

SLEEP-WAKE DISORDERS

A. Etiology

Medical or surgical problems, neurological disorders, and psychiatric disorders can all cause sleep disorders.

- The numerous medical problems affecting sleep include asthma, heart disease, peptic ulcer disease, chronic obstructive pulmonary disease, and rheumatic disorders. Any sort of chronic pain may also impair sleep. Neurological disorders such as neurodegenerative diseases, strokes, headache syndromes, and neuromuscular disorders are associated with sleep disorders.
- Psychiatric disorders such as depression, anxiety disorders, and panic attacks may be the underlying cause for approximately half of all cases of insomnia.
- Drug and alcohol use can induce insomnia. Although some people use it to relax, alcohol, like other sedatives, disrupts sustained sleep. The nicotine found in cigarettes, as well as the caffeine in coffee, tea, and chocolate, can also prevent you from falling asleep. In fact, for individuals sensitive to caffeine, even a few cups of coffee consumed in the morning can adversely affect sleep at night. Stimulant drugs such as amphetamines and antidepressants postpone sleep, as does phenylpropanolamine, which is present in many nonprescription decongestant treatments and diet aids.
- Disruptions in internal sleep–wake cycles (circadian rhythm) can cause sleep disorders. Circadian rhythm refers to biologic changes throughout a 24-hour cycle. In mammals, nerve cell pacemakers control the biological rhythms involving the sleep–wake cycle.
- Patients with circadian rhythm sleep disorders typically experience delayed–sleep phase syndrome, causing them to stay up well after midnight and wake up late in the morning. Delayed sleep phase syndrome is most commonly found in adolescents and young adults, and the onset of this disorder usually occurs around puberty.

Polysomnography is the monitoring of multiple electrophysiological parameters during sleep and generally includes measurement of EEG activity, electrooculographic activity, and electromyographic activity. Additional polysomnographic measures may include oral or nasal airflow, respiratory effort, chest and abdominal wall movement, oxyhemoglobin saturation, or exhaled carbon dioxide concentration; these measures are used to monitor respiration during sleep and to detect the presence and severity of sleep apnea. Measurement of peripheral electromyographic activity may be used to detect abnormal movements during sleep.

Most polysomnographic studies are conducted during the person's usual sleeping hours—that is, at night. However, daytime polysomnographic studies also are used to quantify daytime sleepiness. The most common daytime procedure is the Multiple Sleep Latency Test (MSLT), in which the individual is instructed to lie down in a dark room and not resist falling asleep; this protocol is repeated five times during the day. Sleep latency (the amount of time required to fall asleep) is measured on each trial and is used as an index of physiological sleepiness. The converse of the MSLT is also used: In the Repeated Test of Sustained Wakefulness (RTSW), the individual is placed in a quiet, dimly lit room and instructed to remain awake; this protocol is repeated several times during the day. Again, sleep latency is measured, but it is used here as an index of the individual's ability to maintain wakefulness.

Sleep continuity refers to the overall balance of sleep and wakefulness during a night of sleep. "Better" sleep continuity indicates consolidated sleep with little wakefulness; "worse" sleep continuity indicates disrupted sleep with more wakefulness. Specific sleep continuity measures include:

- *sleep latency*—the amount of time required to fall asleep (expressed in minutes)
- *intermittent wakefulness*—the amount of awake time after initial sleep onset (expressed in minutes)
- *Sleep efficiency*—the ratio of actual time spent asleep to time spent in bed (expressed as a percentage, with higher numbers indicating better sleep continuity).

Sleep architecture refers to the amount and distribution of specific sleep stages. Sleep architecture measures include absolute amounts of REM sleep and each NREM sleep stage (in minutes), relative amount of REM sleep and NREM sleep stages (expressed as a percentage of total sleep time), and latency between sleep onset and the first REM period (REM latency).

- B. The excessive sleepiness causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.
- C. The excessive sleepiness is not better accounted for by insomnia and does not occur exclusively during the course of another Sleep Disorder (e.g., Narcolepsy, Breathing-Related Sleep Disorder, Circadian Rhythm Sleep Disorder, or a Parasomnia) and cannot be accounted for by an inadequate amount of sleep.
- D. The disturbance does not occur exclusively during the course of another mental disorder.
- E. The disturbance is not due to the direct physiological effects of a substance (e.g., a drug of abuse, a medication) or a general medical condition.

