Okay, everybody, our next speaker is Dr. Kevin McCauley. Dr. McCauley, do we have you on the line?

Yes, fantastic. Dr. McCauley is going to be giving our talk on provider and patient perspective. And as an introduction, Dr. McCauley is a physician who has been working in the field of addiction treatment for over two decades. He became first interested in the treatment of substance use disorders while serving as a naval flight surgeon for the Marine Corps heavy lift helicopter and fighter attack squadrons. Since recovering from his struggle with opioids, Dr. McCauley's career path has taken him across the country, currently to Salt Lake City, Utah, where he serves as the director of the program services at New Roads Behavioral Health in Provo. Dr. McCauley has been a prolific speaker, he has given over 2000 lectures on addiction and recovery all across the US, Canada, Caribbean, Europe and Australia.

With a big interest on the discussions and the science behind addiction, rightfully being considered a disease, Dr. McCauley continues to assist pilots with substance use disorder through his collaboration with the Airline Pilots Association, in the program. And with that, I'm going to turn it over to Dr. McCauley.

Thank you, Dr. Spevak. I am very grateful for your invitation to be part of this great symposium. I, first of all, just in terms of Oh, great. So, these are my slides. And I believe I have some control. Terrific. And you can hear me I can take it. Did you all can hear me, everything's fine. We hear it perfectly. Thank you.

Now that that's out of the way, I think we are in business here, I will do my very best to keep my eye on the on the chat and try to answer questions as they come up. If I don't answer your question, hopefully someone will save the chat. I would love to read it afterwards. And I believe the ability to contact me is maybe I should just put this in here really quick. This is my email, if you need to get in touch with me afterwards. Or if you'd like any of the journal articles, or if you have any additional questions. I did make a film about 10 years ago, I'm not a filmmaker, I really can't claim to know what I'm doing when I said I made a film, but it really frustrated me that the fascinating, fascinating science behind addiction was just not really out there. The only production video production that was out there was the Bill Moyers close to home special on addiction in during which Mr. Moyers interviewed [Indiscernible], the head of the NIAAA and Dr. George's colleague, and I wanted to try to find some kind of channel to be able to get that fascinating information to the, to the people that I was dealing with the people who were, you know, presenting to my treatment center, or to the treatment centers that I worked at. So, I made that film, it's, you know, an amateurish production at best. But if it ever is a helpful tool to you to explain the neuroscience of addiction, I, I think it's holding up pretty well over the last 10 years. And so, I think I'd put the Vimeo link where the video link is available.

If you want a DVD copy, and we do have those, I'd be more than happy to, to send you one. They make great coasters; they prop open doors quite nicely. But otherwise, most people use streaming links other than DVDs. So, there's both channels, should you want it. What I'd like to do in this lecture is kind of make use of that fascinating research in neuroscience. I'm incredibly indebted to researchers such as Dr. George and [Indiscernible] Dr. Nora Volkoff, Dr. Mark Schukat, I mean, I could go on and on and on the research is so fascinating. And I have to say on a daily basis, I used this research.

Okay, so the link is not working. We will, we will definitely make sure that the Link gets here, I promise. Anyhow, this this research is helpful to me in explaining to patients, you know what it is that they're going, and patients are just extraordinarily receptive to learning about the brain science. Now, Insight does not necessarily change behavior and explain that to our patients. But I think it can go a long way to

helping patients, craft the narrative that is so personal to them about how they develop this problem, but also how they can get into recovery. And so, what I'd like to try to do in our time together is, you know, give you the perspective of a person who's been through an addiction and is in recovery, especially a service member, and try to see how that experience fits with the neuroscience of addiction. Because I think that's what all of our patients are trying to do. They're trying to figure out, how did this happen? What does it mean?

