

Sleepwalking, Amnesia, Comorbid Conditions and Triggers: Effects of Recall and Other Methodological Biases

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A recent publication in *SLEEP*¹ reported a case-control study of functional impairments in a large group of sleepwalkers. All patients in this cohort had current diagnoses of sleepwalking based on standard clinical methods including polysomnography. As part of the clinical history the authors also noted the presence of triggering factors for historical episodes. The major methodological difficulty of the case-control methodology used in this study is “recall bias.”^{2,3} As the term suggests, recall bias indicates a lack of accuracy in recalling the details of prior medical history or episodes. In the overwhelming majority of medical studies that have used this technique, the memory function of patients and controls is considered to have been normal, but affected by typical time- and age-related memory loss. However, sleepwalking and related NREM parasomnias have traditionally been associated with reports of amnesia⁴ for the episode, suggesting that the term recall bias may be inadequate to describe the typical methodological problems of taking a reliable report of a past episode. Conducting a case-control study that includes taking reports of past episodes in a patient group characterized by amnesia appears to be a unique methodological problem, apparently never before reported.

However, recent reports of dream-like mentation associated with sleepwalking episodes and even the incorporation of elements of perceptual environment and behavior have suggested that amnesia for at least some patients and some episodes is not as complete as has been previously accepted.^{5,6} Nevertheless, amnesia for the actual behavior in the real world continues to be the generally accepted standard and no doubt would affect the degree of recall bias. How reliable are memories of past episodes in a patient who may suffer from partial or complete amnesia? These reports along with recall and other forms of methodological bias have research, clinical, and forensic import.

Lopez et al.¹ and Zadra et al.⁶ do not specify any time limitations on the clinical histories they took. However, similar studies by Ouidette et al.⁵ and Ohayon et al.⁷ state they examined the lifetime prevalence of episodes. Ouidette and colleagues asked their 43 patients “What was going through your mind at the very moment of the episodes...?” This would appear to be a difficult task for patients without any memory impairment at

all, much less for patients with memory impairment that results normally from the sleepwalking disorder as well as normal loss of memory over time.

The amnesia of sleepwalking has been hypothesized to occur as a result of general higher cognitive dysfunction—memories are not formed as opposed to forgotten. An empirical test of memory in sleepwalkers has proven to be essentially impossible in the past. Broughton reports an attempt in 1969 to study memory in child sleepwalkers in a sleep laboratory setting. Sleepwalkers were unresponsive to his attempts to interact with them and test memory. No more current attempts to test memory function in sleepwalkers have been reported. This leaves experimental methodologies that involve report taking. To date, no studies have taken a report immediately following an episode that occurred in the sleep laboratory or even in the morning following the occurrence of an episode in the sleep laboratory or at home. It seems likely that the sooner mentation reports are taken the more likely a report of mentation is to be received if available.

Ouidette and colleagues⁵ reported that 71% of patients with a diagnosis of sleepwalking and/or sleepwalking/sleep terrors reported at least one episode of dream-like mentation. It cannot be determined from this data what percentage of all sleepwalking episodes might be associated with dream-like mentation. Lopez et al.¹ also noted that 59% of the 100 patients studied provided reports of factors triggering sleepwalking episodes, although this was not the main thrust of the study. These reports first require a memory of a sleepwalking episode as well as a memory of the waking time period immediately prior to the episode. Lopez et al. reported that this pre-episode period included stressful events (52%), strong positive emotions (41.8%), sleep deprivation (26.5%), alcohol (12.2%), and intense physical activity (5.1%). Ouidette et al. reported that patients reported that past episodes were triggered by stress or argument (58%), sleep deprivation (28%), and alcohol (14%). Of these factors, only sleep deprivation has been demonstrated experimentally to either prime or provoke episodes during sleep laboratory-based studies: 24–38 hours of sleep deprivation has been reported to result in confusional arousals and/or sleepwalking in the sleep laboratory in 90% of clinically diagnosed sleepwalkers studied.⁹ Thus, the report of sleep deprivation as a trigger in only 26.5% and 28% of episodes is actually quite surprising. The effects of other putative triggers including alcohol have never been confirmed with empirical sleep laboratory testing.¹⁰ A large epidemiological study reported an increased risk associated with a lifetime prevalence of nocturnal wandering and alcohol abuse/dependence (OR 3.5). However, a history of obsessive compulsive disorder had the highest increased risk of 3.9.⁷ As

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there is no known relationship between nocturnal wandering—sleepwalking—and obsessive compulsive disorder, this method may not be the most effective way of determining causative or triggering factors.

Recent research in this area specifies that high percentages of sleepwalking/sleep terror patients at least occasionally report dream-like mentation. However, the overwhelming number of sleepwalkers/sleep terror patients will not report or will still have no direct memory of behaviors that occurred during the episode itself. If sleepwalkers have no memory of sleepwalking behavior or only remember dream-like mentation, then what is the origin of reports given to researchers? Several options are possible. The episode may have been witnessed by family, friends, or others and later reported to the patient as sleepwalking. Thus, these reports are scientific hearsay of a sort. The patient may have awakened to find him/herself in a location other than the bedroom. The patient may have awakened to find circumstantial evidence of nocturnal wanderings. The sleep eater may find food or crumbs in bed. Alternately, the kitchen may show signs of cooking, eating, or other damage or use. The patient may note injuries both mild and severe that were not present prior to sleep onset.

The difficulty with episode descriptions provided by friends and family is that reports to researchers are then often provided by the patients themselves, who did not actually witness the episode and may not have any independent memory of it. The direct witnesses of the episode—family, friends, etc.—were not actually interviewed. Their knowledge of nocturnal wandering is almost certainly limited to a lay knowledge of sleepwalking. Thus, these reports are not even consistent with the typical recall bias, but represent a form of “double recall bias”—memory of the witness as told to the patient who in turn may not recall this description accurately. This necessarily weakens the reliability of the report and its relationship to putative triggers even further.

In addition to recall bias, “attribution bias” may also affect research in this area. Do sleepwalking researchers and patients think all episodes of nocturnal wandering in the past must have been sleepwalking? Does the lay public understand that nocturnal wandering is not always sleepwalking? If this patient becomes severely alcohol intoxicated, are subsequent behaviors to be considered alcohol-induced sleepwalking, or can a known sleepwalker also act day or night from the direct effects of alcohol only? Can someone who is eventually diagnosed with a NREM parasomnia become intoxicated and show intoxicated behavior? How about comorbid epilepsy or misuse or abuse of

CNS depressant medications? When alcohol, epilepsy, or drugs are the putative triggers, what distinguishes their effects from the sleepwalking?

In the presence of amnesia for actual behaviors during episodes, case reports, especially of episodes that occurred many years in the past, must be evaluated with considerable caution. Reports should be taken from the individuals who actually witnessed the episodes and not from patients who have little or no direct memory of the episodes. Anecdotal evidence is at starting point for future empirical research and should not be represented as reliable scientific evidence.

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