

Too Cool for JUUL: The Effect of Pod-Based E-Cigarettes on Sleep and Cognitive Function

Human Results:

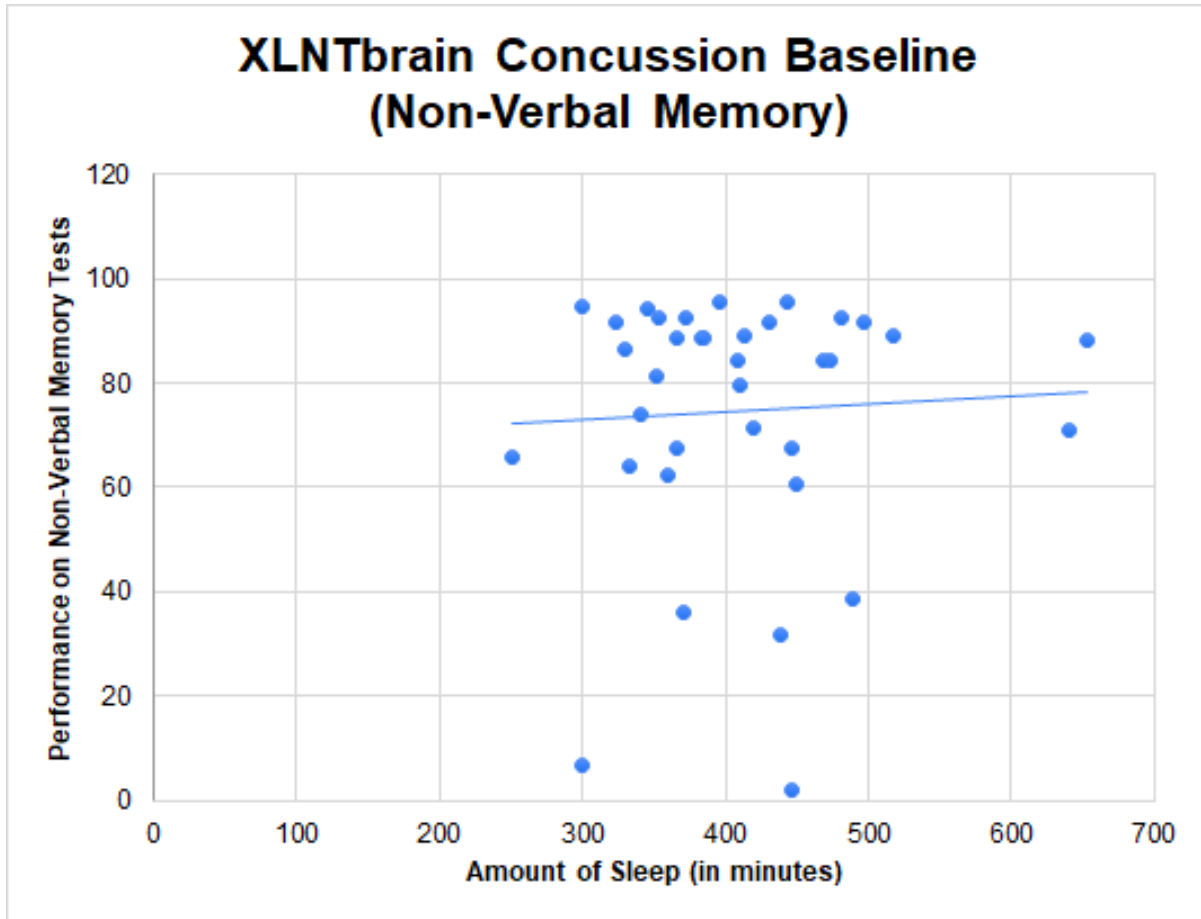


Figure 1: The Non-Verbal Memory scores for 19 participants. While there is a positive correlation, according to the regression analysis, the trend is weak. While there is a positive correlation between sleep and Non-Verbal Memory, the R-squared value, which is the value of how many points fall on the regression line, was 0.01, which implies a weak trend, as the closer the number to 1, the stronger the correlation. The multiple R-value, which is the measure of the strength of the linear relationship, was .3, which again implies a weak trend (the closer to 1, the stronger the linear relationship). The standard deviation was 23.8, which is high, as an optimal standard deviation is close to the mean, or zero

