

Medicolegal aspects of non-rapid eye movement parasomnias

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ABSTRACT

Introduction: In a subset of adults with non-rapid eye movement (NREM) parasomnias, clinical variants might be violent in nature and can potentially result in unintentional but considerable harm. As such, there is substantial interest on the forensic ramifications of these sleep behaviours.

Methods: This review examined the diagnostic criteria for parasomnias established in the context of international classification systems; medicolegal case reports; legal frameworks; and court cases in and outside of Singapore, to provide an overview of the implications of NREM parasomnias.

Results: Violent or injurious behaviours that occurred in the context of somnambulism, otherwise known as sleepwalking, have challenged traditional legal theories of criminal culpability. Yet little has changed in the application of sleep science to criminal responsibility. In Singapore, the defence of somnambulism has hitherto not been directly raised. Nonetheless, sleep medicine practitioners may increasingly be requested to render their opinions on legal issues pertaining to violent or injurious behaviours allegedly arising during sleep. Although the understanding of NREM parasomnias has improved, there is still a dearth of evidence to support both medical and legal decisions in this area.

Conclusion: NREM parasomnias come with disquieting legal and forensic implications for adjudicating criminal responsibility. There is a need to critically examine legal perspectives on behaviours occurring during sleep. More reliable empirical studies investigating the pathophysiology of NREM parasomnias can offer clearer diagnostic guidelines and address complex behaviours of NREM that often come with medicolegal implications.

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INTRODUCTION

Parasomnia is a clinical sleep disorder, which involves undesirable physical or behavioural phenomena that arise predominantly during sleep.^{1,2} This can occur during any stage of sleep, including the transition from wakefulness to sleep, while asleep, or during awakening.³

One category of parasomnias occurs primarily during sudden but incomplete awakening from slow-wave sleep, which is the deepest stage of non-rapid eye movement (NREM) sleep, known as NREM stage 3 sleep.^{4,5} This category of parasomnias occurs most commonly in the first third of the night.^{4,5} In the International Classification of Sleep Disorders, third edition (ICSD-3), this category of parasomnias, also known as NREM-related parasomnia, is subdivided into 4 types: confusional arousals, sleepwalking, sleep terrors and sleep-related eating disorder.¹ In the Diagnostic and

Statistical Manual of Mental Disorders, fifth edition (DSM-5), the terminology is “NREM sleep arousal disorders”, with specification of sleepwalking type, sleep-related eating disorder as a subtype of sleepwalking, and sleep terror type.² Notably, “sleepwalking” is not confined to simple ambulation, with subtypes outlined in the DSM-5.²

Another category of parasomnia outlined in the ICSD-3 is the rapid eye movement (REM) sleep behaviour disorder (RBD). The criteria for RBD require (1) repeated episodes of behaviour and/or vocalisation that are documented by polysomnography (PSG) to arise from REM, or presumed to arise from REM based on reports of dream enactment; and (2) evidence of REM sleep without atonia on PSG.⁶ When REM sleep without atonia is not observed, other clinical findings that may be strongly suggestive may guide the diagnosis of RBD.⁶

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CLINICAL IMPACT

What is New

- This paper provides an overview of the legal implications of non-rapid eye movement (NREM) parasomnias, and explores the role of sleep disorder specialists and expert witnesses, with references to court cases in and outside Singapore.

Clinical Implications

- Sleep medicine practitioners will increasingly be requested to render their opinions on legal issues pertaining to violent or injurious behaviours allegedly arising from NREM parasomnias.
- There is a need for clear guidelines to support both medical and legal decisions on these complex behaviours.

NREM parasomnias can affect both children and adults, but its prevalence in the general population tends to vary with age. NREM parasomnias are much more prevalent in childhood, and often with episodic recurrence that typically decreases with age.^{5,7} For example, NREM parasomnias may affect as many as 20% of children and 4% of adults.⁸ Similarly, a systematic review and meta-analysis showed that the prevalence of somnambulism, otherwise known as sleepwalking, is 5% in children within the past 12 months, while the prevalence in adults is 1.5%.⁹

