Unit 5 States of Consciousness Modules 22-25 (p 217-259)

Module 22 Understanding Consciousness and Hypnosis (p218)

Discussion of Behaviorism (direct observation of behavior)
Behaviorist reject consciousness- as un observable

New Ideas about Consciousness in the 1960s: Neuroscience Modul 22

- Researchers began to study consciousness
- Sleeping
- Dreaming
- Other mental states
- Mental activity
- Hypnosis
- Drugs Alter Consciousness
- Mental Processes
- Cognition

P219

Consciousness defined:

"our awareness of ourselves and our environment."

Dual Processing:

1. Consciousness- awareness (selective attention, allows us to direct our attention)
2. Unconsciousness- outside of our awareness, we still process information

Stream of Consciousness- William James said, "each moment flowing into the next."

3 Types of Consciousness

1. Sleep
2. Awake/Aware
3. Altered State

P 219 Chart Altered States of Consciousness-

1. Spontaneous
2. Physiological
3. Psychological

Some states occur spontaneously	Daydreaming	Drowsiness	Dreaming
Some are physiologically induced	Hallucinations	Orgasm	Food or oxygen starvation
Some are psychologically induced	Sensory deprivation	Hypnosis	Meditation

Hypnosis:

Is an altered state of consciousness
A person is sensitive to suggestion of another…

Hypnotherapy-

Posthypnotic Suggestion-

A suggestion made during hypnosis session
To be carried out after the subject is no longer hypnotized
Used by some clinicians to help control undesired symptoms and behaviors

Used to treat lots of ailments: obesity, drug, alcohol, smoking addiction…
Most successful when used with other therapy

Under Hypnosis people can be influenced:

Perceptions
Feelings
Thoughts
Behaviors

Can anyone Experience Hypnosis?

Hypnotic Ability
Stanford Hypnotic Susceptibility Scale (web) (people with strong imagination)

Memory and Hypnosis:

Memory recovered under hypnosis are generally unreliable.

Can Hypnosis relieve pain?

Yes to a point
"Hypnosis inhibits pain related brain activity
10% respond very well
50% get some pain relief
It can reduce fear = less pain

Explaining the Hypnotic State:

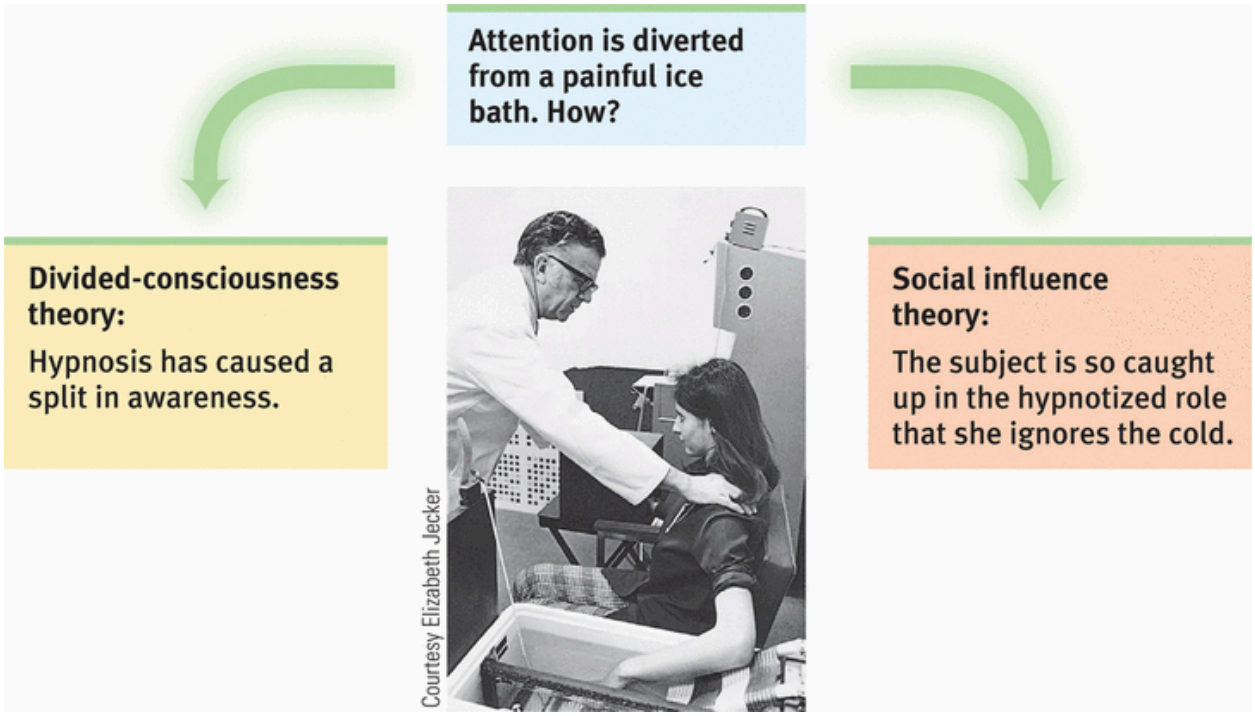
Heightened Suggestibility

Some evidence for hypnosis as a form of Social Influence
Some people want to be hypnosis subjects