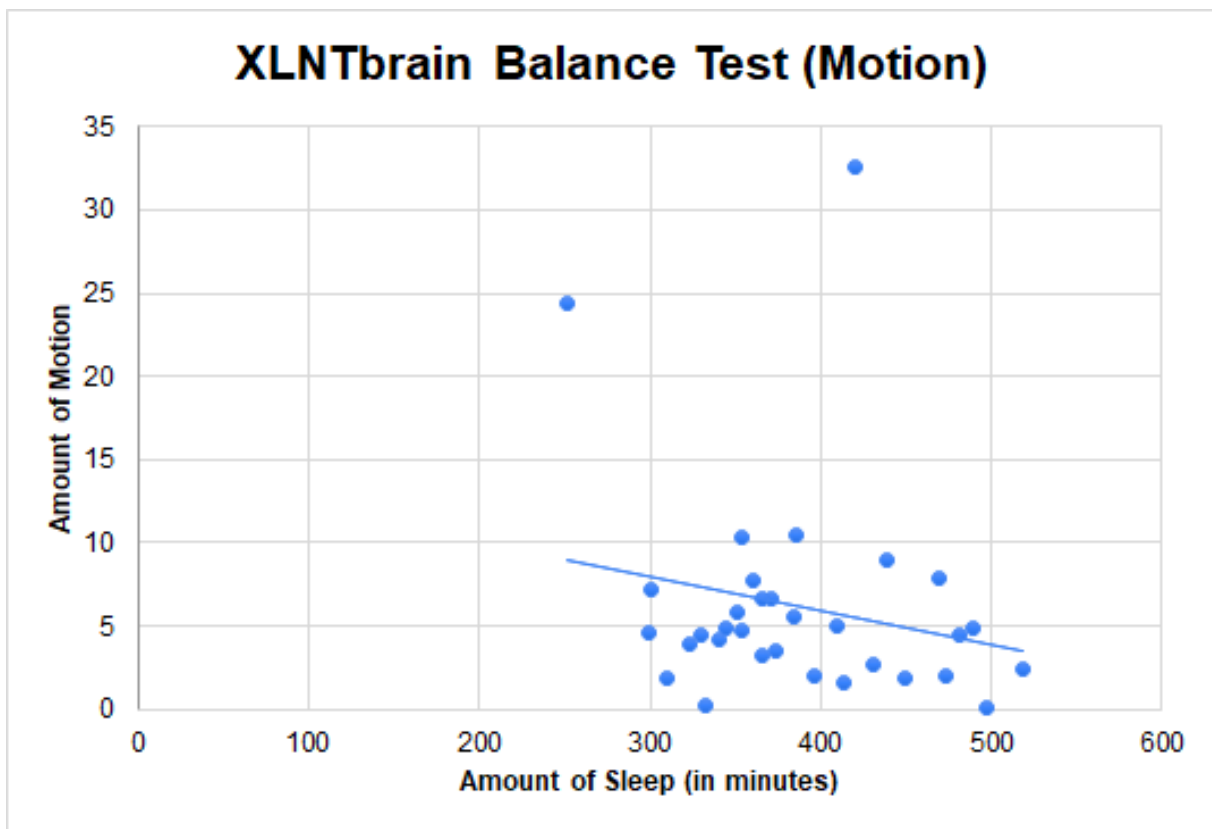


Figure 2: Balance scores for 19 participants. While there is a negative correlation (the more the participant sleeps, the less movement is recorded when they are asked to stand still), the trend is weak according to the R-squared value and Multiple R-values. The R-squared value, which is the value of how many points fall on the regression line, was 0.04, which implies a weak trend. The multiple R-value, which is the measure of the strength of the linear relationship, was .2, which again implies a weak trend. The standard deviation was 31, which is high, as an optimal standard deviation is close to the mean, or zero.

