

Special Article - Tobacco and Smoking Cessation

Mindfulness: An Emerging Treatment for Smoking and other Addictions?

Judson Brewer* and Lori Pbert

Center for Mindfulness, UMASS Medical School, USA

*Corresponding author: Judson Brewer, Center for Mindfulness, UMASS Medical School, USA

Received: August 26, 2015; Accepted: September 02, 2015; Published: September 03, 2015

Prospective

Why do young mothers buy a daily pack of cigarettes instead of spending this money on nutritious food for their children? Why are treatments that help roughly 33% of people overcome their substance use and have a 70% relapse rate hailed as the “gold standard”? In other words, why are addictions so hard to overcome?

Our brains are set up to learn. From an evolutionary perspective, to survive, when we come upon a good source of food or water, it is helpful to remember where it is. When we stumble upon something dangerous, it is helpful to remember this too. And this reward-based learning system, that is conserved all the way back to the most primitive of nervous systems (the sea slug with roughly 20,000 neurons), in its most basic form has three elements: trigger, behavior, reward. We see berries, we eat them, and if they taste good (reward), we lay down a memory to come back for more.

Fast forward to modern day, where food is plentiful, and our environment is relatively safe, our brains still have the same reward-based learning system. Under the names of operant conditioning, associative learning and positive and negative reinforcement, a lot more is known about how it works. This is the good news.

The bad news is that over time, humans have stumbled upon substances that literally hijack this reward-based learning system. In fact, every substance of abuse from tobacco to crack cocaine affects the same brain pathways –the mesolimbic pathway which mainly acts through the neurotransmitter dopamine. And each time we do a line of cocaine and feel the high or smoke a cigarette when we are stressed out and feel better afterwards, we reinforce the “habit loop” (see Figure 1). This combination of tapping into the dopamine system and behavioral repetition is deadly –for example smoking is the leading cause of preventable morbidity and mortality in the US [1].

Treatments such as cognitive behavioral therapy are thought to act through the prefrontal cortex –involved in reasoning, planning and “top down” cognitive control in general. When we know we shouldn’t eat that second helping of cake or smoke a cigarette, this is the part of the brain that helps us control that urge. Unfortunately, like the rest of the body, the prefrontal cortex is subject to fatigue, described by some as “ego depletion” [2]. As the HALT acronym predicts, when we are Hungry, Angry, Lonely, or Tired, we are more susceptible to smoking or using drugs. This may be because, as the youngest part of the brain from an evolutionary standpoint, this

also the first cortical region to go “offline” when we are stressed or otherwise depleted [3].

If we can’t rely on our prefrontal cortex, are there other ways to change our behaviors?

Interestingly, mindfulness training seems to be emerging as a possible solution. Based in ancient Buddhist psychology, mindfulness helps individuals pay careful attention to their cravings, such that they can see what they are made up of –thoughts and body sensations. Importantly, with this awareness, they can notice cravings as they arise, see how they change from moment to moment (instead of lasting “forever” as some of my patients have described), and as a result, stay with them and ride them out instead of acting on them. Also, paying attention helps individuals see clearly what they are getting from their behavior in that moment.

For example, a person in our smoking program commented, “Mindful smoking: smells like stinky cheese and tastes like chemicals. YUCK!” She noticed that smoking wasn’t as great as she might have convinced herself previously. And this is the beginning of the end – we start to get disenchanted with what we were doing –just by paying careful attention. This dual purpose of mindfulness – disenchantment and being able to be with ourselves instead of reacting automatically – may be a winning combination.

We, and others have found that mindfulness training helps individuals with a range of addictions from alcohol to cocaine to nicotine dependence [4]. In fact, in one randomized clinical trial, we found that it was *twice* as good as gold standard treatment (American Lung Association’s Freedom from Smoking) in helping people quit and stay quit [5]. Why would it work so well? It turns out that