You know and go forward. And the neuroscience has been very helpful in doing. So, it was a while, let me just get these little housekeeping slides out of the way. It was, there's that one, and that one, it was it's been a while since I was in the military. And a lot has changed. I know that a lot has changed. And I'm unfamiliar with the current policies and procedures with which you might deal with service members who develop substance use disorder, I can see from our patients who are coming to our treatment center who are referred who are active duty members, that there really does seem to be a genuine interest on the part of their commands, to get them the help they need. There's far less discussion about the punitive aspects, I don't think we'll ever be completely free of that. Because, you know, addiction, you know, does have its consequences, behaviorally, but I do see that change, and that that makes me very happy.

I will just give you a very, very quick personal background, by the way, that's me on the, on the right hand far right there, I still own that flight to I can't wear it anymore, but it looks great in my closet. Anyhow, I at the time I was 30 years old, I was O3 naval flight surgeon serving with the Third Marine Air Wing at Marine Corps Air Station, El Toro, and I absolutely love this job, I just thought that working with pilots and working in preventive medicine and occupational health was just really, you know, where I wanted to be. And I was trying to find a way to do this job as long as I could, without having to, you know, grow up and be a real doctor, and read my delayed adolescence. But you know, this was just a great time of my life. And I had no prior substance use disorder history I, I grew up in Berkeley, California. So, there was some experimentation with cannabinoids, maybe a little too much drinking in high school and college rather. But for the most part, I was I was a blank slate, if you want to call it, I did have a childhood history of ADHD, which went untreated. But otherwise, I'd seem to make some of that work for me for me, and, and then something happened, I had to have a surgery. I actually, I'll just, you know, reveal to you what it was, oddly enough, it was a transurethral resection of the prostate, which is not typically what 30-year old's get. But I had this weird, you know, prostate gland and they wanted to board me out and I did not want to be boarded out. And so, I had the surgery to kind of definitively fix the problem. But I will tell you, it's you know, you can imagine the mechanics here, it's a particularly certain kind of emotional pain that goes along with anything, any surgery that's pelvic I think male or female, or, or whomever has that surgery. And at the end of that surgery, they gave me a big fat bottle of oxycodone.

Now, I have to tell you, this is one of these really, I think, important moments and understanding one's risk and exposure to opioids, because I can I can tell you the moment it was right after the surgery, and I'm catheterized and my mother who's also a physician was coming to drive me home and the urologist came in and told me, okay, you're gonna have the bag for a little while, and I didn't like that very much. And I said, and I just blurted it out, I said, are you going to give me anything for pain, and there was this sort of pregnant pause, because she knew that I didn't really need it. And I knew that I didn't really need it. And my mother kind of knew that I didn't really need it, but I was scared. I was really scared.

It was very humiliating. And I think we all just kind of had a certain attitude towards opioids and three of us. And so, I was given this prescription and so I can't claim that it was imposed on me whatsoever as zero fault on part of the on a part of the military. But when I got home and I was alone and I took that opioid, it was an astonishing feeling. And this is I think, what people are getting when they talk about the hyper euphoria that some people can experience when they first take opioids, even if prescribed for legitimate pain, and how that is such a strong risk factor.

So, anyhow, you know, who knows what that is? I, you know, is it? Is it the difference in the new opioid receptor? Is it the particularly powerful antagonism at the kappa-receptor that, that comes with some opioids, it's hard to say, but it was, I can tell you exactly where I was exactly the time of day exactly? I can feel the planets spinning through the through space, it was just a very powerful, peak experience. And it got its hooks into me. And maybe even though I didn't continue to use drugs, it was sort of always there. And then, a few months later, I was exposed to Tylenol number three times of codeine, after a dental procedure, and bam, it was back. And then I think about three months after that, I had another procedure. And one by one, these experiences kind of just, you know, sort of dissolved the normal, appropriate boundaries towards self-prescribing. And within about six months, I had a pretty severe intravenous Demerol problem. And, you know, I was absolutely petrified. I mean, I, I guess I was given the gift of knowing that from the first unauthorized Percocet, that I took, that this was not good that I shouldn't be doing this, that I had a secret clearance and, you know, a certain responsibility and enroll to uphold, but I could not stop. And that just made me feel terrible. And I tried everything I ripped up my you know, triplicate prescription, so they had to get opioids that, you know, stopped me, I just found another way to get it.