NREM parasomnias are characterised by several clinical features. These include unresponsiveness or altered perception to external stimuli;^{10,11} time and space disorientation;¹⁰ diminished conscious awareness accompanied by affective, autonomic and motor activation;^{12,13} and full or partial post-episodic amnesia.¹⁴ The prototypical behavioural patterns of NREM parasomnias are confusional arousal, somnambulism and night terrors, which are postulated to represent a hierarchical continuum rather than distinct entities.¹⁰ Although 1 behavioural pattern might predominate, most individuals with NREM parasomnias also experience other variants of sleep disorders.¹⁵

Many disorders within the category of parasomnias are generally benign and do not invite legal scrutiny. However, a minority of these clinical variants might be violent in nature, and can potentially result in unintentional but considerable harm to self and others, or damage to the environment.^{5,16} In a study by Lopez et al., almost half of the clinical patients with NREM

parasomnias reported self-injurious and aggressive behaviours (47/100 sleepwalkers).¹⁷ More commonly observed in males, these behaviours appear to involve complex behaviours that require some executive functions (e.g. moving furniture and driving).^{11,14}

During an episode of NREM parasomnia, individuals may also display sleep-related sexual behaviours or sexsomnia. The first known case of sexsomnia was described in a report from Singapore in 1986, involving a married man with nocturnal episodes of masturbation during sleep despite having nightly sexual intercourse with his wife.¹⁸ It is a subtype of confusional arousals and sleepwalking. It subsumes a wide spectrum of sexual activities occurring during sleep, ranging from explicit sexual vocalisation, violent masturbation, indecent exposure, and sexual contact with oral, genital or anal regions.^{19,20}

Sexsomnia can be problematic. It can result in sleep disruption for the bed partner, and physical injury and harm to the individual or bed partner due to aggressive sexual behaviours. It can also cause psychological disturbance to the bed partner from offensive sexual sleep-talking, inappropriate time and type of sex, and non-consensual nature of the sexual behaviours.²¹ Sexsomnia can also become a significant legal issue if the sexual misconduct leads to accusations of sexual assault or rape, or when a minor is involved.

METHODS

This review examined medicolegal case reports, and court cases in and outside of Singapore, to provide an overview of the implications of NREM parasomnias. It also provides a summary of legal frameworks upon which criminal liability of NREM parasomnias is determined, and summarises some of the overarching challenges presented by the case reports and court cases.

RESULTS

In a systematic review of medicolegal case reports on sexsomnia conducted by Ingravallo et al., victims in 4 out of 9 cases were aged between 4 and 10 years old, and victims in 2 other cases were adolescents.²² Of these 9 cases, the verdict for 8 cases was in favour of the defendant (the accused), while the trial outcome for the remaining case was unknown.²² Cases of sexsomnia, however, often go unreported as patients and/or their bed partners are hesitant to talk about it unless there is a legal issue.²¹

Some individuals with NREM parasomnia may also exhibit sleep-related violent behaviours, or violent somnambulism.²³⁻²⁵ In a study by Lopez et al., 55/100

patients diagnosed with somnambulism at a sleep disorders clinic presented violent behaviours, with 31.25% directed at the patients themselves and 45.83% towards their bed partners.¹⁵ Notably, despite the classic view of NREM parasomnias as non-dreaming states, this complex subtype has a pattern of vehement dream enactments, which occur in the absence of REM sleep without atonia on PSG.²⁵ When actively probed about these complex and agitated episodes of NREM parasomnia, patients often reported vague recollections of terrifying dream-like experiences and imagery that involved some form of perceived threat to themselves or to a loved one.^{26,27} This elicits an intrinsic sense of emergency, and the patient's corresponding emotionally charged responses to these perceived threats were often the cause of injury.²⁸ Such pattern of vehement dream enactments in NREM parasomnia has to be distinguished from the dream enactment of REM parasomnias. Furthermore, available reported cases on violent somnambulism refer almost exclusively to adults.¹⁰ This phenomenon parallels the gradual development of cognitive abilities and dream imagery in children, where children have fewer dreams than adults.²⁹ As a result, children likewise have less frequent reports of the mental content of NREM parasomnia episodes than adults.^{10,29}

The ICSD-3 does not acknowledge sleep-related violence to be a separate pathophysiological subtype, although it mentions the possibility of nocturnal violence for disorders of arousal.¹¹ Similarly, the DSM-5 mentions that violence during sleepwalking as likely to occur in adults,^{2,11} and not as a subtype of parasomnia.²