Specify if:

Recurrent: if there are periods of excessive sleepiness that last at least 3 days occurring several times a year for at least 2 years

Diagnostic Features

The essential feature of Primary Hypersomnia is excessive sleepiness for at least 1 month as evidenced either by prolonged sleep episodes or by daytime sleep episodes occurring almost daily (Criterion A). The excessive sleepiness must be sufficiently severe to cause clinically significant distress or impairment in social, occupational, or other important areas of functioning (Criterion B). The excessive sleepiness does not occur exclusively during the course of another Sleep Disorder (Criterion C) or mental disorder (Criterion D) and is not due to the direct physiological effects of a substance or a general medical condition (Criterion E).

In individuals with Primary Hypersomnia, the duration of the major sleep episode (for most individuals, nocturnal sleep) may range from 8 to 12 hours and is often followed by difficulty awakening in the morning. The actual quality of nocturnal sleep is normal. Excessive sleepiness during normal waking hours takes the form of intentional naps or inadvertent episodes of sleep. Objective measurements demonstrate increased physiological sleepiness. Daytime naps tend to be relatively long (often lasting an hour or more), are experienced as unrefreshing, and often do not lead to improved alertness. Individuals typically feel sleepiness developing over a period of time, rather than experiencing a sudden sleep "attack." Unintentional sleep episodes

very overweight individuals and can be associated with a complaint of either excessive sleepiness or insomnia.

- the presence of concurrent substance use that is exacerbating the condition.

Circadian Rhythm Sleep Disorder (formerly Sleep-Wake Schedule Disorder)

Diagnostic criteria for Circadian Rhythm Sleep Disorder

- A. A persistent or recurrent pattern of sleep disruption leading to excessive sleepiness or insomnia that is due to a mismatch between the sleep-wake schedule required by a person's environment and his or her circadian sleep-wake pattern.
- B. The sleep disturbance causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.
- C. The disturbance does not occur exclusively during the course of another Sleep Disorder or other mental disorder.
- D. The disturbance is not due to the direct physiological effects of substance (e.g., a drug of abuse, a medication) or a general medical condition.

Specify type:

- **Delayed Sleep Phase Type:** a persistent pattern of late sleep onset and late awakening times, with an inability to fall asleep and awaken at a desired earlier time
- **Jet Lag Type:** sleepiness and alertness that occur at an inappropriate time of day relative to local time, occurring after repeated travel across more than one time zone
- **Shift Work Type:** insomnia during the major sleep period or excessive sleepiness during the major awake period associated with night shift work or frequently changing shift work
- **Unspecified Type**

1. Complaints of clinically significant insomnia or hypersomnia that are attributable to environmental factors (e.g., noise, light, frequent interruptions).
2. Excessive sleepiness that is attributable to ongoing sleep deprivation.
3. Idiopathic "Restless Legs Syndrome": uncomfortable sensations (e.g., discomfort, crawling sensations, or restlessness) that lead to an intense urge to move the legs. Typically, the sensations begin in the evening before sleep onset and are temporarily relieved by moving the legs or walking, only to begin again when the legs are immobile. The sensations can delay sleep onset or awaken the individual from sleep.
4. Idiopathic periodic limb movements ("nocturnal myoclonus"): repeated low amplitude brief limb jerks, particularly in the lower extremities. These movements begin near sleep onset and decrease during stage 3 or 4 non-rapid eye movement (NREM) and rapid eye movement (REM) sleep. Movements usually occur rhythmically every 20-60 seconds, leading to repeated, brief arousals. Individuals are typically unaware of the actual movements, but may complain of insomnia, frequent awakenings, or daytime sleepiness if the number of movements is very large.
5. Situations in which the clinician has concluded that a dyssomnia is present but is unable to determine whether it is primary, due to a general medical condition, or substance induced.

