be asked to describe how you typically think about negative experiences or problems. Please read the following statements and rate the extent to which they apply to you when you think about negative experiences or problems.

	1	2	3	4	5
	Never	Rarely	Sometimes	Often	Always

1.	The same thoughts keep going through my mind again and again.	1	2	3	4	5
2.	Thoughts intrude into my mind.	1	2	3	4	5
3.	I can't stop dwelling on them.	1	2	3	4	5
4.	I think about many problems without solving any of them.	1	2	3	4	5
5.	I can't do anything else while thinking about my problems.	1	2	3	4	5
6.	My thoughts repeat themselves.	1	2	3	4	5
7.	Thoughts come to my mind without me wanting them to.	1	2	3	4	5
8.	I get stuck on certain issues and can't move on.	1	2	3	4	5
9.	I keep asking myself questions without finding an answer.	1	2	3	4	5
10.	My thoughts prevent me from focusing on other things.	1	2	3	4	5
11.	I keep thinking about the same issue all the time.	1	2	3	4	5
12.	Thoughts just pop into my mind.	1	2	3	4	5
13.	I feel driven to continue dwelling on the same issue.	1	2	3	4	5
14.	My thoughts are not much help to me.	1	2	3	4	5
15.	My thoughts take up all my attention.	1	2	3	4	5

**DBAS-16**

**Several statements reflecting people's beliefs and attitudes about sleep are listed below. Please indicate (by circling the number) to what extent you personally agree or disagree with each statement. There is no right or wrong answer. For each statement, circle a number that best reflects your personal experience. Consider the whole scale, rather than only the extremes of the continuum.**

	1	2	3	4	5	6	7	8	9	10
	Strongly disagree									Strongly agree
I need 8 hours of sleep to feel refreshed and function well during the day	1	2	3	4	5	6	7	8	9	10
When I do not get a proper amount of sleep on a given night, I need to catch up on the next day by napping or on the next night by sleeping longer	1	2	3	4	5	6	7	8	9	10
I am concerned that chronic insomnia may have serious consequences for my physical health	1	2	3	4	5	6	7	8	9	10
I am worried that I may lose control over my abilities to sleep	1	2	3	4	5	6	7	8	9	10
After a poor night's sleep, I know that it will interfere with my daily activities on the next day	1	2	3	4	5	6	7	8	9	10
In order to be alert and function well during the day, I am better off taking a sleeping pill rather than having a poor night's sleep	1	2	3	4	5	6	7	8	9	10
When I feel irritable, depressed or anxious during the day, it is mostly because I did not sleep well the night before	1	2	3	4	5	6	7	8	9	10
When I sleep poorly on one night, I know that it will disturb my sleep schedule for the whole week	1	2	3	4	5	6	7	8	9	10
Without an adequate night's sleep, I can hardly function the next day	1	2	3	4	5	6	7	8	9	10
I can't ever predict whether I will have a good or poor night's sleep	1	2	3	4	5	6	7	8	9	10
I have little ability to manage the negative consequences of disturbed sleep	1	2	3	4	5	6	7	8	9	10
When I feel tired, have no energy or just seem not to function well during the day, it is generally because I did not sleep well the night before	1	2	3	4	5	6	7	8	9	10
I believe that insomnia is essentially a result of a chemical imbalance	1	2	3	4	5	6	7	8	9	10
I feel that insomnia is ruining my ability to enjoy life and prevents me from doing what I want	1	2	3	4	5	6	7	8	9	10
Medication is probably the only solution to sleeplessness	1	2	3	4	5	6	7	8	9	10
I avoid or cancel obligations (social, family, occupational) after a poor night's sleep	1	2	3	4	5	6	7	8	9	10

ESS EN CES				
Using the scale below, please identify the extent to which you agree with each statement using the following scale;				
0	1	2	3	4
Not at all	Little	Somewhat	Quite a lot	Very much

This ward has a homely atmosphere	0	1	2	3	4
The patients care for each other	0	1	2	3	4
Really threatening situations can occur here	0	1	2	3	4
On this ward, patients can openly talk to staff about all their problems	0	1	2	3	4
Even the weakest patient finds support from his fellow patients	0	1	2	3	4
There are some really aggressive patients on this ward	0	1	2	3	4
Staff take a personal interest in the progress of patients	0	1	2	3	4
Patients care about their fellow patients' problems	0	1	2	3	4
Some patients are afraid of other patients	0	1	2	3	4
Staff members take a lot of time to deal with patients	0	1	2	3	4
When a patient has a genuine concern, he finds support from his fellow patients	0	1	2	3	4
At times, members of staff are afraid of some of the patients	0	1	2	3	4
Often, staff seem not to care if patients succeed or fail in treatment	0	1	2	3	4
There is good peer support among patients	0	1	2	3	4
Some patients are so excitable that one deals very cautiously with them	0	1	2	3	4
Staff know patients and their personal histories very well	0	1	2	3	4
Both patients and staff are comfortable on this ward	0	1	2	3	4

Appendix 4: Study 2 & 3: Research information sheets and consent forms

## **Research Title: Sleep and aggression: understanding and intervening – Study 1b Educational Intervention Responsible Clinician (RC) Information Sheet**

### **Introduction**

The current study aims to evaluate two educational interventions which are aimed at improving sleep in psychiatric patients. They will be evaluated by randomly assigning patients to one of three conditions; a mindfulness intervention, sleep hygiene intervention or treatment as usual. The treatment as usual condition will be used as a control and patients in this condition will not have to attend any intervention sessions, they will just be asked what they usually do to get to sleep.