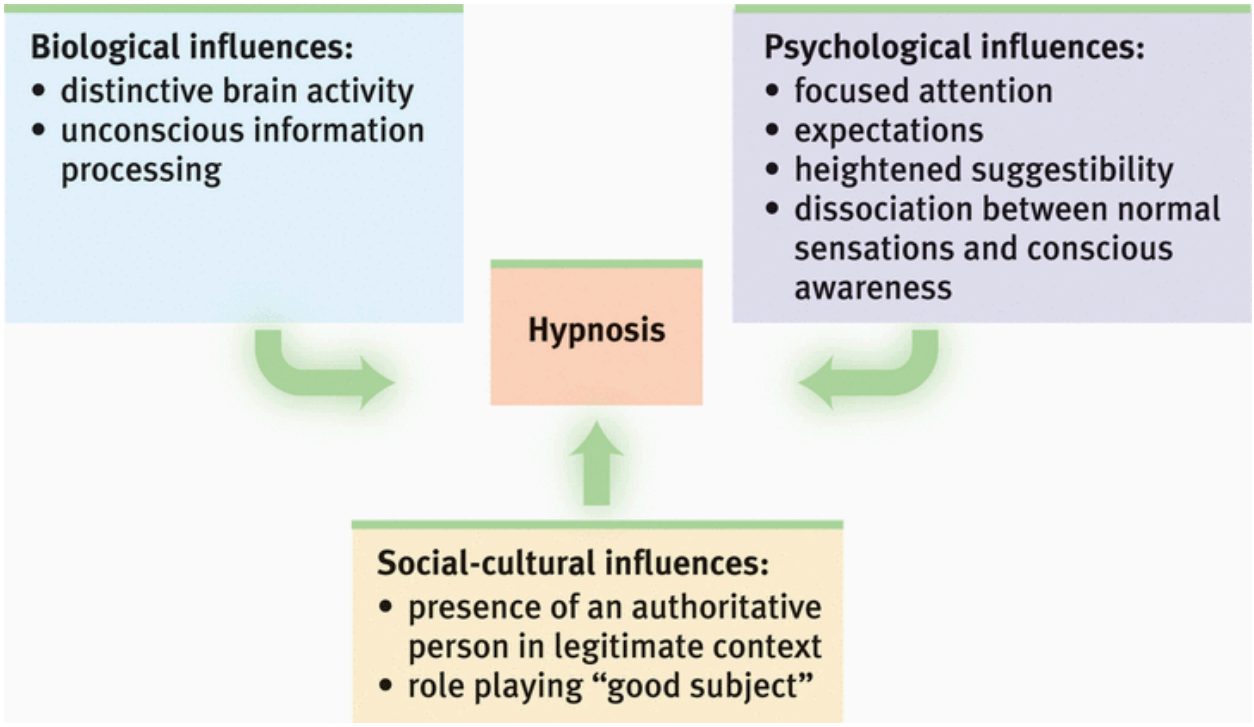
The hypnotist has influence over the hypnotized subject.
"The hypnotist's ideas become the subject's thoughts…"

Ernst Hilgard- researcher in Hypnosis Dissociation

Said hypnosis was about social influence but also dual processing
Called **Dissociation**- a split between different levels of consciousness
A form of "mind split" similar to doodling while listening to a lecture…
The consciousness is altered
A split in consciousness/awareness



"Selective Attention can block our attention to stimuli."



Module 23 Sleep Patterns and Sleep Theories

Auditory Cortex responds to sound stimuli even during sleep.

Biological Rhythms

Circadian Rhythm

- 24-hour cycle
- Biological clock
- Circa=about
- Dia=day
- "Thinking is sharpest and memory most accurate when we are at our daily peak."

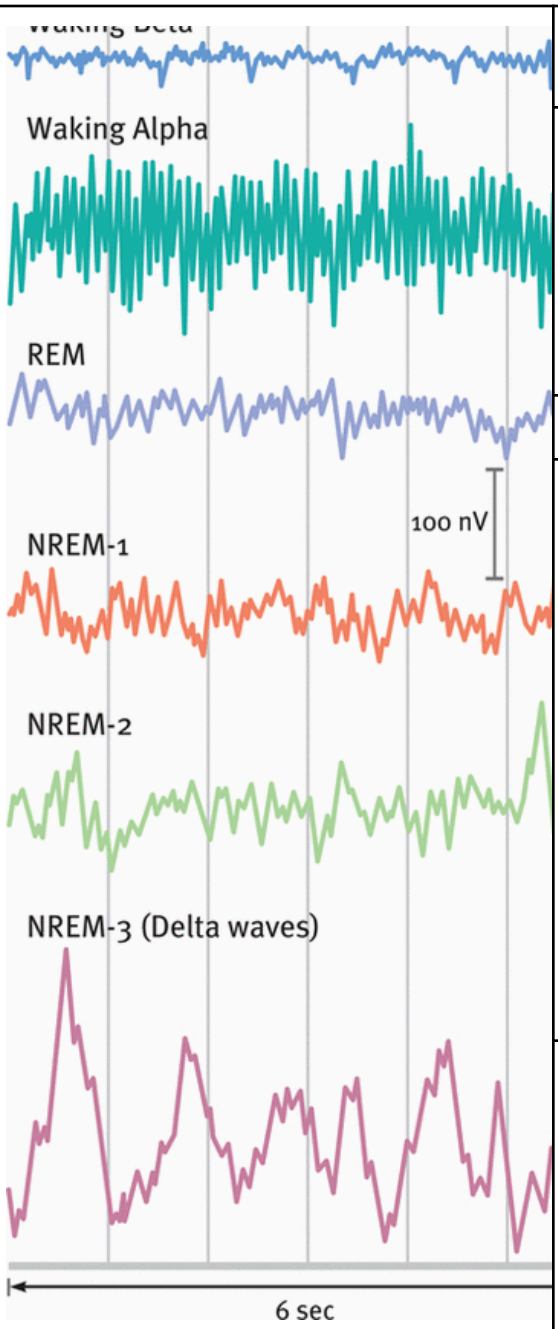
    Age can alter Circadian Rhythm

    Owls: Teens and young adults are evening energized, with performance improving across the day.

