

Binge Drinking and Electrophysiology of Attention to Alcohol Stimuli

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Background

- In 2010, 18-24 year olds were the age group with the highest prevalence of binge-drinking and Wisconsin was the state with the highest rate of binge-drinking in the United States (Centers for Disease Control and Prevention, 2012)
- Beta activity (human brain activity in the 12-30 Hz range) is associated with increased arousal and attention
- Increased power in slow Beta (12-20 Hz) and fast Beta (20-35 Hz) ranges found in binge-drinking students at rest (no presented stimuli); this may be a biomarker for binge drinking (Courtney & Polich, 2010)
- We looked at Beta activity during presentation of alcohol and non-alcohol stimuli in bingeing and non-bingeing student drinkers at the University of Wisconsin-Eau Claire (UWEC)
- We predicted greater appeal and/or alcohol craving and higher Beta power in response to alcohol stimuli, especially for binge-drinkers.

Method

Participants:

- 18 UWEC students (11 women & 7 men, age: $M = 24$, $SD = 7.4$ years)
- No alcohol or drugs 48 hours prior to testing
- Blood Alcohol Content (BAC) upon arrival was 0.00 for all participants
- No neurological conditions and no current episode of mood or anxiety disorders
- No regular use of psychoactive medications
- Two groups:
 - Bingers: 4 or more drinks in any 2-hour period in the past 6 months for females and 5 or more drinks in any 2-hour period in the past 6 months for males.
 - Non-bingers: 1-3 drinks in any 2-hour period in the past 6 months for females and 1-4 drinks in any 2-hour period in the past 6 months for males

Electroencephalography:

- 64 electrodes (Electrical Geodesics Inc.)
- 250 Hz sampling
- 0.3-45 Hz bandpass filter
- Power calculated by wavelet analysis for sites Fz, Cz, Pz
- Slow Beta range: 12- 20 Hz
- Fast Beta range: 20-35 Hz
- 3 participants excluded from EEG analysis as outliers ($n=15$)



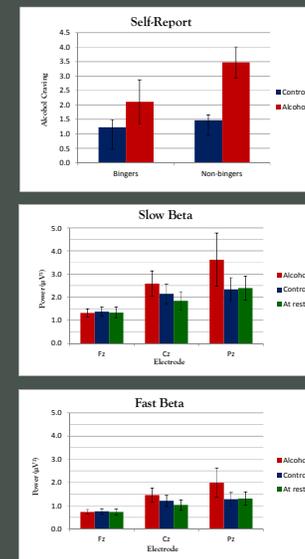
Procedure:

- Interview for drinking patterns
- Participants sat 75cm away from stimuli
- 3 stimulus conditions:
 - At-rest: 3 minutes looking at blank piece of paper
 - Alcohol: 1 minute each of looking at preferred alcohol beverage (2 options for each alcohol type)
 - Beer: Leinenkugels Honey Weiss OR Miller Lite
 - Wine: Barefoot Moscato OR Sutter Home Merlot
 - Liquor: Jack Daniels Whiskey OR Smirnoff Vodka
 - Control: 1 minute each of looking at non-alcohol beverages with a similar visual appearance
 - Beer match: Sprecher Cream Soda OR Mountain Dew
 - Wine match: Pelegrino Sparkling Water
 - Liquor match: Pure Leaf Sweet Tea OR Vitamin Water
- Ratings collected after each stimulus:
 - Appeal: On a scale from 1 to 10, how appealing did you find the can/bottle of <beverage>, where 1 means “extremely unappealing” and 10 means “extremely appealing”
 - Crave: How much do you crave an alcohol beverage right now on a scale from 1 to 10, where 1 means “no craving at all” and 10 means “the most craving you’ve ever felt”?



Results

- No significant group effects
- No significant effect of stimulus condition on appeal
- No significant effect of stimulus condition on slow/fast Beta power
- Higher craving in response to alcohol beverages ($M = 3.02$, $SD = 1.92$) than to control beverages ($M = 1.39$, $SD = 0.64$)



Discussion

- Alcohol stimuli elevated alcohol craving. This may reflect a benefit of using actual alcohol beverages as stimuli instead of mere representations.
- While not statistically significant, fast and slow Beta power appear larger for alcohol stimuli, especially at site Pz, suggesting increased arousal and attention. If this is true then the combination of increased attention toward and craving for alcohol may facilitate drinking behavior.

Future directions:

- Analyzing additional electrode sites
- Analyzing additional frequency bands: Delta (0.4 Hz), Theta (4-8 Hz), Alpha (8-12 Hz), and Gamma (35-45 Hz)
- Additional higher bingeing participants

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