The mindfulness and sleep hygiene interventions will be outlined.

### **Mindfulness Intervention**

Mindfulness is described as “paying attention in a particular way; on purpose, in the present moment’ (Jon Kabat-Zinn, 1994). It is a way of training the mind to focus on the here and now, rather than being distracted by our thoughts. A brief mindfulness intervention will be implemented, which is expected to improve sleep. Those assigned to this condition will be asked to attend a total of three sessions, two of which will last approximately 45 minutes. These two sessions will include an introduction to the concept of mindfulness, practicing mindfulness techniques and discussions of the techniques. Patients will be asked to practice mindfulness skills outside of the sessions. The third session will be a follow-up session lasting approximately 15 minutes which will refresh the learnt techniques.

### **Sleep hygiene intervention**

Sleep hygiene refers to the habits and practices that enable an individual to sleep. Good sleep hygiene practices include environmental and lifestyle factors that promote a good night’s sleep. A brief sleep hygiene intervention will be implemented, which is expected to improve sleep. Two sessions, lasting approximately 45 minutes will include a discussion about what sleep hygiene is and what they feel they are currently doing which may be classed as good or poor sleep hygiene. They will be given information with regards to both environmental and lifestyle factors. They will be asked to adhere to the practices outside of their sessions. A third follow up session (approximately 15 minutes) will be used as a refresher for the practices.

The study is separated into three core phases: 1. Pre-assessment; 2. Post-assessment; 3. Follow-up assessment. A description of each follows.

### **PRE-ASSESSMENT: PHASE ONE**

A number of psychological instruments and measures will be administered to consenting patients. There will be no negative outcomes for patients not wanting to consent and this will be made clear to them. The measures employed will include a file trawl, nine self-report questionnaires and a sleep diary.

The three elements to phase one are as follows:



1. **FILE TRAWL:** This will comprise a collation of information for a quantitative analysis of aggressive and self-harm incident reports within the last five years. Information regarding mental health diagnosis and medication over the past four years will also be recorded. The researcher will not access this information without prior consent from patients.
2. A total of 9 self-report questionnaires will be administered, all of short length (i.e. less than 30 items). The measures are selected as they address aspects needed to explore. The questionnaires are as follows: AQ – Buss and Perry Aggression Questionnaire; SBQ-R –Suicide Behaviour Questionnaire- revised; SPSI-R – Social Problem-Solving Inventory – Revised; Hostile Measures - Hostile Responding Task, Story Stems & Impression Formation Story; PTQ- Perservative Thinking Questionnaire; PSQI – Pittsburgh Sleep Quality Index, DBAS-16 – Dysfunctional Beliefs and Attitudes about Sleep; MAAS – Mindfulness Attention Awareness Scale, and the Essen Climate Evaluation Schema.
3. **SLEEP DIARY:** Patients will be asked to complete a diary every morning for one week. They will be asked to respond to ten short questions regarding their sleep the night before. This will give a clearer indication of their sleep.

Further information on each measure is provided in Appendix 1 of this information sheet. It is important to note that measures will not be completed all at once with participants. They will be separated over two days. It is expected that sessions will last approximately one hour.

### **POST-ASSESSMENT: PHASE TWO**

Post-assessment measures include all of those indicated in phase one, including a quantitative assessment of aggressive and self-harm incidents within the last four weeks. Participants will also be asked to complete another sleep diary for one week.

For those assigned to the interventions (mindfulness or sleep hygiene), post- assessment will take place approximately one week after the interventions have ended. For the control group, they will be asked to complete the post-assessment measures approximately four weeks after the pre-assessment measures were taken. As before, post assessment measures will be collected over two sessions. Patients will be asked to consent to this phase, and their participation is completely voluntary.

### **FOLLOW-UP ASSESSMENT: PHASE THREE**

All participants will be invited to complete all measures again four weeks after the post-assessment phase. Another quantitative assessment of aggressive and self-harm incidents within the last four weeks, will be conducted.

A second follow up assessment will be completed approximately four weeks after the first follow-up assessment. This will include the quantitative assessment of aggressive and self-harm incidents within the last four weeks.

These follow-up assessments will give further insight into the longer-term effectiveness of the intervention.

### **What am I being asked to consent to?**

**You are being asked to give your consent for the researcher (Leah Greenwood) and a researcher from the Ashworth Research Centre to approach a patient. They wish to try to consent your patient to engage in either an intervention or to be part of the control group. They also wish to try to consent your patient for phases 1 to 3.**

### **Who is doing the research?**

A PhD student and Stage II BPS Forensic Psychologist in Training, Leah Greenwood, will be completing the research. All phases (intervention/control and phases 1 to 3) will be completed by Leah. However, a research assistant from the Ashworth Research Centre will also help with the collection of some of the post- assessment and follow-up assessment measures. This research will contribute to both Leah's PhD and Stage II BPS Forensic Psychologist in Training qualification.

### **Who is supervising the research?**

This research will be completed under the supervision of Professor Jane L. Ireland (University of Central Lancashire and Psychological Services, Ashworth Hospital) and Professor Janice Abbott (University of Central Lancashire).

