Was that a cookie?!
On the neuroscience of attentional bias in obese adolescents
Siqi Chen¹, Yajun Jia¹, Steven Woltering
Texas A&M University, Educational Psychology Department
¹ Both authors contributed equally to this work

Introduction

Objective
● To pilot a study (n = 4) evaluating the attentional blink task.
● To ultimately investigate whether and how food stimuli evoke attentional biases for obese adolescents utilizing Electroencephalography (EEG).

Why study childhood & adolescent Obesity?
In the United States, the prevalence of obese children has almost tripled in the past 30 years³. Substantial adverse consequences to physical and mental health are associated with child and adolescent obesity³. Previous research has shown that children and adolescents have less control and are more sensitive to the rewarding properties of food cues⁴.

Why study attentional bias?
Attentional bias directs us to important environmental stimuli and shapes subsequent emotional, motivational, and cognitive processing. This type of rapid, and often unconscious, bias may also have a great impact on decision-making processes involved in dietary behavior and the development of addictive behavior patterns⁵. A better understanding of the role of attentional biases in the development and maintenance of obesity may help prevention and treatment research.

Why use an attentional blink EEG task?
The attentional blink (AB) phenomenon has been observed in rapid visual search tasks which have been widely used to study attentional bias². Subjects are often unable to report the second target (T2) correctly (they are temporarily ‘blind’) when it is presented less than 500ms after the first target (T1)². The size of attentional blink is determined by individual differences, and a stronger attentional focus on T1 promotes a larger attentional blink². T2 accuracy could be an indicator of the amount of resources used in processing T1 and attentional blink magnitude for T2². EEG allows us to examine differences in underlying neural mechanisms mediating these processes between individuals with obesity and those without.

Method

EEG
EEG provides a continuous measure of processing between a stimulus and a response and can be used to pinpoint the time at which attention begins to influence processing with a millisecond resolution⁶. EEG can also be used to examine conscious and nonconscious processes that cannot be measured by self-report.

Method (continued)

Posner’s model of attention⁷ suggests that human attention may be divided into three sub-processes: alertness, selectivity, and processing capacity. Two specific early Event-Related Potentials (ERPs): P2 and N2, relate to selectivity and processing capacity, respectively. P3 activation reflects later cognitive, more conscious evaluative, processing.

ERPs were generated through filtering (1.30 Hz). Segmenting was conducted 400ms before and 800ms after the onset of T2. Articulating algorithms aided in cleaning up the data.

Participants
Participants were recruited through advertising in the Bryan-College Station area. Groups (obese & normal weight) were divided by BMI. For the present poster, a total of 4 participants aged 15-18, composed of 3 normal weight females (BMI: 24.3, 18.4, 19.3) and 1 obese male (BMI: 36.7) were used to determine the validity of the task.

Method (continued)

Research Question & Hypothesis
How do obese adolescents differ from normal weight adolescents in the amount of neural resources required for attentional sub-processes?
We expect lower N2, P2 and P3 magnitudes at T2 for obese adolescents compared to normal-weight adolescents for blinked food T1 trials compared to ‘blinded’ neutral trials. This would indicate that food stimuli are taking up more attentional resources causing an attentional narrowing negatively affecting subsequent processing in obese versus normal-weight adolescents.

EEG Results

Task Validation:
Reliable ERPs components were detected from this pilot study.

● Increased P3 activation for correct T2 detection trials versus incorrect T2 detection trials suggested that we effectively captured the neural activation underlying the attentional blink phenomenon and we can apply this task to further study attentional processes in obese adolescents.
● Clear N2 and P2 components were observed around the mediofrontal area (e.g., FCz).

Future data analysis will focus on comparing N2 and P2 amplitudes between different T1 content conditions.

References

7. More info: nld.tamu.edu

More info: nld.tamu.edu