

Parasomnia: Describing What Goes Bump in the Night
and
More than Something to Lose Sleep Over

by

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PARASOMNIA: DESCRIBING WHAT GOES BUMP IN THE NIGHT
AND
MORE THAN SOMETHING TO LOSE SLEEP OVER

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ABSTRACT

Sleep disorders known as parasomnias are characterized by undesirable behaviors occurring during the sleep period. Recently, new and different parasomnias have been emerging, some relatively harmless, but others complicated enough to involve legal issues. This thesis uses a content analysis comprised of eighteen medical charts of parasomnia patients from two physicians and attempts to provide an overall profile of a parasomnia patient. The findings of this thesis indicate that there are certain demographic characteristics or traits shared among parasomnia patients. Also, this thesis did not find that most of the subjects were overweight or on sleep medications, contrary to expectations. Lastly, there was a connection found between certain parasomnia patients having legal issues. Future studies should include possible risk factors like sleep deprivation, stress, and use of alcohol or drugs when studying parasomnia patients as well as enhancing certain methodological aspects this thesis points out are limiting.

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CHAPTER 1

INTRODUCTION

There really are things that go bump in the night, and they are worth losing sleep over! They are called parasomnias, and they are nothing new. According to the *International Classification of Sleep Disorders Second Edition 2005*, parasomnias are undesirable physical events or experiences that occur during entry into sleep, within sleep, or during arousals from sleep, and are often under recognized and misunderstood. Parasomnias encompass abnormal sleep-related movements, behaviors, emotions, perceptions, dreaming, and autonomic nervous system functioning. Parasomnias are clinical disorders because of the resulting injuries, sleep disruption, adverse health events, and untoward psychosocial events (Sateia, 2005). The clinical consequences of parasomnias can affect the patient, the bed partner, or both.

Sleep, according to *Principles and Practice of Sleep Medicine*, is a reversible behavioral state of perceptual disengagement from and unresponsiveness to the environment. Sleep is also understood as the natural and periodic state of rest during which consciousness of the world is suspended, and the powers of the body are restored. Sleep was once thought of as an inactive process, a sort of “time out” from life, but is now understood to be a very dynamic process that takes place in the brain.

Recently, new and different parasomnias have been emerging, and are occurring more frequently than ever before (Roman, 2009). Traditional parasomnias include things like sleep walking, sleep terrors, bed wetting and sleep talking, but recently dimensions of parasomnias such as sleep eating, sleep driving, sleep violence

and sleep sex have been making headlines in the general media. For example, a woman wakes up to find she has eaten all the butter in the refrigerator, or a wife says her husband initiates sex in his sleep and is far more aggressive and amorous than when he is awake. The majority of the new behaviors are thought to be the result of the 24 hour society (Roman, 2009), where people are getting less sleep than ever before, and others are thought to be caused by prescription sleeping pills or breathing problems. Still others are of unknown etiology.

Because some parasomnias are more recently discovered behaviors, and not much is known about how and why they occur, it is of interest to further study them (Kryger, 2005). Left untreated or sometimes misdiagnosed as psychiatric problems, parasomnias can have negative consequences with people hurting themselves or others, causing social or family problems and even legal dilemmas.

The topic is of interest to the researcher because parasomnias are often under-recognized and misunderstood (Fulda, 2008). The research will enhance the understanding of parasomnias, and will allow the researcher the ability to be a valuable resource to physicians and other health care professionals involved in treating parasomnias.

Purpose of the Study

The purpose of this thesis is to describe a profile of parasomnia patients. The focus is on addressing the question “what is the general description of a typical parasomnia patient?” Relationships among things like demographics, legal issues, and health concerns will be investigated.

There is new attention being paid to parasomnias, but there needs to be more. This thesis is an attempt to describe certain aspects of parasomnias. In short, this thesis will shine the light on a topic that until recently has been mostly in the dark.

The investigation uses a retrospective cohort design coming from medical chart histories from two physicians and attempts to deliver a patient profile of a parasomnia patient. In this thesis, the focus is on certain characteristics of these parasomnia patients.

Statement of the Problem

The purpose of this study is to investigate the characteristics of a parasomnia patient. Given the relatively high prevalence of parasomnia disorders in healthy people (Kryger, 2005), it is imperative that health care professionals know as much as possible about parasomnias. Future research can build on these findings in order to help health care providers to target and intervene early on in the care of the parasomnia patient. This thesis aims to help sleep medicine professionals and other health care providers to target these patients to minimize any personal, social or legal consequences involved.

Hypothesis

There are three hypotheses pursued in this investigation. The first hypothesis proposes that parasomnia patients will have certain demographic traits, including gender, age, and ethnicity. Specifically, parasomnia patients will be more likely to be male, middle-aged, and white than female, young or old, and a minority. The

second hypothesis is that the majority of parasomnia patients will have certain health concerns; they will be overweight and on sleep medications. The third and final hypothesis puts forth that most parasomnia patients will be involved in legal issues related to their diagnosis.

Summary

Parasomnias are undesirable events or experiences that occur during sleep. They can have detrimental effects on not only the person with the parasomnia, but the bed partner or family members as well. In addition, parasomnias can result in injuries, sleep disruption and untoward psychological, social and legal ramifications.

Chapter II is a review of the literature that discusses sleep, parasomnias, and the new and different parasomnias developing. It also discusses the 24 hour society, thought to possibly play a part in the development of the more recently discovered parasomnias.

Chapter III presents the methods and procedures used to analyze the data. This information includes the design, the parameters of the study, and the guidelines used for the analysis.

Chapter IV presents the results and findings of the research. It looks at the data as it relates to the three hypotheses.

Chapter V summarizes the major findings, and discusses implications of the findings. Chapter V also presents the limitations of the research and concludes with recommendations for future research.

CHAPTER II

LITERATURE REVIEW

With a rise in the incidence and types of parasomnias, it is important to gain more of an understanding of who might experience them. The framework for the literature review consists of different topics including an overall view of sleep, the results of the Center for Disease Controls's Behavioral Risk Factor Surveillance Survey data on quality of rest, a synopsis of parasomnia in general, how today's society seems to impact parasomnias, and a closer look at the more recently identified parasomnias.

Sleep

Sleep has been of interest to researchers for well over a century, and the field of sleep medicine has existed for about four decades (Kryger, 2005). The evolution of the field involves clinical research, development of clinical services, and changes in society and public policy that have recognized the impact of sleep disorders on society. The field is still evolving as new disorders are being discovered, new treatments are being delivered, and science is lending an understanding of the complexity of sleep and sleep disorders (Kryger, 2005).

Compared to other body functions, very little is known about sleep. Sleep is fascinating and is the natural state of bodily rest observed in humans and other mammals. The outward appearance of sleep seems very passive and simple, but contains underlying brain activity that is very complex. For a long time, no real distinction was made between sleep and other states of quiescence such as coma, stupor, intoxication, hypnosis, anesthesia, and hibernation (Kryger, 2005). Waking up and being awake were

thought of as a reversal of the sleep process (Kryger, 2005). It was once thought that the brain would rest when you slept, but sleep actually is an active process that files and stores away the day's events (Roman, 2009). It wasn't until the discovery of rapid eye movement, that sleep was regarded as an active state (Kryger, 2005).

In the 1930's at Harvard University, researchers discovered the electrical activity in the brain during sleep. On the human electroencephalogram (EEG), sleep was characterized by high-amplitude slow waves and spindles, whereas wakefulness was characterized by low-amplitude waves and alpha rhythms. The image of the brain being completely "turned off" gave way to the image of the brain being engaged in slow, synchronized idling neuron activity (Kryger, 2005). Although not recognized at the time, this was one of the most critical turning points in sleep research (Kryger, 2005).

Sleep, unlike coma, is defined as a normal and reversible state of disengagement from the environment (Wills, 2002). Sleep is one of many daily rhythms synchronized to the earth's 24 hour geophysical cycle (Schwartz, 1987). The sleep-wake cycle is regulated by the circadian biological clock, and sleep/wake homeostasis. Disorders of the sleep-wake cycle are classified in two categories, transient and persistent (Schwartz, 1987).

Sleep length and depth vary markedly between individuals. The average total sleep period ranges between four to ten hours. Sleep duration and organization, also called sleep architecture, also vary as a function of age. Newborns and children spend more time in deep sleep than adults. As people age, sleep becomes more fragmented with less time spent in deep sleep. Total sleep time is highest in infancy, decreases to adult levels, and declines with old age (Schwartz, 1987).

