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Sleep and its association with aggression among prisoners: Quantity or quality?

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ABSTRACT

Objective: The current paper aims to examine the association between self-reported sleep quality and quantity and how these relate to aggression motivation and hostile cognition in a male prisoner sample. The cognitive component of sleep, namely perception, is consequently a variable of particular interest and one neglected by previous research.

Methods: Two independent studies are presented. The first comprised 95 adult male prisoners who completed a sleep quality index along with measures of implicit and explicit aggression. The second study extended this to consider aggression motivation and hostile attribution biases using a sample of 141 young male adult prisoners. **Results:** In study one, sleep quantity and indicators of sleep quality were found not to associate with aggression whereas the *perception* of poor sleep did; those perceiving poor sleep quality were more likely than those perceiving good sleep to report they had perpetrated aggression in the previous week and to report higher levels of implicit aggression. Study two found that while increased indicators of poor sleep quality were associated with lower prosocial attribution tendencies and higher levels of reactive and proactive aggression, sleep quantity was not associated. The perception of poor quality sleep was important; those perceiving poor sleep were more likely to report higher levels of reactive and proactive aggression than those reporting good sleep.

Conclusions: Collectively the studies highlight the importance of accounting for the perception of sleep quality as an important cognitive component in understanding the association between sleep and aggression.

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Sleep quality and quantity can impact on cognition, emotion (e.g. Hyypa, Kronholm, & Mattlar, 1991; Koffel & Watson, 2009; Pilcher, Ginter, & Sadowsky, 1997) and psychosocial functioning, including relationships (Tavernier & Willoughby, 2014). Poor sleep is known to adversely affect health related quality of life, a concept capturing physical, emotional, mental, social and behavioural components of well-being (Roesser, Eichholz, Schwerdtle, Schlarb & Kübler, 2012). In non-clinical populations good sleep quantity and quality is correlated with improved health (e.g. Bellec, 1973; Hyypa et al., 1991). Good sleep quality has, however, been found to relate better to measures of health and well being than sleep quantity, including both depression and anger (Pilcher et al., 1997). In addition, sleep difficulties, including insomnia, poor sleep quality, hypersomnia, fatigue and sleepiness have all been related to symptoms of anxiety and depression; hypersomnia, fatigue and sleepiness related to depression and anxiety more strongly than the other elements and in particular to depression. This was

expected since depression can be characterised by such symptoms (e.g. Koffel & Watson, 2009). Indeed, the association between sleep difficulties and psychiatric disorders (e.g. depression, anxiety, post-traumatic stress disorder, schizophrenia, and substance related disorders where there is withdrawal and/or current use), have long been recognised (Benca, 1996). The importance of sleep quality has been increasingly identified as an important consideration (Benca, 1996; Magnée, de Weert-van Oene, Wijdeveld, Coenen, & de Jong, 2015; Tavernier & Willoughby, 2014). Research to date has, however, focused primarily on non-forensic populations.

There is reason to consider the importance of examining sleep in forensic populations as a particular area of concern. Within closed forensic environments, such as prisons, psychosocial and socio-cultural factors may contribute to sleep challenges (Elger & Sekera, 2009; Ireland & Culpin, 2006). For example, incompatible sleeping behaviours are reported within prison settings where beds become places to sit, watch TV, and eat meals but not solely to sleep (Ireland & Culpin, 2006). Environmental factors such as noise, lack of physical activity, heat, cold and boredom can also contribute to reducing sleep quantity and are noted components of institutional living (Levin & Brown, 1975). Brooke, Taylor, Gunn, and Maden (1998) extend this by suggesting prisoners' experience increased insomnia as a result of a high prevalence of

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substance misuse and associated withdrawal symptoms, including insomnia. Thus there is sufficient evidence based on the limited research to date to suggest that closed environments such as prisons can serve to promote poor sleep as a product of the environment and the individual's housed within (Elger & Sekera, 2009; Ireland & Culpin, 2006).

Sleep deprivation is known to affect cognitive functioning (Brand, Hatzinger, Beck, & Holsboer-Trachsler, 2009; Durmer & Dinges, 2005) and emotional management capabilities (Dahl, 1999; Lindberg, Tani, Appelberg, Naukkarinen, et al., 2003; Lindberg, Tani, Appelberg, Stenberg, et al., 2003; Morin, 2002). This has been reported across samples (e.g. Haynes et al., 2006; Lemola, Schwarz, & Stiffert, 2012), including with prisoners (e.g. Lindberg, Tani, Appelberg, Naukkarinen, et al., 2003; Lindberg, Tani, Appelberg, Stenberg, et al., 2003; Orme, 1972). Emotional and cognitive functioning challenges are expected to aggravate a range of behavioural difficulties, suggesting that an association should therefore be expected between sleep challenges and behaviour. Such challenges are certainly fundamental to our understanding of aggression with difficulties in cognitive and/or emotional functioning raising the potential for aggression (e.g. Anderson & Bushman, 2002; Huesmann, 1998; Ireland, 2011).

Within forensic settings, aggression is of particular interest although research has concentrated on a limited range of variables such as trait aggression and trait hostility (Ireland & Culpin, 2006), both of which are associated with reports of poor sleep by prisoners. Research has not considered the association between sleep and aggression *motivation* (i.e. reactive aggression, namely emotionally driven aggression; Kempes, Matthys, DeVries, & Engeland, 2005; Orobio de Castro, Merk, Koops, Veerman, & Bosch, 2005; and proactive aggression, described as more planned behaviour, Arsenio, Adam, & Gold, 2009), *implicit* aggression or more current hostile and prosocial attributions. In addition, there has been no consideration of more *current* aggressive behaviours. Consequently our understanding of the dynamics between aggression and sleep is limited.

