

# The Effects of Stimulants and Depressants on Sleep: A Literature Review



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## Abstract

- Sleep quality is adversely affected by the concomitant use of stimulants and depressants.
- Good sleep is important because it improves cognitive function, boosts mood, supports physical health, enhances performance, and regulates weight.
- Stimulants, such as amphetamines and caffeine, promote increased dopamine and serotonin neurotransmitter activity in the central nervous system, thereby enhancing arousal and wakefulness.
- Depressants, such as alcohol, induce drowsiness by increasing the inhibitory GABA neurotransmitter activity, ultimately leading to fragmented sleep.
- The generalized use of stimulants and depressants likely has measurable and long-term effects on individual wellbeing and the functioning of society.
- Consistent disturbance of the natural sleep-wake cycle and the reduction of restorative sleep quality via the concomitant use of stimulants and depressants may result in a cascade of negative health consequences such as, chronic fatigue, decreased productivity, impairing cognitive function, and an increased risk of serious health complications.
- Educating the public about these risks should be prioritized.

## Stimulants and Sleep

- The effects of stimulants on sleep are largely dependent on dosage, the length of use, and individual characteristics.
- Stimulant doses in the low to moderate range have been reported to shorten sleep duration and initially increase wakefulness. Long-term or high-dose stimulant use leads to a rebound effect that makes it harder to fall and stay asleep, also causing fatigue, irritability, insomnia and sleep disturbances.
- Stimulants, such as cocaine and caffeine, promote increased activity of neurotransmitters such as dopamine and serotonin in the central nervous system, thereby enhancing arousal and wakefulness.
- Caffeine blocks the brain's adenosine receptors, thereby preventing the neurotransmitter that promotes sleep.
- When stimulants, such as caffeine, are taken close to bedtime, sleep quality is reduced, and the onset of sleep is greatly delayed. Using stimulants earlier in the day may have less adverse effects on sleep, since the body has more time to metabolize and eliminate the drugs.
- Prolonged use of stimulants may disrupt circadian rhythms, thus contributing to the worsening of insomnia and other sleep disorders. Individual factors, such as age, genetics, and other existing medical conditions also interact to determine how stimulants affect sleep.