Ideally, sleep should be both efficient and effective, to allow for maximal daytime function. In parasomnia patients, however, there is an abnormal sleep pattern of arousal disorders that can complicate the typical sleep cycle.

There are two defined states of sleep: non-rapid eye movement sleep (NREM) and rapid eye movement (REM). NREM sleep is divided into four stages. Stages 1 and 2 are lighter sleep and stages 3 and 4 comprise a deeper sleep. During stage 1 sleep, muscles relax and brain waves are rapid and irregular. In stage 2 sleep, brain waves become larger, with bursts of electrical activity. During stages 3 and 4 sleep, also known as delta sleep or slow wave sleep, the brain produces large, slow waves. Slow wave sleep is more difficult to awaken from. This is when many restorative processes occur in the body. Slow wave sleep builds the immune system, consolidates memory, restores muscle, processes stress, and repairs damage to cells. Slow wave sleep leads to recuperation. After an hour or so, sleep shifts to a highly active stage known as REM sleep. During REM sleep, brain waves are almost as active as the awake state. This is when dreaming occurs (Kryger, 2005).

A normal sleep pattern consists of four to five sequences of stages 1, 2, 3, 4, and REM, with an increasing duration and percentage of REM episodes as the night progresses. Although REM and NREM sleep are defined as electrical recordings, they are also characterized as states of physiologic events. Blood pressure, heart and respiratory rates decrease during progressive stages of NREM sleep, and fluctuate abruptly during REM sleep. REM sleep alternates with NREM sleep every 90-100 minutes (Schwartz, 1987).

The percentage of REM sleep time during a typical night is approximately 20% to 25 %. Periods of REM tend to be shorter in the early cycles of the night. REM sleep is not divided into stages, but is characterized by muscle atonia and episodic bursts of rapid eye movement. The mental activity of REM sleep is associated with dreaming based on vivid dream recall reported after approximately 80% of arousals from this state of sleep. Therefore, a short definition of REM sleep is a highly active brain in a paralyzed body. This typical human sleep pattern has been documented over and over in both sexes, in different cultures, and across the life span (Kryger, 2005).

In general, a number of statements can be made about a normal young (older adults typically experience a slightly different pattern) adult's night's sleep:

1. Sleep is entered through NREM sleep.
2. NREM and REM sleep alternate with a period of 90 minutes.
3. Slow wave sleep predominates the first one third of the night.
4. REM sleep predominates the last third of the night.
5. Wakefulness in sleep generally constitutes less than 5% of the night.
6. Stage 1 sleep generally constitutes 2% to 5% of sleep.
7. Stage 2 sleep generally constitutes 45% to 55% of sleep.
8. Stage 3 sleep generally constitutes 3% to 8% of sleep.
9. Stage 4 sleep generally constitutes 10% to 15% of sleep.
10. NREM sleep is usually 75% to 80% of sleep.
11. REM sleep is usually 20% to 25% of sleep occurring in 4 to 6 episodes.

(Kryger, 2005).

After a person experiences sleep loss on one or more nights, the sleep pattern will show more slow wave sleep, or NREM sleep, during recovery the following night. REM sleep usually recovers only after slow wave sleep recovers. A person's tolerability to sleep loss seems to vary among individuals (Kryger, 2005).

The classification of sleep disorders is constantly evolving, with approximately eight to fifteen percent of the adult population in the United States having frequent and chronic complaints about the quality and the amount of their sleep. Certain lifestyle choices including late-night television, internet use, caffeine or stimulant consumption like alcohol or nicotine can result in sleep loss. Sleep disorders like insomnia, breathing disorders, sleep apnea, restless legs syndrome, narcolepsy, and shift disorders can result in sleep loss as well. Sleep disorders are associated with mental disorders like depression and anxiety, as well as obesity, hypertension, diabetes, high cholesterol, and behaviors such as cigarette smoking, inactivity, and heavy drinking (CDC, 2008).

The Center for Disease Control (CDC) in collaboration with state health departments conducts a state-based random telephone survey of noninstitutionalized United States civilians over 18 years of age every year called the Behavioral Risk Factor Surveillance Survey (BRFSS). Because sleep disorders and sleep loss can reduce the quality of life and productivity, increase the use of health care services, and result in injuries, illness or death, the BRFSS incorporated a question in the survey asking participants "During the past 30 days, for about how many days have you felt you did not get enough rest or sleep?". The question was asked to residents in four states, specifically Delaware, Hawaii, New York, and Rhode Island. Among all respondents, 30% reported no days of insufficient rest or sleep every day during the preceding 30 days.

Hawaii respondents reported higher rates of sufficient rest (38.%) versus 28% of people in Delaware and New York and 29% in Rhode Island (McKnight-Eily, 2008).

In the BRFSS, the prevalence of no days of insufficient sleep or rest increased with age. Also, as education increased, a smaller percentage of respondents reported no days of insufficient sleep or rest. Responses categorized by race/ethnicity and sex did not differ significantly. On average, 10% of respondents reported insufficient rest or sleep every day during the preceding 30 days (McKnight-Eily, 2008).

Parasomias

Parasomnias are undesirable physical events or experiences that occur during entry into sleep, during sleep, during sleep transitions, or during arousals from sleep. Parasomnias often involve complex, seemingly purposeful, and goal-directed behaviors, which are performed with some personal meaning to the individual at the time despite the illogical nature of the behaviors. They are manifestations of central nervous system activation transmitted into skeletal muscle and autonomic nervous system, often with experiential concomitants (Sateia, 2005). Parasomnias encompass abnormal sleep behaviors, emotions, perceptions, movements and dreaming. Instinctual behaviors are often released inappropriately, as seen with sleepwalking (locomotion), sleep violence (aggression), sleep eating disorder (feeding), and sleep sex (sexual behaviors). These basic “drive” states, all promoting survival of the species, can emerge and result in injuries, sleep disruption, adverse health effects, and unwanted psychological effects.

Parasomnias are nothing new. They have been documented for hundreds of years (Roman, 2009). Parasomnias include things like sleepwalking, sleep terrors, sleep-

related bed-wetting, nocturnal seizures, and other more recent developments like sleep sex, sleep eating, sleep violence, and sleep driving. Lately, there has been an increase in these new and different parasomnias, due in part to technology's effect on society, and possibly also related to some prescription medications that are on the market (Roman, 2009). As today's researchers learn more about sleep, it will hopefully shed more light on parasomnias, as well.

The word parasomnia is derived from the Greek prefix of para, meaning "along side of", and the Latin word "somnus" which means to accompany sleep. As parasomnias are being more carefully studied, it is becoming apparent that they are not a unitary phenomenon, but rather are due to a large number of completely different conditions, most of which are diagnosable and treatable. Most are far more prevalent than previously thought (Kryger, 2005).

Approximately 6% of the general population experience parasomnias, while parasomnias in children are considered normal with about 15% prevalence (Kryger, 2000). Although many children experience parasomnias, it is not understood why only certain adults continue to experience them, while others wane during adulthood (Roman, 2009). According to Kryger, data on the incidence of parasomnias is unclear for many reasons. One reason is the data are scattered among different larger health surveys instead of being identified in literature searches with the use of appropriate key words. Kryger also says that many of the surveys were retrospective and performed in variable study populations with variable definitions. The definition of parasomnias, and the wording of questions is a major problem for determining the prevalence as well. It is also possible that sleep terror as a medical entity is largely unknown to people and

therefore underreported or reported as different things. An additional problem, according to Kryger, is the likelihood that parasomnias often go unnoticed. Unless a cohabitating person reports the behavior, the parasomnia patient may be unaware of the symptoms or the behavior.

There is a wide variability in the knowledge of sleep disorders. For some, like narcolepsy or insomnia, there is a plethora of information in the form of research or literature (Sateia, 2005). For others, like parasomias, there is far less. *The International Classification of Sleep Disorders Diagnostic and Coding Manual* (ICSD) put out by the American Academy of Sleep Medicine, has sorted sleep disorders into 8 categories, and has listed one of these categories as parasomnias (Sateia, 2005). These can be seen in Appendix A.

Parasomnias are disorders that intrude into the sleep process, causing behaviors and experiences that are usually infrequent and mild. “Classic” parasomnias include things like sleepwalking (somnambulism), sleep terrors, and other confusional disorders (Parasomnias, 2009). These disorders tend to run in families, and are more common in children. Certain medications and being overly tired can exacerbate the condition. If it is a severe enough case that involves violence, excessive eating, or disturbs the bedpartner or family, treatment by a sleep specialist may be necessary. Key features of parasomnias include age of onset, time of night of the events, characteristics of the behavior, memory of the events, and family history (Kryger, 2005).

