

Avoidance of Risky Substances: Steps to Help Patients Reduce Anxiety, Overeating, and Smoking

Judson A. Brewer, MD, PhD

doi: 10.12788/jfp.0244

CASE STUDY

A 40-year-old white man presented to my office with the chief complaint of anxiety. He described how, a few months earlier, when he was driving on the highway, he suddenly had the thought, “Oh, no, I’m in a speeding bullet. I might kill someone.” This was accompanied by the sudden onset of racing heart, sweating, and shortness of breath. Similar episodes followed and, despite the fact that he had never been in a car accident, he now avoided driving on the highway and even felt a bit nervous driving on local roadways.

A full history revealed that the patient met criteria for both panic disorder and generalized anxiety disorder. Of note, he also had hypertension, steatohepatitis, obstructive sleep apnea, and a body mass index (BMI) > 40.

BACKGROUND

Anxiety disorders are the most common mental illnesses in the United States,¹ with an estimated 31.1% of adults experiencing an anxiety disorder at some time in their life.² According to the Centers for Disease Control and Prevention, the prevalence of obesity was 42.4% in 2017-2018.³ Yet, for patients who present

Judson A. Brewer, MD, PhD

AUTHOR AFFILIATIONS

Mindfulness Center, Providence, RI; Department of Behavioral and Social Sciences, Brown University School of Public Health, Providence, RI; Department of Psychiatry, Warren Alpert School of Medicine at Brown University, Providence, RI

DISCLOSURE

Dr. Brewer owns stock in, and serves as a paid consultant for, Sharecare Inc., the company that owns the mindfulness apps described in this manuscript.

with either of these conditions, busy physicians have only a few minutes in which to counsel patients about stress reduction or lifestyle modification practices (and prescribe medications as appropriate). Patients who present with both (as my patient did) can be challenging for the most seasoned family physicians.

In medical school and residency, I learned the nuts and bolts of how to treat anxiety (eg, selective serotonin reuptake inhibitors [SSRIs] are still first-line treatment, number needed to treat = 5.15),⁴ and the straightforward theory of weight loss (more calories out than in). But I found it pretty unsatisfying to have to prescribe an SSRI to more than 5 patients to see a significant response in 1 of them, and all of my patients knew the calories in/out formula walking in the door—they just could not always follow it.

So, I started studying habit change in my laboratory to see what I had missed. There are simple principles of positive and negative reinforcement that are at the root of forming any habit, and they break down to this: if a behavior is rewarding, we will keep doing it. To form a habit, we only need a trigger, a behavior, and a reward. For example, with positive reinforcement, if we see a piece of cake (trigger), eat it (behavior), and it tastes good (reward), we learn to repeat the behavior through dopamine firing in the reward centers in our brain. The same is true for negative reinforcement: if we are stressed, eat a piece of cake, and feel better, we learn to repeat that behavior as well, because we distracted ourselves and/or enjoyed eating the cake, which reduced the negative feeling of the stress. In a nutshell, positive reinforcement helps us learn to repeat behaviors that feel good (ie, have positive outcomes) and negative reinforcement helps us learn to repeat behaviors that reduce bad feelings (ie, reduce negative outcomes). Both positive and negative reinforcement form “habit loops” that people repeat over and over.⁵⁻⁷ The term

habit loop was first described by Charles Duhigg, and will be used in this article from this point forward.⁸

Reinforcement learning is also critical for changing habits (including worrying, which is a key component of anxiety and can be negatively reinforced due to the rewarding sense of being in control or problem solving—even if one is not truly in control).⁹⁻¹¹ In particular, the reward value of a behavior gets laid down in our brain so that, when given a choice between 2 behaviors, we can easily decide which one to pick—or more accurately—we habitually pick the behavior that has a higher reward value. For example, if children are served broccoli and cake at the same time at dinner, which one they'll pick is a no-brainer.

This reward value hierarchy is the key to breaking unhealthy habits.¹² To reduce the likelihood of overeating or smoking (or even worrying), one needs to reduce the reward value of the unhealthy behavior—the corollary is true for increasing healthy habits. This process has been studied from bench to bedside: neuroscience research has identified key brain regions and networks (eg, the orbitofrontal cortex) that lay down and store the reward value of behaviors,¹²⁻¹⁵ including relatively recent clinical studies¹⁶⁻¹⁸ that have linked brain and behavioral mechanisms.^{12,19}

Importantly, changing reward value is not an intellectual process. We cannot think our way out of anxiety or into better health. To update the reward value of a habit, we must be very clearly aware of how rewarding the behavior is right now, not when it was first laid down (eg, the reward value of eating lots of cake was reinforced with every birthday party we attended as a kid). And reward value is relative. So, the reward hierarchy can be changed in 2 ways: decreasing the reward value of the old behavior or comparing it with other behaviors that are more rewarding. One can think of the more rewarding behaviors as “bigger, better offers” that our brains will pick if given a choice. For example, curiosity feels better than a craving or worry.²⁰ When someone has a craving for cake or a cigarette, they can get curious about what that urge feels like in their body, which not only brings curiosity to the front of awareness, but also helps individuals see that their cravings do not last forever. By simply being curious about the cravings, people can ride them out without smoking or eating cake.²¹