And I can remember, at the time, we had a joint drug and alcohol counseling center, on El Toro, and it was the job of a flight surgeon to go over there once a month and kind of sign off on the charts. And all of us notice that there were kind of two, two stacks of charts, there were the Marines who had alcohol use disorder, and were getting treated and going back to their units. And then there were the Marines who had talked positive on a commander analysis, and we're getting, you know, a bad conduct discharge. And so, there was a real level of fear, I think, at that time, and I certainly, you know, believe that there was no way that I could come forward and say, hey, I think I've got a problem. And so, if I have a recommendation, it would be to create as many avenues as possible for a service member at some good moment of their day, when they're thinking this has got to stop, I can't do this anymore. To be able to come forward, I realized that self-supporting always has to be balanced against the just culture, I understand the professional standards that have to be upheld. But I did call the California Medical Board. And so, I do believe that I would have reached out for help.

And the California Medical Board said, well, you have to go to the Betty Ford Center. And I said, you don't understand. I'm in the military. And no one really knew what to do. But I was kind of I got really lucky, in that I met kind of the community of recovering physicians in Orange County, California, but it wasn't long before. You know, I would stay sober, then I would relapse I would stay sober. Then I would relapse in the Navy caught me pilfering Demerol from the branch clinic pharmacy. And they had a solution that the California Medical Board diversion program didn't have they sent me here, which I understand is not happening anymore. I understand that that is not really, you know, the way that the military handles these things, I must confess, it wasn't just use, there were things peripheral to the use, such as diversion from patients' theft of Demerol, all of these things added up to about 28 years under the UCMJ. And, and even though it was, you know, crushing at the time.

I simply allocated because I was guilty at my court martial. And I was given a year of confinement, which like I said at the time was just devastating. But it did give me the time to kind of, you know, get a little brain healing. Read everything I could find on addiction, and this is the year 1997 And the neuroscience of addiction was just starting to kind of come together at that time Alan Westerners famous article addiction is a disease and it matters I just been published.

And then once I was done My federal year, which is 10 and a half months, the Navy paid for all of my treatments. So less I am forever grateful. But I think, you know, in trying to figure out the symptoms of persistent use, despite negative consequences, loss of control, cravings, you know, the neuroscience has gone a long way in the last 20 years to kind of give some foundation to that, and I think really convey a degree of validation to patients who are otherwise completely baffled at why they're behaving the way they are. And I think one of the first things I point to is the American Society of Addiction Medicine, definition of addiction, eight-page document came out 10 years ago, fabulous document if we have a primary document, and by we, I mean people in recovery, this has got to be it. And I encourage all of our patients, and certainly their families to read this, there has been a plain language update in 2019, ASAM published that. And so, I would give that as well. But that's, that's only like one paragraph. But I think this document goes a long way to bring that neuroscience together with those, you know, incredibly frustrating, incredibly baffling symptoms of addiction. I also, you know, believe that the Surgeon General's report is also a primary document, much longer document. And this, of course, looks at the work of Dr. Volkoff and Dr. George. You know, you can imagine if I'm trying to explain the neuroscience of addiction to people who are five days sober, if I put a slide like this on the board, they're not going to make a lot of friends. But I think it all sits very nicely.

Not only with the experience of people going through addiction, but also what we know about recovery. And also, what we know about 12 step recoveries, and I spend a lot of time trying to bring the concepts that people you know, talk about in 12 step recoveries together with this neuroscience. And frankly, I think it's fits very well. But I kind of try to boil it down to what I think are three important sentences. To know about addiction, I might be cutting a few corners here, but I think this is pretty much consistent with the with the last slide and the other neuroscience that you'll read about. I think the first things that's important to know about addiction is that we've essentially got a disorder here in the hedonic system, essentially, a broken pleasure set. And that's a that's a very big idea that addiction is a disorder of hedonic processing. And of course, at the core of that is dopamine. Dopamine is not the only chemical that's important. But I really tried to, you know, encourage our patients to think about what it means to have a disorder of this system that we just take for granted, the next time you, you put a piece of chocolate cake in your mouth, and it's delicious, and you say, yum, what's actually happening there. And, you know, that would be bad enough, right there, we have lots of talk about ADHD, you know, the impact of adverse childhood experiences we can go on all day. But it turns out, there are major consequences for another system in the brain, to that dopamine disorder. And that is the system that we use to make choices.

