The Effect of Teenagers' Sleeping Deprivation on Cognition/Academic Outcome and Obesity

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ABSTRACT

The effect of sleep state on memory process would be task dependent, with the procedural memory gaining from REM sleep and declarative memory linked to NREM sleep (Curcio, Ferrara & Gennaro, 2006). Sufficient sleep is necessary to enable proper focus for academic performance (Ponzio, 2014). Neuroimaging studies have shown that sleep allows the brain to consolidate newly acquired memories and reinforces synaptic pathways created during wakefulness through activity in the hippocampus (Gradinaru, Gardiner, & Dohtani, 2011). "Lack of sleep prevents the brain from being able to initially make new memories, brain shut down and can’t commit new experiences to memory and can’t make and create those new memory."(Matthew Walker, 2018)

Sleep deprivation leads to a marked increase in sleepiness that usually facilitates cognitive, emotional, behavioral and academic failure.

BACKGROUND: Sleeping Cycle/Hormone

Hormone Secretion during Sleeping

Brain: Growth Hormone, Antidiuretic Hormone, Melatonin, Oxytocin, Prolactin

Hormones and their functions:
- Melatonin: Suppression of melatonin during daytime behavior and variability in performance
- Growth Hormone: Stimulation of final height
- Antidiuretic Hormone: Decreases urine production
- Oxytocin: Promotes emotions and social behavior
- Prolactin: Regulates lactation

The reasons of sleeping problems

Adolescents suffer from increasing school schedule, academic activities, extracurricular activities, family and social pressure and from an environmentally induced delay of sleep timing, together with changes of intrinsic regulatory process (Curcio et al. 2006, Penigene et al. 2011)

School schedules are forcing students to lose sleep and to perform academically when they are at their worst (Stockman. 2007)

Sleeping and Academic Outcome

Sleeping and Obesity / BMI/Diabetes

NREM and REM contribute to increase the memory capacity in the processing of procedural knowledge and declarative knowledge.

Sleep deprivation induces insulin resistance and stimulates appetite (+Ghrelin, - Leptin), both of which contribute to increased body weight (Spiegel et al., 2004).

Overweight during the teen years increases the risk of having unhealthy weight in adulthood and elevates the risk of having other physical health problems including hypertension, hypercholesterolemia, metabolic syndrome, type2 diabetes, osteoarthritis, and gallstone (Freedman et al., 1999, Sepet et al., 2005).

Sleep deprivation decreases appetite (-Ghrelin, + Leptin), both of which contribute to decreased body weight (Spiegel et al., 2004).

Sleep deprivation and later school start time is considered as a significant factor of sleep deprivation.

Sleeping and Obesity: How does it work?

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Sleep deprivation decreases appetite (-Ghrelin, + Leptin), both of which contribute to decreased body weight (Spiegel et al., 2004).

SUGGESTIONS

The American Academy of Pediatrics strongly supports the efforts of school districts to optimize sleep in students and urges high schools and middle schools to aim for start times that allow students the opportunity to achieve optimal levels of sleep (8.5-9.5 hours) (The American Academy of Pediatrics, 2014)

Sleeping and Academic Outcome

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REFERENCES


