



## Research paper

# A qualitative study of smokers' views on brain-based explanations of tobacco dependence



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## ABSTRACT

**Background:** The role the brain plays in the creation and maintenance of tobacco dependence has become increasingly prominent in explanations of smoking that are presented to the public. The potential for brain-based explanations of smoking to influence smokers' understandings of their addiction, their sense of self-efficacy, and perhaps even their treatment preferences, has been raised by some working in the addiction field. However, little empirical evidence exists in this area.

**Methods:** This paper reports on semi-structured interviews with 29 daily smokers. Participants were shown a brief presentation about the neuroscience of nicotine dependence. They were then queried about their awareness of the role of the brain in smoking, and the consequences of this knowledge for their understandings of smoking and their treatment preferences.

**Results:** Our results indicated that many participants displayed some awareness of the link between the brain and addiction. While there was a diversity of ideas about the potential impacts of neuroscience knowledge about smoking, there was an overall tendency to maintain pre-existing treatment preferences, and to assert individual responsibility for smoking. Emergent themes that arose were the brain as a special organ, the discourse of the "other" smoker, and the distinction between physical and psychological facets of addiction.

**Conclusion:** While brain-based explanations of smoking are unlikely to revolutionise lay understandings of smoking, neuroscience information should be presented in a way that does not negate people's sense of agency and self-efficacy in relation to quitting smoking.

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## Introduction

Public portrayals and perceptions of cigarette smoking have changed dramatically in recent decades. There has been a shift from the idea that smoking is a habit to the idea that it is an addiction, and more recently, an addiction located in the brain. This paper examines the attitudes of smokers toward brain-based understanding of addiction to smoking, and the ways they interpret its relevance for their everyday practice of smoking.

Neuroscience research has provided strong evidence demonstrating the addictive nature of tobacco smoking. This research has

focused mainly on the role of nicotine, and has revealed that nicotine produces behavioural reinforcement by binding to nicotinic acetylcholine receptors in the brain, thereby influencing dopamine release in the brain's mesocorticolimbic reward circuit (Benowitz, 2010; De Biasi & Dani, 2011). The brain's stress system is also affected by chronic nicotine administration in ways that may contribute to the withdrawal symptoms such as anxiety and irritability that many smokers experience on cessation (Brujnzeel, 2012). At the molecular and cellular levels, plastic changes in the brain, such as changes in synaptic connectivity and the regulation of gene expression, occur with repeated nicotine use and are associated with the development of the clinical signs of addiction: craving, withdrawal, and tolerance (Govind, Vezina, & Green, 2009; Govind, Walsh, & Green, 2012; Peng, Gerzanich, Anand, Whiting, & Lindstrom, 1994).

The general news media regularly report on neuroscientific research, often uncritically, but it is difficult to evaluate the extent to which the public have been exposed to or accept these findings.

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Articles have appeared in the mainstream media with titles such as “Nicotine takes control of brain” (Fewster, 2002, June 11) and “Quitting is a brain game” (Author not attributed, 2011). The public have also been exposed to brain-based explanations of smoking via advertisements for smoking cessation medications. An Australian campaign by Pfizer is headed with the phrase “Break the hold nicotine has over your brain” (Pfizer, 2015). Additionally, influential institutions in the USA have begun to define addiction as a “brain disease” or “brain disorder.” For example the National Institute of Drug Abuse (NIDA) describe addiction as a “chronic, relapsing brain disorder” (National Institute on Drug Abuse, 2007) and the American Association for Addiction Medicine define it as “a primary, chronic disease of brain reward, motivation, memory and related circuitry” (American Society for Addiction Medicine, 2015). An emphasis on how drugs affect the brain is evident in much of NIDA’s public education material, including that on smoking (National Institute on Drug Abuse, 2006).

The veracity of the “brain disease model” has been critiqued at length in the academic literature (Courtwright, 2010; Hall, Carter, & Forlini, 2015; Kalant, 2010; Russell & Davies, 2009). Our goal here is not to address the “reality” of the claim, but to anticipate its potential social implications, specifically its effects on smokers’ understandings of their own smoking behaviour. A number of claims have been made about how an emphasis on the role of the brain could influence the way addicted individuals understand their addiction and the best ways to quit. Proponents believe that it will reduce the stigma associated with addiction, thereby increasing treatment seeking, and also that it will lead to the development of more efficacious and technological treatments (Dackis & O’Brien, 2005; Gardner, Tapper, King, DiFranza, & Ziedonis, 2009; Leshner, 1997). Others however, express concern that the brain disease model of addiction could reduce feelings of individual responsibility for tobacco smoking or other substance use and undermine addicted individuals’ beliefs in their ability to stop using or their willingness to try. In the case of smoking, critics are concerned that quitting self-efficacy will be reduced if smokers are told that they require medical treatment due to a biological “need” to smoke (Caron, Karkazis, Raffin, Swan, & Koenig, 2005) and hence that medicalization of smoking may reduce unassisted quit attempts (Chapman & MacKenzie, 2010). Conversely, some believe that new smoking cessation treatments will be viewed as “magic bullets”, with smokers becoming overly optimistic about the potential for medical treatments to “cure” their addiction to smoking (Dingel, Karkazis, & Koenig, 2011).

