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CME Objectives

After completing this CME activity, the physicians practicing clinical psychiatry should be able to:

- Recognize that parasomnias may have serious consequences that could indicate a mental disorder
- Distinguish between the different forms of arousal parasomnias for making a differential diagnosis
- Recognize the constellation of symptoms accompanying arousal parasomnias

Statement of Need and Purpose

Physicians responding to articles in *The Journal of Clinical Psychiatry* and its related CME activities have indicated a need to better understand sleep disorders and their relationship to other mental disorders. This CME enduring material presents current research data to address that need. There are no prerequisites for participating in this CME activity.

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Drs. Guilleminault, Ohayon, and Priest have no significant commercial relationships to disclose relative to the presentation.

Discussion of Investigational Information

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Night Terrors, Sleepwalking, and Confusional Arousals in the General Population: Their Frequency and Relationship to Other Sleep and Mental Disorders

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Background: Arousal parasomnias (night terrors, sleepwalking, and confusional arousals) have seldom been investigated in the adult general population. Clinical studies of parasomnias, however, show that these disorders may be indicators of underlying mental disorders and may have serious consequences.

Method: A representative sample of the United Kingdom population (N = 4972) was interviewed by telephone with the Sleep-EVAL system.

Results: Night terrors were reported by 2.2% (95% CI = 1.8% to 2.6%) of the sample, sleepwalking by 2.0% (1.6% to 2.4%), and confusional arousals by 4.2% (3.6% to 4.8%). The rate of these 3 parasomnias decreased significantly with age, but no gender difference was observed. Multivariate models identified the following independent factors as associated with confusional arousals (odds ratio [OR]): age of 15–24 years (OR = 4.1), shift work (OR = 2.1), hypnagogic hallucinations (OR = 3.3), deep sleep (OR = 1.6), daytime sleepiness (OR = 1.9), sleep talking (OR = 1.7), daily smoking (OR = 1.7), adjustment disorder (OR = 3.1), and bipolar disorder (OR = 13.0). Factors associated with night terrors were subjective sense of choking or blocked breathing at night (OR = 5.1), obstructive sleep apnea syndrome (OR = 4.1), alcohol consumption at bedtime (OR = 3.9), violent or injury-causing behaviors during sleep (OR = 3.2), hypnagogic hallucinations (OR = 2.2), and nightmares at least 1 night per month (OR = 4.0). Factors associated with sleepwalking were age of 15–24 years (OR = 5.2), subjective sense of choking or blocked breathing at night (OR = 5.1), sleep talking (OR = 5.0), and a road accident in the past year (OR = 3.9) after controlling for possible effects of sleep deprivation, life stress, and mental and sleep disorders.

Conclusion: Arousal parasomnias, especially night terrors and confusional arousals, are often the expression of a mental disorder. Other life or medical conditions, such as shift work or excessive need of sleep for confusional arousals and stressful events for sleepwalking, may also trigger parasomnias. Prevalence rates are based on self-reported data and, consequently, are likely underestimated.

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Parasomnias are physical phenomena occurring mostly during sleep, which are not, strictly speaking, dysfunctions or abnormalities of the processes underlying sleep-wake states as in dyssomnias. These phenomena, unfortunately, have seldom been investigated in the adult general population, probably because they are perceived as harmless and estimated to occur infrequently. Consequently, there are no clear figures regarding their prevalence and associated factors. Clinical studies of parasomnias have clearly demonstrated that some of these phenomena are indicators of underlying mental disorders[1–3] and that they may have serious consequences such as self-injuries or even murders.[4–6]

Under the latest International Classification of Sleep Disorders (ICSD-90),[7] the parasomnias are separated into 4 subgroups: arousal, sleep-wake transition, rapid eye movement (REM) sleep disorders, and a residual group. The present article focuses on the arousal parasomnias, which occur during non-REM (NREM) sleep and include night terrors, sleepwalking, and confusional arousals (also known as sleep drunkenness). Night terrors are characterized by sudden episodes of intense terror that usually begin with a panicky scream, accompanied by a total or partial amnesia of the episodes. The episodes begin mainly in sleep stage 3 or 4 and in the first third of the sleep. Differential diagnosis implies nightmares that occur in REM sleep and without amnesia. Disorders that produce anxiety during sleep, such as panic attacks or ob-

structive sleep apnea syndrome, can also provoke episodes similar to night terrors.

Sleepwalking is characterized by ambulatory episodes that occur in sleep stage 3 or 4. Like night terrors, episodes occur mainly in the first third of the night, and the individual has no memory of the episodes. In some cases, sleepwalking and night terrors may occur together. REM sleep behavior disorder has to be discarded before conclusively diagnosing a sleepwalking disorder.

Confusional arousals are characterized by periods of mental confusion on arousal or awakening. They mainly occur during slow wave sleep and can sometimes be provoked by forced arousals. The differential diagnosis involves a wide range of other parasomnias, including night terrors, sleepwalking, REM sleep behavior disorder, and sleep-related epileptic seizures.