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Parasomnias

Parasomnias are disorders characterized by abnormal behavioral or physiological events occurring in association with sleep, specific sleep stages, or sleep-wake transitions. Unlike dyssomnias, parasomnias do not involve abnormalities of the mechanisms generating sleep-wake states, nor of the timing of sleep and wakefulness. Rather, parasomnias represent the activation of physiological systems at inappropriate times during the sleep-wake cycle. In particular, these disorders involve activation of the autonomic nervous system, motor system, or cognitive processes during sleep or sleep-wake transitions. Different parasomnias occur at different times during sleep, and specific parasomnias often occur during specific sleep stages. Individuals with parasomnias usually present with complaints of unusual behavior during sleep, rather than complaints of insomnia or excessive daytime sleepiness. This section includes Nightmare Disorder, Sleep Terror Disorder, Sleepwalking Disorder, and Parasomnia Not Otherwise Specified.

For some individuals with hypersomnolence disorder, the major sleep episode (for most individuals, nocturnal sleep) has a duration of 9 hours or more. However, the sleep is often nonrestorative and is followed by difficulty awakening in the morning. For other individuals with hypersomnolence disorder, the major sleep episode is of normal nocturnal sleep duration (6-9 hours). In these cases, the excessive sleepiness is characterized by several unintentional daytime naps. These daytime naps tend to be relatively long (often lasting 1 hour or more), are experienced as nonrestorative (i.e., unrefreshing), and do not lead to improved alertness. Individuals with hypersomnolence have daytime naps nearly everyday regardless of the nocturnal sleep duration. Subjective sleep quality may or may not be reported as good. Individuals typically feel sleepiness developing over a period of time, rather than experiencing a sudden sleep "attack." Unintentional sleep episodes typically occur in low stimulation and low-activity situations (e.g., while attending lectures, reading, watching television, or driving long distances), but in more severe cases they can manifest in high attention situations such as at work, in meetings, or at social gatherings.

Narcolepsy

Diagnostic Criteria

A. Recurrent periods of an irrepressible need to sleep, lapsing into sleep, or napping occurring within the same day. These must have been occurring at least three times per week over the past 3 months.

B. The presence of at least one of the following:

1. Episodes of cataplexy, defined as either (a) or (b), occurring at least a few times per month:

a. In individuals with long-standing disease, brief (seconds to minutes) episodes of sudden bilateral loss of muscle tone with maintained consciousness that are precipitated by laughter or joking.

b. In children or in individuals within 6 months of onset, spontaneous grimaces or jaw-opening episodes with tongue thrusting or a global hypotonia, without any obvious emotional triggers.

2. Hypocretin deficiency, as measured using cerebrospinal fluid (CSF) hypocretin-1 immunoreactivity values (less than or equal to one-third of values obtained in healthy subjects tested using the same assay, or less than or equal to 110 pg/mL). Low CSF levels of hypocretin-1 must not be observed in the context of acute brain injury, inflammation, or infection.

exacerbate impairments of respiratory rhythm and ventilation. Individuals taking these medications have a sleep-related breathing disorder that could contribute to sleep disturbances and symptoms such as sleepiness, confusion, and depression. Specifically, *chronic use of long-acting opioid medications* is often associated with impairment of respiratory control leading to central sleep apnea.

Sleep-Related Hypoventilation

Diagnostic Criteria

A. Polysomnography demonstrates episodes of decreased respiration associated with elevated CO₂ levels. (Note: In the absence of objective measurement of CO₂, persistent low levels of hemoglobin oxygen saturation unassociated with apneic/hypopneic events may indicate hypoventilation.)

B. The disturbance is not better explained by another current sleep disorder.

Specify whether:

327.24 (G47.34) Idiopathic hypoventilation: This subtype is not attributable to any readily identified condition.

327.25 (G47.35) Congenital central alveolar hypoventilation: This subtype is a rare congenital disorder in which the individual typically presents in the perinatal period with shallow breathing, or cyanosis and apnea during sleep.

