**The impact of sleep deprivation on food desire in the human brain**Stephanie M. Greer

**Introduction**
This study investigates how one night of complete sleep deprivation impacts the desire for food, as well as identifies sections of the brain altered by sleep deprivation.

**Methods**
This study was a controlled, cross over trial wherein participants underwent normal sleep (8 hours) compared to no sleep (awake for 24 hours) on one night in a laboratory, monitored by lab personnel, and then underwent testing the next morning by MRI scans of their brains, as well as ratings of perceived hunger, and ratings of food desirability.

*Participants*
23 young (20 years), healthy women and men were involved in this study. The participants abstained from drugs, alcohol, and caffeine for 3 days.

*Study Design*
All participants underwent the normal sleep condition in the lab, were measured, then went back to their life for 7 days, then returned to the lab to undergo the sleep deprivation, were measured, then the study ended.

**Results**Figure 1*Background*: This figure shows the MRI scans of the brain after sleep deprivation (Red bars/Deprived) when tested for food desirability. The Anterior Cingulate, Orbital Frontal, and Anterior Insula are part of the cortex and are heavily related to decision making, rational thought, and cognition. Meanhwile, the Amygdala and Ventral Striatum make up part of the limbic system and are heavily involved in emotion and reward, respectively.

*Primary Results*:
- After further analysis, only the Anterior Cingulate was significantly dampened with sleep deprivation (although it shows all three sections dampened – these were independent statistical tests).
- The ventral striatum did not change.
- The amygdala showed greater activity with sleep deprivation.

Take Away: The rational, planning section of the cortex may be inhibited while the emotional center of the brain may be active, yet not the reward centric sections of the brain when a person is sleep deprived.

Figure 2
*Background*: This is a graph simply showing the rating of perceived hunger between the sleep deprived and normal sleep conditions.

*Primary Result*:
- No differences in perceived hunger with sleep deprivation.

Take Away: Being sleep deprived does not lead to greater hunger compared to full night’s sleep.

Figure 3A
*Background*: The participants are shown images of foods that are stratified as low calorie or high calorie and asked about how desirable that food is to the participant.

*Primary Result*:
- Sleep deprived participants found higher calorie foods to be more desirable than normally rested individuals.
- This effect was not seen for low calorie foods.

Take Away: This would imply higher calorie foods are to be consumed more by sleep deprived individuals, assuming the opportunity was presented.

Note: This does not mean participants would eat more – this is an independent test that would still need to be done, because a person can want higher calorie foods and then ultimately eat less of them.

**Conclusions**
Sleep deprivation changes regional brain activation with a preference for, as measured, emotional centers of the brain and likely less rational thought, but likely not driven by reward sensation.

These brain modulated effects are independent of hunger perception.

We are attracted to higher calorie foods when sleep deprived.