The literature suggests that these 3 parasomnias are more commonly encountered during childhood, with prevalence rates of 1% to 6.5% for night terrors[8,9] and 5% to 30% for occasional or frequent episodes of somnambulism.[10] The prevalence of confusional arousals is unknown. For most individuals, these disorders cease in late adolescence. However, they can also appear for the first time in adulthood.[3] In the adult general population, the prevalence of sleepwalking is estimated at 2% to 5%.[11–13] No figures exist for night terrors or confusional arousals in the adult general population.

Studies have found night terrors and mental disorders to be associated in clinical populations.[1,3] Sleep deprivation, stressful events,[1] sleep apnea, and the use of central nervous system (CNS) depressants[14] have been identified as predisposing factors to these parasomnias. No study to date, however, has explored the relationship between the arousal parasomnias and mental disorders in the general population.

The purpose of the present study was 2-fold: (1) to investigate the prevalence of night terrors, sleepwalking, and confusional arousals in a general population and (2) to identify factors associated with these disorders.

METHOD

Subjects

A more extensive presentation of the methodology employed in this survey can be found elsewhere.[15] The data for this study were collected over 4 months in 1994. A representative sample of 4972 subjects aged 15 years or over was drawn from the noninstitutionalized general population in the United Kingdom via a stratified probabilistic approach based on the age, gender, and geographic distribution of the population in the 11 U.K. regions per 1991 U.K. census figures. Subjects were further selected by age and gender according to the Kish method.[16] In all, 6874 individuals living in private households were solicited. Of these, 9% were excluded because of a speech or hearing impairment, an illness prohibiting being interviewed, or insufficient English fluency; 18.6% refused to be interviewed after 2 requests. The participation rate was 79.6% (4972 of 6249 eligible subjects agreed to be interviewed).

Instrument

Interviews were conducted by 40 interviewers using the Sleep-EVAL expert system, an artificially intelligent computer program.[17] This software features a nonmonotonic, level-2, causal reasoning mode that enables the system to formulate a series of diagnostic hypotheses (causal reasoning process) and to verify these hypotheses through subsequent questions and deductions (nonmonotonic, level-2 feature). In short, the system is composed of 3 main modules: The first reproduces the Kish selection procedure, the second performs the logical reasoning necessary to customize the questionnaire to each subject (inference engine), and the third is devoted to file management. Figures 1 through 3 show the ICSD-90 decision trees built by Sleep-EVAL and the questions for the exploration of arousal parasomnias. A more extensive description of the Sleep-EVAL system and its validity can be found elsewhere.[19]

The mean ± SD duration of interviews was 33.93 ± 18.02 minutes. Interviews could be completed over 2 or more sessions if the duration exceeded 60 minutes.

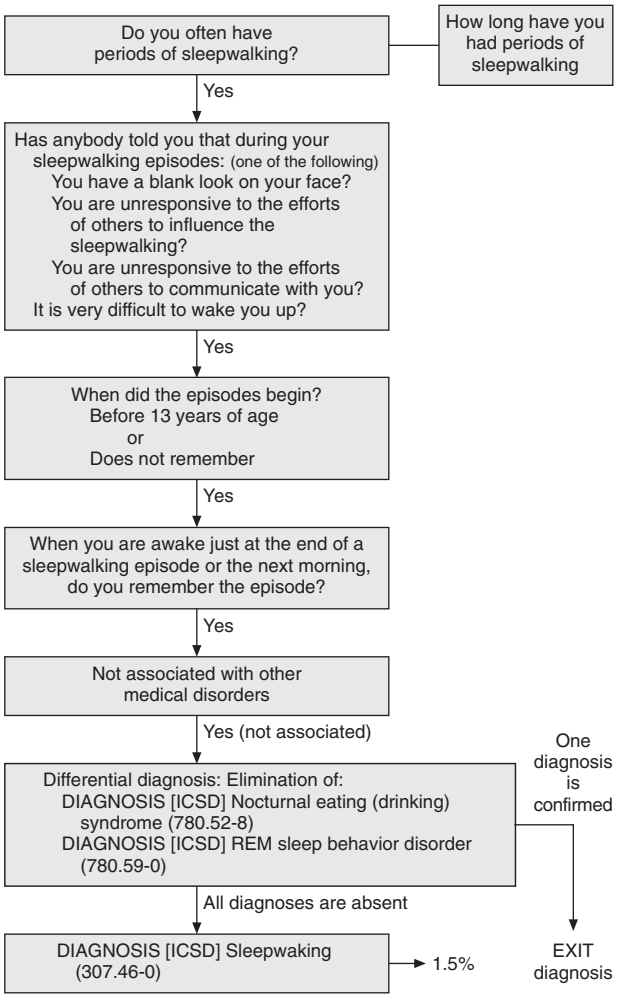
Responses to questions relative to parasomnias were analyzed against the following major data categories explored in the investigation: sociodemographic characteristics, current medication intake, medical consultations and treatments in the past 12 months, and DSM-IV mental disorders[20] and ICSD-90 sleep disorders.[7]

Definitions

Sleepwalking. This parasomnia was present if sleepwalking episodes occurred often and were perceived by the subject as a sleep problem. The decision tree of the Sleep-EVAL system for sleepwalking is presented in Figure 1.

