3c. Sleep importance - Differences Across the Lifespan

Changes in REM and NREM Sleep trends:

- From birth onward, the total amount of time we spend sleeping gradually decreases as we get older.
- In addition, the proportion of time spent in REM sleep decreases markedly during the first two years and then remains relatively stable through to a very old age
- Early in life, after birth, we sleep for about 16 hours a day, about 50% of which is REM sleep.
- By the end of infancy at about 2 years of age, total sleep time declines to around 12–13 hours and REM sleep as a percentage of total sleep is about 20–25%.
- By the end of childhood and onset of adolescence, total sleep time drops to around 9 hours and about 2 hours or 20–25% is REM sleep.
- The gradual decrease in total sleep time continues through childhood, adolescence and adulthood, but the 20–25% proportion of REM sleep is maintained well into old age.
- In later adulthood, at around 60 or so years of age, the total sleep time averages about 6 hours.

Summary:

Sleep patterns change quite significantly with age.

Key points:

➔ As people grow older, their total time spent in sleep tends to decrease. Infants may sleep for up to 16 hours a day, while older adults may only sleep for 6-7 hours per day.

- ➔ The amount of time spent in REM sleep decreases during the first two years of life, and then remains fairly stable through to an old age. When first born, infants have approximately 50% REM sleep, this decrease to 20-25% by age 5 and remains fairly stable throughout the rest of life.
- ➔ As people age, their amount of deep sleep (NREM stages 3 and 4) decreases. Often, elderly people may have very little or no deep sleep, and spend a lot more time in NREM stage 2 sleep.
- ➔ REM sleep decreases across lifespan, NREM sleep increases
- ➔ REM sleep increases across sleep cycle (one night), NREM sleep decreases
- ➔ For restoration theory - NREM is body, REM is brain. To remember this, you can think that your body is bigger than your brain, and people spend more time in NREM sleep than REM sleep.

Changes in NREM sleep:

- There is also an age-related decrease in the proportion of NREM sleep that persists through to a very old age

Newborns and infants:

- From birth to about two months of age, sleep onset may occur at any time of the day or night, with no regular rhythm or concentration of sleeping and waking periods.
- Sleep duration also tends to be irregular, with the length of one episode lasting from 30 minutes to 3 or 4 hours.
- The cyclic alternation of NREM–REM sleep is present from birth, but there are fewer sleep cycles as they are asleep for a shorter amount of time.
- More than half of the infant's sleep is REM sleep or active sleep that is like REM sleep.

Children:

- Total sleep time continues to decrease as the child gets older, from about 13 to 11 hours between 2 to 5 years of age.
- This has been attributed to Maturation and other biological factors.
- As well as social factors such as:
    - Decreased daytime napping
    - The introduction of preschool time routines
    - Other changes that can influence sleep

Adolescents:

- Research findings indicate that adolescents tend to get less sleep than they need to function at their best.
- More responsibilities and social/environmental pressures: texting friends, working, sport.
- One reason is a biologically driven change in their sleep–wake cycle that changes the timing of sleep
    - Many adolescents tend to have irregular sleep patterns across the week — they typically stay up late and sleep in late on the weekends, which can affect their biological clocks and impact on the quality of their sleep, delaying its onset for one to two hours.

Adults vs Elderly:

- Sleep also tends to become more fragmented as we age, with more night time awakenings among older adults.
- One reason for more frequent awakenings is the decline in NREM stages 3 and 4 sleep with age — we are harder to awaken during slow wave sleep.

Elderly people:

- Much more frequent cycles
- Don't enter REM sleep every time. Adults get much bigger chunks of REM sleep, elderly spend less time in REM sleep.

- Never reach stage 4 and spend only approx. 15mins in stage 3
- Waking up a lot more
- Issue with the hypnogram is that elderly get less sleep than adults so should not sleep for the same amount of time.

Practice question:

Using the restoration theory of sleep, explain the differences in proportions of REM and NREM sleep in infants and adults.

The restoration theory states that REM sleep is important to restore and replenish our mental stores and abilities, whereas NREM is important to restore and replenish our physical wellbeing.

Infants spend about 50% of their total sleep in REM sleep and 50% of their total sleep in NREM. Contrastingly, adults only spend 20-25% of their total sleep in REM and approximately 75-80% in NREM.

According to the restoration theory, infants require more REM because their brain is constantly making new connections, leading to a higher need to replenish their mental capabilities, however they are not moving as much resulting in a decreased need to replenish their physical stores.

Once a person reaches adulthood they generally have fixed mindsets leading to less synaptic connections being made and a decreased need for REM sleep. However, they will be experiencing more physical movement requiring more NREM sleep.