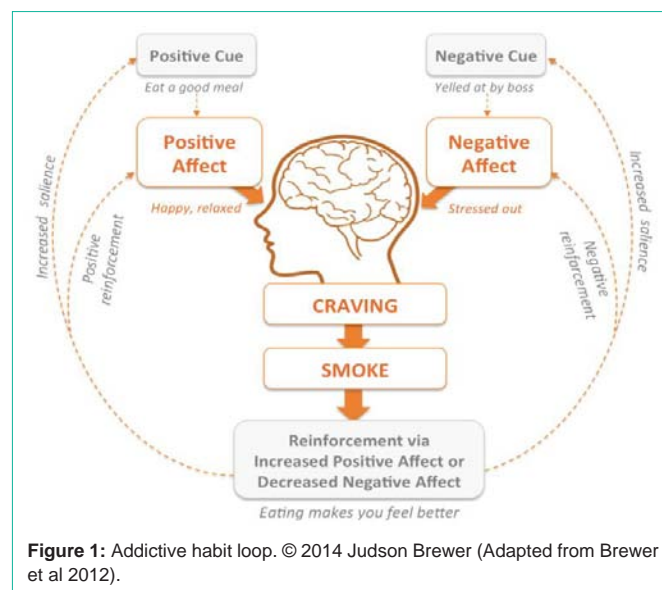


Figure 1: Addictive habit loop. © 2014 Judson Brewer (Adapted from Brewer et al 2012).

it targets the core addictive loop –by helping people ride out their cravings instead of acting on them, it decouples the link between craving and smoking, effectively dismantling the loop [6]. This is an important point, because these data pinpoint a mechanistic link that is being targeted by mindfulness, which is not always easy to find in behavioral treatments.

Though more research is needed, treatment programs such as Mindfulness-based Relapse Prevention (MBRP) show promise and are now manualized such that therapists can be trained to deliver them [7]. Additionally, web and app-based delivery of mindfulness is being tested. For example, Craving to Quit delivers the manualized mindfulness training that we developed at Yale University described above through short daily videos, animations and in the moment exercises via a web and smartphone app, and is paired with an online community where individuals can get peer and expert support (e.g. forum moderated by an addiction psychiatrist) [8]. Craving to Quit is now being studied in clinical trials funded by the American Heart Association and the National Cancer Institute (e.g. a study at UMASS Medical School is currently enrolling: <http://www.umassmed.edu/quit-smoking/>). This smartphone app also is being adapted and tested with adolescent smokers in a clinical trial funded by the National Institute of Drug Abuse (Craving to Quit-Teen). Given mindfulness training has shown promise in helping adolescents improve emotional and cognitive functioning including self-regulation and mobile phones are a ubiquitous part of many teens' lives, this approach has tremendous potential in supporting adolescents in their efforts to quit.

An earlier version of this article appeared on Rehabs.com.

References

1. Center for Disease Control and Prevention. *Smoking-Attributable Mortality, Years of Potential Life Lost, and Productivity Losses --- United States, 2000-2004*. MMWR Morbidity and Mortality Weekly Report 2008 [cited 2011 November 17].
2. Muraven, M. and R.F. Baumeister. *Self-regulation and depletion of limited resources: does self-control resemble a muscle?* Psychological bulletin, 2000; 126: 247-259.
3. Arnsten AF. *Stress signalling pathways that impair prefrontal cortex structure and function*. Nat Rev Neurosci. 2009; 10: 410-422.
4. Brewer JA, Elwafi HM, Davis JH. *Craving to quit: psychological models and neurobiological mechanisms of mindfulness training as treatment for addictions*. Psychol Addict Behav. 2013; 27: 366-379.
5. Brewer JA, S Mallik, TA Babuscio, C Nich, HE Johnson, CM Deleone, et al. *Mindfulness training for smoking cessation: Results from a randomized controlled trial*. Drug and Alcohol Dependence. 2011; 119: 72-80. PMID: 3191261.
6. Elwafi HM, K Witkiewitz, S Mallik, TAt Thornhill, and JA Brewer. *Mindfulness training for smoking cessation: moderation of the relationship between craving and cigarette use*. Drug Alcohol Depend. 2013; 130: 222-229. PMID: 3619004.
7. Bowen S, Witkiewitz K, Clifasefi SL, Grow J, Chawla N, Hsu SH, et al. *Relative efficacy of mindfulness-based relapse prevention, standard relapse prevention, and treatment as usual for substance use disorders: a randomized clinical trial*. JAMA Psychiatry. 2014; 71: 547-556.
8. Garrison KM, Pal P, Rojani R, Dallery J, O'Malley SS and Brewer JA. "A randomized controlled trial of smartphone-based mindfulness training for smoking cessation: a study protocol". BMC Psychiatry. 2015; 15: 83.