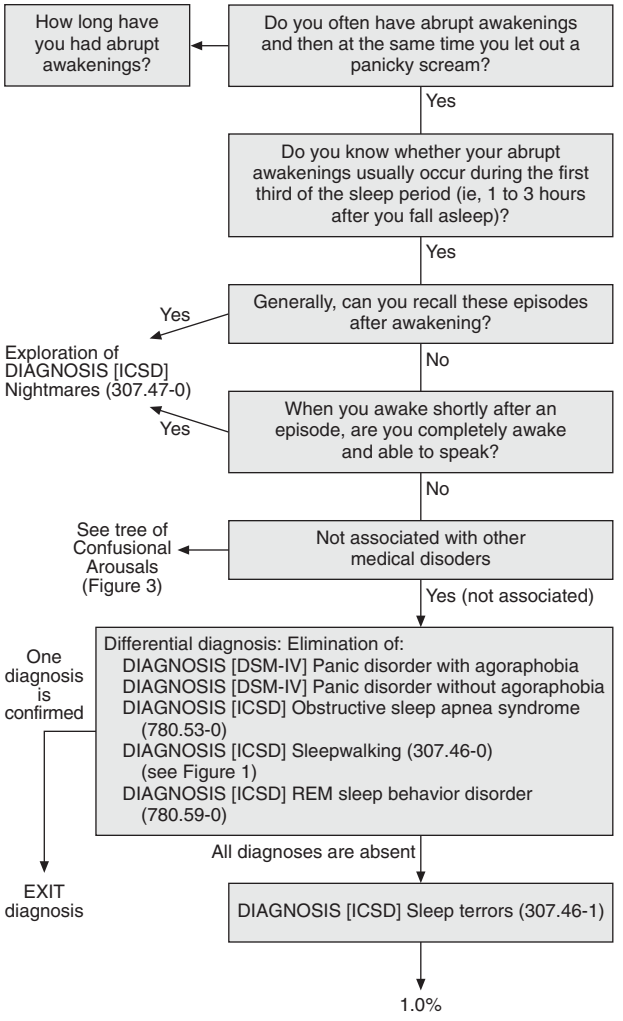
Night terrors. This parasomnia was present if awakening abruptly from sleep with a panicky scream occurred often and was perceived by the subject as a sleep problem. The decision tree of the Sleep-EVAL system for night terrors is presented in Figure 2.

Figure 1. Sleepwalking Decision Tree of the Sleep-EVAL System[a]



[a]From reference 18. Decision tree of REM sleep behavior disorder can be found elsewhere (see reference 15).

Figure 2. Sleep Terrors Decision Tree of the Sleep-EVAL System[a]



[a]From reference 18.

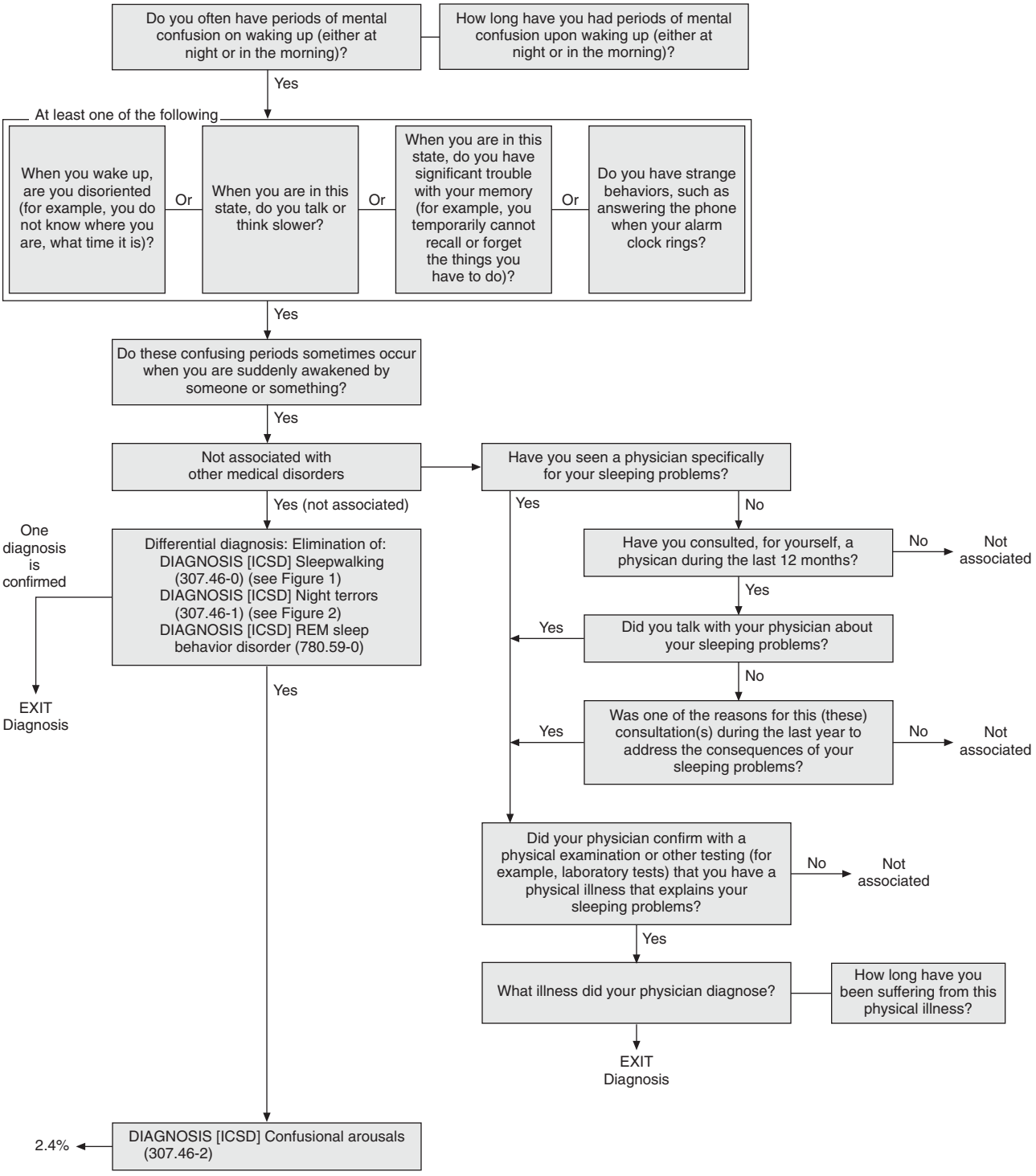
Confusional arousals. This parasomnia was present if mental confusion on awakening (at night or in morning) occurred often and was perceived by the subject as a sleep problem. The decision tree of the Sleep-EVAL system for confusional arousals is presented in Figure 3.