    Larks: (morning people) Older adults are morning energized, performance declines as the day wears on.

    Morning types tend to do better in school, take more initiative, and to be less vulnerable to depression…

    Sleep Stages



Beta Waves = Alert and awake waves

Alpha Waves

Awake but relaxed

Slow (just before sleep)

Occur during relaxed, closed-eyes resting state and early sleep stages, with a frequency range of around 8-12 Hz, and are associated with relaxation and reduced cortical activity.

Dream State

Stage 1 NREM 1 Sleep

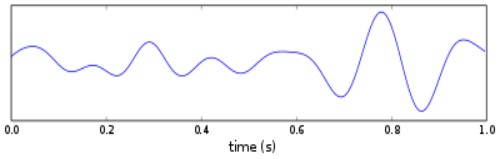
Irregular Brain waves

Hypnagogic Jerk- Hypnic Jerk

May experience hallucinations

Theta Waves:

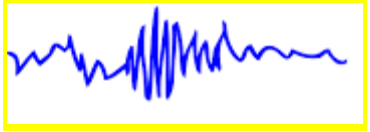
Occur during early stages of sleep and have a frequency of around 4-8 Hz… deep relaxation and reduced awareness, and play a role in suppressing irrelevant sensory inputs to initiate sleep.



Stage 2 NREM 2 Sleep

20 minutes

Periodic sleep spindles "bursts of rapid rhythmic brain-wave activity"



Stage 3 NREM 3 Sleep

30 minutes

Deep Sleep/hard to wake up

Large Slow Waves = Delta waves

Bed wetting in this stage

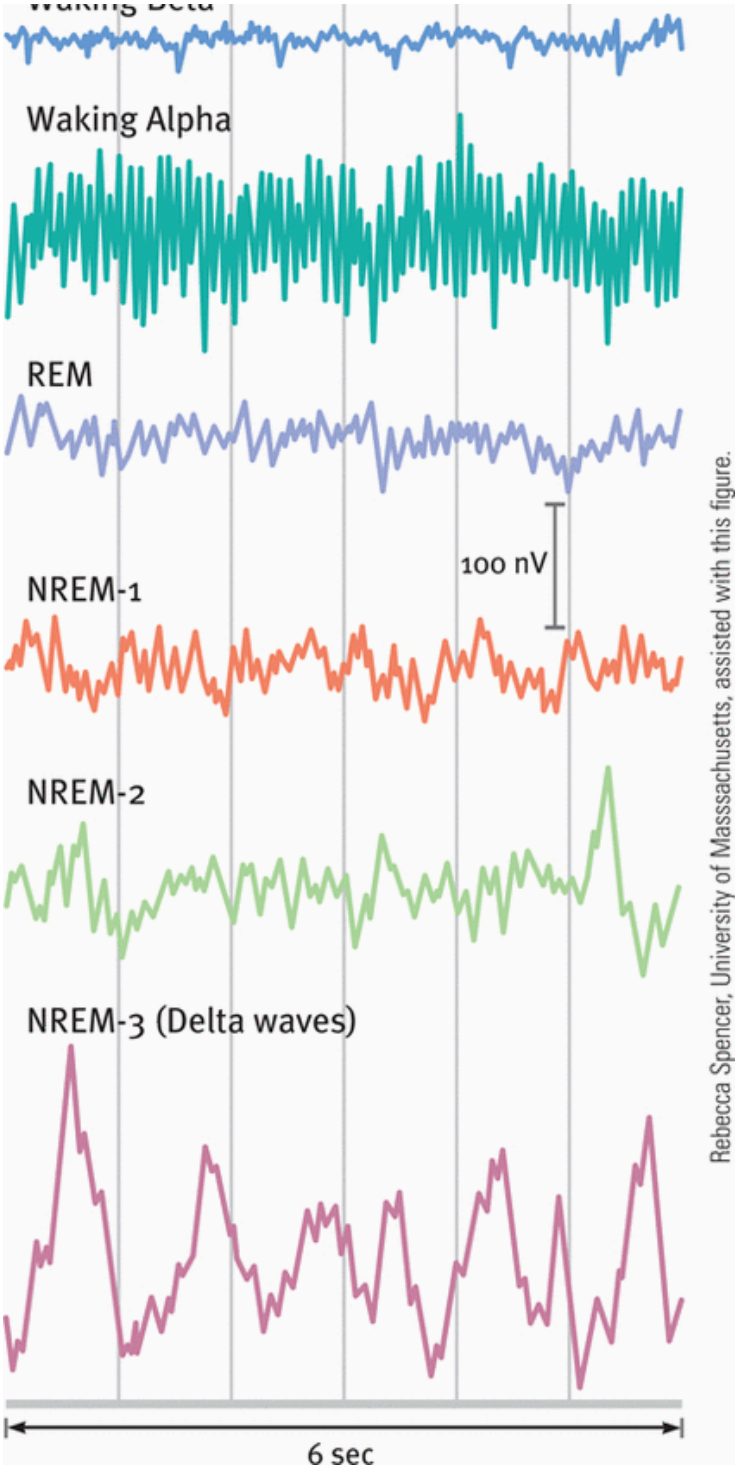
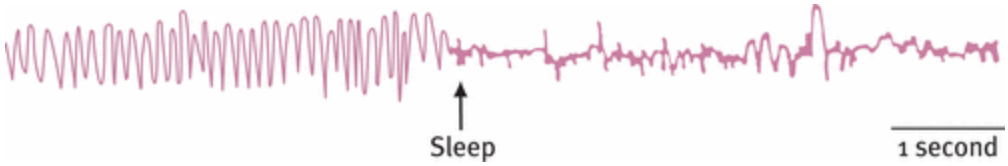