Fortunately, there are specific ways to train awareness to help with this process, such as mindfulness training, and the evidence base is building, suggesting that it can help with habit change.^{6,7,20,22-24} Mindfulness can be operationally defined as bringing awareness and curiosity/nonjudgment to present-moment experience.^{25,26} For example, studies have found that mindfulness training outperforms cognitive therapy 5-fold in helping people quit smoking and targets specific neural pathways for its effects.^{18,27} Another study found a 40%

reduction in craving-related eating with app-based mindfulness training (Eat Right Now).¹⁷ Furthermore, a recent study of app-based mindfulness training for anxiety (Unwinding Anxiety) demonstrated a 57% reduction in Generalized Anxiety Disorder-7 (GAD-7) scores in anxious physicians,²⁸ and a randomized controlled trial of the same program showed a 67% reduction in GAD-7 scores in people diagnosed with generalized anxiety disorder.²⁹

INTERVENTION

In the clinic, patients can follow a simple 3-step process based on the research described above.²⁰

STEP 1: Recognize habit loops. Map out the trigger, behavior, reward (or result if the behavior is not rewarding anymore) sequence so that you can see the cause-and-effect relationship that reinforces the behavior. Free worksheets that briefly describe what a habit loop is and how to map it can be downloaded at www.mapmyhabit.com or clinicians and patients can collaboratively write this down on a piece of paper.

STEP 2: Update reward value. Focus on the result of the behavior. Notice what it feels like in your body when you overeat or eat junk food. Notice what a cigarette tastes and smells like. Ask yourself, “What do I get from this?”

STEP 3: Find the bigger, better offer (BBO). There are many BBOs when it comes to unhealthy habits. As mentioned above, curiosity feels better than cravings and can be trained to be used in situations when strong urges come on. When it comes to eating, you can compare what it is like to stop when full vs overeating or to eat healthy foods vs processed food, to see which one feels better both immediately and afterward (eg, which one leads to lethargy, indigestion, mood swings, etc).

CHALLENGES

Busy physicians may find it challenging to spend any extra time in clinic visits providing psychoeducation. Additionally, if a physician is more comfortable with prescribing medications and/or a patient is expecting a prescription, trying out a new approach can feel uncomfortable, as one or both participants may be moving out of their comfort zones (eg, the expectation to prescribe/receive medication). Fortunately, extra time can be billed, and the above-stated 3-step process can begin with just the few minutes it takes to map out a habit loop together with a patient in the clinic. Then, instruct the patient to start mapping these habit loops out in daily life while asking themselves the question, “What do

I get from this?” Additionally, with a small amount of practice, prescribers can quickly feel more comfortable exploring this approach, with the added benefit of increasing empathetic connection with patients (eg, mapping out a habit loop together shows a patient that a clinician hears and understands the concerns, and it also helps the clinician confirm an accurate understanding of the patient’s experience).

CASE STUDY

In our first clinic visit, my patient was not interested in taking a medication for anxiety, so I mapped out his habit loops with him. Trigger: thoughts of getting in a car accident. Behavior: avoid driving. Reward: reduction of panic attacks. I gave him a coupon code for free access to the mindfulness training app my laboratory had studied with the instructions to map out his habit loops before the next visit. At his next clinic visit 2 weeks later, he described how he had mapped out a number of habit loops, including one in which anxiety triggered stress-eating. Using mindful awareness, he had realized that stress-eating was not rewarding and had largely stopped this behavior (resulting in a 14-pound weight loss). During the next year, he lost more than 20% of his weight and his blood pressure and liver enzymes returned to normal levels. His anxiety returned to normal, and he started working as an Uber driver.

CONCLUSION

Current approaches to obesity, anxiety, and other behaviors that are driven by reinforcement learning (eg, smoking) may not be taking into account well-established theoretical models. Novel approaches that specifically target these mechanisms through using awareness to update the reward value of behaviors show promise (eg, mindfulness training), which may help the field move away from willpower and cognitive control-based interventions that currently predominate (eg, calorie restriction). My lab has found direct correlations between anxiety and physician burnout.²⁸ Understanding the basics of how this process works can give clinicians simple tools to not only reduce their own stress and anxiety but also to improve their relationships with their patients and to improve patient outcomes more broadly. A physician who has used these methods to manage his/her own stress may be able to counsel patients more effectively from a position of authenticity and wisdom beyond simply recommending that one follow standard guidelines. ●

