There has been much debate in the past month whether Alcoholics Anonymous is effective or not, whether it should be criticized or not, as well as whether or not there are more effective treatments available for those with a substance-use disorder (or as I’ll refer to it, addiction) and alcohol-use disorders, in particular.

It all started with Gabrielle Glaser’s recent article in The Atlantic, which was critical of Alcoholics Anonymous. She cited the low efficacy rate of AA for helping those with addiction and discussed other types of treatment that are more evidence-based but not widely available. Then, there was the inevitable backlash against Glaser’s article. Some said that AA actually is effective, and others said that AA is no more effective than other types of treatment, but hey, at least it’s free. Members of AA find her arguments disconcerting and baffling. Since it has worked for them, why question it?

Gabrielle Glaser and the journalists who counter her arguments are frustratingly obtuse when it comes to the nature of addiction and the best way to treat it. They cite some stats, and they talk to some scientists (typically whichever one confirms their idea), but they do not know how to talk about the science itself.

As an addiction researcher, I feel it is imperative to provide some fact checking. After reading Glaser’s article and this counter article, then this one, this one, and this one, I feel they present a one-sided case and, generally, are not interested in statistics that contradict their point of view. Furthermore, when I hear them talking about the addiction problem, they do not delve too deeply into the science of addiction. Mainly, this is because they haven’t been educated in science, thus, lack some of the vocabulary to articulate what is really going on with people who have addiction and for those who receive help from a particular treatment.

**A BRIEF INTRODUCTION INTO THE NEUROSCIENCE OF ADDICTION**

When Gabrielle Glaser was a guest on the Brian Lehrer show she was asked about naltrexone and why it works. She talked about how alcohol causes the release of endorphins, which, she said, is why alcohol is pleasurable, and naltrexone blocks endorphins. She said the effect of the endorphin blockade, in her own personal experiment, was that she didn't feel like drinking. It was an explanation that was meant to be accessible, but it left out vital points about functioning in the brain. I've learned that people are genuinely interested in the brain and how it works. There has been a push for more understanding of neurobiology as it relates to behavior. I don't want to negate the importance of environment and other sociological factors, but in order to effectively treat addiction, there needs to be
an understanding of how addiction affects the brain.

The effects of alcohol on the brain are a bit more complex than Glaser's explanation. For instance, consumption of alcohol increases inhibition (through GABAergic mechanisms) and decreases excitation (through Glutamatergic mechanisms), globally, in the brain. This is what gives alcohol its sedative properties. It also affects endogenous opioids (think morphine) in the reward circuitry of the brain, which is why alcohol is pleasurable. What's important is that decades of research have shown that addiction is not caused by opioid transmission. Rather, dopamine has been implicated as one of the main culprits in driving addictive behaviors. People often misconstrue the role of dopamine as causing pleasure, but it acts more like a motivating agent. One of its primary functions in relation to addiction is its role in craving. With natural rewards, such as a chocolate or sex, dopamine is released upon consumption of the reward (chocolate) or participation in the rewarding activity (sex). Over time, however, dopamine begins to be released by exposure to environmental cues associated with the rewarding activity, such as your favorite ice cream place or your significant other. The release of dopamine at these cues causes a wanting (or craving) for that specific rewarding thing. On the other hand, the release of opioids is caused by the rewarding thing, and it causes a person to like the thing (pleasure). But, wanting and liking are separate events mediated by separate neurobiological mechanisms, a concept that is fundamental to the understanding of drug addiction and for successful treatment of drug addiction.

Drugs also work the way natural rewards do, but drugs do it better than natural rewards. A prominent addiction researcher put it best, telling me that drugs make pleasure easy. The system of reward and reinforcement were evolved to keep us alive, to find food, and to propagate the species. In order to have sex, a person has to find a mate, fall in love (sometimes), and eventually have sex. You can just smoke or snort drugs, and achieve a similar type of pleasure. In a sense, drugs hijack a well-adapted evolutionary mechanism for survival.

Many problems arise from chronic drug use. One is neural adaptation to these drugs with continued use, so that more of the substance is needed to achieve a similar feeling. Another is probable relapse after trying to stop using, usually facilitated by craving. And, as noted with natural rewards, craving occurs when in the presence of a cue that has been paired with the drug. Sometimes, this precipitation of craving can even occur at the subconscious level.