And so, the idea that addiction starts out as a disorder of pleasure, but then it becomes a disorder of choice of volitional disorder as a very, very big idea. And when I say, you know, volitional disorder, or craving or impaired decision making, plus the loss of insight component that is not peculiar to addiction, but it's, you see it in a lot of psychiatric disorders, but, but it's particularly famous in addiction. Now, this is already, you know, a lot to absorb in terms of the cause of addiction. You know, it's important, I think, to reflect what the ASAM definition says. And to me, it says that addicts that genes are very important,

but they are themselves are not the cause of addiction. They're the powerful mediator that the real cause works through. And I would put that down to stress, chronic severe stress, repetitive, poorly managed stress, early in life stress, certainly, and that goes back to the Lydian and the studies that Dr. George mentioned in the last lecture, but also, you know, Candela work on the epigenetic effects. That may be, you know, short term or long term or maybe even transgenerational of severe trauma, intergenerational trauma, genocide, all of these things, I think, help us understand the overlap of addiction with these other disorders, which are all at some point using that dopamine wiring in the brain.

So, this is a busy slide, but I think it summarizes really well, where we are right now. So, if I have a one paragraph summation of that eight-page document, this would be it. And then, you know, I can usually get through this in the first five minutes of any lecture that I do for our patients. And then we can spend the rest of the time kind of picking it apart and kind of see what it means and, and how it fits into recovery. But I think, again, I just want to thank the researchers for this wonderful, wonderful work. And, and it's not just their work, it's the fact that they're fabulous writers. I mean, they are really fine, fine wordsmiths. And that's important, because that gives me the vocabulary, the language that I can impart to patients, and that really structures their conscious understanding of their experience and gives them hope for the future. I tried to tell Dr. Koop and Dr. Volkoff that, you know, maybe they don't understand exactly how, how their work really does penetrate into prisons. I can remember there was a monograph, I don't know who made it some drug company. And it was kind of a summary of this roundtable discussion at which Dr. Volkoff and Dr. Koop were at. And I, I remember a bunch of inmates sitting around a table trying to read it and glean what they could from it. And when you see something like that, it really changes you it really, I think, you know, I didn't necessarily make me a better clinician, but it's certainly I think, helped me understand just how important this research is to the to the individual who is lucky enough to stumble across it. But I think we have a pretty good being there's lots more to learn. But I think we have a good understanding now that we would use only slightly had 20 years ago. And, and, you know, it's this research is a wonderful tool. When I look at the DSM5 criteria, obviously, this is a this is a moving target changes every now and then.

I think that these symptoms kind of cluster into problems of valuation. And that, to me is the issue, you know, with dopamine, problems in learning and memory, and then problems with the processing that we attribute to the frontal cortex with the executive functioning component, and leaving tolerance and withdrawal out here because they're, they're not terribly specific symptoms of addiction. But the symptom that matters the most, to the people around the person with addiction is this one, you know, why don't they just stop if they knew what they were doing? If they knew what they were harming? If they knew what professional standards, they were violating? They would stop, right? Well, no, because something has gone wrong in a very, very deep and unconscious valuation system or survival valuation system in the brain, as Dr. George was speaking about, you know, the loss of control and relapse, which is I think, part of the experience, not everyone's experienced, not everyone relapses when they leave treatment, but it is something that we have to address. And then the symptom that I think matters, most of the person actually has addiction. And that is the suffering the craving, that that mental state of not being able to think about anything else is a powerful emotional ruminative unwanted aversive experience that that, you know, really does demand some explanation and they think we, if we look to, you know, the dopamine system and its input in the frontal cortex, there are a lot of answers there.