The law and NREM parasomnias

English common law may describe a legal tradition, rather than reflective of current territorial jurisprudence. For example, the influence of the English common law on the development of Singapore law may be more evident in traditional common law areas (e.g. Restitution) than in other statute-based areas (e.g. Criminal Law).³⁰ It should also be noted that within the UK, there are differences in Scotland and Northern Ireland, which maintain some of their own laws and precedents. Similarly, former dominions such as Canada and former colonies such as Singapore have developed their own Constitutions, Acts of Parliament, and case law. Singapore law, which was enacted since independence and includes the Penal Code, has not specifically addressed the issue of culpability in cases of sleep-wake disorders, and there are no legal precedents of such cases. In the absence of legislation and legal precedent, the Singapore courts may choose, as they often do, to use precedent cases in the UK and Commonwealth

countries with similar legal frameworks but these precedents are not binding. This review does not discuss other countries with other legal systems.

There is substantial interest in the forensic ramifications of sleep-related behaviours, such as personal injury, inappropriate sexual behaviours and homicide.¹³ Although these behaviours occurring during sleep are rare, they come with troubling legal and forensic implications for adjudicating criminal responsibility.³¹

In the English legal tradition, criminal liability requires the presence of 2 elements: *actus reus* (i.e. guilty act) and *mens rea* (i.e. guilty mind).³² This is derived from the Latin maxim “*actus non facit reum nisi mens sit rea*”, which means “the act does not make a person guilty unless the mind is also guilty”.³³ Presence of both elements are required before a person can be convicted of an offence.

When violent behaviour and harm towards others occur, the law considers citizens to be responsible unless medical testimony can convincingly establish the absence of consciousness, such as during sleep or an epileptic seizure.³¹ Hence, the diagnosis of NREM parasomnias has been raised as a legal defence to deny *mens rea* for the crimes alleged, including road traffic accidents, rape, murders and attempts to conceal forensic evidence.⁸ Sleep medicine practitioners are increasingly requested to render their opinions on legal issues pertaining to violent or injurious behaviours allegedly arising from sleep.¹⁶ In NREM parasomnia where there is no “state of mind”, and the absence of the requisite *mens rea*, an individual cannot be convicted of a criminal offence⁸ except in possible instances of negligence, which will be discussed later.

Although acts that occurred in the context of somnambulism have challenged traditional legal theories of criminal culpability, little has changed in the application of sleep science to criminal responsibility since the late 19th and early 20th centuries.⁸ Society continues to struggle with the concept of violent behaviours and criminal acts during sleep, and individuals who use episodes of NREM parasomnia to establish a legal defence are often viewed as malingering and exploiting the legal system.³¹ Given the lack of conscious awareness and control during these sleep behavioural episodes, deleterious consequences can ensue unpredictably, and with no forewarning in individuals with usually benign and non-violent NREM parasomnias.¹⁰

Automatism

During an episode of NREM parasomnia, the individual is capable of performing acts that are not the product

of any “conscious” decision or will. Thus, actions in legally unconscious states are termed “automatisms”.^{8,34} Automatism would not be deemed an *actus reus* of a crime as it is not a voluntary act. “Sane” automatisms have an external cause, such as hypoglycaemia (e.g. caused by a blow to the head).³⁵ “Insane” automatisms, on the other hand, are a result of internal factors—such as brain tumour or a psychological disorder—and are referred to as “diseases of the mind”. Idiopathic cases of NREM parasomnia and those associated with family history would also be categorised as insane automatisms. Where sane automatisms can result in complete acquittal, insane automatisms traditionally result in compulsory confinement in a psychiatric facility.³⁵

Insanity

Somnambulism has also been considered a variant of the insanity defence for criminal acts during sleep. The insanity defence undermines the *mens rea* requirement by establishing that at the time of the crime, the defendant lacked the mental capacity to comprehend the nature of his act or to distinguish between right and wrong in accordance with the law.³¹ This requires an extensive psychological and psychiatric examination by experts to determine if a mental disorder or defect had impaired the defendant’s ability to conform to the law at the time of the crime, and the experts will then have to testify at trial.³⁶ In England and Wales, somnambulism is classified as insane automatism because an internal factor must be involved for the behaviour complex to be evoked. When a sleepwalking episode is triggered by a sudden arousal from an external factor such as a blow, it is classified as sane automatism.³⁷