If scientists have discovered the reason for relapse and craving, then why hasn't there been the development of a successful treatment? It has been tried. When researchers found out that all addictive drugs (and activities) act on a common dopaminergic pathway in the brain (the limbic system), drugs that modulated dopamine were tested. But, as noted, dopamine is essential for every rewarding activity (not to mention motor activity), so dopamine drugs for treating addiction have failed, because dopamine regulators effect every day motivation, and people aren't compliant with the medication.

The good news is that the strength of these drug-cue pairings (hence, the intensity of the craving) can be weakened and eventually abolished. The brain is plastic. It can change.

ALCOHOLICS ANONYMOUS

There appears to be so much animosity on both sides of the AA debate. Sober AA members preach the AA way with enthusiasm as if their very lives depend on it. Atheists reject it on principle. Scientists and journalists tend to fall on one side or the other.

In recent news articles, the most-cited research was the Cochrane review from 2006, in which the authors reported that AA was no more effective than other types of treatment, such as cognitive behavioral therapy (CBT) and motivational therapy. As far as scientific studies go, double-blind randomized controlled trials, the only type used in the Cochrane review, are the gold standard.

Jesse Singal's article refuted Glaser's article, in which he interviewed current AA researchers and
authors of the next Cochrane review for AA effectiveness (reported to be due this August). He talked to Dr. Kelley and Dr. Kastukas, both of which research AA and had only positive things to say about AA. They predict that the next Cochrane review will show that AA actually is effective.

And, you know what, it is ... and it isn't. It's complicated. Let me back up for a moment.

The central tenets of AA have been around (and unchanged) for almost 80 years. The founders were among the first to call alcoholism what it really is, a disorder. Back then, public opinion was that people with addiction were lacking willpower. They were immoral degenerates. The founders of AA gained the support of doctors and psychologists, who agreed that alcoholism is a type of disorder. They, incorrectly, called it an allergy, an over-reaction of sorts, but a disorder nonetheless.

The very core of AA's philosophy on how to get and stay sober is that an alcoholic must have a spiritual awakening. In a sense, alcoholics have to toss aside all their old ideas and form new ones. They do this by admitting they are powerless, surrendering to a higher power, admitting their mistakes, righting wrongs when possible, and helping others. That is no small feat, but if (and for some people that is a big if) they can give themselves completely to the AA program, they have a good shot at staying sober.

But, there's a problem.

After reviewing more of the scientific literature on AA, I came to the conclusion that AA work. Does it always work? No. Is it for everyone? No. But, those who make a commitment to AA will have a greater chance to stay sober. Some reports (from scientists Jesse Singhal mentioned) put success at ~50% for those that go to a lot of meetings, get a sponsor, and help others. The problem is that AA success involves a level of buying into what AA is selling. That can be a tough sell for some. Some won't be able to commit to AA, and they shouldn't be faulted for not being able to.

There are a few reasons for why it can be helpful, but one of the big reasons is related back to this idea of dopamine's role in causing cravings. Smokers who have tried to quit know the incessant cravings they face throughout the day. This is because smokers tend to smoke everywhere and in many different circumstances, wherein several drug-cue pairings are made. A cigarette in the morning with coffee. A cigarette while driving. A cigarette with a beer. A cigarette after sex. And so on. Each of these cues (coffee, driving, beer, etc) trigger dopamine release, and, subsequently, craving. The strength of each pairing has to be weakened. This is accomplished by being in the presence of the cue that usually proceeds smoking and then weakening the drug-cue pair by not smoking a cigarette. In scientific terms, this is called extinction, essentially a relearning of what these cues mean. In the case of quitting smoking, the brain slowly learns that the cues don't predict having a cigarette, and eventually the cravings diminish.

So it is with alcohol and other drugs. The person with addiction will be initially bombarded with cues that have predicted drug use. The cues will trigger dopamine release, thus craving. One of the positive qualities of AA is that person with addiction trying to quit can choose to be surrounded by individuals who have been through a similar situation, and a helpful guide (usually called a sponsor) can talk the person through serious cravings. They'll be exposed to a myriad of environmental factors that have caused craving to use, but a support system in AA is available to help them through. Additionally, since AA promotes abstinence, the brain can heal over time, sometimes it takes years, but the brain can change.