### **Consenting for a patient to take part**

Patients will not be invited to take part in the research without prior consent from their RC. Following RC consent, patients will be approached and invited to take part. Patients will be provided with an information sheet and given time to consider whether or not they wish to engage in the research. If a patient consents to participating and later loses the capacity to consent to the subsequent phases they will be withdrawn from the study. Any data already collected with consent will be retained and used for the research. No further data will be collected.

### **Risks and Benefits**

The questionnaires that the patients answer may include things that they find distressing, such as their engagement in aggressive and self-injurious behaviour. If the patient finds any of the questions distressing, they are advised that they do not have to continue with the study. There are also benefits to this study as the patients may experience an improvement in their sleep and also will gain insight into alternative strategies to use to sleep well.

### **Anonymity**

All patients who take part will be given a 'research number' which will appear on all information to replace their name. Only the researcher will know which number matches to which name, a key will be used to store this information and it will be destroyed on completion of the study. The information collected is purely for research purposes. Patients will not be identified in any formal write up of the results, it is totally anonymous.

## **Exceptions to anonymity**

Information provided by patients during the consent or data collection process may be disclosed to staff if it includes anything indicating a threat to themselves or others. For example, if they report information about a previously unreported crime, about a possible or future crime or if they report an active intent to self-harm. In these instances, this information will be disclosed to staff. No information will be disclosed to other patients.

## **Security of information obtained**

Any identifying information will be kept securely on site in a locked filing cabinet. Once this information is anonymised, it will be held on the university system which is password protected. Mersey Care NHS Trust or Research Ethics Committee – North West-Preston may audit the information that we hold (e.g. checking that the researcher has written consent from everyone who has agreed to take part), but this is focused on protecting research participants and checking that researchers have completed everything that they have agreed to.

## **Further information**

Further information on this study can be obtained at any time from the following.

### **Researcher**

Leah Greenwood. PhD Student Department of Psychology, University of Central Lancashire and & Stage II BPS Forensic Psychologist in Training; Ashworth Research Centre, North Admin, Ashworth Hospital, Parkbourn, Maghull. Tel: (0151) 472 2618 Email [leah.greenwood@merseycare.nhs.uk](mailto:leah.greenwood@merseycare.nhs.uk)

### **Supervisors**

Professor Jane L. Ireland, Chartered Forensic Psychologist, Professor in Forensic Aggression, Department of Psychology, University of Central Lancashire, Preston; and Violence Treatment Lead, Psychological Services, Ashworth Hospital, Parkbourn, Maghull Tel: (0151) 472 4525; Email [jane.ireland@merseycare.nhs.uk](mailto:jane.ireland@merseycare.nhs.uk)

Professor Janice Abbott, Chartered Psychologist, Professor of Psychology, Department of Psychology, University of Central Lancashire, Preston. Email [jabbott@uclan.ac.uk](mailto:jabbott@uclan.ac.uk)

If you wish to contact someone independent of the research regarding this study, please contact the University Officer for

Ethics:OfficerForEthics@uclan.ac.uk. Please remember this is not an NHS email and so do not forward anything that is confidential.

**RESEARCH CONSENT FORM (PATIENT'S RC: RESEARCHER COPY)**

**PATIENT NAME:** \_\_\_\_\_ **HOSP NO:** \_\_\_\_\_

**RESEARCH TITLE: SLEEP AND AGGRESSION: UNDERSTANDING AND INTERVENING – STUDY 1B**

**Researcher: Leah Greenwood**

**Supervisors: Professor Jane L. Ireland & Professor Janice Abbott**

I ..... RC to .....

hereby give my approval to the involvement of the above-named patient in the research projected conducted by Leah Greenwood (University of Central Lancashire and Ashworth Research Centre – Mersey Care NHS Trust).

I have received a written explanation of the study and I am also satisfied that the participant is capable of giving his consent for his involvement in the study.

Signed..... Date.....

## **Research Title: Sleep and aggression: understanding and intervening – Study 1b**

### **Patient Information Sheet – Mindfulness (Example)**

#### **Introduction**

The current study is interested in improving sleep for patients within the hospital. It is also interested in understanding how sleep may impact your thoughts and behaviour. You are being asked to take part in this research which will involve you attending a total of three mindfulness sessions.

You are being asked to take part in this research by engaging in the mindfulness intervention. Please note that you do not have to engage in this research – the decision to do this is completely up to you.

#### **What is mindfulness?**

Mindfulness is a technique which allows you to live in the present moment. We are often distracted by our thoughts about the past or the future, taking time to be mindful allows us to take a step back and concentrate on what is happening right now.

#### **What will happen in the mindfulness sessions?**

If you consent to this research study, the mindfulness sessions will be one-to-one sessions with yourself and the researcher. The sessions will outline what mindfulness is in more detail and how it may help you in your daily life. You will be asked to engage in some short mindfulness techniques and you will be asked to discuss your experience with the researcher.

#### **How long will the sessions last?**

There will be a total of three sessions. Two of these will last approximately 45 minutes, this is where you will learn more about mindfulness and practice the techniques. The final session will be a short 15 minute sessions to discuss how you are finding the techniques and if there is anything that may need recapping.

#### **Will I have to do anything outside of the sessions?**

Yes – Mindfulness is a skill that takes practice. You will be asked to practice the short exercises outside of the sessions.