Parasomnias as a primary sleep disorder (one not caused by disorders of other organ systems) do not appear to be related to physical or mental illness and are not substance-induced (Sharma, 2007). Secondary parasomnias occur when organ systems

take advantage of the sleep state to declare themselves, like sleep apnea, gastroesophageal reflux, or seizures. Unlike dyssomnias, which are characterized by abnormal sleep quality and amount of sleep, parasomnias are distinguished by deviant behavioral or psychological events (Sharma, 2007). Parasomnias can affect sleep, health, and social function.

According to the *ICSD*, parasomnias can be separated into 15 categories. This research will look at the two major categories of the disorders; disorders of arousal, also known as non-rapid eye movement (NREM) sleep disorder, and rapid eye movement (REM) sleep behavior disorder (RBD), a REM sleep disorder. Both are of interest in order to study bizarre sleep behaviors.

Disorders of arousal, or NREM sleep disorders, are the most frequent parasomnias and represent a partial, as opposed to a full, awakening from deep NREM sleep. They tend to arise from slow wave sleep (stages 3 and 4 of NREM sleep) and typically occur in the first 60-90 minutes after sleep onset. Typical NREM parasomnias are confusional arousals, sleepwalking, and sleep terrors. Specialized forms include sleep related eating disorder and sleep sex (Kryger, 2005). The patient arouses, but does not emerge to conscious wakefulness (Wills, 2002). The brain is awake enough to perform very complex motor or verbal actions, but is asleep enough not to have conscious awareness or responsibility for the actions. Rarely are NREM episodes recalled by the sleeper. NREM parasomnias are thought to arise clinically at the time of transition from one stage of sleep to another (Wills, 2002).

Arousal disorders, or NREM disorders, occur in 4% of adults, and up to 17% of children (Mahowald, 1999). There appears to be a familial predisposition to arousal disorders, but no specific patterns have been identified (Wills, 2002).

The majority of NREM parasomnias are mild in severity, and require no intervention. Reassurance that these do not represent psychiatric illness, along with education on sleep architecture (stages and cycling) and sleep hygiene (good sleep practices to avoid sleep deprivation) are important in patient care. Night terrors or sleep terrors lie at the dramatic end of arousal disorder spectrum. They typically involve screaming, running, flailing, or striking out with limbs, along with signs of agitation and fearfulness, such as tachycardia, tachypnea, and sweating. Patients can unintentionally hurt themselves or others during an episode (Kryger, 2005). Treatment is often not necessary, but sometimes tricyclic antidepressants or benzodiazepines are used (Kryger, 2005).

REM sleep behavior disorders (RBD) occur when not all of the features of REM sleep are present, and result in a bizarre disorder. Muscle atonia (paralysis) is absent from REM sleep, and dreams can be acted out, often with violent or injurious results. Most patients who act violently during RBD remember and recall having a nightmare. Typically the dream consists of being attacked by animals or unfamiliar people, and the dreamer will either fight back or attempt to flee. Fear, rather than rage, is the accompanying emotion reported. An ironic situation was produced by RBD when a dreaming husband would fight to defend his wife from an aggressor while actually striking her in bed. Her screaming would awaken him from the unfortunate incident

(Kryger, 2005). Idiopathic RBD is a chronic progressive disorder, with increasing complexity, intensity, and frequency of expressed behaviors.

The RBD can affect both sexes at any age, but typically affects middle age to older men, many of whom will eventually develop neurodegenerative disorders like Parkinson's disease or dementia. RBD may be the first manifestation of these conditions, and usually precedes them by more than 10 years. Reports indicate that 25% of patients with Parkinson's disease exhibit RBD behavior or have sleep-related injurious episodes, and up to 47% of Parkinson's patients have sleep-related complaints (Kryger, 2005).

Increasingly, it is discovered that selective serotonin reuptake inhibitors (SSRI's) are the cause of RBD and the majority of patients respond to clonazepam (Kryger, 2005). Rarely does RBD appear to follow psychic trauma or to be associated with stress. The overwhelming male predominance of RBD raises the intriguing question of hormones, and the typical late age onset suggests an organic brain factor. One highly speculative theory of RBD suggests a delayed manifestation of REM sleep abnormalities occurring early in development (Kryger, 2005). Interestingly, there is no evidence of aggression during wakefulness in patients with RBD (Cramer Bornemann, 2006). Routine medical examinations should include questions that screen for abnormal sleep patterns, behaviors, and altered dreams especially in older adults, and those with central nervous system disorders.

There are a limited number of parasomnia or sleep-related movement disorder questions on general sleep questionnaires, and these assessments typically ask about nightmares and sleep walking. Recently, two questionnaires for nocturnal eating (an awake behavior) have been validated, and one RBD questionnaire has been developed

specifically screening for restless legs syndrome, a movement disorder (Fulda, 2008). Researchers in Munich, Germany published in 2008 the Munich Parasomnia Screening Questionnaire which is a self-rating 21 item instrument assessing the lifetime prevalence and frequency of parasomnias and nocturnal behavior in adults. The questionnaire asks about very specific behaviors and actions that occur during the sleep period and can be seen in Appendix B. This screening tool aims to provide to the clinician a quick overview of current or past nocturnal behaviors (Fulda, 2008).

The 24 Hour Society

With technology creating a true 24 hour society, researchers are seeing a rise in parasomnia incidents (Roman, 2009). The research in this area has not kept up with the increase in the types of parasomnias and why they are occurring more often, but are thought to be a result of today's hectic schedules. Sleep problems have become a modern epidemic that is taking a toll on our bodies and our minds. The 24 hour society has not happened by accident. Dual working-parent family households, pre-scheduled weekends, and the internet have all led there. The challenges of a 24 hour society have created things like all night pharmacies, restaurants, health clubs, 24 hour customer service, and weekend banking. Daycare often operates around the clock. Even the Exxon Valdez accident was a result of our 24 hour society (Barlow, 1993).

People are constantly trying to pack more and more activities into the typical day. The expression 24/7 is a reality. "It's a cultural earthquake that is changing the way we live. It's a slogan with its roots in the internet and its soul in hip-hop music. It's turning the way businesses operate upside down. And like a societal heartbeat, it keeps on

ticking” (Horovitz, 2001). With the 24 hour day, we are ignoring thousands of years of evolution and sleep that has always come at night. “This is your wake-up call: The night shift isn’t just for power-plant operators and assembly-line workers anymore. It’s also for software developers, web producers, stockbrokers, and customer service reps. The sun never sets on knowledge work. The new economy is open for business, 24 hours a day, 7 days a week” (Muio, 2007). Working around the clock may help companies keep up with the global marketplace, but it eventually takes its toll on the body. There’s no escaping the fact that the average person needs eight hours of sleep per night. During the week, however, the average person gets less than seven hours of sleep (Muio, 2006).

Patterns of behavior have changed over the years which have increased the speed and pace at which not only business transactions are conducted, but personal lives as well. The “hurry syndrome” and impatience are very typical of the times (Johnson, 2008). People steal nighttime hours for daytime activities, and end up cheating themselves out of precious sleep. Ultimately, this has affected sleep patterns. People are constantly battling fatigue because of their irregular sleep schedules. The 24 hour society makes for a sleep-deprived society.

Recently Discovered Parasomnias

The more recently identified parasomnias include sleep sex, sleep driving, sleep working, and sleep violence. Most people with parasomnias do not find themselves entangled with the law, with things like sleep eating or calling a friend, but certain parasomnias, like sleep sex, may pose a greater liability with the legal system and with

personal relationships. Sleep driving, when people get up, grab the keys, drive somewhere, and return home, most often occur without incident. This poses a great liability also. Sleep eating is a self-destructive behavior, and patients have no recollection of it in the morning (Sleep Eating, 2009).

Sleepsex, “sleep sex”, or “sexsomnia” is now listed in *The International Classification of Sleep Disorders* (ICSD-2). It is recognized as a subtype of a parasomnia, not a primary parasomnia. Sleep sex is a variant of confusional arousals or NREM parasomnia. It is thought of as a mixed state of wakefulness and sleep.

There are numerous reasons why sleepsex now has its own classification, including a growing awareness that abnormal sexual behaviors occur during sleep. The fact that sleepsex can often be identified through polysomnogram evaluations, and the forensic aspects of the disorder have commanded increasing attention (Schenck, 2007).

