Attentional Biases for Cigarette and Anti-cigarette Cues in Ex-smokers
Kristin E. Iodice & Jane W. Couperus
Hampshire College

Objectives
- Examine the process of attentional bias to cigarette-related stimuli over the course of cigarette addiction
- Hypothesis: Recent ex-smokers will exhibit an attentional bias for cigarette-related and anti-cigarette images in comparison to neutral images.
- Determine whether or not anti-smoking advertisements that clearly display an image of a cigarette induce cravings for cigarettes in current smokers and ex-smokers.

Background
- Substance-related stimuli induce reactions similar to those elicited when using the actual substance such as pleasure, subjective craving, and neurophysiological activation.
- These stimuli also attract and hold substance users' attention, a phenomenon known as an attentional bias.
- Attentional bias is present, substance users will pay more attention and elicit a greater P300 to substance-related images as opposed to the neutral images (attentional bias).
- The presence of this attentional bias triggers a conditioned response of craving for the substance which has the ability to actually induce drug use in current users as well as relapse in ex-users.
- Past research has found:
  - Cigarette smokers show an attentional bias for cigarette-related images as compared to neutral images.
  - Cigarette smokers show an attentional bias for anti-cigarette images as compared to neutral images.
  - Ex-cigarette smokers show an attentional bias for cigarette-related images as compared to neutral images.

Methods
- EEG signals were recorded while participants viewed three sets of 42 (or 45) images on a computer screen.
  - Each set contained 14 cigarette-related images, 14 anti-cigarette images, and 14 neutral images presented one at a time in a random order at 2000ms intervals.
  - In order to make sure participants were paying attention, they were told to be on the lookout for an image of a black cat. At the end of each of the three blocks, participants were asked to write down on a piece of paper whether or not they saw a black cat in that block.
  - The ERP component investigated was a positive waveform elicited within the 300-400ms timeframe at the PZ electrode site.

Participants
- 13 Non-Smokers (NSs): Never smoked a single cigarette in their lifetimes
- 16 Smokers (Ss): Smoked an average of ten or more cigarettes per day at the time of study participation
- 10 Recent ex-smokers (REXs): Quit smoking between six months and ten days prior to study participation following smoking a single cigarette within that period
- 12 Established ex-smokers (EXEs): Quit smoking at least nine months prior to study participation without smoking a single cigarette within that period

Results
- Smokers and Recent ex-smokers:
  - P300 amplitudes were significantly higher in response to cigarette-related (S: p < .001; REX: p < .05) and anti-cigarette (S: p < .01; REX: p < .001) images as compared to neutral images.
  - There was no significant difference in P300 amplitudes between cigarette-related and anti-cigarette images.
- Established ex-smokers:
  - P300 amplitudes were significantly higher in response to anti-cigarette images as compared to neutral images (p < .001).
  - There were no other significant differences found.
- Non-Smokers:
  - No significant differences between P300 amplitudes and image types were found.
  - All participants were correct in reporting whether or not a black cat was present for each block.

Discussion
- Both smokers and recent ex-smokers showed attentional biases for cigarette-related and anti-cigarette images as compared to neutral images.
- Established ex-smokers displayed an attentional bias for anti-cigarette images in comparison to neutral images.
- Non-smokers did not show any attentional biases for cigarette-related or anti-cigarette images.
- Overall, this study supports the original hypothesis and suggests:
  - Attentional biases in cigarette-related and anti-cigarette stimuli might change in ex-smokers depending on duration of time since quitting.

Next Steps
- More care should be taken in the design and dissemination of anti-smoking advertisements in order to make sure they are efficient in their purpose and do not make it harder for users to quit.
- Further studies need to be conducted to better understand the line between recent ex-smokers and established ex-smokers in order to develop more personalized ways to help them remain abstinent.
- This study should be conducted with other methods of measuring attentional bias such as the Stroop task and the eye-tracking device.

References

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