Figure 23.2 Brain waves and sleep stages The beta waves of an alert, waking state and the regular alpha waves of an awake, relaxed state differ from the slower, larger delta waves of deep NREM-3 sleep. Although the rapid REM sleep waves resemble the near-waking NREM-1 sleep waves, the body is more aroused during REM sleep than during NREM sleep.



Hypnic Jerk:

- A sudden muscle contraction that occurs during the transition from wakefulness to sleep, often accompanied by a feeling of falling or a visual flash.

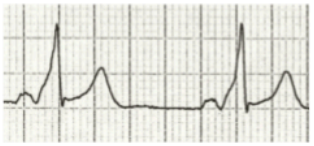
Delta Waves:

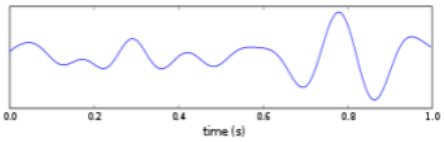
- The slowest and highest amplitude brain waves that occur during deep sleep, with a frequency range of around 0.5-4 Hz. They are associated with deep relaxation and restoration, memory consolidation and immune regulation.

Theta Waves:

- Occur during early stages of sleep and have a frequency of around 4-8 Hz. They are associated with deep relaxation and reduced awareness, and play a role in suppressing irrelevant sensory inputs to initiate sleep.


Hypnic jerk


Delta waves



Theta waves

P226
Consciousness fades “As different parts of your cortex stop communicating.”
BUT: sleeping brain remains active.

Sleep Cycles:

Every 90 minutes
4 distinct sleep stages
We cycle through the stages

Aserinsky-

Was a researcher placed EEG on kid during sleep
Discovered REM sleep
P 227
Sleep Researcher Dement

Beta Waves

Alert and awake waves

Alpha Waves

Awake but relaxed
Slow (just before sleep)

Stage 1 NREM 1 Sleep

Irregular Brain waves
Hypnagogic Jerk- Hypnic Jerk
May experience hallucinations

Stage 2 NREM 2 Sleep

20 minutes
Periodic sleep spindles "bursts of rapid rhythmic brain-wave activity"

Stage 3 NREM 3 Sleep

30 minutes
Deep Sleep/hard to wake up
Large Slow Waves = Delta waves
Bed wetting in this stage

REM Sleep

20-25% of sleep
Rapid Eye Movement
Dreams occur
10 minute sessions
Heart Rate Rises
Breathing Rapid
Irregular
Dreams
Emotional
Story like
Richly hallucinatory
Genital become aroused
Your **motor cortex is** active- but brain stem blocks your movement = paralysis
REM sleep increases longer duration
100 minutes per night in REM sleep
600 hours/1500 dreams per year

What effects our sleep patterns?

1. Genetic patterns
    a. Twins studies
2. Culture
    a. Stimulus Stuff
    b. Keeps our minds occupied
    c. Nervous energy
3. Light
    a. Tweeks circadian rhythm
    b. Light sensitive retinal proteins
4. Supra-chasamatic Nucleus
    a. Located in hypothalamus

b. Controls pineal gland
c. Reduces melatonin (hormone associated with sleep)

P 230

Sleep Theories

5 reasons we need sleep

1. Sleep protects from harm at night (evolutionary)
2. Sleep Helps us recuperate
    a. Helps restore and repair brain tissue/neurons
    b. Pruning unused connections
3. Sleep helps restore and rebuild our fading memories of daily experiences
    a. Sleep consolidates our memories
    b. Strengthens neural memory traces
    c. More sleep = better memory
4. Sleep Feeds Creative Thinking
    a. Dreams inspire literary/artistic/scientific Achievements
    b. Boosts thinking and learning
    c. Problem solving
    d. Making and spotting connections
5. Sleep Supports Growth
    a. Pituitary gland releases growth hormones
    b. Hormones promote muscle growth
    c. Help athletic ability

Module 24 Sleep Deprivation, Sleep Disorders, and Dreams

When we don't sleep we feel bad.