Yet, for all its potential help, AA remains fragmented, with many pockets of the program giving bad advice, such as encouragement to not use medications for mental health issues or not going to therapy or telling someone that they just have to believe in something greater than themselves or that they are to blame for all their problems. True, AA meetings are as diverse as its members, and this is a boon and a curse. Each meeting is unpredictable, and there is no consistency in the quality of its treatment. This allows members to sample a variety of meetings until they find one or two that suits them. But,
wouldn't AA be better if there was a professional to guide new members to AA members best suited for them? This is what is suggested by the National Institute on Drug Abuse, suggesting that the person with addiction works with a counselor for guidance upon entering the disjointed AA world.

The most troubling aspect of AA is this: for all of its potential promise, there is the requirement of belief. I'm not just talking about belief in a higher power, which can indeed be a deterrent for some. Rather, I am talking about the requirement of belief in the program itself.

That is why AA cannot be ubiquitously prescribed for all people with addiction. Some, most probably, simply won't or can't believe (or buy into) the program, and that is not their fault. It is the fault of a paradigm that doesn't allow for new evidence to update its protocol. It can work, but it works much like a religion. If you can convince yourself to believe that AA is the answer to your addiction problems, then you'll have a host of people that will agree and support you in that endeavor. But, if you don't, then you'll be the reason for failure. People have to conform to AA, but any good treatment can morph to the person, to their set of beliefs, to their circumstances. In the past years, AA has had a chance to update its program but replies to scientific endeavors by dismissing them outright on principle because of their tenth tradition. Here is a typical reply found in a US News article.

"Alcoholics Anonymous is guided by its Twelve Traditions, one of which suggests that AA express no opinion on outside issues, in order to avoid being drawn into controversy," the public information coordinator at the General Service Office of AA said in an email. "This includes expressing opinions on what others may say about AA."

We simply cannot put our trust in a rigid system of belief to save the lives of people with addiction.

And, that is what AA asks people with addiction to do. We can learn from AA, though. We can take the good parts, the ones that proven to be effective, and leave the rest. We can form a new treatment around the principles that have proven to be successful, ones that precipitate neurobiological change.

Unfortunately, AA cannot be the ubiquitous treatment for all people with addiction, which is too bad, because it is free. Are there other treatments out there, proven to be effective?

CONTINGENCY MANAGEMENT

What is Contingency Management (CM), you say? No one has mentioned it in all of these recent articles? That's unfortunate, since it has proven to be one of the most effective types of treatment available. It is typically an outpatient treatment program that, basically, rewards individuals for not using; behavioral modification reinforced monetarily. A person goes to a clinic 3-4 times a week, provides a urine sample, and if the sample is clean, the person gets a chance to win a prize (worth $1 to $100) or points on a voucher (exchanged for merchandise).

In a 1994 study, Dr. Higgins compared CM to standard treatment. Standard treatment consisted of 12-step facilitation (like AA) and weekly therapy sessions, among other things. People in the CM group got standard treatment, too, but they also got CM on top of that. CM was more effective than standard treatment in reducing overall drug use and increasing continuous abstinence. Several follow-up studies have found similar results for several drugs, including alcohol, nicotine, marijuana, cocaine, and methamphetamine. Overall, it has reliably produced positive results, reducing drug use, increasing treatment attendance, and increasing medication compliancy. No other treatment besides Contingency Management can claim that type of success.

Why does it work? The simple answer is the most obvious one; reinforcing a behavior increases that behavior, and CM rewards a person for not using. There's more to it, I believe, such as extinguishing drug cue and drug use associations and offsetting more automatic neural processes (habit and Pavlovian action selection) by giving people with addiction a choice between two concrete, immediately available options.

What are the problems? For one, it is not widely available, and when I say it is not widely available, I
mean it isn't available anywhere except for clinical studies. Other caveats include that CM requires monetarily compensating patients for not using, and thus the cost for treatment providers can be high. Fortunately Dr. Petry's prize-based method has proven to be just as effective and considerably cheaper. Also, longevity of treatment has been mixed, with some studies showing continued success 2-3 years out and others not.

MEDICATIONS FOR ADDICTION

Medications were a main topic for Gabrielle Glaser, citing naltrexone's effectiveness for treating addiction, while John Horgan challenged her claim.

The medications approved for addiction treatment have been limited. So far, there are approved medications for opioid-use disorders, alcohol-use disorders, and nicotine-use disorders (not discussed in this article).