If you decide to take part in the research, after reading this information sheet, you will be allocated to the mindfulness intervention group. There are two other groups, “sleep hygiene” and “treatment as usual”. The “sleep hygiene” group will attend sessions that will improve something called sleep hygiene. This is the sleeping habits and practices that help an individual to sleep based on the aspects of the environment you sleep in and your behaviour during the day and in bed. The “treatment as usual” group will not be asked to attend any sessions; this is known as a ‘control group’.

The results from all three groups (mindfulness, sleep hygiene and treatment as usual) will be compared.

## **1. PRE-ASSESSMENT**

This will take place before you attend any of the mindfulness sessions. This phase includes three elements described as follows:

1. **FILE TRAWL (Search):** We are asking for your consent to access your clinical files to collect information about any aggressive incidents over the past five years. Aggressive incidents include any verbal or physical incidents recorded which have been directed towards yourself or towards others (patient and/or staff). We also want to obtain information about your mental health diagnosis and the medication you have been taking over the last four weeks.
2. **SELF REPORT ASSESSMENTS:** You will also be asked to complete a total of 9 self-report questionnaires. Most of these are very short (i.e. less than 30 items).
3. **SLEEP DIARY:** You will also be given a diary (1 x A4 sheet) and be asked to complete this every morning for one week. This diary contains a total of ten short questions.

Further information is provided in Appendix 1 of this information sheet. It is important to note that measures will not be completed all at once. They will be separated over two days. It is expected that sessions will last approximately one hour.

## **2. POST-ASSESSMENT**

This will take place approximately one week after you have attended all three of the mindfulness sessions. We will ask for your consent to access your files again to collect information about any aggressive incidents you have been involved in since the pre-assessment phase (over the last four weeks). You will also be asked to complete the self-report questionnaires and the sleep diary again. Again, the sleep diary will be completed every morning for one week.

## **3. FOLLOW-UP ASSESSMENT**

This will take place approximately four weeks after the post-assessment phase. We will be asking for your consent again to access your clinical files to obtain information about the number of aggressive incidents you may have been in within the last four weeks. You will also be asked to complete the self-report questionnaires again.

A second follow-up assessment will be completed approximately four weeks after the first follow-up assessment. Again, this will include access to your files to record any aggressive incidents and completion of the self-report questionnaires (over the past four weeks).

These follow-up assessments will give further insight into the longer-term effectiveness of the intervention.

What am I being asked to consent to?  
You are being asked to consent to the following phase:

---

Your consent will be sought again before any remaining phases are completed.  
You do not have to consent to all phases if you do not want to.

### **Who is doing the research?**

A PhD student and Stage II BPS Forensic Psychologist in Training, Leah Greenwood, will be completing the research. All phases (intervention/control and phases 1 to 3) will be completed by Leah. However, a research assistant from the Ashworth Research Centre will also help with the collection of some of the post- assessment and follow-up assessment measures. This research will contribute to both Leah's PhD and stage II BPS Forensic Psychologist in Training qualification.

### **Who is supervising the research?**

This research will be completed under the supervision of Professor Jane L. Ireland (University of Central Lancashire and Psychological Services, Ashworth Hospital) and Professor Janice Abbott (University of Central Lancashire).

### **Consenting to take part**

You do not have to take part in this study. If you do agree to take part and you then change your mind, please could you inform the researcher before the end of the interview so that we can make sure that we take you out of the sample? The information that you provide will be anonymised and it will not be possible for us to locate you after the interview is completed.

You do not have to agree now. The researcher will agree a time will you to come back and speak to you should you decide that you are thinking about taking part.

If you decide to take part and later feel you do not want to continue, the information that you have consented to being collected will still be used for the research.

However, no further information will be collected from you and you will be withdrawn from the study.

### **Risks and Benefits**

The questionnaires that you answer may include things that you find distressing, such as your engagement in aggressive and self-injurious behaviour. If you find any of the questions distressing, please be aware that you do not have to continue with the study. There are also benefits to this study, you may experience an improvement in your sleep and also gain insight into alternative strategies to use to obtain a good night's rest.

## **Anonymity**

All questionnaires will be completely anonymous. Everyone who takes part will be given a 'research number' which will appear on the information that we collect instead of your name. A key will then be used so only the researcher will know which number matches to which name. This key will then be destroyed once the research is completed to completely protect your identity. You will not be identified in any formal write up of the results, it is totally anonymous.

## **Expectation to anonymity**

Information provided by you during the consent or data collection process may be disclosed to staff if it includes anything indicating a threat to yourself or others. For example, if you report information about a previously unreported crime, about a possible or future crime or if you report an active intent to self-harm. In these instances, this information will be disclosed to staff. No information will be disclosed to other patients.

## **Security of information obtained**

Any identifying information will be kept securely on site in a locked filing cabinet. Once this information is anonymised, it will be held on the university system which is password protected. Mersey Care NHS Trust or Research Ethics Committee – North West-Preston may audit the information that we hold (e.g. checking that the researcher has written consent from everyone who has agreed to take part), but this is focused on protecting research participants and checking that researcher have completed everything that they have agreed to.