Drosophila Methodology:

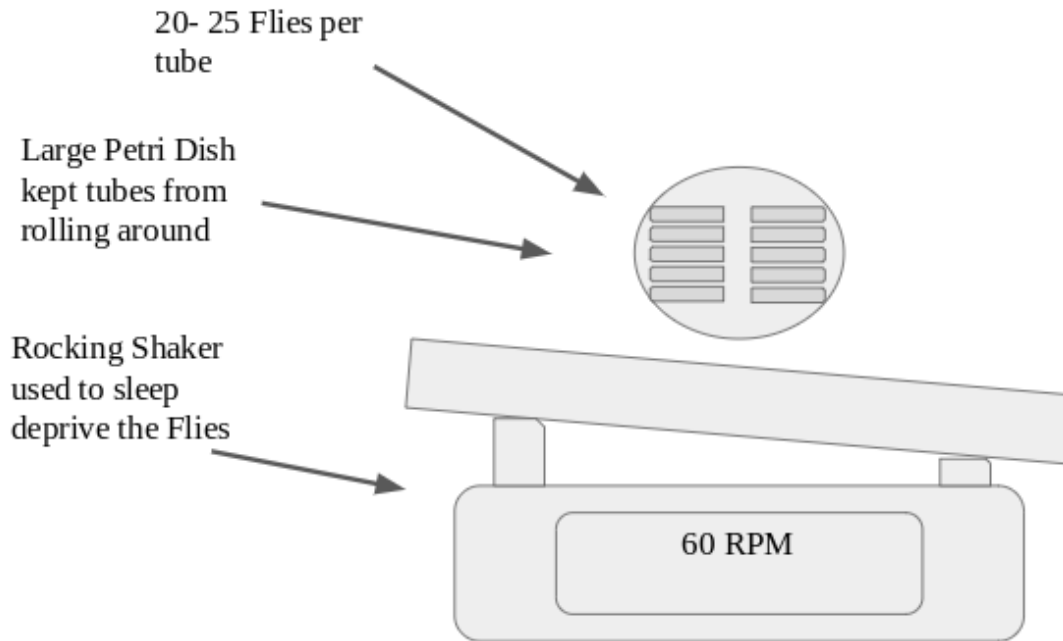


Figure 3: A rocking shaker was used to sleep deprive the flies. At every time interval (12:00 am, 2:30 am, 5:00 am, 7:30 am), the corresponding vials would be taken off the Rocking Shaker.