The omission to address this topic in any detail is of interest since commonly accepted theoretical understandings of aggression (e.g. *General Aggression Model*: GAM, Anderson & Bushman, 2002; *Integrated Model of Information Processing*, Huesmann, 1988, 1998) argue for cognition and emotions as key elements in promoting an aggression response, with emphasis on the former. Both make reference to the concept of aggressive scripts, which an individual learns to apply across time resulting in a largely automatic process of selection (Anderson & Bushman, 2002; Huesmann, 1998). Each theory also makes reference to the role of the environment in promoting choices to engage and situational factors such as the presence of a provocation or aggressive cue. These include what are commonly referred to as Hostile Attribution Biases (e.g. Taylor, Fireman, & Levin, 2013; Orobio de Castro et al., 2005) where ambiguous social cues are interpreted in a hostile fashion.

Hostile Attribution Biases are recognised as common elements explaining the association between cognition and aggression (e.g. Ireland, 2011), with such biases often existing external to conscious awareness. Cognition of this nature is further captured by the concept of implicit cognitive processing (Stacy & Wiers, 2010). Such processing is considered a result of associations in memory thought influenced by experiences, but not those necessarily immediately aware to an individual. The development of these associations in memory is considered to have developed in the same manner as for cognitive (aggressive) scripts, namely through learning and experience.

Implicit processing can impact on emotions and behaviour, with a reported association between implicit aggressive processing and aggression in general, student and workplace samples (e.g. Bluemke, Friedrich, & Zumbach, 2009; Frost, Ko, & James, 2007; Ireland & Birch, 2013; James et al., 2005; Todorov & Bargh, 2002). The findings have also extended to prison samples where the more impulsive implicit processing, rather than the more cognitively effortful processing, is thought to relate to increased aggression tendencies (Ireland & Adams, 2015).

Implicit processing is considered part of the *impulsive* component of the *Reflection-Impulsive Model* (RIM: Strack & Deutsch, 2004). In this model the associative and reflective systems of processing co-exist. The reflective system is the most explicit element where action is via conscious deliberation and appraisal (Hofmann & Friese, 2008). Reports of aggressive behaviour would, for example, fall within the reflective system. The impulsive element of the model is considered more automatic and associated with disposition and rehearsed learning. No research to date, however, has considered how implicit cognitive processing, namely the impulsive element of this processing system, may associate.

This more automatic (implicit) processing is also occurring in a closed setting where there are a range of *environmental* factors aggravating poor sleep (e.g. Levin & Brown, 1975), *situational* factors ensuring aggression is considered more commonplace than in general and community settings (e.g. Ireland, 2011), with evidence for *personal* factors raising the risk for aggression (e.g. Hostile Attribution Biases and raised tendency towards implicit aggression). What has not been fully considered is the role of a further variable in raising the risk for unhelpful aggressive cognitions and subsequent behaviours and which could add to descriptions for both the environmental and personal factors. Arguably such a variable is poor sleep.

Recent evidence has emphasised the importance of *perceptions* of sleep quality for a range of cognitive and behavioural outcomes (e.g. Chao, Mohlenhoff, Weiner, & Neylan, 2014; Draganich & Erdal, 2014; Roeser, Meule, Schwerdtle, Kubler & Schlarb, 2012; Tsuchiyama, Terao, Wang, Hoaki, & Goto, 2013). Most notable is a recent demonstration of a 'sleep placebo' effect whereby the manipulation of participants' beliefs about how well they slept the night before exerted significant effects on several measures of cognitive functioning. Irrespective of participants' own self-reported sleep quality, participants who were led to believe that they had slept well performed better on a number of cognitive tests than participants who were told they had slept poorly (Draganich & Erdal, 2014). Poor subjective perceptions of sleep quality have also been associated with a reduction in frontal lobe volume in Gulf War veterans that is independent of comorbid psychiatric conditions (Chao et al., 2014). An association between frontal lobe difficulties and aggression is well documented (Wood, Lioffi, & Psych, 2014). Given that the frontal lobes are broadly implicated in executive functioning, including planning, response action and behavioural inhibition, this implies that perceptions of sleep quality may influence an individual's ability to respond appropriately to environmental and social circumstances. It is surprising therefore that there has been a lack of research into what may be a common denominator in this area, namely aggression. One fairly recent study has also linked self-reported sleep quality to hostility (as a trait characteristic) while objective measures of sleep quality were unrelated to hostility (Tsuchiyama et al., 2013). Thus, recent evidence strongly converges on the view that individuals' perceptions of the quality of their sleep may exert powerful biases on information processing.

Certainly, poor sleep quality and/or quantity could be expected to impact on the social information processes outlined in models such as the General Aggression Model (GAM, Anderson & Bushman, 2002) and Integrated Model of Information Processing (Huesmann, 1988) where information becomes misinterpreted (i.e. activation of Hostile Attribution Biases) as a result of sleep contributing to poor concentration and cognitive awareness (Brand et al., 2009; Durmer & Dinges, 2005). Indeed, those who are sleep deprived are recognised to misattribute information (Arsenio & Lmerise, 2004; Arsenio et al., 2009; Kempes et al., 2005). It could also be speculated that the reflective system of the Reflective-Impulsive Model (RIM: Strack & Deutsch, 2004) may become impaired by poor sleep, resorting therefore to more use of the impulsive component of this system within which implicit (aggressive) processing resides.

The current studies aim to explore these issues in more detail by examining the quantity and quality of sleep in a prison environment where the *environmental* factors are known to be a likely aggravator of poor sleep; where *situational* factors indicate the risk for aggression is

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