3d. Consciousness - Sleep Deprivation & BAC

Same correlation between sleep deprivation and alcohol consumption

- **Cognition, accuracy, speed, concentration decreases**
- **Mood increases then decreases**

Dawson and Reid (1997) results:

- Participants were assessed on ‘cognitive psychomotor performance’ requiring eye-hand coordination, concentration, speed, accuracy and decision making at half-hourly intervals.
- Statistical analysis led Dawson and Reid to conclude that the effects of moderate sleep deprivation (i.e. 24 hours) on performance are similar to moderate alcohol intoxication (i.e. 0.05%).

0.05 BAC (legal limit for driving) is the same as being 17 hours without sleep
0.10 has the same effects on your body as being awake for 24 hours

Drug-induced ASC - Stimulants and depressants:

Brain wave patterns due to drug-induced altered state of consciousness:
A drug is any substance that can change a person’s physical and/or mental functioning.

Stimulants: Drugs that increase activity (beta waves) in the central nervous system and the rest of the body. They have an alerting, activating effect.
These include:

- Caffeine

- Nicotine
- Chocolate
- Amphetamines (party drugs - speed, ice)

Psychological effects:
- Increased alertness and focus
- Increased confidence
- Increased feelings of well-being and motivation
- Clearer thoughts and perceptions
- Amphetamine psychosis – hallucinations, paranoid delusions and aggressive behaviour

Physiological effects:
- Stimulate sympathetic NS
  - Increased heartrate and blood pressure
  - Energising effects that arouse the body and reduce feelings of tiredness
- Changes in brain wave patterns

Depressants: Drugs that <u>decrease</u> activity (beta waves) in the central nervous system and the rest of the body. Generally, their effects result in a state of calm, relaxation, drowsiness, sleep or anaesthesia as doses of the drug increase.

These include:
- Barbiturates and benzodiazepines (anxiety medicines)
- Opiates (pain killers: opium, morphine (can cause strong hallucinations))
- Alcohol

Psychological effects (opposite of stimulants):
- Decreased alertness and focus
- Reduced environmental awareness

- Decreased responsiveness to sensory stimuli
- Decreased cognitive functioning
- Loss of self-control (inhibition and coordination)

Physiological effects (opposite of stimulants):

- Increased state of calm
- Increased drowsiness
- Pain relief (opiates)
- Changes in brain wave patterns

- **Sleep deprivation: sleep loss/going without sleep, either partially or totally.**
- **Partial sleep deprivation: having less sleep (total, REM or NREM) than what is normally required**
    - Most sleep disorders are associated with partial sleep deprivation over a prolonged period.
- **Total sleep deprivation: not having any sleep at all**

The A-B-C of partial sleep deprivation:

Affective functioning:

<u>A</u>ffective (emotional) difficulties:

- Mood changes (less stable moods), confusion, irritability, sadness
- Compromised emotional regulation and reactivity – Lowered emotional response threshold can lead to amplified emotional responses – more likely to occur with REM sleep deprivation
- Difficulty processing emotional information and making accurate emotional perceptions (e.g. impaired facial recognition of other people's emotions)
- Increased risk taking

<u>B</u>ehavioural functioning:

- Sleep inertia – 'state of grogginess' – can lead to
    - Slowed performance
    - Reduced motor coordination/skills
    - Risk-taking
    - Reduced performance (speed and accuracy - reaction times) on monotonous tasks requiring extended concentration.
- More pronounced when woken from deep sleep (NREM 3 and 4)

- Excessive sleepiness during normal waking time
    - Difficulty maintaining an alert awake state
    - Reduced efficiency – takes longer to complete tasks
    - Slower reaction times
- Microsleeps – a brief period of sleep lasting up to a few seconds. Often no recollection of the sleep event.
- Inhibits performance on simple tasks
- The performance on complex tasks is not affected

Cognitive functioning:

- Excessive sleepiness due to sleep deprivation can adversely affect:
    - Mental capabilities
    - Lapses in attention and concentration
        - Resulting in lapses in selective attention and reduced ability to divide attention
        - Levels of awareness decreases
    - Processing information slower
    - Thinking and reasoning = poor decision making particularly for tasks requiring complex thought
    - Situational awareness – tendency to overlook important details
    - Memory and learning declines
    - Creative and abstract thinking declines

Recovering from sleep deprivation:

- **REM rebound –** involves catching up on REM sleep immediately following a period of lost REM sleep.
- **Paying off sleep debt –** generally the effects of partial sleep deprivation tend to be minor and temporary when they occur occasionally or on a short-term basis. When the accrued sleep debt is paid off the person will quickly recover.

Long-term sleep deprivation effects:

- Long term sleep deprivation can place the individual at greater risk for a range of diseases and health problems including:
    - Obesity
    - Diabetes
    - Cardiovascular diseases
- Long term sleep deprivation is also linked to increased risk of accident and injury in people of all age groups.

Practice VCAA 2013 question:

Question 6 (3 marks)

Bernie is a taxi driver. When his driving partner fell ill recently, Bernie took over his partner's shift, in addition to continuing his own shift. This resulted in a two-week period during which he experienced only four hours of sleep per night. When waiting for a passenger, Bernie liked to challenge himself with the crossword puzzle in the newspaper. Which would be more likely to be affected by Bernie's sleep deprivation – his ability to do the crossword puzzle or his ability to drive safely? Justify your answer.

- Bernie driving a car safely is a simple task that enables divided attention as he is an experienced taxi driver. Bernie doing a challenging crossword puzzle is a complex task requiring selective attention (1 mark for setting up the context).

- Sleep deprivation has a greater impact on automatic processing (1 mark for the justification), thus Bernie's ability to drive safely which is a controlled process will be greatly affected by his sleep deprivation compared to his ability to complete a crossword which is less impaired by his sleep deprivation (1 mark for correctly stating which task is more likely to be affected by Bernie's sleep deprivation)