NCJTC- Fox Valley | Introduction to Neurobiology of Addiction

Welcome, everyone, to the National Criminal Justice Training Center webinar, Introduction to the Neurobiology of Addiction. Presenting today's webinar is Dr. Anjali Nandi. My name is Joann Joy, and I will be moderating today. Thank you for joining us for this webinar, which is part of a webinar series for the Bureau of Justice Assistance, BJA, Comprehensive Opioid, Stimulant, and Substance Abuse Program, otherwise known as COSSAP, and the Indian Alcohol and Substance Abuse Program for Coordinated Tribal Assistance Solicitation Purpose Area 3 grantees and non-grantees focused on responses to alcohol and substance abuse related crime.

These projects are supported by a grant awarded by the Bureau of Justice Assistance, Office of Justice Programs, US Department of Justice. The opinions, findings, conclusions, or recommendations expressed in this webinar are those of the contributors and do not necessarily reflect the views of the Department of Justice. With that, let's try our first poll question.

This is a simple question to find out who is joining us today. Which of the following best describes your role, victim services/victim advocate, probation/community corrections, law enforcement, CAC worker, social worker, mental health worker, or other? It appears that almost 40% of our attendees are made up of CAC workers, social workers, or mental health workers. The next largest segment comes to us from our probation and community corrections community.

I would also like to summarize our learning objectives. Our first objective for this training in this webinar is to understand the impact of addiction on the brain. Our second learning objective is to explore the latest research on evidence-based practices and medication-assisted treatments. Our third learning objective is to implement strategies to effectively facilitate long-term behavior change out of a pattern of addiction.

I'm pleased to introduce you to our presenter, Dr. Anjali Nandi. Dr. Nandi is an associate with the National Criminal Justice Training Center of Fox Valley Technical College. She is the chief probation officer for the 20th judicial district for the state of Colorado. Additionally, Dr. Nandi is a published author, having co-authored nine books. Dr. Anjali Nandi, the time is now yours.

Thank you so much, Joann, and welcome, everyone, to this webinar. The place I want to start is by talking about addiction in general, and then we'll get pretty specific. We'll talk about the brain. We'll talk about neurobiology and some of the latest research we now know about the brain and the impact of addiction on the brain, about what to do.

This is a tough topic, something that people struggle with quite a lot both, our clients and all of us as human beings. And so we'll talk about what are strategies to really support folks? And then what are some of our misconceptions as well? Please feel free to ask questions along the way. And we will address the questions towards the end of the webinar.

So we now know a lot more about addiction than we did even 20 years ago. We know that addiction is a brain disorder. We used to think that perhaps it was a moral problem, a problem of morality or a problem of willpower. We used to think perhaps that we just needed to stop, like can't we just stop? If we valued our family enough, we would stop. Or if we were threatened enough with bad things, maybe with negative consequences, maybe we'd stop.

And what we're learning is that it's a lot more complicated than that, and it has less to do with willpower and more to do with neurological adaptations that happen in the brain as a result of being exposed to some pretty strong, powerful external chemicals. So we'll talk more about that. But the research, it's really both exciting, and in a lot of ways, reassuring. Because the more we know about what addiction is, the more we then know about how to support people struggling with addiction.

So it is a brain disease. And luckily, it is a treatable brain disease. It's something that we absolutely can work on.

It's chronic, meaning it's not something that starts and stops. So we can talk about it in terms of a continuum. And when we're talking about addiction, true addiction, we're talking about adaptations that have happened in the brain and in the body, actual changes that have happened. We're not talking about a one-time use, for example, or even misuse.

We're talking about something that we have to contend with for quite a long time. So it's not an acute issue. It's a chronic issue. We can relapse at any time and relapsing is a part of this process. It's a part of the disease.

In fact, relapse rates for addiction are very similar to relapse rates for other medical issues. Diabetes is a simple one to compare with, and we'll talk a little bit about relapse rates compared to diabetes a little bit later. So it's a relapsing illness.

One of the characteristics of addiction is craving. So let's just pause here and talk a little bit about craving. I'm sure all of you on this webinar have at some point experienced craving, whether it's for drugs or alcohol, whether it's for chocolates or some delicious food. We've experienced this real yearning, right this craving. That is part of the addiction process.

But when we think about craving, if we've never used substances, we underestimate the power of a drug craving or a craving for alcohol. So in some recent research, they compared the relative size of craving in our brain. So just hang with me as I try to explain this.

In the research, what they did was they took a bunch of folks. And most often, when we do sketchy research, we recruit graduate students. So in this research, these excellent researchers recruited some graduate students and had them deprived of water. And they hooked them up to fMRI, so a functional MRI, just to seen where the blood flow was and what craving looked like.