So, you know, I try to ask our patients, Okay, the next time you have a pleasurable experience, stop yourself and ask yourself, what's happening? How is my brain creating this pleasurable experience? So, what I've done here is I've taken Dr. Kenneth Blooms reward cascade, and I've kind of flipped it upside down. He ends with dopamine, I'm starting with dopamine, but I think this helps understand how what we think of as pleasure really involves a lot of downstream chemicals, I would include the opioid system, probably a lot about the cannabinoid system. The oxytocin component of pleasure, I think is really important than and very early on. My personal studies led me to the work of Yakatamskeps, who's the really the father of Affective Neuroscience, and he has this brain opioid theory of substance abuse, which I think is absolutely right on the money. And he makes the point that that the pain system that we developed the opioid system that we developed was exaggerated, and that's a technical term I had to look it up.

In other words, it's a shift in function from one trait to another. And so, in developing this more complex and adaptable pain system, we got a sort of side benefit. And that side benefit is attachment, which is really missing when you think about it. And it's most of what we consider life to be, you know, that makes life worthwhile when they hand you, your child, minutes after it's born. I think this is this is important, and it was kind of a side benefit to the opioid system. But I think that there, there's something about opioid addiction, opioid intoxication, that there really needs to be defined in terms of attachment. And there have been another number of folks, Dr. Flores has written a book on how addiction and attachment are important disorders that merge. But I start with dopamine, and I, I think it's helpful to tell patients about this dopamine hypothesis. And so that's what's at the core of every pleasurable experience. Dr. George mentioned the periaqueductal Gray, I'm leaving it out here. But obviously, it's very important, I, you know, reconsider putting it in here. But I tried to keep the locations of the brain that I was talking about to a to a minimum, and this is a nice slide here.

One thing I had mentioned is that when we talk about locations in the brain, that's sort of a heuristic kind of tool to think about the brain. But really, what we have to realize is that all of these areas are richly interconnected, and truly the connectivity between them that matters, but that initial connection from the VTA and the VTA sends connections everywhere. But that initial connection from the VTA to the nucleus accumbens appears to be the part of the brain that is initially active. And so, this is a commonly used diagram to show the synapses not only from the VTA to the NA, but also how other connections modify that signaling. And when we're talking about normal pleasures, normally, pleasurable things that normally survival, we're talking about a normal amount of dopamine release at this particular synapse, and I'm borrowing very heavily here from the work of Dr. Volkoff. And What intoxication is, is an overdrive a super physiologic release of dopamine, not just an amount, but in speed, how fast the dopamine comes on, is really what signals to the brain. If not pleasure, then hey, this is important for survival, pay attention to it. And so perhaps the first time I used opioids, lotta dopamine in there, maybe not so much as time went on, but dopamine to me is the chemical that gets my attention and tells me this is particularly valuable at the level of survival, you know, strategies, right?

So, yeah, so I think that to understand that, and to see the connections, you know, other connections that modify that signaling is important for patients to understand. And it's that that continuous intoxication, that that over release of dopamine, that just pushes the value. And again, we're talking about an unconscious survival value of the intoxicants drug, higher and higher and higher until it becomes really equated with survival, and the two are indistinguishable. And I think this is something I want families to understand alcohol for the alcoholic is really not just alcohol anymore, it is the main

way of getting through, you know, the next 15 seconds alive. And once that, that attribution of the drug on the level of survival has occurred, it's going to be very hard to bring any consequence or threat there have to bear so the last two decades, I have tried mightily to explain to myself to patients to their families, certainly the prosecutors, that that what makes addiction so frustrating and so fascinating, is that you really cannot rely reliably, you cannot reliably predict the effect of punishment or threat of punishment on addictive behavior. And that's a hard one to get across. Sometimes.