Some find sleepsex humorous, but most people find it disturbing, annoying, or embarrassing. It can be very difficult for couples, individuals, or bed partners. Typically, when someone is informed of the sleepsex behavior, they find it very hard to believe they behaved in that manner. Sexual behavior during sleep can vary from loud disruptive moaning, to sexual assault. There is even documentation of sleep-related homosexual behavior in heterosexual males. In most instances, adverse physical and/or psychosocial events were present due to the behavior (Schenck, 2007).

The forensic aspects of abnormal sleep related behavior has commanded increasing attention, and the question of how to distinguish normal from abnormal sleep related sexual activity needs to be considered as well (Schenck, 2007). Agitated or assaultive sleepsex behaviors, sleepsex with minors, and legal consequences affect a

large number of parasomnia patients. Typically sleepsex is more injurious to the bed partner than the parasomnia patient. There are times, though, that bedpartners express pleasurable aspects of the sleepsex behaviors. In one metaanalysis, 35% of the sexsomnia cases resulted in forensic consequences (Schenck, 2007).

Sleepsex behaviors include a number of different things like masturbation, sexual vocalizations and talking, sexual fondling, and intercourse. In general, females engage in masturbation and vocalization, while males commonly engage in fondling and intercourse (Schenck, 2007). Most sexsomnia cases are NREM parasomnias, and masturbation or intercourse before bedtime has no effect on the sleepsex behavior (Schenck, 2007). Some examples include:

- A 27 year old man “usually awoke” with an ejaculation between 2 am and 6 am during the preceding two years. He broke two fingers when he tore off restraints he used to avoid moving in bed. He also slept on the floor in futile attempts to avoid the undesired masturbation.
- A 26 year old married woman had a history of abruptly tearing off her clothing and masturbating violently during the first half of the night. Her masturbation was associated with soft to loud vocalizations and occasional vaginal discharge. If her husband interrupted the episode of masturbation, it might recur a second or a third time during the night. Any attempt to initiate intercourse after she was awakened was rejected, and she denied the behavior.
- A 38 year old man had sexually assaulted his wife during sleep between 3 and 5 am at least once every 15 days for 12 years. He would tear off his

wife's clothes, fondle her, and initiate sexual intercourse. His wife observed that he was "not present" and "unresponsive" while acting violently, and one time attempted to choke her.

- A sleepwalking 16-year-old male went sleepwalking into the bedroom of his aunt and uncle and started fondling his uncle's genitals.

(Schenck, 2007)

The good news is, sexsomnia appears to respond to therapy, alleviating both the behavior and the embarrassment.

Sleep eating is another sleep related disorder that is relatively rare, and is gaining recognition by sleep specialists. It is characterized by sleep walking and nighttime excessive eating. Sleep eating is considered an "other parasomnia" as opposed to a NREM or REM parasomnia in the ICSD-2 classifications. The sleeper may engage in complex behaviors, such as preparing food and eating full meals. Sleep eaters are unaware and unconscious of their behavior, and at best have a sketchy recall of the event (Talk About Sleep, 2009). One woman gained 100 pounds (Ambien, 2009). Sleep eating is different from nighttime eating disorder, as individuals are awake during nighttime eating.

Foods consumed during an episode of sleep eating are typically highly caloric, and not necessarily foods that are consumed during daytime hours. Simple foods or entire hot or cold meals can be prepared, and sloppy food handling often occurs. Sleep eaters consume a variety of unusual foods including things like frozen pizzas, raw bacon, salt sandwiches, buttered cigarettes, cat food, and coffee grounds (Sateia, 2005).

Alcoholic beverages are almost never consumed. Interference with an individual during sleep eating is often met with irritation or agitation.

Sleep walking is often part of a childhood history of the sleep eater. Females comprise 66% to 83% of the cases, and the mean age of onset is between 22 and 29 years (Sateia, 2005). The mean duration of sleep related eating disorder prior to clinical presentation was approximately 11 to 15 years, which suggests a chronic disorder.

A familial pattern with the disorder is not uncommon, but has yet to be proven (Young, 2008). There have been reports of sleep eating after smoking cessation, alcohol cessation, or substance abuse cessation (Sateia, 2005). Some sleep related eating disorder patients have documented obstructive sleep apnea (OSA). The OSA induced arousal episodes can cause weight gain, which can aggravate the OSA, and a vicious cycle can develop (Scheck, 2008).

Scheck (2008) describes a 34 year old male with obesity resulting from his sleep eating disorder. He also had symptoms of obstructive sleep apnea. He was incarcerated for 1.5 years, and while in prison did not have access to food during the night. While incarcerated he lost 79 pounds. His weight loss lead to clinical improvement of his obstructive sleep apnea as well. Upon release from prison, he had a relapse of sleep eating due to unlimited access to food, resulting in obesity and obstructive sleep apnea, documented by a polysomnogram. The patient refused treatment for his obstructive sleep apnea, and was lost to follow up.

Sleep driving is a newly discovered hazard. It is often associated with the sleep drug, Ambien or zolpidem. Sleep drivers may be involved in severe auto accidents, and have no recollection of the events (Sleep Driving, 2009). While alcohol and other drugs are

sometimes also involved in the zolpidem traffic cases, the drivers tend to stand out from other under-the-influence motorists. The behavior can include driving in the wrong direction or slamming into light poles or parked vehicles, as well as seeming oblivious to the arresting officers. (NY Times, 2009).

In one study, 13 of 14 sleep driving cases involved zolpidem (Southworth, 2008). It is unclear, however, if these cases were due to zolpidem, an increase in the use of the drug, or other factors. In 2007, the United States Food and Drug Administration asked manufacturers of all prescription sleep medications to revise their labeling to include a warning on the risk of rare but serious side effects, like sleep driving and other complex sleep behaviors (Ambien, 2009). It is also noted that many of the incidents involving sleep driving and zolpidem also include some alcohol consumption.

A traffic case highlighting the possible connection between zolpidem and sleep driving involves Dwayne Cribb, a longtime probation officer and parole officer in Rock Hill, South Carolina. Mr. Cribb claims to remember nothing after taking Ambien before bed in Halloween 2005. He awoke in jail to learn he had left his bed and taken a drive, smashed into a parked van and drove away before crashing into a tree. Mr. Cribb is still facing charges of leaving the scene of the accident (Saul, 2006). Another instance involves a registered nurse, who lives outside Denver, who took Ambien before going to sleep one night in 2003. She remembers nothing about getting into her car wearing only a thin nightshirt in 20-degree weather, had a fender bender, urinated in the middle of the intersection, and became violent with police officers (Saul, 2006).

In the 2005 edition of *Principles and Practice of Sleep Medicine*, an entire chapter is devoted to violent parasomnias. Sleep violence is violent behavior during sleep that can

be directed to self or individuals, objects or property, and is always unintentional. It includes a broad range of behaviors including self-mutilation, sexual assault, murder attempt, murder, and suicide (Ohayon, 2009). The common denominator is that the sleeping violent individual is unaware of the behavior he/she is committing and has complete amnesia of the actions (Ohayon, 2009). Violence during sleep differs from violence in the waking state in many ways, including a lack of motive, no previous personal animosity, no signs of premeditation, no attempt to conceal evidence, and usually out of character for the individual (Shneerson, 2009).

Sleep violence is more common than is recognized but for many reasons only a small minority of episodes come to either medical attention or lead to criminal allegations (Cartwright, 2004). The term “sleep violence” is invoked increasingly in the hope of absolving someone accused of violent nocturnal behavior from criminal and civil liability (Cramer, 2008). In such cases, a sleep medicine specialist may be invited by law enforcement agencies, the legal community, or both to assist in the criminal investigation or to render a medical opinion about these often bizarre behaviors. It is thought that if these complex behaviors were performed while the person accused of the acts was still technically asleep then they were performed without consciousness or full awareness (Cramer, 2008). Increasingly, sleep medicine practitioners are being asked to consult or testify in many of the sleep violence cases (Kryger, 2005)).

A high rate of violent parasomnias has recently been identified in a large-scale study involving nearly 5,000 noninstitutionalized adolescents and adults. A 2.1% prevalence of current sleep-related violence was found, with males having a significantly higher rate than females (Sateia, 2005). Stress, anxiety, use of alcohol or drugs, fever or

sleep deprivation can all exacerbate violent behavior during sleep. Sleep violence can be both a REM and NREM sleep disorder, occurring in both sleep periods. Recently, a parasomnia overlap syndrome, which contains both features of a NREM and REM parasomnias has been described (Kryger, 2005).

