The Dark Side of Product Attachment: an Fmri Study of Reactivity of Users and Non-Users to Addictive Advertising Cues

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[to cite]:

[url]:
http://www.acrwebsite.org/volumes/16200/volumes/v38/NA-38

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EXTENDED ABSTRACT

Advertising is a ubiquitous and pervasive environmental cue. The average consumer, for example, is exposed on average to three thousand ads per day (Schwartz 2004). Under normal circumstances, consumers choose which advertising cues to attend to both consciously and non-consciously (Bargh 2002; Grunert 1996). However for consumers, environmental cues may elicit a unique type of response affecting decision making and driving behavior (Bernheim and Rangel 2004). The aim of this research is to explore how environmental cues affect addictive product users and non-users using the brain imaging technique developed in neuroscience functional magnetic resonance imaging (fMRI) for cue-exposed users and non-users.

A great deal of debate, both in the literature and among advertisers and public policy makers, centers on how environmental cues influence people to engage in risky and addictive behaviors (Pollay 1986; Pollay et al. 1996a). Marketers and manufacturers argue that advertising and promotional materials offer consumers brand options and information that enhance the consumer’s ability to make choices (Gilly and Graham 1988; Goldberg et al. 2006), while researchers and public health officials argue that there is a strong correlation between detrimental behavior and exposure to marketing for addictive products (Pollay 1986; Pollay et al. 1996b). There remain unanswered questions regarding how users and non-users respond to this type of stimulus. In addition, there are conflicting indications of how craving elicited by cues impacts cognitive processing, including cognitive depletion leading to impulsivity outside the addictive substance domain. Given the ongoing debate there is a need for a better understanding of the underlying psychological and physiological mechanisms that drive the reactive response to advertising cues by users and non-users.

The research question addressed in this research is whether environmental cues—namely cigarette advertising—cause a reactive response in the form of increased craving in users or non-users resulting in downstream impulsive behavior as a result of cognitive resource depletion. The study uses functional magnetic resonance imaging (fMRI) to examine the underlying neural response to addictive (cigarette) advertising versus non-addictive (non-cigarette) advertising in users (smokers) and non-users (non-smokers). Brain imaging data have been collected from 10 current, daily smoker and 10 non-smokers for this study. This study was a 2 (user type: smoker vs. non-smoker) x 2 (cue type: addictive ad cue vs. non-addictive ad cues) design using a 3T fMRI scanner.

A long history of addiction studies demonstrates how drug cues elicit craving via reactivity to the cue (for reviews see Carter and Tiffany 1999; Childress et al. 1993; Stritzke et al. 2004). There has also been evidence of attentional bias toward addictive cues in users (Robinson and Berridge 2003; Robinson and Berridge 2001; Robinson and Berridge 1993). Some studies have shown that this response may result in increased attentional bias and increased arousal (Bradley et al. 2004; Drobos 2002; Johnsen et al. 1997; Mogg and Bradley 2002; Munafò et al. 2003). However other studies have found that addictive product users, when exposed to these cues, may have an ability to inhibit the craving response and its effects (Artiges et al. 2009; Goldstein et al. 2007a; Stippekohl et al. 2010; Volkow and Fowler 2000; Volkow et al. 2010). On the other hand, non-users have been shown to be largely unaffected by exposure to addictive cues (Due et al. 2002; Tapert et al. 2003). However, research on the uptake of addictive products by new users points to evidence that addictive product cues, such as advertising, do indeed have an effect on non-users (Altman et al. 1996; Pierce et al. 1991). Thus there remains a debate in the literature as to whether advertising enhances or attenuates the craving response in users and how it ultimately affects non-users.

This brain imaging data indicates neural activation of brain regions that are related to craving and self-control in smokers and non-smokers. For example, there is differential activation in regions associated with craving including the amygdala and the thalamus. Regions associated with self-control including the dorsolateral prefrontal cortex and anterior cingulate cortex are also differentially activated with significant deactivation in smokers exposed to cigarette ads. The results show significant differential activation for non-users when exposed to addictive ad cues versus non-addictive ad cues. In addition, the results show a different effect when users are exposed to addictive ad cues versus non-addictive ad cues. They demonstrate that a cue reactivity response elicits significant activation in brain regions associated with craving in both non-users and users. There is also significant activation in regions associated with cognitive resource depletion for non-users as a result of the increased craving activation. This may be due to the fact that non-users underestimate the effect of this type of advertising, assuming that because they do not smoke, these ads are not targeted directly to them. However, because these non-users have not built up the ability to resist the tempting urge response generated by the addictive product ads, brain regions necessary in order to resist the temptations are activated. Interestingly there is significant deactivation in brain regions of users associated with self-control indicating inhibition of the cognitive resource depletion possibly as a way for users to cope with stimuli that they feel is targeting towards them and an urge response for which they feel they cannot satisfy at that moment.

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