The defence of insanity for crimes arising from somnambulism, however, is rarely pleaded in the UK.³⁸ This is because modern legal systems are abandoning the classification of somnambulism as an insanity defence, as criminally insane defendants are often admitted to a mental institution, which is an inappropriate treatment for sleepwalkers.³⁹ Another major problem with the current legal system is the endeavour to label automatism as sane or insane, which is stigmatising and medically untenable, and hence should be dropped.³⁷ Instead, Popat and Winslade proposed to consider that different factors may evoke automatisms or NREM parasomnias in individuals differently.³⁵ Accordingly, there should be varying levels of legal responsibility and appropriate legal consequences for cases where an offence occurred as a result of NREM parasomnia.³⁵ In cases where automatisms were caused by factors within one’s control, the individuals should be held legally accountable for their actions. On the other hand,

individuals who exhibit automatism due to factors that are out of their control should not be held responsible for their actions.^{31,35} Consider, for example, an individual who has been accused of an offence during an episode of NREM parasomnia triggered by excessive alcohol consumption. In the current jurisprudence, it would be classified as sane automatism because the episode was triggered by an external factor. Hence, the individual may be acquitted as he did not have full mental capacity while he was intoxicated, despite the voluntary act of getting drunk. The new schema, in contrast, would hold the individual legally responsible for his actions as the automatisms were triggered by factors within his control.³⁵

Physiological features of NREM parasomnia

A new theory known as “state dissociation theory” was developed to understand NREM parasomnias, in which brain activity lies between the sleeping and waking states.³⁵ According to this theory, sleep and wakefulness are neither dichotomous nor mutually exclusive, and can mix or oscillate rapidly. Typically, the body’s physiological mechanisms synchronise or line up for one particular state. However, in the case of somnambulism, although the body prepares to enter the deep stages of NREM sleep, some important mechanisms do not occur and significant motor activity (an aspect of wakefulness) remains.⁴⁰ Studies conducted on NREM parasomnia using PSG found that 97% of patients with somnambulism displayed an abnormal motor behaviour or sustained muscle activity during an episode of NREM parasomnia or when there was one hypersynchronous delta wave arousal.¹⁵

Although this apparent conflict of activation appears to result in NREM parasomnias, it does not explain why certain NREM behaviours occur in some people but not in others. Currently, video PSG is not performed for routine evaluation of NREM sleep parasomnia as it has limitations in differentiating between patients and normal sleepers due to its low sensitivity for positive diagnosis.⁴¹ Instead, video PSG is utilised only to rule out differential diagnoses, including REM sleep behaviour disorder, sleep-related epilepsy, and other sleep disorders such as obstructive sleep apnoea syndrome.¹⁰ Further research is needed to elucidate the exact mechanisms that enable this state dissociation, and the causative factors or triggers that are unique to NREM parasomnias.

The first documented probable case in England arose in 1686 when Colonel Cheyney Culpeper shot and killed a guardsman and his horse. He was tried and convicted of manslaughter by reason of insanity at the Old Bailey in London. Culpeper, who was known to be a sleepwalker,

was eventually pardoned by King James II.⁴² Over the centuries, there have been several cases of interest, with judgements largely based on applications of the concepts of automatism, consciousness and sanity. The defence of somnambulism has hitherto not been raised in Singapore to date. There may come a time when Singapore courts will have to consider the plea, with the opportunity for it to be better dealt with.⁴³

One of the first few cases in this region where the defence of automatism was asserted took place in 1955 (prior to the independence of Malaysia and Singapore) in an appeal case of *Sinnasamy v Public Prosecutor* [1956] 1 MLJ 36 Court of Appeal (Malaya).⁴⁴ In this case, the appellant was accused of murdering his infant daughter. An expert witness testified that the appellant was epileptic, but further stated that although automatism is associated with epilepsy in some cases, an individual acting under automatism would not have been conscious. Automatism is often perceived as amounting to a lack of consciousness rather than an inability to control one's actions. It was so regarded by the Malayan Court of Appeal in this case.⁴⁵ As the appellant was able to relate in great detail what transpired immediately before and after the alleged offence, the Court of Appeal hence concluded that the appellant was conscious at the time of the crime and was not acting in a state of automatism.

