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Lack of attentional retraining effects in cigarette smokers attempting cessation: A proof of concept double-blind randomised controlled trial

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ABSTRACT

Background: Observational studies have shown that attentional bias for smoking-related cues is associated with increased craving and relapse. Laboratory experiments have shown that manipulating attentional bias may change craving. Interventions to reduce attentional bias could reduce relapse in smokers seeking to quit. We report a clinical trial of attentional retraining in treatment-seeking smokers.
Methods: This was a double-blind randomised controlled trial that took place in UK smoking cessation clinics. Smokers interested in quitting were randomised to five weekly sessions of attentional retraining ($N = 60$) or placebo training ($N = 58$) using a modified visual probe task from one week prior to quit day. Both groups received 21 mg nicotine patches (from quit day onwards) and behavioural support. Primary outcomes included change in attentional bias reaction times four weeks after quit day on the visual probe task and craving measured weekly using the Mood and Physical Symptoms Scale. Secondary outcomes were changes in withdrawal symptoms, time to first lapse and prolonged abstinence.
Results: No attentional bias towards smoking cues was found in the sample at baseline (mean difference = 3 ms, 95% CI = −2, 9). Post-training bias was not significantly lower in the retraining group compared with the placebo group (mean difference = −9 ms, 95% CI = −20, 2). There was no difference between groups in change in craving ($p = 0.89$) and prolonged abstinence at four weeks (risk ratio = 1.00, 95% CI = 0.70, 1.43).
Conclusions: Taken with one other trial, there appears to be no effect from clinic-based attentional retraining using the visual probe task. Attentional retraining conducted out of clinic may prove more effective.
Clinical trial registration: UK Clinical Trials ISRCTN 54375405.

1. Introduction

Excessive attention towards drug-related cues is termed attentional bias (Field and Cox, 2008). Theoretical accounts of attentional bias suggest that drug-related cues become salient to users through learning initiated and maintained by repeated pairing to drug reward (Robinson and Berridge, 1993, 2001). Franken (2003, 2007) suggests attentional bias towards drug-related cues influences drug-seeking and increases craving, prompting relapse. Numerous studies report associations between attentional bias and craving intensity for several drug substances (Copersino et al., 2004; Field et al., 2005). Attentional bias has been associated with an increased risk of relapse in smokers (Powell et al., 2010), alcohol users (Cox et al., 2002) and heroin users (Marissen et al., 2006).

Attentional bias is commonly measured with a visual probe task (Bradley et al., 2004; Hogarth et al., 2003). Pairs of words or pictures

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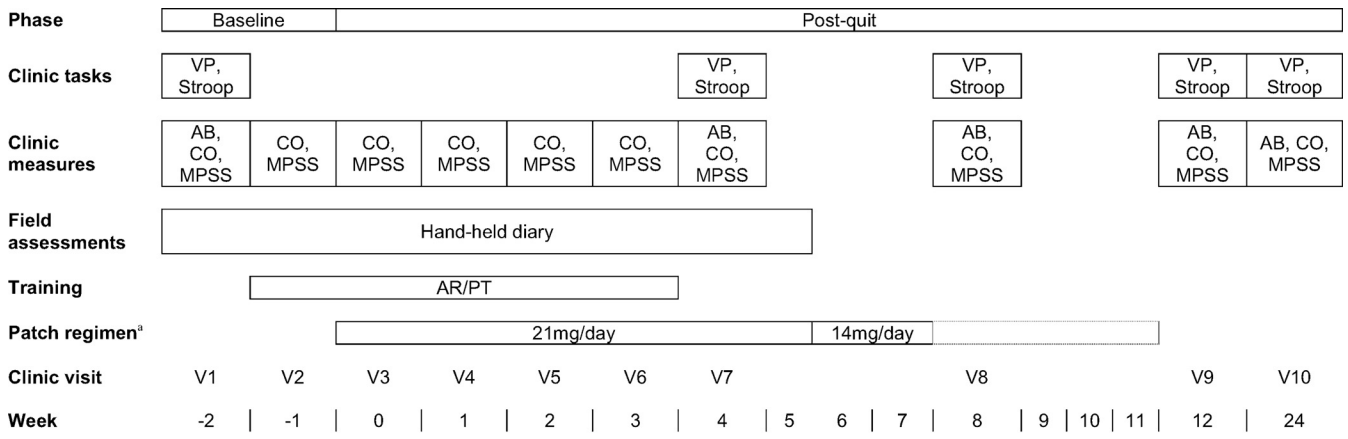

Fig. 1. Timeline of procedures and clinic visits. V = visit; VP = visual probe task; AR = attentional retraining; PT = placebo training; AB = attentional bias; CO = carbon monoxide; MPSS = Mood and Physical Symptoms Scale; mg = milligrams. [a]Dashed lines indicate that patch regimen ranged from 8 to 12 weeks.