Groups were constituted without using the differential diagnoses in order to verify how frequently the groups are associated.

Data Analyses

The data were weighted according to the U.K. distribution by age and gender of the population. These transformations were performed for all variables, and the results were tabulated on the basis of these weighted percentages. After weighting, the sample comprised 52.2% women and 47.8% men. Bivariate analyses were performed using the chi-square statistic and the Bonferroni correction. When sample size (N) values were less than 5, the Fisher exact probability test was applied. Factors associated with parasomnias were determined via logistic regression.[21] A method of quasi-sequential selection (forward) was used with the likelihood-ratio test to determine which variables should be dropped from the model. The cutoff point of entry (PIN) was fixed at .05, and the cutoff point of exclusion (POUT) at .10. All data analyses were performed with the help of the SPSS statistical computer program (version 6.1).

Figure 3. Confusional Arousals Decision Tree of the Sleep-EVAL System[a]



[a]From reference 18.

RESULTS

The sample consisted of 4972 subjects between 15 and 100 years of age. Night terrors were reported by 2.2% (95% CI = 1.8% to 2.6%) of the sample. Rates were comparable between men and women (1.8% and 2.5%, respectively). A significantly smaller percentage of subjects aged 65 years or over reported night terrors compared with subjects between 25 to 44 years old (Table 1).

Table 1. Prevalence of Night Terrors, Sleepwalking, and Confusional Arousals by Age Group and Gender[a]

	Age Group									
	15–24 Years (N = 859)		25–44 Years (N = 1790)		45–64 Years (N = 1342)		≥ 65 Years (N = 981)		Total (N = 4972)	
Parasomnia	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Night terrors										
Total	2.6	1.5 to 3.7	2.5	1.8 to 3.2[b]	2.3	1.5 to 3.1	1.0	0.4 to 1.6	2.2	1.8 to 2.6
Male	2.4	1.0 to 3.8	2.0	1.1 to 2.9	1.6	0.6 to 2.6	1.0	0.0 to 2.0	1.8	1.3 to 2.3
Female	2.7	1.2 to 4.2	3.1	2.0 to 4.2[b]	3.0	1.7 to 4.3	1.0	0.2 to 1.8	2.5	1.9 to 3.1
Sleepwalking										
Total	4.9	3.5 to 6.3[b]	2.1	1.4 to 2.8[b]	1.1	0.5 to 1.7	0.5	0.1 to 0.9	2.0	1.6 to 2.4
Male	3.8	2.0 to 5.6[b]	2.1	1.2 to 3.0[b]	0.6	0.0 to 1.2	0.2	0.0 to 0.6	1.7	1.2 to 2.2
Female	5.9	3.7 to 8.1[b]	2.1	1.2 to 3.0[b]	1.5	0.6 to 2.4	0.6	0.0 to 1.2	2.3	1.7 to 2.9
Confusional arousals										
Total	8.9	7.0 to 10.8[b]	4.8	3.8 to 5.8[b]	2.5	1.7 to 3.3	1.4	0.7 to 2.1	4.2	3.6 to 4.8
Male	9.5	6.7 to 12.3[b]	4.2	2.9 to 5.5	3.2	1.9 to 4.5	0.9	0.0 to 1.8	4.4	3.6 to 5.2
Female	8.4	5.8 to 11.0[b]	5.3	3.8 to 6.8[b]	1.7	0.7 to 2.7	1.7	0.7 to 2.7	4.1	3.3 to 4.9

[a]Abbreviation: CI = confidence interval.
[b]$p < .05$ with lowest figures in the same row.