Methadone and buprenorphine have been shown to be equally effective in reducing opioid use, yet it remains a controversial type of treatment. Why? The mixed perception of methadone maintenance programs largely stems from the varied implementation of them. In controlled studies, doses and administration times were tightly controlled, but presently, these programs have limited availability (in methadone clinics) and unpredictability in the doses given.

For alcohol-use disorders, there are two main medications, naltrexone and disulfiram. Naltrexone has received much of the praise and criticism from the recent news articles. If I had purely based my opinion on the recent articles in the news, I would have said that the results about naltrexone are mixed, however; the data shows that naltrexone is, in fact, an effective form of treatment. John Horgan, in his article, dismissed naltrexone by quoting the Cochrane study results:

A 2010 Cochrane analysis of 50 studies involving 7,793 subjects concluded that "more patients who took naltrexone were able to reduce the amount and frequency of drinking than those who took an identical appearing, but inert substance." The effect was hardly overwhelming. "On average," the Cochrane report noted, "one out of nine patients was helped by naltrexone."

I looked up the Cochrane report, and indeed the authors did say that, but they continued with the report, which was not quoted by John Horgan. Below is the conclusion of the Cochrane review on naltrexone for alcohol-use disorders:

Naltrexone appears to be an effective and safe strategy in alcoholism treatment. Even though the sizes of treatment effects might appear moderate in their magnitude, these should be valued against the background of the relapsing nature of alcoholism and the limited therapeutic options currently available for its treatment. (emphasis added)

In other words, alcoholism is a difficult disorder to treat, most people relapse, and we don't have a lot of options. Therefore, any success should be considered a rather important success, and it is probably best not to dismiss a promising treatment for addiction.

Dr. Kathleen Carroll, a prominent addiction researcher, in a recent review, also pointed to naltrexone as a promising treatment, citing three well-designed studies that showed its effectiveness, but cautioning that it should be used in conjunction with behavioral treatment. It is unknown how effective it would be in conjunction with self-help programs like AA, but if AA members were more open to using medication, I'm sure it would be just as effective there, as well. She also stated that, like methadone maintenance, the treatment provider's education and training for such a treatment have been limited and inconsistent.

In fact, consistency in treating addiction is an issue that has come up time and again during my review of the addiction literature. Partly, this is because doctors are rarely sought out for help treating addiction, and partly it is due to the level of education of treatment providers, and subsequently the diverse training of providers. This is an issue that is found only in the treatment of addiction, a bona fide medical condition, and other mental health disorders.
Glaser reports that doctors in Finland and many in the U.S. are using naltrexone with behavioral treatment, such as CBT and motivational interviewing.* This is good, because thus far, evidence shows that naltrexone has been most helpful as part of a treatment package. That doesn't mean it wouldn't be helpful as a stand-alone drug, but rather it has had the most success paired with some type of behavioral therapy.

Disulfiram is the other medication for alcohol-use disorders, which has had limited success, mainly due to compliancy issues, but can be effective for certain, highly motivated, people.

**MATCHING SPECIFIC TREATMENT WITH SPECIFIC PEOPLE**

Instead of taking the side of one particular treatment and damning the rest, we would do better to recognize that a particular treatment is going to be helpful for a particular person. This has been one of Gabrielle Glaser's strengths. She hasn't denied that AA has been helpful for some, but she emphasizes that there are other types of treatment that might be more helpful for others and, importantly, should be tried before giving up on getting help.

Scientists have discovered much about addiction in the last three decades, but there remain gaps between the public knowledge of addiction and the treatment of addiction with the scientific understanding of addiction.

There are various reasons for why people have addiction (sometimes even just appear to have addiction), and our understanding of how to approach those reasons are growing. If one type of treatment doesn't help an individual, it doesn't mean that the person is untreatable. Treating medical conditions, mental health especially, sometimes takes several different attempts. One treatment isn't necessarily right for another. I have mentioned several types in this article, but there are more, such as CBT and motivational interviewing, as well as other support groups, such as SMART recovery and Moderation Management. And, there are new treatments being studied, currently. Treating underlying issues can also be effective, such as reducing impulsivity or treating depression.

We've moved out of the 20th century, and our understanding of addiction has changed. It is past time we move our treatment approach out of the 20th century, as well.

*Edited May 4, 2015: The article mistakenly reported Gabrielle Glaser as supporting naltrexone as a stand-alone treatment. In a brief correspondence, she corrected this inaccuracy. She does not view medications as a cure all for addiction. The sentence was removed and a new one was added that is accurate.