And then what they did was they had someone sit in front of them and drink water. They showed them pictures of a cold glass of ice water with the water dripping on the sides. They showed them pictures of flowing water and water sounds and continued to deprive them of water and then measured the size of the craving in their brain.

And so because we're talking about relative size, I'm going to use things that we can compare different things to. So in terms of the size of the craving, meaning the amount of energy, the amount that lit up in the brain this desire for water, it was about the size of a baseball. so. Let's just hold that for a second. So craving for water-- about the size of a baseball.

They then took a group and did something similar. But instead of water, they did it for food. Now, if you're anything like me, I would absolutely take food over water, even though I need water to survive and I'm well aware of that. Food is so delicious.

So they took folks, and they asked them what their favorite foods were. And my favorite food is burgers and fries-- you know, health food. And so they showed people pictures of their favorite foods and did not feed them. So they deprived people of food, but showed them pictures of foods wafted in the smell of burgers and fries or whatever their favorite foods were, and they measured craving.

So they measured craving for water, which was about the size of a baseball. They measured craving for food, which was bigger and about the size of a basketball. Now, I'm not saying that they had a basketball-sized brain. I mean relatively, the amount their brain lit up in the craving centers, which is the central part, the limbic system of the brain, it lit up way more than it lit up for water. So we're talking baseball for water and basketball, so several times the amount, right?

And then-- and you know where this story is going-- they did something very similar for drugs. Again, deprived people of their drug of choice and then exposed them to different kinds of stimulus.

And for this part of the experiment, they didn't use graduate students. They used people who volunteered for this part of the experiment who have addiction to, whether it's cocaine, or meth, or whatever their drug of choice was, and then showed them pictures of people using drugs, flashed these drug cues. And they measured the amount of craving.

And so if you were all in front of me, I would ask you to guess how big it was. And usually, when I'm doing these presentations in person, people say, well, if water was baseball and food is a basketball, maybe it's 4 basketballs, or maybe it's 10 basketballs. But what they noticed the relative craving size was the size of a football field.

So just making sure that we're all understanding what's going on here, the relative size of craving is so much bigger than what we can even fathom. So when our clients are struggling with cravings, if we've never used drugs and alcohol we have no idea how desperately they are struggling. So addiction is characterized by this craving and this drug seeking, and it continues despite negative consequences. So the theory that if we just punish people enough, surely they'll stop really doesn't work, and you've probably seen this in your work.

We also call a behavior problematic or harmful or addiction if it's harmful based on some socially acceptable standards, right? So I could say I'm addicted to exercising. But if it's not causing me harm, maybe I'm misusing the term addiction. If it were causing me harm, we could call it addiction. Same for gambling or retail therapy. Some of us like to call it maybe a shopping problem. It's harmful by some acceptable standard.

And the last piece about addiction is that we can diagnose it. We have certain criteria that when people meet, for the most part, we know that these brain changes or adaptations have happened.

So let's talk about the brain for a second. In the center of this particular slide, you see our limbic system, the reward system, the old part of our brain. This houses all of our reward circuitry, and this is the most impacted part of our brain when we're talking about addiction. The cerebral cortex, which comes over it, is our frontal cortex, the thinking part of the brain. And so the parts that are most impacted are in the center.

And then there's a relay, a system that connects the central part of the brain to our frontal cortex or our decision-making part of our brain. And one of the hallmarks of addiction is a larger reward system and poor connection to our frontal cortex, meaning that the relay is damaged, that, essentially, this limbic system in addiction gets hijacked and is a rogue system. It's a system that tends to seek for reward over anything else. And the part of our brain that thinks through

consequences, which is our frontal cortex, doesn't even have a chance to come in because that highway is impaired.

Now, I want to be clear that all of this is solvable, right? We can treat this. We can work on making things better. But I really want you all to understand that it's a brain issue. It's not just the person not having motivation or the person not wanting to.

So I'll give you an example of some of this kind of impairment. If I asked you all on the webinar would you like $500 today or $1,000 next week, my guess is that most of you would say $1,000 next week, right? That part of your brain that can think things through and can delay gratification resides in the frontal cortex.

But if you were addicted to substances, that part of your brain is impaired and you couldn't give up whatever is now for the future. You would take the $500 now over anything in the future.

And you've probably experienced this with your clients, where they will take their drug of choice now for their freedom tomorrow. They'll take their drug of choice now for their children tomorrow. So it's not a moral issue. It's not being able to access that part of the brain that allows them to delay their gratification in this way.