Sleepwalking episodes were reported by 2.0% (95% CI = 1.6% to 2.4%) of the sample. There was no significant difference between men and women (1.7% and 2.3%, respectively). Sleepwalking was reported by a significantly higher proportion of younger subjects (15–24 years old) and decreased significantly with age (see Table 1). Subjects between 25 to 44 years old also had significantly higher rates than the oldest group of subjects.

Confusional arousals were reported by 4.2% (95% CI = 3.6% to 4.8%) of the sample. Again, the prevalence of confusional arousals was comparable between men (4.4%) and women (4.1%), was highest in the 15–24 years old age group, and significantly decreased with age (see Table 1).

The co-occurrence of night terrors and sleepwalking was noted in 15 subjects (0.3% of overall sample). Sleepwalking and confusional arousals were found to be associated in 20 subjects (0.4% of overall sample), and night terrors and confusional arousals in 30 subjects (0.6% of overall sample). The co-occurrence of all 3 phenomena was noted in only 5 subjects.

Medication, Alcohol, Caffeine, and Tobacco Intake

Subjects were asked whether they currently took medication to induce sleep, reduce anxiety, or treat depression and whether they consumed any other kind of medication. If so, they were asked to provide the name of any medication that they were currently taking. The drugs reported were classified according to the Compendium of Pharmaceutical Specialties into psychotropic and nonpsychotropic medication. Psychotropic drugs were further divided into hypnotics, anxiolytics, antidepressants, and neuroleptics.

Psychotropic drug consumption was significantly higher in the confusional arousal group than in the nonparasomnia group (6.5% vs. 3.4%; odds ratio [OR] = 2.0; 95% CI = 1.1 to 3.8). The rate of psychotropic drug consumption was 6.8% in the night terrors group and 4.1% in the sleepwalking group. More specifically, anxiolytic drug consumption was significantly higher in the night terrors (3.5%; OR = 4.9, 95% CI = 1.5 to 16.4) and confusional arousal (2.2%; OR = 3.7, 95% CI = 1.3 to 10.6) groups than in the nonparasomnia group (0.7%). Hypnotics were used by 3.3% of the confusional arousal group, 3.1% of the night terrors group, 1.5% of the nonparasomnia group, and by 1 (1%) sleepwalking subject.

Antidepressants were used by 1.9% of the confusional arousal group, 2.9% of the night terrors group, 1.0% of the nonparasomnia group, and by 1 (1%) sleepwalking subject.

Nearly half (45.4%) of the confusional arousal subjects were daily smokers, which was significantly higher than the rates observed in the other groups: 26.4% for night terrors, 31% for sleepwalking, and 21.6% for nonparasomnia ($p < .001$).

The percentage of subjects who consumed alcohol did not differ across the groups, nor did the quantity of alcohol consumed. However, a significantly higher proportion of subjects with confusional arousals (12.2%), night terrors (19.9%), and sleepwalking (11.4%) reported consuming alcohol at bedtime compared with subjects with no parasomnia (6.0%, $p < .001$).

Quantity of daily caffeine intake did not differ significantly between groups. However, a marginal association

was found between sleepwalking and heavy caffeine consumption (≥ 6 cups/day) (OR = 1.8, 95% CI = 1.0 to 3.0).

Table 2. Distribution of Parasomnias by DSM-IV Diagnoses

DSM-IV Diagnosis	Confusional Arousals (%) (N = 164)	Night Terrors (%) (N = 94)	Sleep-walking (%) (N = 99)	No Parasomnia (%) (N = 4615)	χ^2 (df = 3)	p Value
Current mental disorders						
Mood disorders (total)	25.8	30.4	14.6	5.7	120.637	< .001
Major depressive disorder	13.7	18.4	3.3	4.5	42.658	< .001
Bipolar disorder	11.5	10.7	9.4	1.5	75.317	< .001
Anxiety disorders (total)	18.9	34.2	12.7	4.7	118.782	< .001
Panic disorder	6.6	13.6	5.5	1.7	44.197	< .001
Agoraphobia disorder	3.5	6.2	1.5	0.8	21.291	< .001
Generalized anxiety	4.2	10.4	3.9	1.2	31.743	< .001
Adjustment disorders	6.5	1.9	0.8	1.7	13.401	< .005
Psychotic symptoms	3.1	3.2	5.4	0.9	15.583	< .005
History of mental disorders						
Mood disorders	9.7	19.0	5.7	4.4	33.199	< .001
Anxiety disorders	8.8	15.9	4.8	4.3	23.031	< .001
Psychotic symptoms	1.2	2.8	0.9	0.2	12.751	< .01

Mental Disorders

As shown in Table 2, a significantly higher percentage of subjects with a parasomnia were diagnosed with a DSM-IV mood disorder at the time of the interview compared with those with no parasomnia. More specifically, major depressive disorders were more common in the confusional arousal and night terrors groups than in the sleepwalking and nonparasomnia groups. Subjects in the parasomnia groups were also more likely to have a bipolar disorder compared with those in the nonparasomnia group. In addition, DSM-IV anxiety disorders were observed more frequently in the parasomnia groups than in the nonparasomnia group. Panic disorders and generalized anxiety disorders occurred more frequently in the night terrors group than in any of the other groups (see Table 2). A significantly higher proportion of subjects with confusional arousals received an adjustment disorder diagnosis compared with those in any other group (see Table 2). The highest rates of current or past mental disorders were observed in the night terrors group.