Further information

Further information on this study can be obtained at any time from the following

### **Researcher**

Leah Greenwood. PhD Student Department of Psychology, University of Central Lancashire and & Stage II BPS Forensic Psychologist in Training; Ashworth Research Centre, North Admin, Ashworth Hospital, Parkbourn, Maghull. Tel: (0151) 472 2618 Email [leah.greenwood@merseycare.nhs.uk](mailto:leah.greenwood@merseycare.nhs.uk)

### **Supervisors**

Professor Jane L. Ireland, Chartered Forensic Psychologist, Professor in Forensic Aggression, Department of Psychology, University of Central Lancashire, Preston; and Violence Treatment Lead, Psychological Services, Ashworth Hospital, Parkbourn, Maghull Tel: (0151) 472 4525; Email [jane.ireland@merseycare.nhs.uk](mailto:jane.ireland@merseycare.nhs.uk)

Professor Janice Abbott, Chartered Psychologist, Professor of Psychology, Department of Psychology, University of Central Lancashire, Preston. Email [jabbott@uclan.ac.uk](mailto:jabbott@uclan.ac.uk)



**RESEARCH CONSENT FORM (PATIENTS: RESEARCHER'S COPY)**

**PATIENT NAME: \_\_\_\_\_ HOSP NO: \_\_\_\_\_**  
**RESEARCH TITLE: SLEEP AND AGGRESSION: UNDERSTANDING AND INTERVENING – STUDY 1B**  
**Researcher: Leah Greenwood**  
**Supervisors: Professor Jane L. Ireland & Professor Janice Abbott**  
**Consenting for Phase \_\_\_\_\_ Mindfulness Group**

I have read and understood the information sheet dated 10th July 2017 for the above study and have had the opportunity to ask questions. I also understand that I do not have to agree immediately, but I can consider the information that I have received and ask the researcher to come and see me at a later date.

..... (Patients initial)

I understand that my participation is voluntary and that I am free to withdraw up until the end of the interview, without giving any reason, without my medical care or legal rights being affected.

..... (Patients initial)

I understand that no personal information obtained during the course of the study relating to myself will be disclosed to other patients.

..... (Patients initial)

I understand that all information relating to myself obtained as part of this study will remain anonymous to everyone other than the researcher, and that I will not be personally identified in the final report of the study. However, I understand that if I report information indicating a threat to myself or others e.g. if I disclose a previously unreported crime, possible or future crime or intent to self-harm, then this information will be disclosed to the appropriate personnel.

..... (Patients initial)

I understand that the researchers will access my clinical files to obtain information regarding my involvement in aggressive incidents, self-injurious behaviour, my mental health diagnosis and any medication I am taking. I understand that this will only be seen by members of the research team.

..... (Patients initial)

I understand that this consent form may be seen by responsible individuals from Mersey Care NHS Trust for the purposes of monitoring research procedures. I understand that this is for audit purpose only to ensure that my consent has been sought.

..... (Patients initial)

I understand that relevant sections of my medical notes and data collected in the study may be looked at by regulatory authorities or by persons from the Trust where it is relevant to my taking part in this study. I give permission for these individuals to have access to this information

..... (Patients initial)

I.....agree to be involved in the study carried out by Leah Greenwood (University of Central Lancashire and Ashworth Research Centre –Mersey Care NHS Trust) and I am satisfied that the purpose and procedure of the study has been fully explained to me by Leah Greenwood.

Signed.....(patient)

Date.....

Signed.....(researcher)

Date.....

## Appendix 5: Study 3: Mindfulness intervention session plan

## MINDFULNESS – SESSION 1

1. Overview of the session
2. What we will try to achieve today
3. What is mindfulness?
4. Practice mindfulness of sounds
5. Discussion of mindfulness of sounds practice

## **MINDFULNESS – Session 1**

### **Overview of sessions**

- Why are we doing these sessions?
- How do you sleep in general?
- Do you use any techniques to get to sleep?

### **Introducing mindfulness**

- Discussion about what mindfulness is?
- What do you think mindfulness means?
- Have you heard of it before?
- Have you used the practices before?

### **Give an explanation of what mindfulness is and what it is not.**

- Remember to keep it simple when explaining mindfulness.
- Short descriptions work best

**“Paying attention in a particular way; on purpose, in the present moment”**

**“Being mindful is being the opposite of being on autopilot”**

**“Taking control of your mind rather than allowing your mind to be in control  
you”**

- Mindfulness is not a religious practice – it is a skill.
- Not a relaxation technique – in relaxation tension is seen as a bad thing and relaxation is seen as good. Mindfulness does not promote this. Tension is accepted.
- Mindfulness is not meant to “work” – mindfulness focuses on the here and now. Expecting mindfulness to “work” means that it is future oriented. **Soufflé metaphor (Metaphor 1.1).**
- Mindfulness is not meant to stop your mind from wandering. It is about training your mind to know when it wanders.

### **Mindfulness techniques**

- Explain how the mind is like an untrained puppy
- How do you train a puppy?
- You don’t train a puppy by holding it still. You let it explore and gradually introduce ways to train it.
- The mind is the same as an untrained puppy. It explores. Your thoughts will run away with you unless you gradually learn to understand when they are running away with you.
- Explain that it is easier to begin to focus on an external source to begin with.

## **Exercise**

Explain that this first practice will be the mindfulness of sound. It is useful to keep your eyes open, but if you feel you want to close your eyes you are welcome to do that too. This will only be a short practice.

### **Start with a simple mindfulness practice with an external focus (mindfulness of sounds exercise 1.2)**

#### **Discuss how easy this is to practice outside of the sessions.**

- Would it be possible to try this technique at least two times this week?
- May be useful to do this before bedtime. But do not have to do it at this time. Try it when you feel it is the best time for you to practice it. And we will discuss the techniques in the next session.