Two examples illustrate legal issues involved with sleep violence. The first involves the famous “Parks” case in Canada. The defendant drove 23 miles, killed his mother-in-law and attempted to kill his father-in-law. Somnambulism (a type of parasomnia that occurs during stage 4 sleep) was the defense and he was acquitted. The second took place in Butler, Pennsylvania where a confusional arousal of sleep violence was attributed to underlying obstructive sleep apnea which was offered as the defense for a man who fatally shot his wife during his sleeping hours. He was found guilty. The difference in the outcome of the two cases was attributed to a history of documented parasomnias in the Park’s case (Schenck, 1995).

Recent advances in sleep medicine have made it apparent that some complex behaviors, occasionally violent or injurious, can arise exclusively or predominately from the sleep period. The medical and legal aspects of the actions, however, differ greatly. As P.J. Fitzgerald once said, “Acts done by a person asleep cannot be criminal, there being no consciousness” (Fitzgerald, 1961).

There are a limited number of parasomnia or sleep-related movement disorder questions on general sleep questionnaires, and these assessments typically ask about nightmares and sleep walking. Recently, two questionnaires for nocturnal eating (an awake behavior) have been validated, and one RBD questionnaire has been developed specifically screening for restless legs syndrome, a movement disorder (Fulda, 2008).

Researchers in Munich, Germany published in 2008 the Munich Parasomnia Screening Questionnaire which is a self-report 21 item instrument assessing the lifetime prevalence and frequency of parasomnias and nocturnal behavior in adults. The questionnaire asks about very specific behaviors and actions that occur during the sleep period and can be seen in Appendix B. It aims to provide to the clinician a quick overview of current or past nocturnal behaviors.

Parasomnias can range from having very benign, to having devastating effects on people's emotional and social lives. The more the field of sleep medicine can identify the causes, manifestations, and consequences of parasomnias, the greater the opportunity to educate sleep medicine professionals, neurologists, the public and other health care professionals about the nature and the occurrence of the behaviors. In addition, sleep medicine professionals can assist in the legal issues and implications of parasomnias that result in forensic medical issues.

The next chapter presents details describing how the data addressing “what does a parasomnia patient look like?” Design, sampling, measurement, and analytical details are provided.

CHAPTER III

METHODS

Chapter III provides a description of how the information was gathered to address the hypotheses and then subsequently analyzed. This methodology aims to produce information that adds to existing knowledge about parasomnia patients in order to build our understanding of the disorder. Covered in this chapter are descriptions of the design, sample, measures, and types of statistics used among other methodological items.

Design

The design of this research is content analysis. A retrospective medical chart review was done in order to gather demographic and medical information on parasomnia patients from two physicians. Both physicians specialize in Sleep Disorders Medicine with a particular interest in parasomnias. A content analysis chart review was chosen as the information was readily available from the physician offices and provided data critical to the development of this thesis. In medicine, there are standards of care for most diseases and disorders. The raw data are assumed to have validity because these physicians are trained in the field of sleep medicine and follow the standards of care closely.

Physician one has a specialty in Sleep Disorders Medicine. He completed his medical degree at the University of Puerto Rico, his residency at Providence Hospital in Detroit, and completed two fellowships, one in pulmonology at Michigan State University and a fellowship in sleep disorders at Scripps Clinic and Research Foundation

in Miami, Florida. He is the Medical Director for the Center for Sleep Disorders at Doctor's Hospital of Stark County in northeastern Ohio. Physician one is an associate professor at a local university. He is board certified in both internal medicine and Sleep Disorders Medicine. Additionally, physician one has a law degree from the University of Akron.

Physician two is a pulmonologist with an emphasis in Sleep Disorders Medicine and practices in Pennsylvania. He completed his medical degree at Philadelphia College of Osteopathic Medicine, his residency at Warren General Hospital in Warren, Ohio, and his fellowship in pulmonology at Grandview Hospital in Dayton, Ohio. Physician two is the Director of the Sleep Laboratories at the University of Pittsburgh Horizon Medical Centers in Farrell and Greenville, Grove City Medical Center, and Elk Regional Health Center, all located in western Pennsylvania. He is a research-based physician with many published articles. Physician two is a Diplomate of the National Board of Osteopathic Medical Examiners, the American Osteopathic Board of Internal Medicine, and the American Osteopathic Board of Internal Medicine in Pulmonary Diseases.

This author obtained an approval letter from the Youngstown State University Human Subjects Research Committee prior to the collection of data (Appendix C). Permission from both physicians was also obtained. The letters of permission stated they would provide anonymous information on all their recent parasomnia patients from 2006-2009 (Appendix D) from their medical charts. In one office, electronic medical records were accessed to gather data, while the other office utilized traditional hard copy charts. In both situations, the physician sat with this author to provide the information, while the researcher filled in the data collection sheet, all in compliance with the Health Insurance

Portability and Accountability Act (HIPAA) laws. Interviews with both physicians were conducted to clarify any possible misunderstandings of the chart information. All the data were entered into the spreadsheet by this author. To make sure the data were entered correctly, the author checked the data sheet for errors. The research conducted did not require any type of funding.

Subjects and Sampling

The study consisted of medical chart information on parasomnia patients from the two physician offices. There were 18 patients represented by these two physicians diagnosed with parasomnias that presented to the offices between 2006 and 2009. These two physicians were selected because of their interest and expertise in Sleep Disorders Medicine and parasomnias.

Measures

The data collection sheet (Appendix E) for this study was developed specifically for this project by this author. The data collection sheet was developed to gain as much pertinent information as possible from the medical chart relating to the parasomnia patients demographic traits, medical issues, and possible legal problems. The 10-item data collection sheet gathered demographic data on age of onset of parasomnia, race, gender, and occupation. It included data on medically related information as to what type of parasomnia the patient experienced: sleep violence, sleep sex, or sleep eating. In addition, the data collection sheet collected information on the completion of a polysomnogram (a sleep study), and if it was positive for obstructive sleep apnea, as

well as if the subject had been on sleep medication, had a family history of parasomnias, and if the patient was obese. Other data assembled included if the subject was involved in any legal issues due to the parasomnia diagnosis.

Analysis

The information extracted from the medical charts was entered into a spreadsheet and SPSS was used in its appropriate places. The analysis included three stages. First, descriptive statistics were used to build an overall profile of the parasomnia patients. In stage two, comparison statistics were used to look for possible subgroup differences by demographic, health, medical, and legal characteristics. Lastly, connective statistics such as measures of association and correlations were used to examine possible links between these specified characteristics. The assumption is there will be enough cases to interpret a chi-square (at least five cases per cell). The information gathered from the data collection sheet was used mostly for descriptive statistics. Frequencies, means, standard deviations, and percentages were used to come up with a profile for a typical parasomnia patient. The data gathered was analyzed to test the three hypotheses this author poses.

CHAPTER IV

RESULTS AND FINDINGS

Parasomnias are now identified as a major category of sleep disorders, affecting approximately six percent of the general population (Kryger, 2000). Parasomnias can have untoward effects on both the patient as well as the bed partner and the consequences can manifest as psychological, social, and legal dilemmas. This thesis aims to augment the information and knowledge on parasomnias and tries to define a typical profile of a parasomnia patient from a medical chart review consisting of 18 parasomnia patients. There are three hypothesis tested in this thesis. First, parasomnia patients in the chart review will have certain demographic traits, including gender, age, and social class and ethnicity. Second, parasomnia patients will have specific health and medical characteristics. Lastly, certain parasomnia patients will be involved in legal issues.

Demographic, medical, and legal information was gleaned from 18 parasomnia patients' medical charts of two local physicians. The analysis included three stages. First, descriptive statistics were used to build an overall profile of the parasomnia patients. In stage two, comparison statistics were used to look for possible subgroup differences by demographic, health, medical, and legal characteristics. Lastly, connective statistics such as measures of association and correlations were used to examine possible links between these specified characteristics. All chi-square analyses had insufficient sample sizes. Therefore, patterns were determined based on column percentage comparisons from the cross-tabulations.

Results will be presented relative to each of the hypothesis in the following pages. First, a profile of the 18 patients in the chart review will be provided. Demographic data helps to provide a parasomnia patient as seen in Table 1.