– one smoking-related and one neutral – are briefly displayed on a computer screen before a probe appears in the location of one of the stimuli that participants must respond to as quickly as possible. Attentional bias is indicated by quicker responses to probes that replace smoking-related stimuli compared to neutral stimuli, indicating that the smoker was attending to the smoking-related stimuli. Other measures of bias include the modified Stroop task, which typically uses word stimuli but can use pictorial stimuli (Cox et al., 2006). Each stimulus is presented in a colour that participants must identify and respond to as quickly as possible. Smokers are slower to name the colour of smoking-related stimuli, indicating that attention is captured by smoking cues (Munafo et al., 2003).

Pre-clinical studies have investigated whether attentional retraining influences attentional bias and craving (Attwood et al., 2008; Field and Eastwood, 2005; Field et al., 2007, 2009a; McHugh et al., 2010; Schoenmakers et al., 2007). In attentional retraining, the probe always appears in the place of either the neutral or drug-related stimuli, thus the user learns to look towards one stimulus type. All these studies have taken place in a laboratory with a single episode of training followed by immediate reassessment of craving in heavy drinkers or smokers not seeking to change their behaviour. Some studies have compared training to attend to a drug-related stimulus with training to avoid them. Differences in attentional bias and craving have been reported (Attwood et al., 2008; Field and Eastwood, 2005). These provide proof of principle that it is possible to manipulate attention and that this may affect craving but leave open whether it is training to attend or training to avoid that is having the effect. Four studies have assessed whether training to avoid a drug-related stimulus reduces attentional bias or craving compared with no training (Field et al., 2007, 2009a; McHugh et al., 2010; Schoenmakers et al., 2007), which is the more clinically relevant comparison. One reported a significant reduction in attentional bias (Schoenmakers et al., 2007) but three found no significant difference (Field et al., 2007, 2009a; McHugh et al., 2010). No studies found that training to avoid reduced craving compared with control. Thus laboratory data suggest it is possible to manipulate attention and this may influence craving in people not looking to quit substance use but the data are not strong.

Clinical studies give more direct evidence that attentional bias can be reduced and that this may affect clinical outcomes. Randomised trials show that attentional retraining is effective for anxiety disorders, reducing both attentional bias and improving symptoms up to four months after treatment (Amir et al., 2009a,b; Schmidt et al., 2009). One uncontrolled trial of attentional retraining in heavy drinkers reported positive results on consumption (Fadardi and Cox, 2009). Another randomised trial with alcohol-dependent patients reported that five training sessions on a modified visual probe task led to reduced attentional bias, earlier discharge from treatment and delayed time to relapse compared with controls (Schoenmakers et al., 2010). Here, we report a randomised trial of multiple sessions of attentional retraining (versus placebo training) on attentional bias, craving, withdrawal severity, and abstinence in people quitting smoking.

2. Methods

2.1. Design

This double-blind placebo controlled randomised trial took place in National Health Service (NHS) stop smoking clinics, a nationwide network of clinical support for smokers operating to standard protocols. Weekly withdrawal-orientated behavioural support was given immediately prior to and after quit day and 21 mg 24 h nicotine patches were provided for 8–12 weeks. Participants received five sessions of attentional retraining or a dummy "placebo" training procedure. The design and methods are described in detail elsewhere (Begh et al., 2013).

2.2. Recruitment

Participating general practices and stop smoking services wrote to their patients offering trial participation as a way of achieving abstinence. The trial team screened participants and booked them into a clinic.

2.3. Participants

Eligible participants were 18 years or over, smoked at least 10 cigarettes per day and had normal or corrected-to-normal vision. We excluded people already on smoking cessation medication and who had such severe medical or psychiatric problems to make participation impossible. Almost all people with stable medical and psychiatric problems were included. Detailed inclusion/exclusion criteria are reported in Begh et al. (2013).

2.4. Materials

Eighteen picture pairs of smoking-related and neutral pictures were used across attentional bias assessment and training tasks. These pictures have been used in previous research (McClernon et al., 2007, 2008). In the assessment version of the visual probe task and pictorial Stroop task, 12 picture pairs were used. In both the retraining and placebo visual probe task, 12 picture pairs were used, consisting of six pictures that featured in the assessment version of the task and six pictures that did not. Four neutral picture pairs that had not been used in the assessment or training versions of the task were used for practice trials before each task.

2.5. Study procedures

Fig. 1 displays the timeline of the study procedures and treatment plan. The trial statistician produced the sequence that allocated participants 1:1 to either attentional retraining or placebo training, using a computer-generated simple randomisation scheme ordered in random permuted blocks of four. An independent programmer entered the sequence on to a dedicated online trial database, which