I'm looking at the clock here and kind of starting to run out of time. So, I'm going to apologize about the questions. I'm definitely available afterwards, you know, by email to answer any of those questions. And then, as Dr. Volkoff has pointed out, it's the reason that this, this spike of dopamine is problematic is that it's really toxic to these dopamine receptors. And so, the idea that the addicted person has to have these receptors, and that affects the signaling or at least the communication back and forth between it and other areas of the brain. And the cortex, I think is very helpful for the patients. But I also think it connects this neuroscience with what you will read in the basic text of Alcoholics Anonymous. The first thing that you will read in The Big Book is a statement by Bill Wilson's doctor that basically says, I can't prove it. But I kind of think these people are different. There's something fundamentally different in the way that they respond to alcohol. And that may be metabolic that may be genetic, but it definitely, I think, affects the like, component of alcohol. And in fact, there's the one thing that doctors have used men and women drink, essentially, because they like it. And this was often used, like, my first early lectures were, one of them was to a district attorney's office. And I can remember this young assistant district attorney, just greening the out saying, you didn't shoot gasoline into your veins, you shot drugs into your veins, and you did it because you liked it. So, stop saying you had a disease, you use drugs, because you liked it. And that lecture did not go well.

But I really tried to think about why her statement is both right and wrong at the same time. And then it was, you know, I kind of was looking at the doctor's opinion, in the course of a meeting, I think, and it hit me there's something wrong with my like system, I shouldn't want to like drugs, I shouldn't want them the way I do. Something has gone wrong in that valuation system. And that's, that I think that that's so central to the experience of being a human that volition is so central, that we have a very hard time seeing that it can be part of a disease process, like that old thing that you know, fish doesn't know what water is, because it's right in the middle of it. And I think volition is so central that we just, we have a very hard time accepting that that bit can become part of a disease process. But I think the dopamine hypothesis is very, very helpful in and having patients see that, that there's really a range of things that can be intoxicants behaviors on one side, which vary in their ability to release dopamine, but they all appear to and then behaviors which can be manipulated ritually, into intoxicants. And I think this helps a lot of people understand how their cocaine problem is wrapped up in their sex problem, that their opioid problem and their alcohol problem are wrapped up in their codependency, although that word needs you know, a lot more operationalization. I do think that it's a real thing. And so, this is, I think, a very, very helpful way of understanding addiction.

So, I made up this thing is kind of goofy, I can send you a copy of it, to really kind of, you know, at least visually drive that point home is that I might have had a problem with Demerol or alcohol, I still have a problem with sugar. But really, I've got a dopamine issue. And so anything that that releases dopamine, whether it's a major stimulant, like the red ones here, cocaine and the phenylethylamine, or a sedative hypnotic like alcohol, or this other blue row, which includes the benzodiazepines, or opioids, or a behavior, like gambling disorder, all of these things, you know, fit into this rubric, because they, they use

dopamine at some point. Now, there are some, you know, and I think what helps patients with all of this, you know, helps them to get sober, is really understanding I got to be good to my dopamine system, I got to take intoxication out, regardless of its source. And I've got to avoid cross addiction, chemicals or behaviors. But I also have to really practice normal, healthy, pleasurable activities to restore that population of dopamine receptors. And there's some evidence that that effect if it does.

Now, I will say there are some naysayers about the dopamine hypothesis. This is very important research. And I certainly, like any good scientist would certainly don't want to discount it out of hand. But I mean, that the research that supports the dopamine hypothesis is a mountain. And it's going to take a lot more than just a half dozen or a dozen studies to disprove it.

But it may be that that, you know, dopamine is more complex when it comes to its role. I think Dr. Volkoff published a paper that caffeine actually decreased dopamine. So, who knows how this is all going to work out, but from a clinical standpoint to help patients understand what they're going through, I think it's very helpful? So, when we talk about relapse, you know, there we go can go back to the ACM definition. And point out that one of the things that causes relapse is any big hit to the dopamine system. Another thing that causes relapse is exposure to things that went along with intoxicants. And that's mediated by the chemical that comes after dopamine, which is glutamate. And the work of Peter Coleus shows that these releases of dopamine are so great that they actually spill out in the synapse, and start buying the extra synaptic glutamate receptors, and really don't just create memories of drug but burned the drug into memory, they create these very powerful hyper memories that are very enduring, and, and leave the person open to relapse into the future.