P 234

Students experience micro sleep when they don't get enough sleep

Effects of Sleep Loss

Not enough sleep = energy drain

Less feeling of well being

Sleep researcher Dement

1/3 of our lives we sleep

Most adults sleep 9 hours at night

Lots of sleep deprived students

"Sleep Debt"

= when you don't get enough sleep

Sleep loss is a predictor of depression

People slept 5 hours or less get 71% higher risk for depression

Sleep loss predicts depression

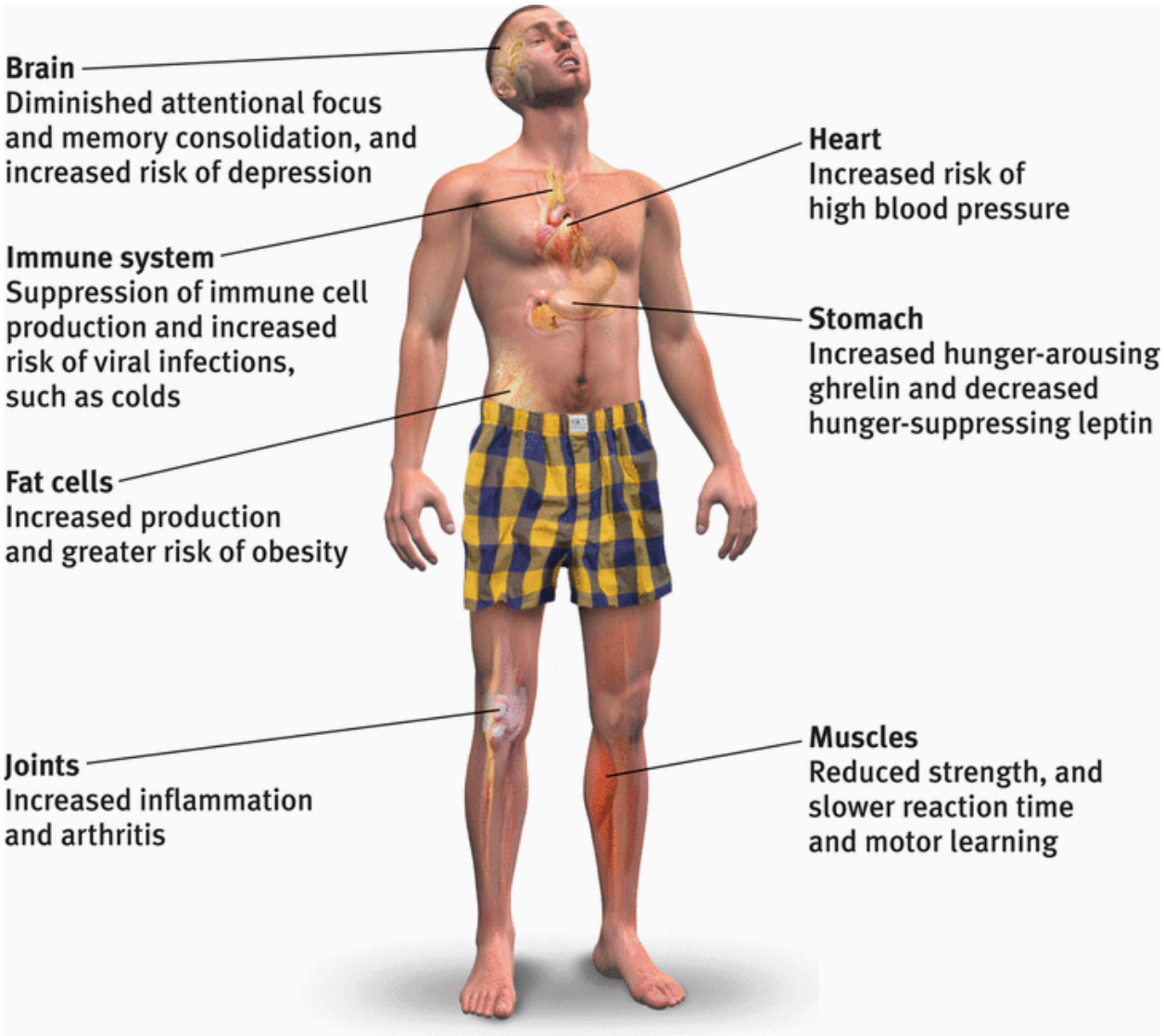
REM sleep helps protect against depression

"Sleep deprivation has consequences—difficulty studying, diminished productivity, tendency to make mistakes, irritability, fatigue,"

Sleep Deprivation Effects:

- Difficulty studying
- Diminished productivity
- Tendency to make mistakes

- Irritability
- Fatigue
- Cortisol=stress hormone, also makes fat
- Can suppress immune system
- Increase appetite and eating
- Slows reactions
- Increases errors on visual attention



P237 figure 24.2 Effects of Sleep Deprivation

Sleep Disorders:

1 in 10 adults have insomnia

Insomnia

- Persistent problems in falling to sleep or staying asleep
- Alcohol + sleeping pills don't help so much- reduce REM sleep

Narcolepsy

- Sudden attacks of overwhelming sleepiness last less than 5 mins
- Severe they lap into REM sleep
- 1 in 2000 have it

Sleep Apnea

- Stop breathing during sleep
- 1 in 20 have it
- Associate with snoring
- Deprived of slow wave sleep
- Associated with obesity

Night Terrors

- Mostly children
- May sit or walk around
- Talk incoherently
- Appear terrified
- Increase breathing
- Increase heart rate
- Seldom wake up during an episode
- Not nightmares – they are REM Sleep
- Occurs in NREM 3 stage