## Common Stimulants and Depressants

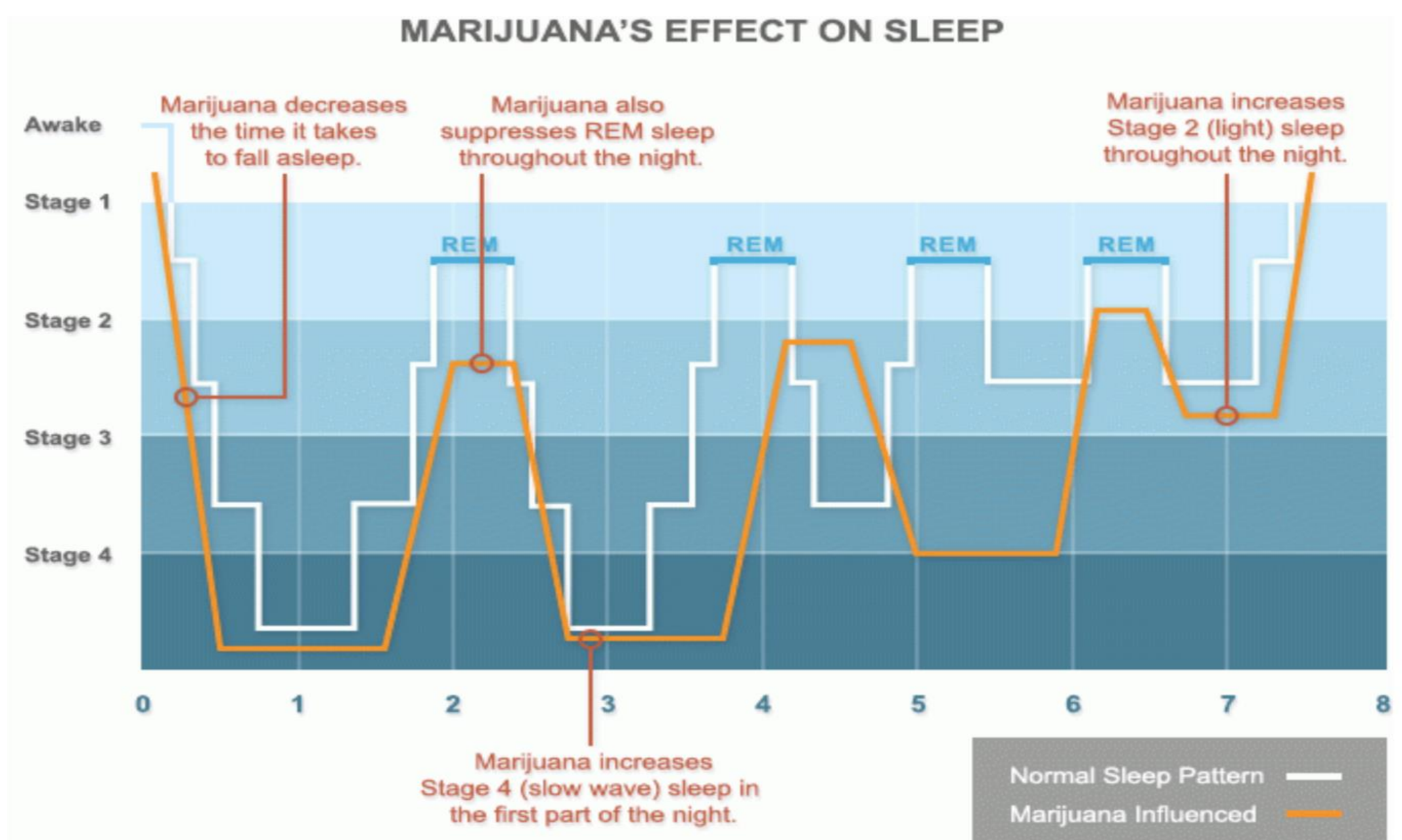
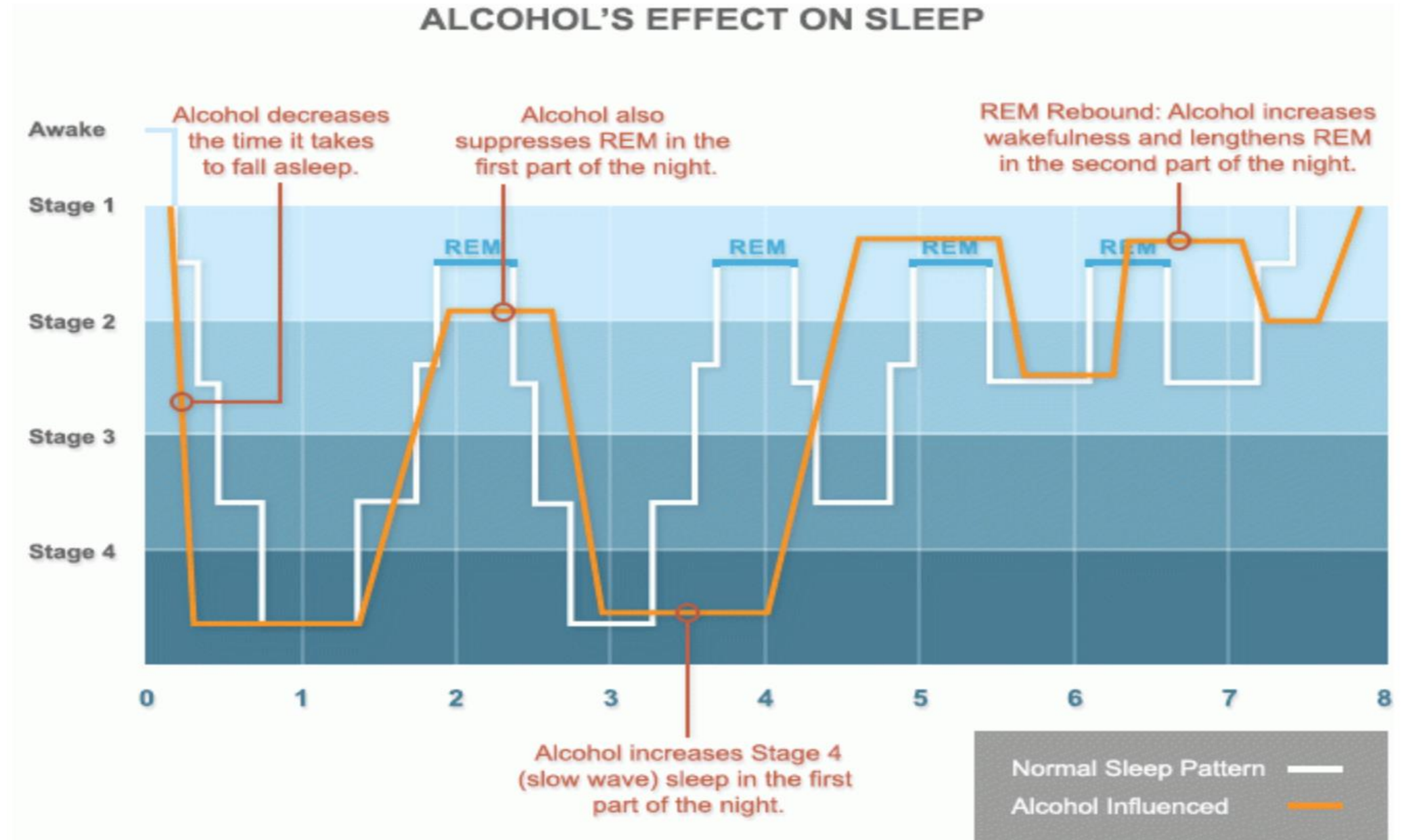


