

Inhibiting responses to unhealthy food

Ethics approval number: 2014/064

Researchers: Vanessa Moore, Dyann Padberg, James Dunn, Matthew Pearce, Emily Parker, Luke Hickey

Supervisors: Dr Christopher Brydges and Prof Mike Anderson

Results available: April 2016

Defining Response Inhibition, and Aims of Research

Response inhibition refers to the ability to suppress an automatic or prepotent response. Being able to successfully inhibit inappropriate responses or actions is often considered to be an important part of intelligence, as well as impacting upon an individual's ability to function in everyday life. Research has shown that pairing the very stimuli individuals are trying to resist (i.e. salient) with a stopping behaviour in a Go/No-go task, increases inhibition to that stimuli greater than if trained with non-salient stimuli

The 2011-13 Australian Health Survey shows that 63.4% of the Australian adult population aged 18 years and over are overweight or obese. The imbalance between energy intake and expenditure significantly contributes to becoming overweight or obese and an individual's self control (i.e. response inhibition) over food intake is an important component

In addition, research has shown that regions in the frontal lobe of the brain elicit a unique response with regards to Go/no-go and response inhibition. A distinct negative amplitude known as the N2 is the second negative peak in the average ERP, appearing between 200-300 ms after stimuli onset. Research has shown that those with greater inhibitory control display a larger negative amplitude of the N2 than those with less inhibitory control.

This research aimed to train individuals to inhibit unhealthy food using both salient (healthy vs. unhealthy food) and non-salient stimuli (food colour) while ERPs are recorded by EEG. Training success was measured by the amount of food consumed for a subsequent tasting plate. It was hypothesised that participants trained using salient stimuli would consume less unhealthy food from a subsequent tasting plate than those trained using non-salient stimuli. It was also hypothesised that the N2 amplitude would decrease in negativity as inhibitory control is trained and becomes greater.

Methodology

A total of 31 participants took part in the study. All participants spoke English and had normal or corrected-to-normal vision. A Go/No-go task was used in this study to train response inhibition over two consecutive days. The task required participants to respond ('Go') to stimuli and inhibit their response ('No-go') to stimuli. Participants were divided

into two groups: salient stimuli (i.e. they were required to respond to pictures of healthy food and not respond to pictures of unhealthy food), or non-salient stimuli, whilst electroencephalographic data was recorded.

At the conclusion of training on the second day, participants were relocated to complete a bogus personality questionnaire which was a distractor to the main aim which was consuming food from the tasting plate provided, which consisted of 30 pieces of healthy and unhealthy foods. The platter was removed after 10 minutes and items consumed were counted.

Findings and conclusions

It was found that behavioural performance on the go/nogo task improved from day 1 to day 2 in both groups, implying that practice on the task had a meaningful effect. However, a mixed design ANOVA revealed no significant differences between groups for 'No-go' N2 amplitude between day one and day two for either group. Additionally, there were no group differences for the amount of healthy, unhealthy, or total food eaten at the end of the training procedure, suggesting that training participants' with salient stimuli did not increase their inhibition toward unhealthy foods any more than those trained with non-salient stimuli.

It may be possible that training inhibition in the current study did not happen, as the stimuli presented were not salient enough to the food presented on the platter. In addition, individuals were inhibiting responses to individual food items and not a category of food i.e. unhealthy. It may be possible that more training is required to establish a connection between the images being presented and a category. Future research should focus around the number of sessions required to achieve successful inhibition to a category of food such as unhealthy foods. In addition, implementation of training outside a lab environment should be considered with the focus being on the transferability of training to real world settings.