So how can we use what we know about learning and memory to help people get sober? Well, I think that there are some medications that can help here, I think this is a large part of where cognitive behavioral therapy can be useful, you know, simple incapacitation, such as not hanging around the same places, or being the same people that I used to use with that that can be helpful. The third thing, that ACM definition points out as the cause of relapse would be stressed that the person does not yet have the capability of dealing with and so this is where we can bring in Dr. Koops work especially. And the idea that it's this, you know, it all starts out happy with positive reinforcement from the dopamine system. But increasingly, dopamine recruiting more and more of the stress system, more of those aversive chemicals. And so, it's really negative reinforcement that that is the second stage of addiction, it's really this dark side, that's mobilizing and continuing drug use. And I think people realize very quickly if that if that, in fact, is true, that the Donika system and the stress system kind of work against each other, then then very quickly, people recognize that the drug or their intoxicant, is the most efficient thing that they have come across, to manage stress. And so, I think, you know, this is this is another area where, where we really need to look at things as basic as housing, and who your friends are, and your ability to cope with stress, and hopefully, the increasing resilience that a person gets to dealing with stress as they get deeper into their recovery. I think this could be very explanatory.

But if I put these three things together, the incredible salience that the drug has on the level of survival, these hyper memories that are laid down, that I don't really even understand or are at work, when I'm in the early stages of craving, and just the sheer utility that the drug has, in managing whatever it is that I'm coming across. I think these three things together go a long way to explaining a word that we often toss around in treatment, and don't always explain and that is this concept of powerlessness, this idea that it's not, you know, powerless over everything. But when it comes to this drug, when it comes to

alcohol, I simply have no idea where, you know, a drink will leave me. And I think this is where the vernacular of lay recovery can come together very nicely. With the neuroscience of addiction.

This concept of powerlessness is one of the most misunderstood aspects of recovery, especially I think, among psychologists, is often a call a different powering philosophy. I don't agree with that. I think it's simply an admission that there are some automatic processes that have kind of taken over here and I need to strategize from that position. My first sponsor said that the big book mentions the word powerlessness once we've mentioned the word power 53 times in the first 168 pages. And I think that that's, that's an indication here that, that, you know, I've really got to start separating out those things that I can control and need to take responsibility for. And those things that I never need, could and need to let go. And isn't that exactly what the Serenity Prayer is all about? I think the other word that we don't always explain is, is the concept of unmanageability, the chaos that goes along with a person's active addiction. And I think that that's well explained. If we look now at what all of that below stuff has been doing to the frontal cortex and the interaction that those earlier areas of the brain have with these particular areas, the frontal cortex, Dr. George mentioned, the anterior cingulate I think that that's one of the places that's important to pay attention to now, it's hard to actually get a definition of exactly what these areas do. And I think that that the reason that you see such a wide variation in the words used is because you were doing, we're still using that that tool of localization to describe something that's much more global. But I think, you know, just for the sake of argument, it helps to understand that, that the anterior cingulate cortex is my error detector. And normally it works quite well, it's especially important for social cognition, I like to think of the anterior cingulate cortex is the part of my brain, where I observe myself through your eyes. And when I use drugs, I can't do that. And I fall into this brain state, where my thinking is extremely rigid, I cannot respond to social cues, I can't see how my behavior is negatively impacting the people around me. And, you know, certainly our patients don't need any reminding families definitely don't need any reminding of what this looks like. But I tell people, if you want to see what this looks like, turn on that television show intervention. Because this is the part of the brain that fails, that makes us such good television, whether that's an ethical thing to do to film a person at what must surely be the worst moments of their life, I don't know. But I think what's important to understand is that this, this can be fixed, it is possible to recalibrate this area of the brain. But I've got to immerse myself in that area of that intense social media, orbital frontal cortex as well. Now we're talking about areas of valuation and social cognition, not only valuation, but also probability and uncertainty processing. And you know that faulty dopamine signaling, you know, interrupts this delicate process.

