



# A comparison of emotion regulation strategies in response to craving cognitions: Effects on smoking behaviour, craving and affect in dependent smokers



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## ARTICLE INFO

### Article history:

Received 9 October 2014  
Received in revised form  
26 March 2015  
Accepted 30 March 2015  
Available online 31 March 2015

### Keywords:

Smoking  
Craving  
Reappraisal  
Suppression  
Defusion  
Acceptance and Commitment Therapy  
Emotional regulation

## ABSTRACT

**Aim:** The effects of three emotion regulation strategies that targeted smoking-related thoughts were compared on outcomes relevant to smoking cessation.

**Method:** Daily smokers applied defusion ( $n = 25$ ), reappraisal ( $n = 25$ ) or suppression ( $n = 23$ ) to thoughts associated with smoking during a cue-induced craving procedure. Smoking behaviour, approach/avoidance behavioural bias, and subjective measures of experiential avoidance, craving, and affect were assessed during the experimental session, with additional behavioural and subjective outcomes assessed at 24 h and seven day follow-up. The influence of baseline group differences in smoking level and nicotine dependence were explored statistically.

**Results:** Defusion and reappraisal were associated with greater restraint in smoking behaviour in the immediate post-session period as well as reduction in smoking at seven day follow-up compared to suppression. Relative to suppression, reduced subjective craving was seen in the reappraisal group, and reduced experiential avoidance in the defusion group. Differences in approach/avoidance responses to smoking and neutral cues were observed only between the suppression and reappraisal groups. Although suppression was rated as lower in both credibility and strategy-expectancy compared to defusion and reappraisal, neither credibility nor expectancy mediated the effect of any strategy on changes in levels of smoking.

**Conclusion:** Defusion and reappraisal produced similar benefits in smoking-related behavioural outcomes but, relative to suppression, were associated with distinctive outcomes on experiential avoidance and craving. The effects appear to be independent of perceived expectancy and credibility of the different strategies. Overall, the results suggest a role for reappraisal and defusion strategies in the development of psychological treatments for addiction-related disorders.

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## 1. Introduction

Despite the success of health campaigns, tobacco addiction remains a significant and costly public health problem. The powerful motivational-affective experience of craving, which reflects the coordinated activation of a motivational system that controls attention and behaviour (Sayette, Martin, Hull, Wertz, & Perrott, 2003), is central to the intractability of cigarette addiction. Furthermore,

craving is accompanied by self-referential verbal thoughts supported by propositional networks (Tiffany, 1990), and behaviours that are biased towards approaching smoking-related cues in preference to other stimuli (Mogg, Bradley, Field, & De Houwer, 2003; Stacy & Wiers, 2010). Such cognitive and motivational biases themselves increase responsivity to smoking cues (e.g. craving) in a feed-forward mechanism which increases drug-taking behaviour (Franken, 2003; Robinson & Berridge, 2000). However, emerging evidence suggests that the use of certain 'emotion regulation' strategies can subvert this vicious cycle and reduce the intensity of craving and/or smoking behaviour.

Emotion regulation refers to the use of cognitive, behavioural or

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emotional strategies (e.g. avoidance, reappraisal, rumination, escape, suppression, distraction and problem-focused coping; Gross, 1998) to alter the form, frequency, intensity or situational occurrence of emotional experiences. Among these strategies, *reappraisal* has consistently been shown to reduce the emotional impact of aversive experiences (Gross, 1998, 2002; Jackson, Malmstadt, Larson, & Davidson, 2000). Reappraisal presumably involves modification of the propositional networks that underlie verbal statements that relate, for example, to the desirability of drug-use, self-efficacy in managing intense craving and positive expectancies regarding drug effects. The deliberative use of reappraisal is a central feature of Cognitive Behavioural Therapy (CBT) for addictive disorders (Marlatt & Gordon, 1985). Alternatively, while commonly used as a spontaneous coping strategy, *suppression* of aversive emotional experiences can paradoxically enhance unpleasant emotional reactions (e.g. Jackson et al., 2000). In the case of addiction, suppression of drug-related thoughts and feelings might therefore be expected to increase responsivity to drug cues.

In contrast to reappraisal, as used in CBT, recently developed psychological therapies such as Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999) emphasise an individual's *relationship towards* their thoughts, rather than thought content (Hayes, 2004; Segal, Teasdale, & Williams, 2004). This approach highlights the role of two broad trans-diagnostic factors in psychiatric disorders: experiential avoidance and psychological inflexibility (Hayes et al., 1999). Experiential avoidance refers to the habitual tendency to strategically or unconsciously avoid, suppress or otherwise minimize aversive internal sensations (thoughts, emotions and somatic experiences). Psychological inflexibility is the tendency to engage in repetitive and maladaptive cognitive and behavioural strategies despite changing circumstances, often in the service of experiential avoidance. In smokers, higher levels of experiential avoidance in response to stress are associated with higher levels of smoking behaviour (Pirkle & Richter, 2006) and greater likelihood of relapse (Gifford et al., 2004). ACT aims to decrease experiential avoidance and increase psychological flexibility through the use of strategies that include mindfulness, acceptance and 'defusion'. As with reappraisal in CBT, the primary target of these ACT-based therapeutic (emotion regulation) strategies is propositional thinking (i.e. self-defeating verbal statements).