In a subsequent case of *Public Prosecutor v Kenneth Fook Mun Lee* (No. 1) [2002] 2 MLJ 563 (High Court of Malaysia), the accused was having a hypoglycaemic attack at the time of an alleged murder. This resulted in a state of automatism, which the judge referred to as “a state of defective consciousness in which a person performs unwilled acts”.⁴⁶ It was further remarked that “[t]he defence of automatism can be reduced to the question whether at the material time the accused had the mental capacity to form the particular mental ingredients of the crime with which he is charged”.⁴⁶ As the cause of the accused's hypoglycaemic attack was not known and was likely to recur, the Malaysian High Court thus concluded that the case was classified as insane automatism.

Rather than consciousness per se, the necessary component of automatism and actus reus is the impaired mental capacity to restrain and control one's behaviour. There is the danger of associating automatism with unconsciousness as illustrated in the cases before, and it would be too restrictive to limit automatism to cases where an individual is totally unconscious. Cases have been presented where the individual is in a dream-like state, such as during an episode of NREM parasomnia, and the capacity to consciously control one behaviour

is compromised. It is crucial to understand that it is not unconsciousness per se, but incapacity that renders an act as involuntary.⁴³

In Singapore, a search of the public databases and court files showed that NREM parasomnia was mentioned in only 1 case in 2018, in *Public Prosecutor v Thompson Matthew* [2018] SGMC 22 at the State Courts of Singapore.⁴⁷ An Australian veterinarian was charged with outraging the modesty of a flight attendant on a Singapore-registered aircraft. According to the first charge, he was accused of using his left hand to touch the victim “at her right hip, over her stomach until her lower breast in one motion”.⁴⁷ According to the second charge, he used his left hand to touch the victim “at her right hip and over the stomach in one motion”.⁴⁷

During the trial, the victim testified that upon being first touched, she asked the defendant, “Sir, are you okay? Would you like some water?” and pushed his hand away. She “noticed the Accused looking at her blankly, and that his eyes were red and puffy. She did not notice any alcoholic smell around him. The Accused did not respond to her and continued to stare blankly at her”.⁴⁷ This happened 4 hours into the flight. Within the first 2.5 hours of departure, the defendant had consumed 4 alcoholic drinks, and reportedly fell asleep.

The role of sleep disorder specialists and expert witnesses

In the above case, the defence had brought testimony from a psychologist in Australia who diagnosed the defendant with mixed anxiety and depression, and reported that the defendant had undergone a course of psychotherapy. The defence also reported that an Australian medical doctor had given venlafaxine for generalised anxiety disorder, and doxylamine succinate, an antihistamine used for mild insomnia, which the defendant had taken prior to the flight. Furthermore, he was sleep-deprived before boarding the flight. After he was charged, the defendant saw a Singapore psychiatrist, who testified that the accused's behaviour appeared to have been an involuntary exaggerated startle response directly related to his underlying generalised anxiety disorder and being awakened from sleep.

During the examination by the defence counsel, the psychiatrist opined that besides the startle response, the accused also “likely experienced a ‘disorder of arousal’ when he transitioned from deep non-Rapid Eye Movement sleep to wakefulness”.⁴⁷ However, upon cross-examination, the psychiatrist stated that he “did not diagnose the Accused with disorder of arousal in his report and that it would be dangerous to make a

psychiatric assessment of such a disorder on the basis of the few facts that had been put to him in court, since there is a rigorous set of interviews and history-taking before psychiatrists can come to a psychiatric assessment and diagnosis”.⁴⁷ The psychiatrist further testified that while he “considered doing a polysomnography [sic] on the Accused, he had decided against it as it would have been difficult to replicate all the conditions surrounding the commission of the alleged offences including the level of his sleep deprivation and the level of blood alcohol”.⁴⁷

With regard to disorder of arousal, the District Judge found that since the psychiatrist was “not prepared to make a diagnosis of a disorder of arousal in the absence of history-taking from persons who have observed the patient and witnessed the manifestations of the disorder, or an assessment by a neurologist or sleep disorder specialist”⁴⁷ and “was not prepared to accept that the Accused had committed the offending acts in the two charges as a result of a disorder of arousal”,⁴⁷ the accused was found guilty of outrage of modesty on both counts. The case was appealed to the High Court, but the issue of disorder of arousal did not arise in the appeal.