#### **General feedback of the session**

- What have you learnt from this session?
- Any comments to make about the session?
- Overview of the next session
  - More mindfulness techniques

## **Exercises and metaphors**

1.1 Soufflé metaphor - the goal of a soufflé is for a fluffy puffed up pastry. If you constantly open the oven to check it will stop rising.

1.2 Mindfulness of sound

“We are going to do a mindfulness practice. During this exercise I will guide you to focus on a particular item or experience. As you are following the instructions your mind is likely to wander. This is perfectly normal. When you notice that your mind has wandered, gently return it to the task. Do this as many times as you need to.

When you do this you are being mindful.”

In this exercise we are going to pay attention to sounds. Now, when we listen to sounds our minds usually add a description or label; so if we hear “dring dring” our mind says, “that’s a telephone ringing”. It’s quite an automatic process and we can’t stop our minds doing that. But in this exercise we are just going to be open to the experience of sound – allowing ourselves to experience any thud and hum that comes into our ears without trying to discern what the sound is (but if you find yourself labelling automatically don’t judge yourself, just notice and bring your mind back to the next experience of sound). We will do this exercise for two minutes and I will indicate when to start and when to stop.

## **MINDFULNESS – Session 2**

- Overview of the session
- Discussion about last session
- Discussion about today's session
- Practice mindfulness of an object
- Discuss mindfulness of an object
- Discuss how mindfulness can help thoughts
- Practice mindfulness of the soles of the feet
- Discuss mindfulness of the soles of the feet

## **MINDFULNESS – Session 2 Discussion about the last session**

- What did we do in the last session?
- Can you remember what mindfulness skill we practiced?
- Have you been practicing the mindfulness of sound technique?

### **Discussion about this session**

Explain that we will be using more mindfulness techniques.

#### **Start with an exercise (Mindfulness of an object 2.1)**

For the last session focus on something external i.e. sounds. We are going to continue with that today. For this exercise you are being asked to be mindful of an object. In this instance it will be a leaf. But I will remind you that you can be mindful of any object. (Mindfulness of an object 2.1).

### **Feedback**

#### **Discuss the experience**

- How did you find that? Was it easy? Difficult?
- What did you notice?
- Reflect on their experiences using follow up questions such as did you notice this at the time or now that you are reflecting back.
- If they had a bad experience ask them if they were thinking that at the time.
- Did they stop being mindful and simply give up? If so, demonstrate how they could turn their attention back to the leaf
- Keep everything positive.
- Can you think of a time where this may be a useful practice? Lead to the usefulness of this technique in bed. For example the feel and smell of the blankets.
- 

#### **When mindfulness of an object can be achieved it is useful to try and be mindful of our thoughts.**

- Discuss what thoughts are – they are not facts. We are separate from our thoughts. Leg metaphor (metaphor 2.2).
- Our minds are effective problems solvers – for example if I need to pick up some milk on the way home from work I can take a different route to get everything I need. But some things can't be solved.
- At this point our thoughts tend to take control trying to solve a problem.
- Mindfulness allows you to have a choice: to solve a problem or not.
- Take the sleep example – if you were to say stop thinking about what will happen if you don't go to sleep- what do you think will happen?
- Thoughts that are pushed away will just come back – perhaps even stronger.
- Some thoughts are “sticky” and can't be pushed away. Train metaphor (metaphor 2.3).
- Mindfulness trains your mind to be the conductor of your thoughts.
- 

#### **Exercise – Mindfulness of the soles of the feet**

- We are going to go through another mindfulness exercise. This time it is linked to your thoughts.

(Mindfulness of the soles of the feet – 2.4)



## **Feedback**

- How did you find that? Was it easy? Difficult?
- What did you notice?
- Reflect on their experiences using follow up questions such as did you notice this at the time or now that you are reflecting back.
- If they had a bad experience ask them if they were thinking that at the time.
- Did they stop being mindful and simply give up? If so, demonstrate how they could turn their attention back to the soles of the feet....
- Keep everything positive.
- How do they think this may apply to their everyday life?

## **General Feedback**

- Discuss the practicing the mindfulness outside of sessions.
- Is one technique easier than the other?
- Would they like to practice a mindfulness technique again?
- Reassure that it may take a bit of practice to do the mindfulness of thoughts but once practiced it will be a useful skill to have.
- What have you learnt from this session?
- Remind them that they should practice these outside of these sessions.

## **Exercises and metaphors**

### **2.1 Mindfulness of an object**

First of all hold the leaf in the palm of your hand. Notice the weight of it  
How does it feel against the skin on your palm, are there places where it touches and places where it doesn't? Notice the temperature.

Allow your eye to follow the contour of the leaf, notice the shape. Notice the colour on the upper side of the leaf; see any variations in shade and texture.

Now taking the leaf in your fingers turn it over and notice how the underside differs in colour and texture. Notice how the light catches the leaf differently as you move.

Use your fingers to explore the texture of the leaf. Is there a smell to your leaf?

If you notice any associations then just bring your mind gently back to the leaf in your hand.

### **2.2 Leg metaphor**

My leg belongs to me but it is not who I am. I am not defined by my leg. It is a part of me but it is not what makes me who I am. Thoughts are exactly the same. They are part of us but do not control who we are!