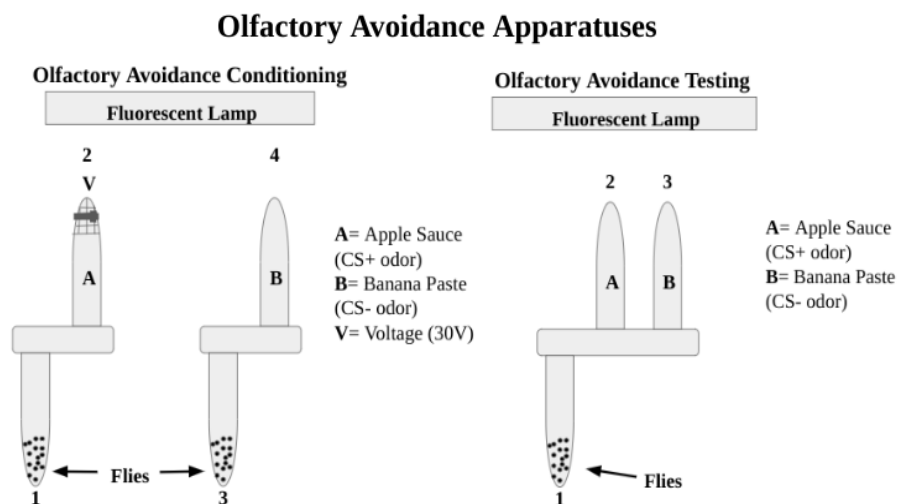


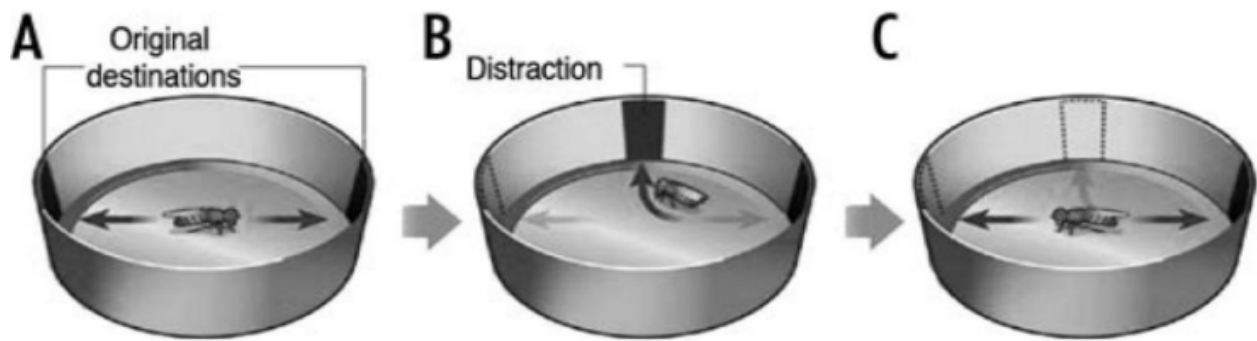
Figure 4: Olfactory Avoidance Conditioning and Testing Apparatuses. In the Olfactory test, the flies were classically conditioned to avoid a certain stimulus using mild electric shocks. This assesses short-term memory.

$$\frac{(\text{number of flies that avoided CS-}) - (\text{number of flies that avoided CS+})}{\text{number of total flies in trial}}$$

number of total flies in trial

Taken from Pitman, DasGupta, Krashes, Leung, Perrat & Waddell (2009)

Figure 5: The learning index equation for the Olfactory avoidance test



Taken from Pitman, DasGupta, Krashes, Leung, Perrat & Waddell (2009)

Figure 6: The Spatial Orientational Test Apparatus. This assesses spatial awareness and vestibular senses and measures long-term memory.

$$\frac{(\text{number of flies that return to original route}) - (\text{number of flies that stay on current path})}{\text{number of total flies in trial}}$$

number of total flies in trial

Figure 7: The learning index equation for the Spatial Orientational Test.

Drosophila Results:

Drosophila Apparatus Prototyping

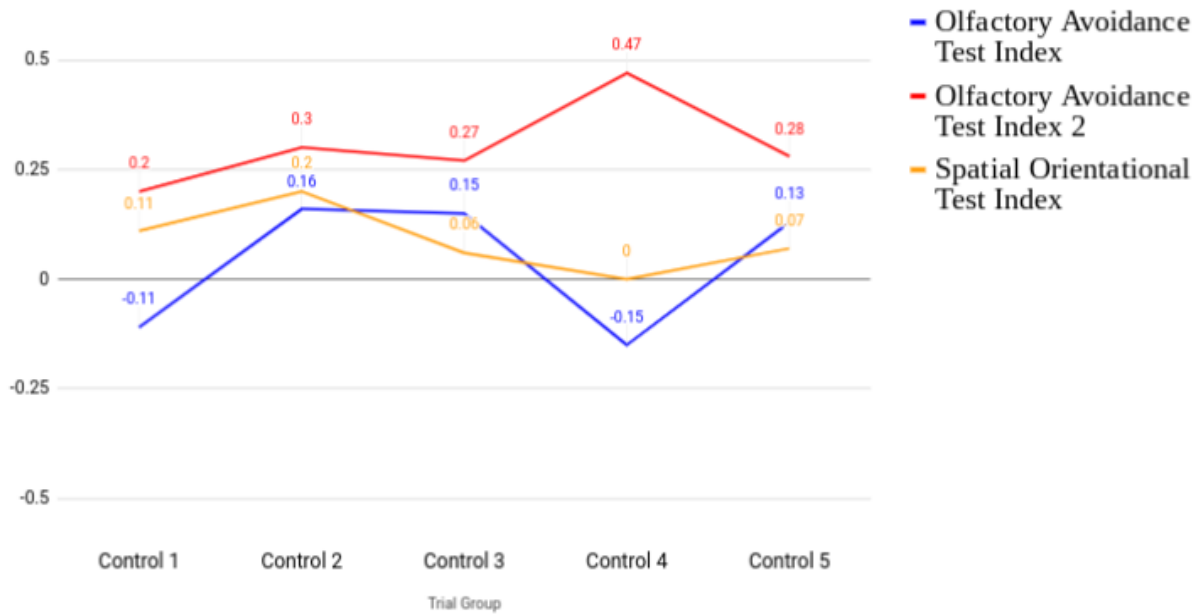


Figure 8: Drosophila Apparatus Prototyping Graph. The yellow and blue lines are the initial results, while the red line was data after making changes at the suggestion of Dr. Waddell. As demonstrated, changing the voltage in the Olfactory conditioning apparatus increased the Index scores and made it increasingly statistically significant, as it demonstrated that the flies were learning.

Toxicity Study

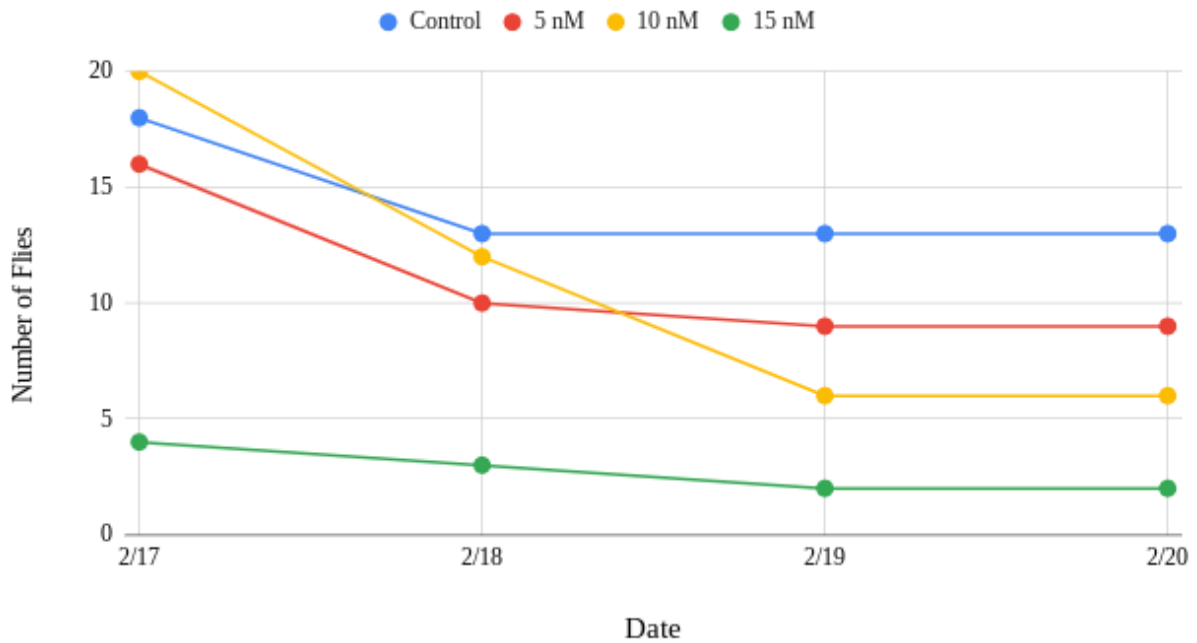


Figure 9: Toxicity Study conducted with the flies to determine their threshold to IMI. Based on the Toxicity Study data, the entire procedure was completed using a control, 5 nM, 10 nM, 15 nM, and 20 nM.