Table 1: Profile of Demographic Items

			Mean	Median	Minimum	Maximum
Age at Parasomnia Onset	14-18	3 (17%)				
	19-29	4 (22%)	38.8	33	14	84
	30-49	6 (33%)				
	50 +	5 (28%)				
Gender	Male	13 (72%)				
	Female	5 (28%)				
Race	Caucasian	17 (94%)				
	E. Indian	1 (6%)				
Occupation	Blue Collar	6 (33%)				
	White Collar	9 (50%)				
	Student	2 (11%)				
	Retired	1 (6%)				
Legal Issues	Yes	4 (22%)				
	No	14 (78%)				

Of the four parasomnia types in the study, 17% (3) presented with sex somnia. Sleep eating comprised 11% (2) of the total, while sleep violence made up 39% (7). The fourth type of parasomnia, sleep walking, formed 33% (6) of the study population.

The age was the age of onset of the parasomnia that the patient reported to the physician. Sometimes this information was provided by a family member or bed partner. Of the 18 subjects, the age of onset varied greatly. The youngest of the 18 subjects presented with parasomnias to the physician at age 17, three years after his parasomnias started at age 14. His mother and father recalled many incidents of his nighttime behaviors, and finally made the doctor's appointment when the behavior became reckless and dangerous. The young man was sleep walking and putting himself in compromising positions by locking himself out of the house, and venturing out into the cold night with no shoes or outerwear. The parents would eventually hear him screaming to get in, or on one occasion the neighbors found him.

The oldest patient in the study reported his onset at 84 years of age. His wife encouraged him to get an appointment with the physician, as he had been doing bizarre things while sleepwalking usually a couple of nights per week. Another subject who presented his onset as the age of 14 had a dual diagnosis of narcolepsy and cataplexy, another sleep disorder. Cataplexy is a unique characteristic of narcolepsy that presents as a sudden loss of muscle tone in reaction to a strong emotion that are usually positive such as elation, laughter, surprise, or pride. The loss of muscle tone ranges from a mild sensation of weakness to a complete collapse (Sateia, 2005).

Of the 18 subjects, 17% recalled the age of onset of their parasomnias to be between 14 -18. Those reporting the onset between the ages of 19 -29 represented 22%

of the subjects, and a third were between the ages of 30-49. There were 28% of the subjects that reported the onset occurring after the age of 49.

The mean age of onset for the 18 subjects was 38.8. The median age was 33, and the standard deviation was 20.0. The cross-tabulation between age of onset and type of parasomnia can be seen below in Table 2.

Table 2: Type of Parasomnia and Age

	<u>14-29</u>	<u>30-39</u>	<u>40-49</u>	<u>50+</u>	<u>N</u>
Sex somnia	14%	25%	50%	0%	3
Sleep eating	0%	25%	0%	20%	2
Sleep violence	29%	50%	50%	40%	7
Sleep walking	57%	0%	0%	40%	6
N	7	4	2	5	18

The gender of the 18 subjects in the study seems to be consistent with the literature that the majority of parasomnia patients tend to be male. Nearly three-quarters (72%) of the subjects were male, leaving approximately one-quarter (28%) to be female. The cross-tabulation of type of parasomnia and gender can be seen in Table 3.

Table 3: Type of Parasomnia and Gender

	<u>Male</u>	<u>Female</u>	<u>N</u>
Sex somnia	23%	0%	3
Sleep eating	8%	20%	2
Sleep violence	46%	20%	7
Sleep walking	23%	60%	6
N	13	5	18

In addition to age and gender, race was also included in the demographic data. Amazingly, 94% (17 of 18) of the subjects in the study were Caucasian, leaving only one subject to be of any other race (Eastern Indian). Surprisingly, there were no African Americans that presented with parasomnias to either physician office in the study. The cross-tabulation between type of parasomnia and ethnicity can be seen in Table 4.

Table 4: Type of Parasomnia and Ethnicity

	<u>Caucasian</u>	<u>East Indian</u>	<u>N</u>
Sex somnia	18%	0%	3
Sleep eating	12%	0%	2
Sleep violence	41%	0%	7
Sleep walking	29%	100%	6
N	17	1	18

The subjects' occupations were broken down into four basic areas, which included white collar, blue collar, student or retired. Exactly half of the subjects were employed in white collar occupations, while one-third were considered to have blue collar jobs. Only two of the 18 subjects were students (11%), while one person was retired, and that patient's former job could not be determined from the chart review data.

Type of parasomnia and occupation were looked at in a cross-tabulation. There is no connection between type of parasomnia and occupation as seen in Table 5.

Table 5: Type of Parasomnia and Occupation

<u>Job:</u>	<u>Blue collar</u>	<u>White collar</u>	<u>Student</u>	<u>Retired</u>	<u>N</u>
Sex somnia	17%	22%	0%	0%	3
Sleep eating	33%	0%	0%	0%	2
Sleep violence	50%	44%	0%	0%	7
Sleep walking	0%	33%	100%	100%	6
N	6	9	2	1	18

With respect to hypothesis two, that the majority of the parasomnia patients in the study will have specific health and medical characteristics, the following data in Table 6 helps address if there are health medical issues related to a typical parasomnia patient.

Table 6: Profile of Health and Medical Items

Polysomnogram	OSA positive	8 (44%)
	OSA negative	10 (56%)
Obesity	Yes	5 (28%)
	No	13 (72%)
Family History	Yes	3 (17%)
	No	15 (83%)
Sleep Medications	Yes	2 (11%)
	No	16 (89%)

All 18 subjects had a polysomnogram (PSG). Slightly more than half (56%) of the subjects were not diagnosed as having obstructive sleep apnea (OSA), while eight of the subjects (44%) were diagnosed with OSA. There is a strong correlation between overweight people and OSA (Kryger, 2005). The data collected also looked at the obesity of the patients. The data showed that almost three-quarters (72%) of the subjects were not obese according to their body mass index, contrary to the expectations. Only five of the subjects (28%) were considered obese. Interestingly, only two of the five (40%) obese subjects were also diagnosed with OSA.

Type of parasomnia and OSA were looked at in a cross-tabulation displayed in Table 7. There seems to be no connection between the type of parasomnia and OSA as seen in Table 7.

Table 7: Parasomnia Type and OSA

	OSA: <u>No</u>	<u>Yes</u>	<u>N</u>
Sex somnia	13%	20%	3
Sleep eating	13%	10%	2
Sleep violence	63%	20%	7
Sleep walking	13%	50%	6
N	8	10	18

Type of parasomnia and obesity were looked at in a cross-tabulation displayed in Table 8. There appears to be no connection between the type of parasomnia and obesity as seen in Table 8.

Table 8: Type of Parasomnia and Obesity

	Obese: <u>Yes</u>	<u>No</u>	<u>N</u>
Sex somnia	0%	23%	3
Sleep eating	20%	8%	2
Sleep violence	40%	38%	7
Sleep walking	40%	31%	6
N	5	13	18

Family history is thought to play a role in parasomnias. Surprisingly, only three of the 18 subjects (17%) recalled a familial history of parasomnias. Therefore, the overwhelming majority of the subjects considered themselves to have no family history of the sleep disorder. The cross-tabulation between type of parasomnia and family history is shown in Table 9.

Table 9: Type of Parasomnia and Family History

	<u>Family History Yes</u>	<u>Family History No</u>	<u>N</u>
Sex somnia	33%	13%	3
Sleep eating	33%	7%	2
Sleep violence	33%	40%	7
Sleep walking	0%	40%	6
N	3	15	18

Another medical factor thought to play a part in parasomnias is the use of sleep medications. The data collected in this study show very little connection between sleep medications and parasomnias. Only two (11%) of the subject's medical histories showed that they were taking sleep medications while experiencing parasomnias. This leaves 89% of the subjects as not taking any sleep medications.

Type of parasomnia and sleep medications were looked at in a cross-tabulation displayed in Table 10. There is no connection between type of parasomnia and sleep medications as seen in Table 10.

Table 10: Parasomnia Type and Sleep Medications

Sleep Medications:	<u>Yes</u>	<u>No</u>	<u>N</u>
Sex somnia	0%	19%	3
Sleep eating	50%	6%	2
Sleep violence	50%	38%	7
Sleep walking	0%	38%	6
N	2	16	18

Yet another thing to consider when looking at the subject's health factors is the physician's specialties as they relate to diagnosing parasomnias. Physician one is a pulmonologist by training, but his practice consists of only sleep medicine. Physician two, on the other hand, is a pulmonologist with an emphasis in sleep medicine. Therefore, the majority of his practice consists of dealing with diseases of the lungs and respiratory tract, with less emphasis on sleep disorders. When looking at the subject's diagnosis of obstructive sleep apnea (a breathing disorder) compared to physician specialty, it would be expected that physician two would have more positively diagnosed OSA patients than physician one. This data can be seen in Table 11.