### **2.3 Train metaphor**

Imagine you are on a train platform edge. All the trains are your thoughts. Some trains are small and go passed you. Some are bigger that you can get on. Imagine you get on a really big train. You travel on that train. But then you remember that you can get off at the next stop. Then that train leaves the station. Some thoughts will go right passed you and some you will go with. But remember that they are your thoughts and you are the conductor of them.

## **2.4 Mindfulness of the soles of the feet**

I'd like you to sit comfortably in your chair, in an upright position, with both feet on the floor. Rest your hands on your legs or in your lap. If possible keep your eyes open, finding a place to gently rest them. Bring your focus of attention into this room, in this moment. We are going to do a mindfulness of the soles of the feet practice. When I tap the table I am going to ask you to cast your mind back to an incident that made you very angry. Let the angry thoughts flow through your mind, naturally, without restriction. Stay with the anger. Your body might show signs of anger (e.g. rapid breathing). Now shift all your attention to the soles of your feet. Slowly move your toes, feel your shoes covering your feet, the texture of your socks, the curve of your arch and heels of your feet against the back of your shoes. Keep breathing naturally and focus on the soles of your feet until you feel calm.

## **MINDFULNESS: Follow-up Session**

### **Discussion about the last session**

- What did we do in the last session?
- Can you remember what mindfulness skills we practiced?
- Have you been practicing the mindfulness of object technique?
- Have you been practicing the mindfulness of the soles of the feet technique?

### **Discussion about this session**

- Explain that this is just a refresher session to see if they can apply the techniques, if they have been using them and if they need any skills refreshing.

## Appendix 6: Study 3: Sleep Education intervention session plan

## **SLEEP HYGIENE – Session 1**

### **Overview of the sessions.**

- Why are we doing in these sessions?
- How do you sleep in general?
- Do you use any techniques to get to sleep?

### **Introducing sleep hygiene**

- Discussion about what sleep hygiene is.
- Explain that sleep hygiene are the habits and practices which are used to help individuals to sleep better.
- There may be things that you are currently doing and things that you aren't doing which may be helping or hindering your sleep.

### **Exercise**

- Can you write down some of the things that you think may be helping or hindering how well you sleep? I have provided a piece of paper where you can separate them into helping and hindering.
- Try to get participant to identify both behaviours and lifestyles factors.

### **See worksheet 1.1**

- Help them to fill out this sheet. Provide examples if they are struggling to think of things.

### **Looking at what they have highlighted.**

- Explain that they have highlighted both environmental and lifestyle factors.
- Is there anything that they think they really need to work on?
- Is there anything that they think works well and they should continue doing?
- We are going to look specifically at how sleep hygiene can improve sleep. For this week's session we will look at the environmental factors.
- What aspects of the environment help them to sleep?

### **Environmental Factors**

- Explain that you understand that the environment that the patient is in is difficult to change.
- However, there are a few things that they can do which can help them to sleep.

#### **1. Dark room**

- Explain that most people need the room to be as dark as possible to sleep. Make sure the curtains/blinds are closed and that no lights are left on. This includes lights coming from the television.

#### **Do you think you would be able to adjust how dark your room is?**

- If yes – ask them to explain how.
- If no – give examples of how it could be improved... e.g. covering small lights that can't be turned off. Remember not all aspects can be changed but little changes can sometimes make a big difference.

#### **2. Quiet room**

- Again, the room could be quiet but there may be noises outside which could be distracting. Think more about how to make the room the participant is in to be as quiet as possible.

**Do you think you would be able to adjust how quiet your room is?**

- If yes – ask them to explain how.
- If no – give examples of how it can be improved... e.g. making sure electrical appliances are turned off (no buzzing noises etc, which may be distracting).

### **3. Using bed for sleeping**

- It sounds obvious doesn't it? However, a lot of people use their bed to do other things, such as playing video games, watching TV, listening to music, writing or drawing.

**Is there anything that you do in bed that you could do somewhere else?**

- If yes – ask them to explain
- If no – give examples e.g. going out of their room to watch TV.
- Also explain that it is important to get out the room as much as possible as you are more likely to associate that room with sleep rather than all the other things that you do in it.

### **4. Temperature**

- Being too hot or being too cold can often affect how well you sleep.

**Is there anything that you can do control the temperature?**

- If yes – ask them to explain
- If no – give examples e.g. wearing more layers if too cold.

### **5. Not eating in bed**

- Not eating in bed links in with using your bed only to sleep. You don't want to associate your bed with eating. Additionally, eating in bed may leave crumbs, making uncomfortable to sleep in.

**What small improvements could you make to not eat in bed?**

- If yes – ask them to explain
- If no – give examples e.g. make small changes such as just drinking in your room and eating snacks outside of your room.

**How do you feel about trying to apply these to your environment?**

- For example, look at two or three of the examples and make a conscious effort to not do them. For example, not eating in your room for a couple of days? Going out of your room more?

**Do you think it would be possible to try these techniques between now and next week's session?**

### **General feedback of the session**

- What have you learnt from this session? Any comments to make about the session?

