Does attentional bias predict smoking behaviour and treatment success?

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Background

What is attentional bias?

- Smoking-related cues in the environment acquire incentive value through learning processes (Robinson & Berridge, 2001)

- Smokers disproportionately allocate their attention toward smoking-related cues over other cues
Background

Why is it important to study attentional bias?

- Positive association between attentional bias and craving across addictive behaviours (Field et al., 2009)

- Pre-treatment attentional bias predicts relapse in heroin (Marissen et al., 2006) and cocaine addicts (Carpenter et al. 2006)

- Attentional bias predicted lapses and eventual relapse in smokers attempting cessation but findings are inconsistent across studies (Waters et al., 2003; Powell et al. 2010; Spiegelhalder et al., 2011)
Aims

To assess whether baseline attentional bias measured using reaction time tasks in a treatment context is associated with:

- Nicotine dependence
- Attentional bias
- Cigarette craving
- Cessation outcome in smokers attempting to quit
Methods

- **Setting**
  - UK smoking cessation clinics

- **Sample**
  - Smokers >18 years, >10 cigarettes per day, CO>10ppm

- **Treatment**
  - NHS stop smoking programme
  - Withdrawal-orientated behavioural support for 7 weeks
  - 21mg/24 hour nicotine patches adjusted accordingly for 8-12 weeks
Attentional bias measure – visual probe task

Images taken from McClernon et al. (2007) stimulus set
Attentional bias measure – pictorial Stroop task

Images taken from McClernon et al. (2007) stimulus set
Methods

- **Materials**
  - 12 matched picture pairs of smoking-related and neutral stimuli
  - 192 trials, 2 block format on visual probe task, 4 block on pictorial Stroop task

- **Measures**
  - Visual probe and pictorial Stroop task assessments of attentional bias at baseline, 4 weeks, 8 weeks, 3 months and 6 months after quitting
  - Fagerström Test of Nicotine Dependence (FTND)
  - Weekly craving from 2 weeks prior to quit day to 4 weeks, 8 weeks, 3 months and 6 months post-quit on the Mood and Physical Symptoms Scale (MPSS)
  - Prolonged abstinence at each clinic visit, CO<10ppm
Results

- **Participant characteristics**
  - 118 smokers
  - Gender ratio (M:F) = 49:69
  - Age (yrs) = 45 (SD=13)
  - Mean FTND = 6 (SD=2)
  - Mean cigarettes per day = 21 (SD=9)

- **Association with nicotine dependence**
  - Baseline attentional bias not associated with FTND
    Visual probe task (B=-0.06, 95% CI=-0.48, 0.36)
    Pictorial Stroop task (B=0.01, 95% CI=-0.40, 0.43)
Results - visual probe task

Association between baseline attentional bias and attentional bias over time

-4 0 4 8 12 16 20

4 weeks 8 weeks 3 months 6 months

Attentional bias (ms)
Results – Stroop task

Association between baseline attentional bias and attentional bias over time

Stroop bias (ms) vs. weeks

-4 weeks 8 weeks 3 months 6 months
Association between baseline attentional bias and craving over time

Craving

Baseline 4 weeks 8 weeks 3 months 6 months
Results – Stroop task

Association between baseline Stroop bias and craving over time
Results – visual probe task

Prediction of continuous abstinence from baseline attentional bias

Odds ratio (95% CI) of quitting

4 weeks  8 weeks  3 months  6 months
Results – Stroop task

Prediction of continuous abstinence from baseline

Odds ratio (95% CI) of quitting

- 4 weeks
- 8 weeks
- 3 months
- 6 months
Conclusions

- Attentional bias is not related to the severity of tobacco dependence, craving or smoking cessation outcome using visual probe and Stroop task measures in clinics.

- Visual probe and Stroop tasks have shown poor internal reliability (Ataya et al., 2012), whereas direct measures e.g. eye-tracking may be more reliable.

- Attentional bias may fluctuate with motivational state - experience sampling techniques may capture ‘high risk’ situations for craving and relapse (Marhe et al. 2013; Waters et al. 2013).
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References