327.26 (G47.36) Comorbid sleep-related hypoventilation: This subtype occurs as a consequence of a medical condition, such as a pulmonary disorder (e.g., interstitial lung disease, chronic obstructive pulmonary disease) or a neuromuscular or chest wall disorder (e.g., muscular dystrophies, postpolio syndrome, cervical spinal cord injury, kyphoscoliosis), or medications (e.g., benzodiazepines, opiates). It also occurs with obesity (obesity hypoventilation disorder), where it reflects a combination of increased work of breathing due to reduced chest wall compliance and ventilation-perfusion mismatch and variably reduced ventilatory drive. Such individuals usually are characterized by body mass index of greater than 30 and hypercapnia during wakefulness (with a PCO₂ of greater than 45), without other evidence of hypoventilation.

Specify current severity:

Specify whether:

307.46 (F51.3) Sleepwalking type

Specify if:

With sleep-related eating

With sleep-related sexual behavior (sexsomnia)

307.46 (F51.4) Sleep terror type

Diagnostic Features

The essential feature of non-rapid eye movement (NREM) sleep arousal disorders is the repeated occurrence of incomplete arousals, usually beginning during the first third of the major sleep episode (Criterion A), that typically are brief, lasting 1-10 minutes, but may be protracted, lasting up to 1 hour. The maximum duration of an event is unknown. The eyes are typically open during these events. Many individuals exhibit both subtypes of arousals on different occasions, which underscores the unitary underlying pathophysiology. The subtypes reflect varying degrees of simultaneous occurrence of wakefulness and NREM sleep, resulting in complex behaviors arising from sleep with varying degrees of conscious awareness, motor activity, and autonomic activation.

The essential feature of *sleepwalking* is repeated episodes of complex motor behaviour initiated during sleep, including rising from bed and walking about (Criterion A1). Sleepwalking episodes begin during any stage of NREM sleep, most commonly during slowwave sleep and therefore most often occurring during the first third of the night. During episodes, the individual has reduced alertness and responsiveness, a blank stare, and relative unresponsiveness to communication with others or efforts by others to awaken the individual. If awakened during the episode (or on awakening the following morning), the individual has limited recall for the episode. After the episode, there may initially be a brief period of confusion or difficulty orienting, followed by full recovery of cognitive function and appropriate behavior.

The essential feature of *sleep terrors* is the repeated occurrence of precipitous awakenings from sleep, usually beginning with a panicky scream or cry (Criterion A2). Sleep terrors usually begin during the first third of the major sleep episode and last **1-10** minutes, but they may last considerably longer, particularly in children. The episodes are accompanied by impressive autonomic arousal and behavioral manifestations of intense fear. During an episode,

Abnormalities in length, timing, and/or rigidity of the sleep-wake cycle relative to the day-night cycle. A persistent or recurrent pattern of sleep disruption that is primarily due to an alteration of the circadian system or to a misalignment between the endogenous circadian rhythm and the sleep-wake schedule required by an individual's physical environment or social or professional schedule. The sleep disruption leads to excessive sleepiness or insomnia, or both. The sleep disturbance causes clinically significant distress or impairment in social, occupational, and other important areas of functioning.

Five types of CSDs are defined below. The first four are chronic, with neurological causes. The last is temporary, with social and environmental causes

1. Delayed Sleep Phase Syndrome (DSPS) or Delayed Sleep Phase Disorder (DSPD)

A condition characterized by an inability to fall asleep until very late at night, with the resulting need to sleep late in the morning or into the afternoon; but an ability to sleep reasonably well if sleep and wake times are much later than normal.

2. Non-24-Hour Sleep-Wake Disorder (Non-24)

A condition in which a person's day length is longer than 24 hours. Sleep times get progressively later and later, so the person is eventually sleeping during the day until they cycle back to a nighttime bedtime.

3. Advanced Sleep Phase Syndrome (or Disorder) (ASPS or ASPD)

A condition characterized by a need to sleep and wake up much earlier than normal

4. Irregular Sleep-Wake Disorder (ISWD)

A condition characterized by irregular sleep and wake periods, at least three sleep periods per day

5. Shift Work Disorder

A condition in which circadian rhythms are disturbed due to working during the body's natural sleep time, and the patient has serious difficulty in adjusting to the required schedule.

- **PARASOMNIAS**

Parasomnias are disorders characterized by abnormal behavioral, experiential, or physiological events occurring in association with sleep, specific sleep stages, or sleep-