While a growing body of evidence suggests that ACT is a promising therapeutic approach for a variety of disorders – include substance use disorders – the active components of this complex treatment remain unclear. Experimental studies in the tradition of 'component research' can help parse the effects/effectiveness of individual component strategies within complex psychological interventions (Levin, Hildebrandt, Lillis, & Hayes, 2012). The role of defusion for example, has been investigated in isolation from other aspects of ACT using experimental instructions that aim to overcome the literal believability of thoughts by generating a sense of 'psychological distance' from them (Twohig, Masuda, Varra, & Hayes, 2005). These studies suggest that, like reappraisal, defusion techniques can reliably be taught to participants in experimental settings (Deacon, Fawzy, Lickel, & Wolitzky-Taylor, 2011; Hooper & McHugh, 2013; Levin et al., 2012). Most studies on defusion have investigated its effects on self-critical thoughts (Healy et al., 2008; Masuda, Feinstein, Wendell, & Sheehan, 2010; Masuda, Hayes, Sackett, & Twohig, 2004; Masuda, Hayes, Twohig, Drossel, & Washio, 2009). Other studies with more direct relevance to substance use disorders have examined the effects of defusion on food cravings. These show, for example, that defusion results in greater reductions in chocolate consumption compared to suppression (Hooper, Sandoz, Ashton, Clarke, & McHugh, 2012),

reappraisal (Moffitt, Brinkworth, Noakes, & Mohr, 2012), acceptance and relaxation (Jenkins & Tapper, 2013).

Ideally, studies comparing CBT- and ACT-based emotion regulation strategies should include measures that tap the emotional, cognitive and behavioural processes that are predicted to change in response to the respective strategies used in these therapies. However, recent experimental studies of experiential acceptance have tended to use outcome measures which tap acute changes in the intensity of negative emotion or craving, consistent with the aims of CBT rather than ACT (Hofmann, Heering, Sawyer, & Asnaani, 2009; Szasz, Szentagotai, & Hofmann, 2011; Szasz, Szentagotai, & Hofmann, 2012; Wolgast, Lundh & Viborg, 2011). On the other hand, studies comparing defusion with other emotion regulation strategies have tended to include outcome measures guided by the 'psychological flexibility' model that underpins ACT (e.g. believability of thoughts). The latter studies provide preliminary support for the idea that defusion is an effective strategy for regulating the effects of self-defeating thoughts and therefore has clinical utility in its own right. However, important questions remain, not least about the effectiveness of defusion techniques beyond addressing negative self-referential thoughts (self-criticism) and food craving in non-clinical populations. The effects of defusion on drug-use-related thoughts as well as somatovisceral craving sensations, remain unclear. Moreover, studies of emotion regulation rarely assess the credibility and expectancy effects of tested strategies. Of the studies referred to above, only one examined credibility of the interventions tested (Masuda et al., 2004). This is a fundamental limitation of extant research as it is not known whether comparisons are being made between equally credible strategies, and if not, whether treatment-related appraisals (credibility and treatment expectancies) have an effect on outcomes.

The current study seeks to contribute to our understanding of adaptive emotion regulation strategies and their utility in substance use disorders by examining the comparative effectiveness of brief standardised defusion and reappraisal instructions on smoking-relevant and theory-consistent outcomes, using suppression instructions as the comparator. In particular we examined the effects of these instructions on smoking behaviour, implicit behavioural approach/avoidance tendencies, and subjective measures of experiential avoidance, cue-induced craving, and negative affect. In line with previous research, we predicted that thought suppression would adversely affect smoking-related outcomes through its well-established rebound effects on unwanted thoughts and feelings (Gross & Thompson, 2007). In addition, theoretical and empirical studies suggest beneficial but distinct effects of reappraisal and defusion in some domains (Segal et al., 2004). Specifically, emotion regulation and cognitive behavioural theories would suggest that reappraisal will produce relatively immediate reductions in subjective craving and negative affect (Gross, 2002; Perkins, Conklin, & Levine, 2007). Alternatively, since the techniques originating from the psychological flexibility model do not focus on producing immediate reduction in the intensity of specific subjective experiences, craving and negative affect are not predicted to change acutely in response to defusion instructions. Rather, defusion is predicted to be associated with changes in participants' relationship to their craving-related thoughts as well as overt smoking *behaviour*. In addition to testing these predictions, we also examine the effects of reappraisal, suppression and defusion on a smoking approach-avoidance task which assesses a more implicit, non-verbal level of processing of smoking stimuli.

## 2. Method

The study received ethical approval from University College London Graduate School Ethics Committee.

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