

Short Communication

The effects of smoking and abstinence on experience of happiness and sadness in response to positively valenced, negatively valenced, and neutral film clips

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Abstract

Incentive motivation theories of addiction suggest that behavioural concomitants of compromised mesocorticolimbic reward activity during abstinence might include decreased affective reactions to natural reinforcers. This study tested implications for hedonic reactions in abstinent smokers. It was hypothesised that positively valenced (pleasurable) film clips would elicit lower ratings of happiness in abstinent than satiated smokers. Twenty-nine smokers, randomly assigned to either an ‘abstinent’ or a ‘satiated’ condition, and 15 non-smokers took part in a single session in which they rated (i) signs and symptoms of nicotine withdrawal and (ii) affective responses to positively valenced, negatively valenced, and neutral film clips. Compared with satiated smokers, abstinent smokers rated positive clips as eliciting significantly lower levels of happiness, and this was independent of self-reported nicotine withdrawal symptoms; the scores of non-smokers fell between those of abstinent and satiated smokers, more closely approximating those of the latter. By contrast, sadness ratings in response to negative clips were not affected by smoking status, indicating that the effect on happiness was not simply due to general emotional blunting. These results suggest that, for regular smokers, stimuli that are motivationally salient for the general population may elicit reduced positive affective responses during periods of abstinence.

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1. Introduction

Recent neuroimaging studies suggest that the brain's dopaminergic reward system is altered in chronic drug users (Volkow, Fowler, Wang, & Goldstein, 2002). Dagher et al. (2002), for example, reported reduced DA D1 receptor binding in the nucleus accumbens in the brains of smokers compared with non-smokers. Acute drug ingestion however, continues to cause marked increases in DA neurotransmission (e.g. Di Ciano, Blaha, & Philips, 1995). Since the ordinary role of this brain system is putatively to attribute incentive properties to rewarding stimuli, any dampening of activity in regular drug users is likely to be associated with decreased sensitivity to incentives of everyday life. This would be unmasked during periods of drug abstinence or during a quit attempt since the individual would no longer benefit from the short-term DA-enhancing effects of drug taking.

We have consistently found that abstinent smokers show reduced responsiveness to a financial incentive on a simple psychomotor card sorting task (Al-Adawi and Powell, 1997; Powell, Dawkins, & Davis, 2002a; Powell, Pickering, Dawkins, West, & Powell, 2004) and reduced allocation of attentional resources towards motivationally salient stimuli in the emotional Stroop task (Powell, Tait, & Lessiter, 2002b) compared to both non-smokers and satiated smokers (smokers who have recently smoked). Paralleling these findings, abstinent smokers also report expecting to derive less enjoyment from a range of ordinarily pleasurable events and activities compared to satiated smokers on a questionnaire measure (Powell et al., 2002a, 2004).

Blunted emotional affect in abstinent substance users has been reported recently by both Gerra et al. (2003) and Aguilar de Arcos, Verdejo-García, Peralta-Ramírez, Sánchez-Barrera, and Pérez-García (2005). In the former study, heroin users rated pleasant images as less pleasant than did healthy controls and their evaluations of both pleasant and unpleasant images did not differ from evaluations of neutral stimuli. Aguilar de Arcos et al. (2005) reported different response profiles in emotional responses to pleasant and unpleasant images not only between abstinent substance abusers and healthy controls but also between abusers of alcohol and cocaine.

The present study aimed to examine positive and negative affective states in abstinent and satiated smokers, indexed via 'happiness' and 'sadness' ratings in response to film clips. It was hypothesised that happiness ratings to positively valenced clips would be lower in abstinent than satiated smokers. A group of non-smokers was included as a comparison. Neutral and negatively valenced (sad) clips were included in order to prevent participants developing a response set and to determine whether any detrimental effect of abstinence was specific to appetitive motivation or generalised across other forms of emotional reactivity.

2. Methods

In this mixed design, 29 smokers were randomly assigned to either a 10-h 'abstinent' condition, or a 'satiated' condition (smoking as usual including a cigarette within 15 min prior to the testing session). Fifteen non-smokers were also tested. Abstinence and non-smoking status was verified by carbon monoxide (CO) readings of ≤ 11 ppm, and 'satiated' smoking by ≥ 15 ppm, consistent with reported cut-offs (Jarvis, Pedoe, Feterabend, Vesey, & Saloojee, 1987; Jo & Oh, 2003). Participants were tested in groups of 5 or 6 (comprising combinations of non-smokers, satiated smokers, and abstinent smokers) and completed the Mood and Physical Symptoms Scale (MPSS; Hughes & Hatsukami, 1986) and the

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