More than half the subjects with confusional arousals (55.8%) and night terrors (52.4%) reported having experienced a stressful event in the past 12 months. This rate was 36.3% in the sleepwalking group and 27.2% in the nonparasomnia group. The 3 parasomnia groups differed significantly from the nonparasomnia group on this count ($p < .001$) as well. Divorce or separation from spouse significantly distinguished the 3 parasomnia groups (night terrors 3.0%, sleepwalking 4.1%, and confusional arousals 3.2%) from the nonparasomnia group (1.0%; $p < .01$). Bereavement was also significantly higher in the night terrors (14.7%) and confusional arousals (12.2%) groups compared with the nonparasomnia group (7.3%; $p = .01$); in addition, 5.6% of the sleepwalkers reported a bereavement in the past year. Subjects who reported night terrors (38.2%), sleepwalking (25.1%), or confusional arousals (29.5%) were also more likely to find their life highly stressful than those who reported no parasomnia (17.3%; $p < .001$).

Sleep Disorders

Sleep disorder diagnoses were formulated on the basis of the minimal criteria described in the ICSD-90. The parasomnias were found to be associated with sleep talking (confusional arousals 38.1%, night terrors 33.4%, sleepwalking 55.2%, nonparasomnia 18.2%; $p < .001$), sleep bruxism (confusional arousals 11.6%, night terrors 7.5%, sleepwalking 6.0%, nonparasomnia 4.4%; $p < .005$), and sleep starts, which are another type of parasomnia (confusional arousals 6.8%, night terrors 11.2%, sleepwalking 2.0%, nonparasomnia 2.4%; $p < .001$). The night terrors and confusional arousals groups also had significantly higher rates of obstructive sleep apnea syndrome (confusional arousals 6.8%, night terrors 10.3%, sleepwalking 3.8%, nonparasomnia 1.5%; $p < .001$) and psychophysiologic insomnia (confusional arousals 7.6%, night terrors 6.4%, sleepwalking 2.0%, nonparasomnia 1.9%; $p < .001$) than the nonparasomnia group.

Medical Consultations and Hospitalizations

Medical consultations in the past 12 months were reported significantly more often by subjects with confusional arousals (70.2%), night terrors (83.1%), and sleepwalking (66%) than by those with no parasomnia (60.1%; $p < .001$).

A significantly higher percentage of subjects with night terrors (19.2%) and sleepwalking (20.4%) than of those with no parasomnia (10.6%; $p < .005$) reported having been hospitalized in the past 12 months. This was the case for 13.8% of subjects with confusional arousals as well.

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The number of subjects currently being treated for a physical disease did not differ across groups (15.5% of overall sample).

Road Accidents

About 60% of the subjects in each group drove a motor vehicle. Road accidents in the past 12 months were more common in the sleepwalking group than in any other: 19.8% of drivers in the sleepwalking group reported an accident compared with 4.9% in the nonparasomnia group (OR = 5.0, 95% CI = 2.6 to 9.6; $p < .001$), 7.8% in the confusional arousals group (OR = 2.9, 95% CI = 1.1 to 7.6; $p < .05$), and 6.5% in the night terrors group (OR = 4.3, 95% CI = 1.1 to 16.0; $p < .05$). This association, however, was significant only for the 18–24 years age group, where 37.5% of drivers in the sleepwalking group reported an accident in the past year compared with 9.7% in the nonparasomnia group (OR = 4.3, 95% CI = 1.4 to 13.0; $p < .01$), 2 subjects (8.0%) in the confusional arousals group, and 1 (22.1%) in the night terrors group.

Associated Factors

Variables found to be significant in bivariate analyses were entered into stepwise logistic regression models. As the association between parasomnias and mental disorders may stem from an association between sleep complaints, such as insomnia or daytime sleepiness, or life stress, interaction terms that controlled for the presence of mental disorders, sleep complaints, and life stress were entered into the models.

The following variables were found to be independently related to confusional arousals after controlling for stress, sleep complaints, and depressive, bipolar, and anxiety disorders: age of 15–24 years (adjusted OR = 4.1, 95% CI = 1.9 to 8.5), hypnagogic hallucinations (OR = 3.3, 95% CI = 2.1 to 5.1), deep sleep (OR = 1.6, 95% CI = 1.1 to 2.5), daily smoking (OR = 1.7, 95% CI = 1.1 to 2.6), adjustment disorder (OR = 3.1, 95% CI = 1.3 to 7.6), shift work (OR = 2.1, 95% CI = 1.2 to 3.7), daytime sleepiness (OR = 1.8, 95% CI = 1.1 to 2.8), and sleep talking (OR = 1.7, 95% CI = 1.2 to 2.6). A diagnosis of obstructive sleep apnea syndrome was found to be significantly related to confusional arousals only if a depressive disorder was present (OR = 9.8). Depressive disorder was also significantly related to confusional arousals in heavy caffeine drinkers (≥ 6 cups/day; OR = 17.2). Similarly, nightmares at least 1 night per month were significant only in association with complaints of insomnia (OR = 5.3). Finally, subjects with a bipolar disorder without nocturnal symptoms were at higher risk of confusional arousals (OR = 13.0).