- ALCOHOL**
- BARBITURATES**
- Amobarbital** - Amytal
  - Butobarbital** - Butisol
  - Pentobarbital** - Nembutal
  - Secobarbital** - Seconal
  - Phenobarbital** - Donnatal
  - Butalbital** - Esigic, Fioricet
  - Butalbital** - Fiorinal Ascomp, Fortabs
- BENZODIAZEPINES**
- Alprazolam** - Xanax
  - Clonazepam** - Klonopin
  - Chlordiazepoxide** - Librium
  - Diazepam** - Valium
  - Lorazepam** - Ativan
  - Temazepam** - Restoril
  - Triazolam** - Halcion
- OPIOIDS**
- Although Opioids have depressant actions, they are generally not considered a depressant as they do excite parts of the nervous system*

## Depressants and Sleep

- Depressants help sleep by increasing the activity of the brain's inhibitory neurotransmitter GABA. Depressants enhance sleep because it has a sedative effect.
- Alcohol has complicated effects on sleep and they usually get worse later in the evening. Though alcohol may make it easier for people to fall asleep, it also causes less restorative and more fragmented sleep, especially in the second half of the night because the body's attempt to flush alcohol out of the system causes a rebound in arousal and wakefulness.
- Because they directly target and potentiate GABA receptors, benzodiazepines and other sedative-hypnotics are more effective at inducing, maintaining, and improving sleep quality.
- By binding to mu-opioid receptors in the brain, opioids-such as heroin and prescription painkillers-promote sleep. Sleep-promoting effects of opioids, like those of other depressants, are often short-lived, and chronic use can lead to sleep disturbances, such as disrupted sleep and somnolence in the daytime.

## Alcohol and Marijuana's Effect on Sleep



## Future Directions

- Research is needed to elucidate how the effects of stimulants and depressants interact with sleep disturbance and how such interactions impact neurotransmitter systems, circadian rhythms, and sleep-wake regulatory pathways.
- Long-term research would be beneficial to establish the cumulative effect of prolonged use of stimulants and depressants on sleep rhythms and its impact on sleep quality, sleep length, and overall health outcomes.
- It should be investigated how the combination of findings from genetic, metabolic, and individual sleep architecture can be used to inform personalized interventions.
- In response to the complexity in these interactions between these psychoactive drugs and sleep, it may be possible to develop new pharmacological and non-pharmacological interventions based on better understanding of these underlying mechanisms.
- Another critical line of future research should address lifestyle and environmental factors that can modify the effects of stimulants and depressants on sleep.