These can be seen as examples of a wider concern about the influence of “brain talk” on subjectivity and identity. Nikolas Rose believes that neuroscientific discourses of human behaviour are creating “neurochemical selves” (Rose, 2003). That is, individuals are coming to understand their identity and behaviour as mediated by chemical occurrences in their brain. Sociological accounts of addiction have problematised such an emphasis on biology. They have noted the power relations inherent in reductive biomedical accounts of addiction, and prefer to describe drug use as a rational response by social actors (Weinberg, 2011). But as Weinberg has noted, in doing so, some sociological work on addiction has downplayed the sense of “viscerally felt compulsion” that is evident in the accounts of those who describe themselves as addicted to drugs (Weinberg, 2002). Weinberg recommends a post-humanist, empirical approach to addiction that acknowledges the “local practice” of addiction as an embodied experience (Weinberg, 2002, 2013).

There is little empirical research examining the psychological or behavioural impact of neurobiological understandings of nicotine addiction on smokers. A survey study by Hughes (2009) found that many smokers believed that an inability to quit smoking was due to addiction, but only a small proportion believed that biological

factors were to blame. Hughes also found that smokers’ causal beliefs were not strongly related to treatment preferences. He recommended that qualitative research be conducted in order to explore in more depth smokers’ understanding of the causal determinants of addiction and their treatment preferences. Research from the genetics field has looked at the impact of genetic understandings of tobacco addiction on smokers’ sense of control and treatment preferences (Cappella, Lerman, Romantan, & Baruh, 2005; Park et al., 2011; Wright, Weinman, & Marteau, 2003), however mixed findings and variations in study design mean that no clear conclusions can yet be drawn from this data. Moreover, it remains to be seen if people will respond to genetic and neuroscience information in similar ways, given important differences between the two (Green, 2006).

This paper will report exploratory qualitative research examining how smokers interpret and apply information about the brain and addiction to their own lived experiences as smokers. The aims are to:

- Explore the extent to which smokers believe their brain is involved in their smoking behaviour;
- Document the ways that smokers incorporate neurobiological explanations of addiction into their mental models of smoking; and
- Assess the ways in which brain-based understandings of addiction might influence smokers’ sense of self-efficacy and their treatment preferences.

## Method

The data reported here are drawn from the initial qualitative component of a mixed-methods study examining neurobiological understandings of smoking and addiction. For this qualitative stage of the research, semi-structured interviews were conducted with 29 participants who smoked daily. Participants were recruited from a large metropolitan city in Australia. Because this was an exploratory study, purposive sampling was used in order to recruit a diverse range of participants in relation to age, gender, and education. The technique of maximum variation sampling was employed, with periodic reviews of the sample in order to ensure diversity (Patton, 1990). Means of recruitment included handing out flyers, advertising on mailing lists, and placing flyers at community centres and on noticeboards.

Participants were interviewed at a location that suited them and provided with a gift voucher in appreciation of their time. Interviews were conducted individually, except in one case where two relatives attended together and were interviewed concurrently. In order to introduce the type of research that exists on smoking and the brain, we prepared a short audiovisual presentation outlining findings on how tobacco works in the brain and its relationship to nicotine dependence. This was shown to participants on a tablet device during the interview. As NIDA are a major proponent of the brain disease model of addiction, the information we included in the slideshow was adapted from their publication aimed at teenagers titled “Mind Over Matter: Tobacco Addiction” ([http://teens.drugabuse.gov/mom/mom\\_nic2.php](http://teens.drugabuse.gov/mom/mom_nic2.php)) (National Institute on Drug Abuse, 2006). This is a colourfully illustrated pamphlet which provides information about how tobacco works in the brain to produce addiction in easy to understand language. The fact that we provided information framed as “scientific” to stimulate discussion about the brain and smoking inevitably influenced the responses of participants to the questions that followed. In some cases it provoked discussions about the trustworthiness or otherwise of science and scientists. Also, we presented a “strong” version of the neurobiology of

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