A second model explored factors positively associated with night terrors. After controlling for possible effects of stress and mental and sleep disorders, the following variables were proved independent factors associated with night terrors: sleep talking (OR = 2.5, 95% CI = 1.3 to 4.9), subjective sense of choking or blocked breathing at night (OR = 5.1, 95% CI = 2.3 to 11.1), alcohol intake at bedtime (OR = 3.9, 95% CI = 1.8 to 8.3), violent or injury-causing behaviors during sleep (OR = 3.2, 95% CI = 1.3 to 7.9), hypnagogic hallucinations (OR = 2.2, 95% CI = 1.1 to 4.2), obstructive sleep apnea syndrome (OR = 4.1, 95% CI = 1.3 to 12.5), and nightmares either less than once a month (OR = 3.2, 95% CI = 1.6 to 6.4) or at least 1 night per month (OR = 4.0, 95% CI = 1.7 to 9.6). Feeling nonrestored on awakening in the morning was significant only when anxiety disorder and sleep complaints were present together (OR = 7.9, 95% CI = 1.2 to 52.7).

Finally, the results of a third logistic regression, again after controlling for possible effects of sleep deprivation, life stress, and mental and sleep disorders, revealed a higher risk of sleepwalking for subjects aged 15–24 years (OR = 5.2, 95% CI = 1.6 to 17.0) or who reported the subjective sense of choking or blocked breathing at night (OR = 5.1, 95% CI = 2.4 to 11.0), talking in their sleep (OR = 5.0, 95% CI = 2.9 to 8.7), or a road accident in the past year (OR = 3.9, 95% CI = 1.4 to 11.0). The feeling of getting not enough sleep is significant only in subjects younger than 25 years who do not drive a motor vehicle (OR = 5.9, 95% CI = 2.0 to 17.2).

DISCUSSION

Epidemiologic surveys investigating parasomnia phenomena in the general population are rare. This may be due in part to the fact that sleepwalking and night terrors are considered harmless disorders associated mostly with childhood. Our results show that these 2 disorders are predominant in the youngest age group of our sample (15–24 years old) and decrease considerably with age. The prevalence of confusional arousals in the general population had never before been reported. We found it to be twice as high in the general population as the prevalence of sleepwalking and night terrors. However, confusional arousals follow a pattern similar to the other 2 parasomnias in that they are very common in the youngest age group (15–24 years old) and diminish considerably with age. The main limitation of this study is that results are based on self-reported

data. Consequently, it is reasonable to believe that the rates computed are underestimates, especially since subjects living alone may be unaware of any problem.

In clinical studies, subjects with night terrors exhibit a high level of depression, anxiety, and obsessive-compulsive and phobic traits on Minnesota Multiphasic Personality Inventory (MMPI) profiles[1] and a high rate of anxiety disorders.[1,2] In our survey, the night terrors group had the highest rates of current and past mood and anxiety disorders. The fact that night terrors were found to be associated with obstructive sleep apnea, the subjective sense of choking or blocked breathing at night (a symptom of sleep-choking syndrome), and panic disorder suggests that some of these subjects may suffer from nocturnal panic attacks, which can produce symptoms like night terrors. A careful examination of the symptoms accompanying the episodes is necessary to distinguish these disorders. Nocturnal panic attacks are normally characterized by various physiologic signs, such as change in heartbeat and breathing, whereas night terrors occur suddenly without forewarning.[22,23] Furthermore, subjects suffering from night terrors usually do not have daytime panic attacks or agoraphobic symptoms. Similarly, sleep-choking syndrome, which is characterized by sudden awakenings with the feeling of being unable to breathe, is accompanied by an intense anxiety and often a sense of dying. Unlike persons with night terrors, subjects suffering from sleep-choking syndrome are immediately fully awake and their fears recede rapidly.[24] Distinguishing sleep-choking syndrome from sleep apnea syndrome is more problematic, since sleep monitoring is normally required to confirm the latter.

Mental stress and specific life events have been reported to trigger or increase the frequency of sleepwalking episodes and night terrors.[1,14] We observed higher rates of stressful events and mental stress in the past year in our parasomnia subjects compared with those in the nonparasomnia group. A finding of particular interest is the very high rate of past-year road accidents in the youngest group of sleepwalkers. One can hypothesize that driving accidents play a triggering role in the appearance of sleepwalking episodes. Further evidence of this hypothesis is found in that even after controlling for the possible effects of sleep deprivation and life stress, the association remains.