Sleep Walking

- NREM stage 3 (deep sleep)
- Hereditary
- Last 2-10 min
- Sleep talking can occur in any stage
- 20% of 3-12 year olds
- Decreases with age

Table 24.2 Some Natural Sleep Aids

- Exercise regularly but not in the late evening. (Late afternoon is best.)
- Avoid caffeine after early afternoon, and avoid food and drink near bedtime. The exception would be a glass of milk, which provides raw materials for the manufacture of serotonin, a neurotransmitter that facilitates sleep.
- Relax before bedtime, using dimmer light.
- Sleep on a regular schedule (rise at the same time even after a restless night) and avoid naps.
- Hide the clock face so you aren't tempted to check it repeatedly.
- Reassure yourself that temporary sleep loss causes no great harm.
- Realize that for any stressed organism, being vigilant is natural and adaptive. A personal conflict during the day often means a fitful sleep that night (Åkerstedt et al., 2007; Brissette & Cohen, 2002). And a traumatic stressful event can take a lingering toll on sleep (Babson & Feldner, 2010). Managing your stress levels will enable more restful sleeping. (See Modules 43, 44, and 84 for more on stress.)
- If all else fails, settle for less sleep, either by going to bed later or getting up earlier.

Dreams:

Dreams occur during REM sleep
"Hallucinations of a sleeping mind are vivid, emotional and sometimes bizarre."
8 in 10 dreams are negative emotions or events

Common Themes in Dreams

Repeatedly falling
Being attacked
Being pursued
Being rejected
Experiencing misfortune
Most dreams relate to previous day's non-sexual experiences and pre-occupations
For boys 1 in 10 dreams are sexual
For Women 1 in 30 dreams are sexual in nature

Traumatic events are often followed by nightmares.

Why do we dream?

Dream Theories:

Freud

To satisfy our own wishes… "Wish Fulfillment"

P 241

Freud said, “Dreams provide a psychic safety valve that discharges unacceptable feelings.”

Manifest Content-

According to Freud, the remembered story line of a dream (as distinct from its latent, or hidden, content). “The story of the dream-remembered”

Latent Content (Psycho)

According to Freud, the underlying meaning of a dream (as distinct from its manifest content). (p. 241)
Dreams are symbolic
Unconscious drives + wishes
“Most dreams can be traced back to erotic wishes.” Freud
Dreams reflect inner conflicts

Memory Consolidation (BIO)

To file away memories
AKA- information processing
Dreams may help sift, sort
Connection between REM sleep and memory
P242 “if you don’t’ get good sleep and enough sleep after you learn new stuff, you won’t integrate it efficiently into you memory.”

Neural Pathway Development (BIO)

Dreams might provide physiological function
Expand neural pathways

Activation Synthesis-Hobson + McCorley (BIO)

“Dreams erupt from neural activation
From brainstem random neural activity
“Internal stimuli activates brain areas that process visual images
Not visual cortex
Activity in Limbic System/Amygdala **Emotion** is present during REM sleep
Frontal Lobe Less activity (inhibition reduced/reduced logical thinking)

Dreams Reflect Cognitive Development (bio)

Dreams are part of brain development
Maturation
Cognitive Development
Dreams incorporate our knowledge

We need REM sleep
When deprived of REM sleep we rebound

REM Rebound means more REM sleep=more dreaming

REM increases after

Table 24.3 Dream Theories

Theory	Explanation	Critical Considerations
Freud's wish-fulfillment	Dreams provide a "psychic safety valve"—expressing otherwise unacceptable feelings; contain manifest (remembered) content and a deeper layer of latent content—a hidden meaning.	Lacks any scientific support; dreams may be interpreted in many different ways.
Information-processing	Dreams help us sort out the day's events and consolidate our memories.	But why do we sometimes dream about things we have not experienced?
Physiological function	Regular brain stimulation from REM sleep may help develop and preserve neural pathways.	This does not explain why we experience meaningful dreams.
Neural activation	REM sleep triggers neural activity that evokes random visual memories, which our sleeping brain weaves into stories.	The individual's brain is weaving the stories, which still tells us something about the dreamer.
Cognitive development	Dream content reflects dreamers' cognitive development—their knowledge and understanding.	Does not address the neuroscience of dreams.

Modules 25 Psychoactive Drugs (p 246)

Tolerance and Addiction

Substance Abuse Disorder

Drug use creates life disruption

Psychoactive Drugs

Cause perception and moods to change

Some connection to expectancy/culture

Brain circuitry changes causing cravings

Situations trigger memories of drug use

Table 25.1 When Is Drug Use a Disorder?

A person may be diagnosed with *substance use disorder* when drug use continues despite significant life disruption. Resulting changes in brain circuits may persist after quitting use of the substance (thus leading to strong cravings when exposed to people and situations that trigger memories of drug use). The severity of substance use disorder varies from *mild* (two to three symptoms) to *moderate* (four to five symptoms) to *severe* (six or more symptoms) (American Psychiatric Association, 2013).

Impaired Control

1. Uses more substance, or for longer, than intended.
2. Tries unsuccessfully to regulate substance use.
3. Spends much time gaining, using, or recovering from substance use.
4. Craves the substance.

Social Impairment

5. Use disrupts obligations at work, school, or home.
6. Continues use despite social problems.
7. Use causes reduced social, recreational, and work activities.