Forensic evaluation for NREM parasomnia

Forensic evaluation for NREM parasomnia includes psychiatric history (including family and personal history of sleep disorder), and complete physical and neurological examinations.²² Even though a full night of PSG with audiovisual monitoring is warranted, complex sleep behaviour episodes may not be captured as NREM parasomnia episodes are less likely to occur in clinical settings.⁴⁸ In order to address this, sleep behaviour can be monitored at home using a portable PSG recorder.⁴⁹ Alternatively, common provocative tests, such as alcohol ingestion and sleep deprivation prior to the sleep study, may be undertaken to evoke and replicate the sleep behaviour.⁵⁰

Despite great advances in sleep medicine, such as in the use of electroencephalography, sophisticated imaging techniques to monitor sleep, and the recognition of the comorbidity between parasomnias and psychiatric disorders, it is difficult to discern between true and fraudulent claims of NREM parasomnias. This is because circumstances can never be reliably reproduced. Thus, ascertaining whether a criminal act arose as a result of a sleep disorder, dissociative disorder, or deliberate behaviour with denial of recall is a challenge.^{8,11} For example, the utility of PSG and technical scientific data from a formal sleep study would only indicate if the defendant has an NREM parasomnia disorder, with no relevance as to whether an NREM parasomnia episode

was occurring at the time of the incident. PSG as a diagnostic tool is not associated with the crux of the legal focus on the defendant’s *mens rea* in a criminal allegation. Thus, PSG is not routinely performed as part of a medicolegal evaluation.⁵¹

DISCUSSION

NREM parasomnias lie at the very intersection of sleep medicine, forensic neuropsychiatry and jurisprudence. Currently, the term “conscious” is used legalistically in the sense that consciousness and unconsciousness are binary and dichotomous states. However, in scientific reality, they exist on a continuum from coma to hyperarousal states like panic attacks and psychosis.⁵² Similarly, in legal parlance, an act is either voluntary or involuntary, whereas the extent of voluntariness may in fact be nuanced, e.g. in the case of tics and choreas. In English common law, the legal defence of automatism is divided into 2 explicit categories: sane and insane automatisms,³¹ again in a manner supposing that sanity is “all or nothing”.

The medicolegal aspect of NREM parasomnia is particularly complex, with little evidence to support judgement in court, and expert evidence is largely opinion-based—built on history from patients, family and friends, and eyewitnesses. There is a need to increase scientific knowledge on the different aspects for diagnosis, pathophysiology and treatment modalities of NREM parasomnias, and to critically re-examine legal perspectives on behaviours occurring during sleep. Empirical studies investigating the pathophysiology of NREM parasomnias may offer reliable and clear diagnostic guidelines and insight into complex behaviours of NREM parasomnias that often come with medicolegal implications.¹¹

CONCLUSION

An undiagnosed or incorrect diagnosis of NREM parasomnia can have significant medicolegal implications. If incorrectly diagnosed, the guilty or potentially dangerous individual may go free. Conversely, an individual with a treatable but unrecognised NREM parasomnia may be wrongly incarcerated.⁸ In spite of the dearth of evidence to support both medical and legal decisions in this area, it is imperative to recognise and diagnose NREM parasomnias properly.

Formulating guideline recommendations is, however, beyond the scope of this review, but the proposal has indeed been suggested.^{8,37,53} Clearer guidelines can ensure that assessment is supported by strong evidence, based on prevalence and pathogenesis of criminal behaviours

in sleep. This can help address the challenges and ambiguities of presenting legal cases related to sleep disorders in the courtroom setting. It can ultimately assist the jury in making a well-founded decision on the presence of mens rea associated with the alleged criminal act. Over 2 millennia ago, Socrates was particularly astute when he summed it up with this quote from Plato's *The Republic*, “in all of us, even in good men, there is a lawless wild-beast nature, which peers out in sleep”.

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