In many ways, I think this is the most important slide that I have in this deck, at least for patients. And I think it's sometimes hard for them to see this slide. But, you know, because of these deficits in the frontal cortex, I have a very troubled relationship with risk. As a person facing recovery, I can't see it, I can't see the risk of going home, and living alone in the same apartment that I used to drink. And I can't see the risk of continuing hanging around the girlfriend, who still does coke occasionally. And this is where I think the tremendous protection that can come from the group of sober men around me, the sober man, or the group of sober women around that sober woman, or the sober people around that individual is that they give some protection against this self-defeating decision-making style. But that's, I think, something that that is really the crux of recovery is how do I how do I stay sober? How do I go forward, when the very areas of the brain that I need to process things like risk and to have that insight or not working correctly, I personally fall back on what I learned as a flight surgeon, the rules of safety,

the rules that we use to prevent aviation mishaps can be very, very helpful here, because they recognize they casually admit that humans make mistakes, that we cannot function at 100% all the time. And if we do certain things, we can actually be a much safer operational system. And this is where I think this neuroscience goes very well with your fits or flows very well into the science of Recovery Management. Very often, I point out the success stories that we've had over the last few decades with these professional groups, doctors, pilots, nurses, lawyers, these are, you know, groups of people who have phenomenal success rates in recovery. I don't think that there's anything that's all that special about them. And now that we have the collegiate recovery movement, we can see that that you don't actually have to, you know, become a doctor or be a pilot and the threat of losing that is what gets you sober. Well, the collegiate recovery participants are doing as well, as these professionals. If you look at the blueprint studies, you know, they kind of attribute their success to these six things as respectfully as I can because these are some of the biggest names in addiction research. I would like to disagree with number six, do not think it is that sword of Damocles, I do not think that it is the leverage that a professional health program has to simply if the doctor or the nurse is non-compliant, turn it over to the attorney general, that's helping people get sober. It's not the threat of the loss. It's the fact that they want to be a doctor or a nurse. It's the fact that being a pilot has very deep, profound meaning for them. And it's a subtle distinction using the threat of punishment to displace an intoxicant versus retaining the person in that role that gives their life meaning and using that against the intoxicants.

It's a subtle difference, but it means everything. And that's, I think, why I saw so many young marines who had the problems with alcoholism, but we're you know, sort of enveloped by the community, the local community of recovering Marines. And why they did so well, because once they got that eta, that had profound meaning for them, and losing that or being separated from them was simply intolerable. And it motivated them to want to stay sober.

So, I think this is my last slide here, I think, you know, we really do understand what's going wrong. But we also understand, you know, what, what really predicts recovery in certain groups? And I think the challenge is, let's get those things to everybody. Why? Why is it you know, good enough for the person flying the plane, but not necessarily the person turning wrenches on the plane. And I think that that's where we are right now, this is a very exciting time to get so scary, scary time. But some of the things that we're learning about people in recovery are very, I think, hopeful. So, I, I'll just leave you with this. And you know, the reason that these groups are so successful is that they formalize a process that most people leave to chance, not change chance there in the spelled up. And, and I really do think that is possible to understand both of these worlds, because they, they do come together. But I will, I will stop there. And I'll hand it back to Dr. Spevak. And take your instruction as to what, what to do next.

Dr. McCauley, thank you, again, really an absolutely fantastic lecture, you, you know, simply just have this very, very unique ability to combine your personal experience with integrate with the latest in neuroscience. And I can say for all of us that it's so impressive that you've taken a rather dark moment in your life and was able to overcome that and now help 1000s and 1000s of people change the lives of so many people for with the work that you're doing. So really very much an inspiration to us.

And we thank you for that. And thank you for coming back and talking to this audience in the Military Health System. Because it's your experiences have just been invaluable for us and invaluable for us as we then go in and help our patients, our service members, again, change their life, their family life and community life. So unfortunately, we've come to the end of our time. But if you would be so kind you

know, we are there are questions in the chat box and things, and we would love to be able to send those to you and then maybe have your answer to be able to share your answer with the audience if that's possible. Sure, I'm saving. I'm copying and saving them all right now. So, let's see if I can't spend the rest of the day answering them. I'll be more than happy to. Fantastic and so I think we're at the time for our break.