Table 11: Physician Specialty and OSA

	<u>OSA +</u>	<u>OSA -</u>	<u>N</u>
Physician one (sleep)	1 (9%)	10 (91%)	11
Physician two (pulm)	7 (100%)	0 (0%)	7
N	8	10	18

It is also interesting to look at the type of parasomnia diagnosed by physician specialty. This data can be seen in Table 12.

Table 12: Type of Parasomnia by Physician Specialty

	<u>Physician one (sleep)</u>	<u>Physician two (pulm)</u>	<u>N</u>
Sex somnia	27%	0%	3
Sleep eating	9%	14%	2
Sleep violence	18%	71%	7
Sleep walking	45%	14%	6
N	11	7	18

Relative to hypothesis three, that certain parasomnia patients will be involved in legal issues relating to their diagnosis, the following information is presented. There are many types of parasomnias, and some of them can inevitably lead to not only psychological and social problems, but legal problems as well. Table 13 summarizes the data pertinent to this hypothesis.

Table 13: Legal Issues/Parasomnia Type

Legal issues: Yes – 4 (22%)

No -14 (78%)

Legal issues:	Sleep eating	Sex somnia	Sleep violence	Sleep walking	N
Yes:	0%	67%	14%	17%	4
No:	100%	33%	86%	83%	14
N:	2	3	7	6	18

Only 22% (4) of the research subjects experienced any sort of legal trouble related to their parasomnia diagnosis or condition. Two diagnosed with sex somnia, one with sleep violence, and the other a sleep walker. The remaining 14 subjects had not been involved with the legal system due to their diagnosis.

Of the four who experienced some sort of legal dilemma as a result of their parasomnia diagnosis, one was actually prosecuted and found guilty. He is now serving four years in prison. He had been reported to the authorities and was accused of molesting his daughter, who did not reside with him full time. The daughter reported the incident to her mother, who alerted the police. Upon this information becoming public, it was documented that he had sex somnia, but it was also found that he had molested three other girls while not experiencing a parasomnia, and these females came forward after the original charges were pressed.

Another sex somnia patient involved in the legal system due to his diagnosis had fondled a female friend of his sister's while spending the night at the family home. Originally she filed charges, but after discovering his parasomnia through a sleep study, she dropped the charges.

One of the students in the study found himself entangled with the law as well. He attended a state university, and had documented parasomnias since the age of 14. He was successfully treated, rarely experiencing any sort of sleep disorder. One morning during school, he was informed by his resident assistant he had acted very inappropriately by running up and down the dormitory halls laughing and yelling. He then went into a fellow student's room, and exposed himself while urinating; then defecated and smeared the feces all over the hallway walls. His dorm mates reported the behavior to the resident assistant, who alerted the campus police. He subject is now in the legal process of trying to stay in school.

The fourth patient who experienced legal difficulties as a result of his parasomnias was diagnosed with sleep violence. He would become extremely violent approximately once per month, to the point where his wife feared for her safety, therefore alerting authorities by calling 911. They, too, had trouble containing the man, and tried to persuade her to press domestic violence charges, but she sensed he really was not awake during these episodes, and declined to press charges, instead seeking medical attention. They were greatly relieved when the physician diagnosed and treated him successfully with medication and a sleep apnea machine.

There were four types of parasomnias documented in the chart review. Sex somnia comprised 17% of the subjects. All three subjects making up the sex somnia

cases were male. They were all between the ages of 29-42, white males, and two of them had experienced legal issues. The man who had been reported to the law was accused of molesting his daughter, who did not reside with full time, also mentioned above in the legal section. Another was the man mentioned above who fondled someone in his home. The third subject with sex somnia was a recently married 29 year old male who approximately every other week initiated aggressive intercourse or violently masturbated while sleeping with his wife. He was unsure if he had any sex somnia issues in the past, as he has lived by himself for a couple of years, and the behavior was brought to his attention by his wife.

The two cases of sleep eating consist of one male and one female. These two subjects comprise 11% of the four types of parasomnias found in the research. One subject was a 54 year old white female who sleep eats approximately once per week. If she was awoken during this process she would become very confused and agitated, therefore, her spouse would just leave her alone to prepare and eat her food. The other subject with sleep eating parasomnia was a 35 year old white male who was taking sleep medications. He would get out of bed, venture to the kitchen to consume foods that one would not normally eat out of the refrigerator or cupboard, and afterwards would return to bed.

Sleep violence may encompass many different behaviors, some relatively harmless and others extremely dangerous. In this study, seven of the 18 subjects (39%) experienced some form of sleep violence. The vast majority (86%) of the sleep violence cases were male, with only one female. It was not uncommon for the female subject to scream and punch her husband during the night, as if defending herself from some form

of attack. One patient with sleep violence was an emergency medical technician. He would get out of bed, take doors off of closets and doorways, appearing to try to let people escape. He would also lift up the bed as if to let people climb out from under, all of this while screaming frantically. Another of the subjects experiencing sleep violence would try to escape the home by opening the second story windows to jump out. If his bed partner attempted to stop him he would become both verbally and physically abusive.

Sleep walking parasomnias comprised 33% of the parasomnia types. Of the six subjects, half were male, and the other half female. One of the male sleepwalkers, and the oldest subject in the study, routinely experienced a parasomnia where he would get out of bed and act as if he was teaching by pointing to a blackboard or easel. He would speak incoherently, seeming to lecture an audience. The three females diagnosed as parasomnia sleepwalkers had relatively benign behaviors and incidents that would typically happen in the safe confines of their own home, but nonetheless had disturbed those living with them to the point where they sought medical attention.

Summary

This chapter presented the results of the analysis. The first hypothesis was supported revealing that a certain demographic profile does exist for these 18 parasomnia patients. The parasomnia patients tend to be male, middle aged, and Caucasian, and have a white collar occupation. The second hypothesis was not supported. That is, the expected health and medical profiles were not evident. There was no connection between the subjects taking sleep medications, being obese, or having OSA. The third hypothesis

showed mixed support. Some legal issues are apparent in these parasomnia patients, but not to the extent anticipated.

Chapter V will present the results in more detail. Also, limitations of the study will be presented. Finally, recommendations for future research will be brought forth.

CHAPTER V

CONCLUSION

Parasomnias are undesirable physical phenomena that occur during sleep. Investigators are interested in parasomnias because of the relatively high frequency of these phenomena happening in the general population, and their genesis is usually undefined. It is unclear if genetics is involved, and if each parasomnia is a separate entity, or is clustered with other parasomnias or other sleep disorders.

The purpose of this study is to describe potential patterns within parasomnia patients by looking at 18 parasomnia patients from two physician practices. The research was conducted to determine if there are certain characteristics or traits shared among the demographics and medical histories of these patients. It will hopefully augment the information already uncovered by other research.

Discussion

The descriptive statistics for the demographic traits in the patients were clear. Hypothesis one was confirmed, as there were certain patterns of the demographics (age, gender, ethnicity, social class) of the parasomnia patients.

Consistent with the literature, nearly three quarters of the subjects in the study were male (72%). The results reinforce the idea that the majority of parasomnia patients tend to be male. It is possible, however, that female parasomnias tend to be less aggressive or violent than male parasomnias and therefore are not reported to medical professionals as often.

As anticipated, it was concluded that the overwhelming majority of subjects in the study were Caucasian. Only one of the 18 was not Caucasian. He was of Eastern Indian decent, and was considered “economically Caucasian”. It is not clear due to sampling issues if African Americans, Hispanics, and other ethnicities do not experience parasomnias, or that they are less likely to seek treatment for parasomnias. When looking at the data for the makeup of the population of the physician locations from which the 18 patients were drawn, northeastern Ohio and western Pennsylvania, the findings seem to be consistent with the subjects in the study. Local Census data show the northeastern Ohio area is predominately of white, non-Hispanic background (74%). Approximately 21% of the population is African American and the other 6% consists of mixed race, American Indian, Hispanic or “other”. Similarly, when looking at the population of western Pennsylvania, it is found that Caucasians make up 95% of the population, with 3% being African American, leaving approximately 2% of the population to be of mixed race or Hispanic.

The results showed a wide range for the age of onset for parasomnias. A few of the subjects recall their onset as early as their teenage years, while the oldest in the study reported his onset of experiencing parasomnias at the age of 84. The mean age of onset for the subjects was about 40. Some of this self-reported data could be inaccurate, as the subjects were mostly self-reporting and after all, were asleep for their parasomnias. It is more than likely another person in the home would have to alert them to their behavior.

As far as looking at the occupation of the subjects, it was found that 50% of the patients had white collar jobs, while 33% were considered to have blue collar jobs.