Risky Use

8. Continues use despite hazards.
9. Continues use despite worsening physical or psychological problems.

Drug Action

10. Experiences tolerance (needing more substance for the desired effect).
11. Experiences withdrawal when attempting to end use.

Mild

Moderate

Severe

Tolerance = Neuroadaptation

Continued use of alcohol or other drugs

The user's brain chemistry adapts to offset the drug effect = Neuro-adaptation

P 247 "To experience the same effect the user requires larger and large doses."

Addiction

The person craves

Uses substances despite adverse consequences

90 million suffer from addiction
Compulsion to use drugs

Withdrawal

Abruptly stopping may cause undesirable side effects
Discomfort and distress.

Types of Psychoactive Drugs

Depressants
Stimulants
Hallucinogens

All effect Brain Synapses through Neurotransmitters

Inhibiting
Stimulating
Or Mimicking

Depressants

Alcohol, Barbiturates, Tranquilizers, Opiates
Calm neural activity and slow body functions

Alcohol

Dis-inhibitor-

slows brain activity that controls judgement and inhibitions

The urges you would feel if you were sober are the ones you will more likely act upon when intoxicated.

Slowed Neural Processing

Slows sympathetic nervous system

Affects judgement (accidents/crime)

Memory Disruption

Alcohol can disrupt cognition
Nerve cell death
Impairs growth of synaptic connections

Blackout-

Might be because of lack of REM sleep (which deals with memory consolidation.

Reduced Self Awareness and Self Control

Expectancy – expectations influence behavior

Barbiturates- depress the nervous system activity

Opiates-

Depress Neural Functioning
Pupils constrict
Breathing slows
Lethargy sets in
Pleasure replaces pain and anxiety
Discomfort-
Withdrawal

Tolerance
Brain stops producing endorphins
Natural pain killing is reduced

Stimulants

Excites neural activity
Speeds up body function
Pupils dilate
Heart rate increases
Blood sugar rises
Drop in appetite
Energy + Self Confidence rise
Make you feel alert
Lose weight
Boost mood
Can be addictive

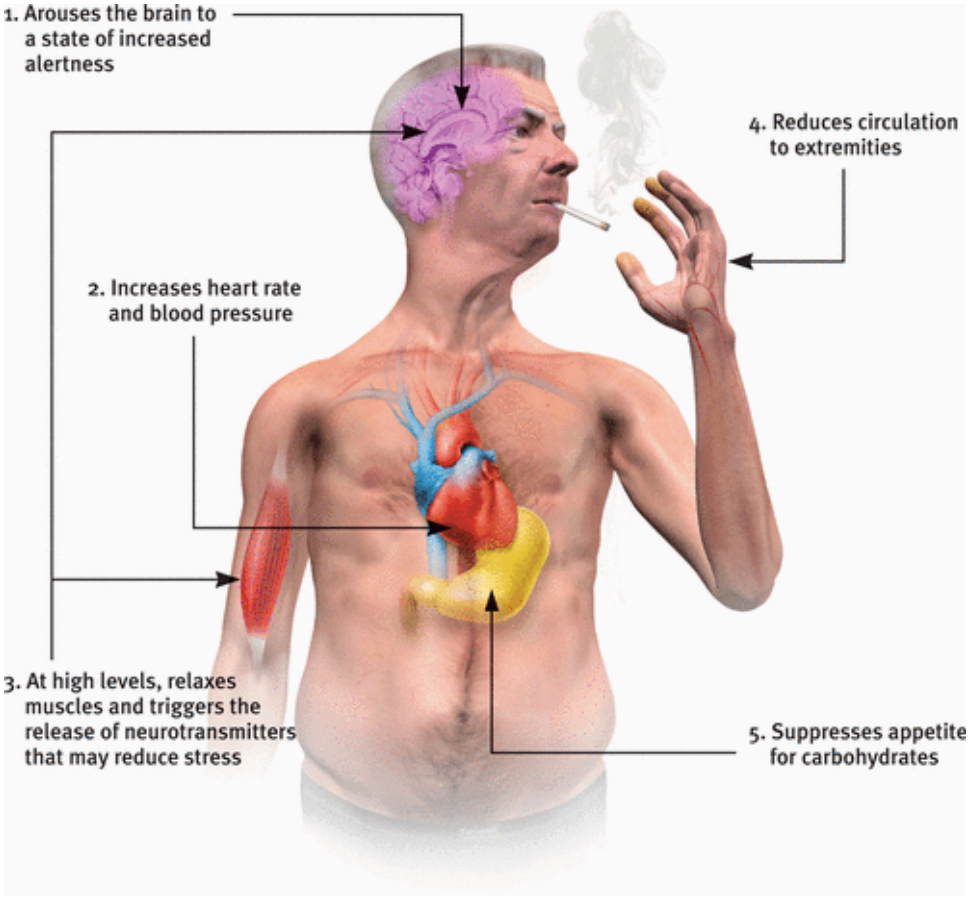
Examples of Stimulants
Caffeine
Nicotine
Amphetamines
Cocaine
Methamphetamine
Ecstasy (also a hallucinogen)

Nicotine

Addictive stimulant
Eliminating smoking would increase life expectancy
Tolerance issues
Withdrawal
Craving
Insomnia
Anxiety
Irritability
Distractibility