Factors Helping Sleep

Factors Hindering Sleep

## **Sleep Hygiene – Session 2**

### Overview of the session

- Discussion about last session
- Discussion about today's session
- How to improve sleep hygiene with lifestyle changes



## SLEEP HYGIENE –Session 2

### Discussion about the last session

- What did we do in the last session?
- Can you remember what sleep hygiene is?
- What are the two main aspects of sleep hygiene? Environment and Lifestyle.
- Last time we looked at the environment – have you applied any of the environmental aspects of sleep hygiene since our last session?

### Discussion about this session

- This session will focus on the lifestyle factors that may be affecting sleep.
- Refer back to helping/hindering sleep (worksheet 1.1) – can you identify the lifestyle factors from this sheet?

### Exercise

- **Start with the factors that they have highlighted to go over how it helps or hinders sleep.**
- **Use worksheet 2.1 to note down the lifestyle factors affecting sleep and how they can be resolved.**

## Lifestyle Factors

### 1. Food and drink

- **How do you think food will affect your sleep?**
- Going to bed too full
- Going to bed hungry
- Eating lots of carbohydrates, fatty foods or sugary foods.
- Drinking lots of caffeine – particularly before bed.
- Drinking fizzy drinks before bed
- **What do you think you can work on to avoid this?**
- Participants should come up with their own examples. They need to be manageable and realistic. Small goals are important.
- Examples include – not drinking caffeine after 5pm, not eating after 8pm (although remember these are subjective to the time that they go to sleep). Improving their diet.

### 2. Exercise

- **How do you think exercise will affect your sleep?**
- Not exercising enough during the day
- Exercising too close to bedtime.
- Exercising too much early in the day and needing to nap later on.
- **What do you think you can work on to avoid this?**
- Participants should come up with their own examples.
- Examples include – steadily exercising a little bit every day. For example, taking a brisk walk. You can do this on the wards or on the grounds if you have access. Remind them about making exercise fun.

### **3. Bedtime routine**

- **What factors associated with the bedtime routine may affect sleep?**
- Going to bed at different times every night
- Lying-in in the morning.
- Getting up at different times every morning
- Going to bed to sleep, although not yet tired
- Take naps in the day
- **What do you think you can work on to avoid this?**
- Participants should come up with their own examples.
- Examples include – having a bedtime routine, making sure you go to sleep at the same time every night and getting up at the same time in the morning. Not going to bed before you are tired.

### **4. Worrying**

- **What factors associated with worrying may affect sleep?**
- Worrying about not getting enough sleep
- Worrying about other problems.
- Waking up worrying you have forgotten something
- Worrying about something that will happen the following day.
- **What do you think you can work on to avoid this?**
- Participants should come up with their own examples.
- Examples include – write down all the worries you have before you go to bed or throughout the day. Talk to staff about anything that may be worrying you, it always helps to get it off your chest.

### **How do you feel about making some of these changes to your lifestyle?**

- For example, look at two or three of the examples and make a conscious effort to change some of your lifestyle factors.

### **Do you think it would be possible to try these techniques between now and next week's session?**

### **General feedback of the session**

- What have you learnt from this session?
- Any comments to make about the session?

Sleep Hygiene – Lifestyle factors

Lifestyle Factor	How it affects sleep	How to improve lifestyle
1.		
2.		
3.		
4.		

## **SLEEP HYGIENE – Follow-up Session**

### **Discussion about the last session**

- What did we do in the last session?
- Can you remember what sleep hygiene is?
- What are the two main aspects of sleep hygiene? Environment and Lifestyle.
- Last time we looked at the lifestyle– have you applied any of the lifestyle aspects of sleep hygiene since our last session?

### **Discussion about this session**

Explain that this is just a refresher session to see if they have made any changes to the environment and lifestyle, if they have been consistently practiced since the last session and if they need anything refreshing.

## Appendix 7: Study 3: Mindfulness Attention Awareness Scale

**MAAS**

Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what *really reflects* your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1	2	3	4	5	6	
Almost always	Very frequently	Somewhat frequently	Somewhat infrequently	Very infrequently	Almost never	
I could be experiencing some emotion and not be conscious of it until sometime later	1	2	3	4	5	6
I break or spill things because of carelessness, not paying attention, or thinking of something else	1	2	3	4	5	6
I find it difficult to stay focused on what's happening in the present	1	2	3	4	5	6
I tend to walk quickly to get where I'm going without paying attention to what I experience along the way	1	2	3	4	5	6
I tend not to notice feelings of physical tension or discomfort until they really grab my attention	1	2	3	4	5	6
I forget a person's name almost as soon as I've been told it for the first time.	1	2	3	4	5	6
It seems I am "running on automatic" without much awareness of what I'm doing	1	2	3	4	5	6
I rush through activities without being really attentive to them	1	2	3	4	5	6
I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there	1	2	3	4	5	6
I do jobs or tasks automatically, without being aware of what I'm doing	1	2	3	4	5	6
I find myself listening to someone with one ear, doing something else at the same time.	1	2	3	4	5	6
I drive places on 'automatic pilot' and then wonder why I went there	1	2	3	4	5	6
I find myself preoccupied with the future or the past	1	2	3	4	5	6
I find myself doing things without paying attention	1	2	3	4	5	6
I snack without being aware that I'm eating	1	2	3	4	5	6
<b>Please indicate whether you have any experience with mindfulness techniques</b>						
Yes		No		Not sure		
<b>If you answered YES to the above question, please indicate how often you practice mindfulness.</b>						
Never	Less than once a week	Once or twice a week	Three or four times a week	Five or six times a week	Everyday	