REFERENCES

1. Anxiety and Depression Association of America. Managing stress and anxiety. Accessed February 10, 2021. <https://adaa.org/living-with-anxiety/managing-anxiety>
2. National Institute of Mental Health. Any anxiety disorder. Accessed April 2, 2021. <https://www.nimh.nih.gov/health/statistics/any-anxiety-disorder.shtml>
3. Centers for Disease Control and Prevention. Adult obesity facts. Accessed January 27, 2021. <https://www.cdc.gov/obesity/data/adult.html>
4. Kapczinski FP, Lima MS, Souza JS, Schmitt R. Antidepressants for generalized anxiety disorder. *Cochrane Database Syst Rev*. 2003;(2):CD003592.
5. 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(2):366-379.
6. Brewer JA, Pbert L. Mindfulness: an emerging treatment for smoking and other addictions? *J Fam Med*. 2015;2(4):1035.
7. Brewer JA, Ruf A, Beccia AL, et al. Can mindfulness address maladaptive eating behaviors? Why traditional diet plans fail and how new mechanistic insights may lead to novel interventions. *Front Psychol*. 2018;9:1418.
8. Duhigg C. *The Power of Habit: Why We Do What We Do in Life and Business*. New York, NY: Random House; 2012.
9. Borkovec TD, Robinson E, Pruzinsky T, DePree JA. Preliminary exploration of worry: some characteristics and processes. *Behav Res Ther*. 1983;21(1):9-16.
10. Davey GCL, Hapton J, Farrell J, Davidson S. Some characteristics of worrying: evidence for worrying and anxiety as separate constructs. *Pers Individ Dif*. 1992;13(2):133-147.
11. Salters-Pedneault K, Tull MT, Roemer L. The role of avoidance of emotional material in the anxiety disorders. *Appl Prev Psychol*. 2004;11(2):95-114.
12. Brewer JA. Mindfulness training for addictions: has neuroscience revealed a brain hack by which awareness subverts the addictive process? *Curr Opin Psychol*. 2019;28:198-203.
13. Bechara A, Damasio H, Damasio AR. Emotion, decision making and the orbitofrontal cortex. *Cereb Cortex*. 2000;10(3):295-307.
14. Blanchard TC, Hayden BY, Bromberg-Martins ES. Orbitofrontal cortex uses distinct codes for different choice attributes in decisions motivated by curiosity. *Neuron*. 2015;85(3):602-614.
15. Burke KA, Franz TM, Miller DN, Schoenbaum G. The role of the orbitofrontal cortex in the pursuit of happiness and more specific rewards. *Nature*. 2008;454(7202):340-344.
16. Taylor V, Moseley I, Sun S, et al. Awareness drives changes in reward value which predict eating behavior change: probing reinforcement learning using experience sampling from mobile mindfulness training for maladaptive eating. *J Behav Addict*. 2021;10(3):482-497.
17. Mason AE, Jhaveri K, Cohn M, Brewer JA. Testing a mobile mindful eating intervention targeting craving-related eating: feasibility and proof of concept. *J Behav Med*. 2018;41(2):160-173.
18. Janes AC, Datko M, Roy A, et al. Quitting starts in the brain: a randomized controlled trial of app-based mindfulness shows decreases in neural responses to smoking cues that predict reductions in smoking. *Neuropsychopharmacology*. 2019;44(9):1631-1638.
19. Ludwig VU, Brown KW, Brewer JA. Self-regulation without force: can awareness leverage reward to drive behavior change? *Perspect Psychol Sci*. 2020;15(6):1382-1399.
20. Brewer J. *Unwinding Anxiety: New Science Shows How to Break the Cycles of Worry and Fear to Heal Your Mind*. New York, NY: Avery/Penguin Random House; 2021.
21. Elwafi HM, Witkiewitz K, Mallik S, Thornhill TA 4th, Brewer JA. Mindfulness training for smoking cessation: moderation of the relationship between craving and cigarette use. *Drug Alcohol Depend*. 2013;2013(1-3):222-229.
22. Brewer JA. *The Craving Mind: From Cigarettes to Smartphones to Love—Why We Get Hooked and How We Can Break Bad Habits*. New Haven, CT: Yale University Press; 2017.
23. Brewer JA, Roy A, Deluty A, Liu T, Hoge EA. Can mindfulness mechanistically target worry to improve sleep disturbances? Theory and study protocol for app-based anxiety program. *Health Psychol*. 2020;39(9):776-784.
24. Schuman-Olivier Z, Trombka M, Lovas DA, et al. Mindfulness and behavior change. *Harv Rev Psychiatry*. 2020;28(6):371-394.
25. Kabat-Zinn J. An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: theoretical considerations and preliminary results. *Gen Hosp Psychiatry*. 1982;4(1):33-47.
26. Bishop SR, Lau M, Shapiro S, et al. Mindfulness: a proposed operational definition. *Clin Psychol (New York)*. 2006;11(3):230-241.
27. Brewer JA, Malik S, Babuscio TA, et al. Mindfulness training for smoking cessation: results from a randomized controlled trial. *Drug Alcohol Depend*. 2011;119(1-2):72-80.
28. Roy A, Druker S, Hoge EA, Brewer JA. Physician anxiety and burnout: symptom correlates and a prospective pilot study of app-delivered mindfulness training. *JMIR Mhealth Uhealth*. 2020;8(4):e15608.
29. Roy A, Hoge EA, Abrante P, Druker S, Liu T, Brewer JA. Clinical efficacy and psychological mechanisms of an app-based digital therapeutic for generalized anxiety disorder. *J Med Internet Res*. 2021 Dec 2;23(12):e26987.