Neurotransmitters

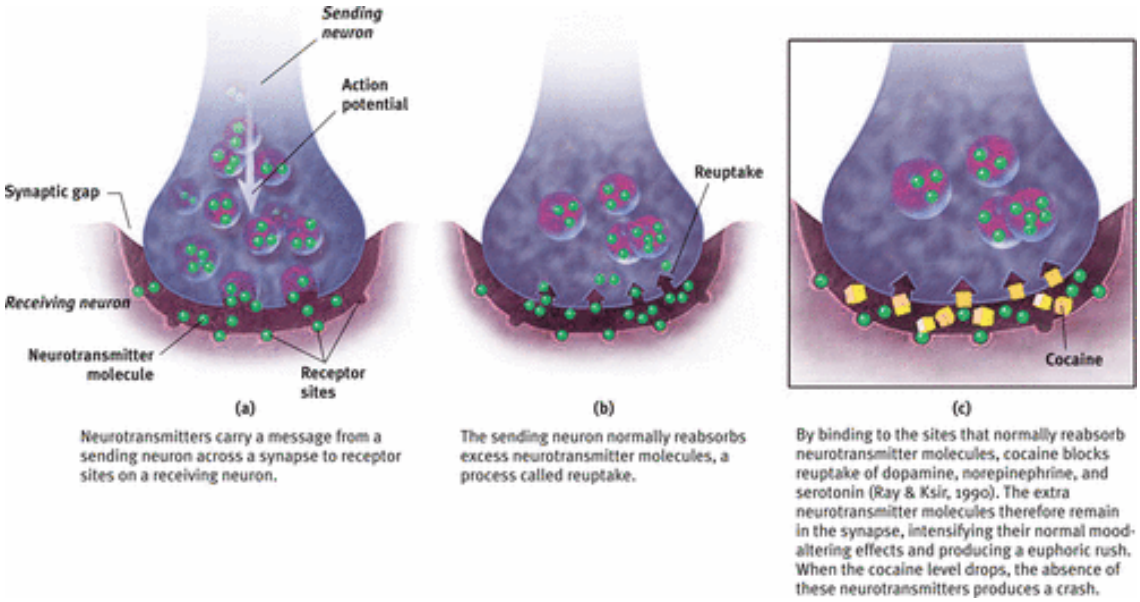
Epinephrine
Norepinephrine
Reduce appetite
Boost mental alertness
Dopamine- calms anxiety



Cocaine

Euphoria
- Dopamine
- Serotonin
- Norepinephrine

Followed by depression
Highly addictive
Associated with aggression
Emotional disturbances
Suspiciousness
Convulsions
Cardiac arrest Respiratory failure



P253

Methamphetamine
- Great effects
- Dopamine
- Energy + mood
- Time reduces dopamine

Ecstasy/MDMA
- Both Stimulant and Mild hallucinogen
- Serotonin release and blocking reuptake
- Triggers dopamine release
- Effect:
  - 3-4 hours of high energy
  - Emotional elevation
  - Connectedness with others…
  - Can damage serotonin-producing neurons
  - Can permanently change brain chemistry (leading to chronic deficit of serotonin)
  - Ecstasy also suppresses the disease-fighting immune system
  - Impairs memory
  - Slows thought
  - Disrupts sleep by interfering with serotonin's control of the circadian clock

Hallucinogens (psychedelics)

Distort perceptions and evoke sensory images without sensory input

MDMA

LSD

Albert Hofmann created in April 1943

Lysergic acid diethylamide
"An uninterrupted stream of fantastic pictures, extraordinary shapes with intense, kaleidoscopic play of colors"
Emotional reactions euphoria or detachment or panic

Marijuana

THC – the active ingredient in marijuana
Mild hallucinogen, amplifying sensitivity to colors, sounds, tastes, and smells.
Relaxes, disinhibits, euphoric feelings
Impairs motor coordination, perceptual skills and reaction times

Marijuana also disrupts memory formation and interferes with immediate recall of information
Heavy use over long time = shrinkage of brain areas that process memories and emotions
Prenatal exposure through maternal marijuana use impairs brain development

Table 25.2 A Guide to Selected Psychoactive Drugs

Drug	Type	Pleasurable Effects	Adverse Effects
Alcohol	Depressant	Initial high followed by relaxation and disinhibition	Depression, memory loss, organ damage, impaired reactions
Heroin	Depressant	Rush of euphoria, relief from pain	Depressed physiology, agonizing withdrawal
Caffeine	Stimulant	Increased alertness and wakefulness	Anxiety, restlessness, and insomnia in high doses; uncomfortable withdrawal
Methamphetamine	Stimulant	Euphoria, alertness, energy	Irritability, insomnia, hypertension, seizures
Cocaine	Stimulant	Rush of euphoria, confidence, energy	Cardiovascular stress, suspiciousness, depressive crash
Nicotine	Stimulant	Arousal and relaxation, sense of well-being	Heart disease, cancer
Ecstasy (MDMA)	Stimulant; mild hallucinogen	Emotional elevation, disinhibition	Dehydration, overheating, depressed mood, impaired cognitive and immune functioning
Marijuana	Mild hallucinogen	Enhanced sensation, relief of pain, distortion of time, relaxation	Impaired learning and memory, increased risk of psychological disorders, lung damage from smoke

To learn about the influences on drug use, see Module 81.