One explanation for the majority of the subjects being white collar could be that more educated people are more comfortable seeking out medical attention for a sleep disorder (Roman, 2009). Blue collar workers may be more embarrassed to go to a doctor for a sleep problem, or may be ignorant to the fact that they could be helped.

Hypothesis two was not confirmed. It was not found that most of the subjects were overweight or on sleep medications. Nearly three quarters of the subjects were of normal weight, leaving only 28% of the subjects to be obese. This would suggest there is no connection between being overweight and experiencing parasomnias. It was thought that since there is a link between OSA and being overweight for the subjects in this investigation, and also a link between OSA and parasomnias that more of the subjects studied in this thesis would be obese. This was not the case.

In addition, only two of the subjects were on sleep medications when they presented to the physician with parasomnias. According to the literature, there appeared to be more of a connection, although in this sample of patients, there was not. It is possible that the patients were on other medications, like selective serotonin reuptake inhibitors (antidepressants), that could affect their sleeping patterns and possibly their parasomnias, but the chart review did not abstract this information.

There was a relationship found between certain patients having legal issues due to the diagnosis of parasomnias. Almost one-quarter of the subjects had experienced some sort of legal trouble from their sleep disorder, with one even going to prison. It is quite possible that some of the behaviors experienced during the parasomnias warranted legal attention, but because the behavior is normally witnessed by family members in the home, it was not reported to authorities. When the behavior does

occur outside the home, like the university student in the dorm, or possibly someone in a hotel, the likelihood of legal trouble appeared to be higher.

Limitations

There were some limitations to the study. A key limitation lies in the fact that insurance companies sometimes force physicians to “hide” the parasomnia diagnosis within another sleep disorder. For example, if an insurance company refuses to pay for a polysomnogram (PSG, a sleep study) for a patient, the physician may code or diagnose the patient with narcolepsy (a chronic sleep disorder characterized by excessive daytime sleepiness) or insomnia (repeated difficulty with sleep initiation or duration) to try to get the insurance company to pay for the PSG. Another example might be that an insurance company will not accept a diagnosis of sleep walking, so the physician must code the patient with a different primary diagnosis than they would actually like. Therefore, there may be parasomnia patients in the physician practices that were not included in the study due to the constraints of coding schemes for a primary diagnosis dictated by insurance.

In addition to insurance issues, parasomnias themselves present difficulties in diagnosing. One of the difficulties in classifying parasomnias (or sleep disorders in general) is that a single medical condition may present under more than one category. For example, restless legs syndrome (also a parasomnia) or sleep apnea may lead to insomnia or excessive daytime sleepiness. Similarly, conditions such as sleep terrors or sleep walking, characterized as parasomnias, may cause severe sleep disruption and present as insomnia, and unless the physician uncovers the underlying disorder, the patient can be misdiagnosed.

Another caveat of the study is that the data were from only two physicians. One physician was a sleep specialist while the other was a pulmonologist, with an emphasis in sleep medicine. More than likely, due to their training, both have a different way of looking at and diagnosing sleep disorders. Greater access to a larger number of physicians and their patients could have produced a more diverse data set.

Moreover, a third constraint would be that the sample is not ethnically diverse. As mentioned earlier, it is possible that minorities with sleep disorders like parasomnias are more hesitant to seek help due to embarrassment or ignorance though research is needed to shed light on this.

Yet another limitation to the study would be the paucity of health information in the data set. It would have been helpful to include not only obesity status, sleep medications, and PSG status, but other medications the patient might be taking as well. There are not only numerous medications that can cause sleep disruption, but stress levels, and other health related items like diabetes or alcohol use.

Lastly, in terms of limitations, it may be helpful to expand the time frame in future studies to be not only retrospective, but prospective in order to investigate the course of parasomnias over the lives of the patients. Doing so would make it possible to see any changes in severity of parasomnias relative to a person's life course development.

Recommendations

Overall, in studying trends in parasomnias in the future, a more comprehensive data collection should be conducted. The chart review should have a wider scope of items to consider. It should include, for example, chart information such

as all medications taken (not just sleep medications), and a closer look at the legal and psychological implications to the individual due to their parasomnia diagnosis. Future studies should also include possible risk factors like sleep deprivation, stress, and use of alcohol or drugs. As alluded to earlier, the ability to follow the subjects over a long period of time would also be helpful, to see if the disorder progresses or wanes, is the condition chronic or episodic, and do the subjects respond to treatment.

Another recommendation is to expand on the sample size of this study to include a larger number of sleep-specialist physicians in both urban and rural areas. In doing so, a wider, more diverse subject population of parasomnia patients would be investigated.

In addition, it would be beneficial to have a more comprehensive look at sleep and sleep disorders in the general population for incidence and comparison purposes. The Center for Disease Control (CDC) conducts The Behavioral Risk Factor Surveillance System Report (BRFSS). It is a state-based system of health surveys that generates information about health risk behaviors, clinical preventive practices, and health care access. The BRFSS includes information on a wide variety of topics including diabetes, cancer, nutrition, exercise, and dental hygiene among other issues. The BRFSS questionnaire is comprised of core questions and optional modules. There are three types of core questions. Fixed core questions are asked every year. Rotating core questions are asked every other year. Emerging core questions typically focus on “late-breaking” health issues. These questions are evaluated at the end of a survey year to determine if they are valuable. If the coordinators decide to keep the questions, they are added to the fixed core, rotating core, or optional modules, whichever is most appropriate. All states must

ask all core questions. The optional modules are standardized questions that are supported by the CDC that cover additional health topics or are more detailed questions on a health topic included in the core. Each year states must choose which optional modules they will use based on the data needs of their state (Center for Disease Control and Prevention, 2009). There is one question related to “quality of sleep” in the survey, but it would be helpful to expand this into its own module to be able to get a more comprehensive look at the sleep habits of the general population. .

Summary

Parasomnias are an integral part of the field of sleep medicine, and this study intended to examine parasomnia patients, and to identify the profile of a typical parasomnia patient. In sum, it aimed to shed some light on our understanding of parasomnias, as much of the information about them remains in the dark. Covering things like the duration and extent of the complex behaviors, to assessing the degree of personal accountability from the consequences of parasomnias, will hopefully be more than just dreams with more and more research done in this area. With the knowledge gained from this thesis, possible nightmare issues related to parasomnias were addressed and greater awareness of the demographic, legal and health dimensions of parasomnia patients was achieved.

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APPENDIX A

The International Classification of Sleep Disorders

Categories of Parasomnias:

Disorder of Arousal (From NREM Sleep)

1. Confusional Arousals
2. Sleepwalking
3. Sleep Terrors

Parasomnias Usually Associated With REM Sleep

4. REM Sleep Behavior Disorder (Including Parasomnia Overlap Disorder)
5. Recurrent Isolated Sleep Paralysis
6. Nightmare Disorder

Other Parasomnias

7. Sleep Related Dissociative Disorder
8. Sleep Enuresis
9. Sleep Related Groaning (Catathrenia)
10. Exploding Head Syndrome
11. Sleep Related Hallucinations
12. Sleep Related Eating Disorder
13. Parasomnia, unspecified
14. Parasomnia Due to Drug or Substance
15. Parasomnia Due to Medical Condition

APPENDIX B
German Parasomnia Screening Tool

Removed due to copyright.

APPENDIX C
YSU Human Subjects Research Committee Approval.

Youngstown
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June 15, 2009

Dr. Salvatore Sanders, Principal Investigator
Ms. Kristen Hawthorne, Co-investigator
Department of Health Professions
UNIVERSITY

RE: HSRC Protocol Number: 168-2009
Title: Recent Trends in Parasomnias

Dear Dr. Sanders and Ms. Hawthorne:

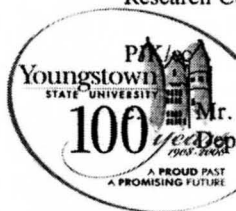
The Human Subjects Research Committee has reviewed the abovementioned protocol and determined that it is exempt from full committee review based on a DHHS Category 4 exemption.

Any changes in your research activity should be promptly reported to the Human Subjects Research Committee and may not be initiated without HSRC approval except where necessary to eliminate hazard to human subjects. Any unanticipated problems involving risks to subjects should also be promptly reported to the Human Subjects Research Committee.

The HSRC would like to extend its best wishes to you in the conduct of this study.

Sincerely,

Peter J. Kasvinsky
Dean, School of Graduate Studies
Research Compliance Officer



Mr. Joseph Mistovich, Chair
Department of Health Professions

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