Unlike night terrors and sleepwalking, confusional arousals, as the term suggests, occur on awakening, producing confusion, disorientation, and motor uncoordination. Episodes may be triggered by sudden awakening from sleep. The confusional arousals group is also characterized by high rates of mental disorders, which in turn are often treated with psychotropic medication. Drugs, such as hypnotics, that have a depressive effect on the CNS are likely to produce confusional arousals. In our survey, subjects who reported confusional arousals were also the greatest consumers of psychotropics and the greatest bedtime consumers of alcohol, which is also a CNS depressant. Psychotropic medication, stimulants, antihistamines, and alcohol are also likely to induce night terrors and sleepwalking episodes.[14] Another interesting finding was the association between sleep apnea syndrome and confusional arousals. It would not be unreasonable to surmise that the hypoxemia occurring in sleep apnea provokes a sleep drunkenness phenomenon when awakening occurs close to the apneic event. We also noted that confusional arousals were associated with shift work. Upsetting the circadian rhythm may favor the appearance of confusional arousals, as can sleep deprivation.[25,26] The main symptoms of sleep deprivation are, among others, daytime sleepiness and feeling nonrestored on awakening, 2 symptoms closely associated with confusional arousals. Furthermore, confusional arousals are often associated with idiopathic hypersomnia.[26] This association may be the result of chronic sleep deprivation experienced by hypersomniac subjects whose sleep needs may exceed current supply.

As stated earlier, the night terrors and confusional arousals groups are more likely to have a current mental disorder. This is true for about half of them, but for only about one fifth of sleepwalkers. The relationship between psychopathology and night terrors is not entirely clear. According to the findings of Llorente et al.,[27] the course of these 2 conditions presents little or no overlapping, which suggests the existence of other unidentified underlying factors that would predispose some adults to night terrors and mental disorders. The relationship between psychopathology and confusional arousals is not well documented, either. However, our finding that about one fourth of subjects with confusional arousals have a mood disorder is in keeping with expectations—major depressive disorders are often accompanied by sleep disturbances (insomnia or hypersomnia) and bipolar disorders by symptoms of insomnia. That the association between confusional arousals and major depressive disorders is explained in full by other factors (in multivariate models, this relationship disappeared when we controlled for possible interactions between major depressive disorders, insomnia, and daytime sleepiness complaints) would support the assumption that sleep disturbances are responsible for the onset of confusional arousals. In the case

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of bipolar disorders, the situation is different; even when possible interactions with sleep disturbances are controlled, bipolar disorders appear as an independent risk factor. This association would mean that other unknown underlying factors could be responsible for it. Further research is needed to explore the mechanisms underlying this association.

Finally, the association between night terrors and violent or injury-causing behaviors occurring during sleep must be brought to the forefront, given the general assumption that arousal parasomnias are harmless.[15] The numerous case reports in the literature of self-injuries, death, or murders during episodes of sleepwalking, night terrors, and confusional arousals attest to the potentially serious consequences of these 3 parasomnias.[4–6]

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1. Among the following parasomnias, which is *not* an arousal parasomnia?
a. Night terrors
b. Nightmares
c. Sleep drunkenness
d. Sleepwalking
e. Confusional arousals

2. Arousal parasomnia is an undesirable physical phenomenon that occurs predominantly during:
a. The wake state
b. The non-REM sleep
c. The REM sleep
d. The transition between wake state and sleep
e. None of the above

3. Which percentage represents the prevalence of the co-occurrence of night terrors and sleepwalking?
a. 2.0%
b. 2.2%
c. 4.2%
d. 0.3%
e. 0.4%

4. Which group has the highest rate of anxiety and mood disorders?
a. Nonparasomnia
b. Confusional arousal
c. Night terrors
d. Sleepwalking
e. Answers b and c

5. Which of the following is true?
a. Antidepressants were the most frequently used psychotropic medication in the parasomnia groups.
b. Hypnotics were used most frequently by nonparasomnia subjects.
c. Anxiolytic intake was an independent risk factor for night terrors.
d. Confusional arousal group has the highest rate of daily smokers.
e. None of the above

6. Who is at greater risk of road accidents?
a. Subjects 65 years of age or older in the confusional arousal group
b. Subjects 65 years of age or older in the sleepwalking group
c. Subjects 18–24 years of age in the confusional arousal group
d. Subjects 18–24 years of age in the night terrors group
e. Subjects 18–24 years of age in the sleepwalking group

7. Which disorder can produce episodes similar to night terrors?
a. Nocturnal leg cramps
b. Obstructive sleep apnea syndrome
c. Sleep talking
d. Sleep deprivation
e. All of the above

Answers to the October 1998 CME posttest

1. d 2. b 3. a 4. d 5. e 6. c 7. b

Circle the one correct answer for each question.

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5. Achievement of educational objectives:
   A. Enabled me to recognize that parasomnias may have serious consequences that could indicate a mental disorder. ❑ Yes ❑ No
   B. Enabled me to distinguish between the different forms of arousal parasomnias for making a differential diagnosis. ❑ Yes ❑ No
   C. Enabled me to recognize the constellation of symptoms accompanying arousal parasomnia. ❑ Yes ❑ No

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