So rewards play a huge component. But unfortunately, as people get addicted to substances, it moves away from just being rewarding to becoming survival. So it starts off in the reward circuitry by impacting a particular neurochemical called dopamine. Now, dopamine is this very essential neurochemical that has to do with motivation and pleasure, also learning new things, remembering things.

Dopamine is the neurochemical that you feel when you accomplish a task, for example, when you finish a puzzle, or you climb a mountain, or at least for me, you check something off the list. I get a little bit of a dopamine rush every time I check things off my list. So dopamine is essential for our survival. And then, fortunately, addiction, whatever our substance of choice is, involves certain neurochemicals, but it also involves dopamine.

So I'm going to switch to a slide ahead and then come back to this one for a second. Essentially, what happens is we have dopamine that gets released in between our neurotransmitters. So our neurotransmitters run an electrical circuit. And then, from one neurotransmitter to the next, there's a chemical interchange. And this chemical interchange happens in our synapses. And I'm sure you all remember this from either high school or at some point that in the synapse is where things happen,

right where we can really impact the message.

So dopamine, as you can see in this particular slide, you can see that dopamine is being released. And then we have receptor sites in green underneath. We have receptor sites that then pick up the dopamine and the signal continues.

What happens with drug use and alcohol use is whatever the external drug is, it mimics our dopamine, meaning it pretends to be dopamine. And so what our body does is several different things. If we do this over and over again and keep taking this external dopamine, then our body stops producing its own dopamine because, hey, I'm getting a ton of dopamine from outside, right?

Let's say I'm using cocaine. Cocaine mimics dopamine. And so I'm getting a ton of cocaine from the outside. I'm getting dopamine, so my body stops producing dopamine. That's one thing. My body also starts to kill some of the receptor sites because there's so much dopamine coming from the outside.

So let's talk about how much dopamine when we're using things like cocaine or meth or alcohol, for that matter. So in order to get out of bed in the morning, in order just for me to function, for any of us humans to function, we need about 50 nanograms of dopamine. We need a certain amount of dopamine just to open our eyes and say, OK, we're going to have a good day.

And during the day, dopamine might rise. The most it can go is about double that, so about 100. And I can have a really, really good experience. Let's talk about good experiences. Maybe it's a really amazing meal right, and I have a maybe 98, or I do really well on something, or I accomplish something really huge, or I win the lottery.

I win the lottery, and that's about 100 nanograms of dopamine that I can produce with my own body. I cannot produce any more. As human beings, this is called androgynous dopamine, meaning dopamine that we produce has a particular limit.

Now, let's say we take cocaine or meth, something from the outside, or alcohol for that matter. It mimics dopamine, and the amount of dopamine that is then released in our bodies is not 100 because we're taking it from the outside. It's not even double that. It's not 200. It's about 1,000 nanograms of dopamine.

So I want you all to really think about that. If you and I have never used alcohol or drugs and never experienced this, we've only experienced about what pleasure is on a 0 to 100 scale. And talk about experiencing 1,000 on 100 scale right, 10 times the amount.

So exogenous dopamine is dopamine taken from the outside. It absolutely impacts our system in a major way. It stimulates the circuit and then overloads it. And then, because our bodies go through so many changes in order to manage how much dopamine is coming our way, we start to make adaptations, neurological adaptations. And one of the adaptations is for us to stop producing dopamine. The other adaptation is to kill the receptor sites.

So then one day, we get into trouble with the law. And we get into treatment or on probation or wherever we go. And we are told, sorry, you can't use cocaine anymore, or you can't use meth, or you can't use alcohol anymore.

My body is not producing dopamine by itself. Dopamine is necessary for me to get motivated, to get out of bed, to learn, to have pleasure, to remember things. But you just took away all of my dopamine, and my body is not producing any of its dopamine, and it's killed all the receptor sites-- or not all, but most of them.

So you take away my external drug. And now, in order just to survive, I need about 30 nanograms of dopamine, but my dopamine that my body produces is maybe a 10 or 20. And I tell you this just so we can have a little bit of understanding of what some of our clients who are deeply addicted to substances, what they are going through just in their bodies.

Imagine not having any motivation to even get out of bed, let alone come to treatment, let alone take a UA or a breathalyzer or whatever we're asking them to do. And then we expect them to be motivated to do all of these things that we're requiring them to do. And then we expect them to learn skills and to learn new things.

To onboard new memories, we need dopamine, and we just have folks who are not producing dopamine. And so we need to be so patient, particularly in the first three months of this process of recovery, this process where the body starts to recalibrate and tries to start, again, producing its own dopamine.

So I've gone on long enough here. And I want to bring in Kevin, who is one of our panelists. Kevin, would you mind coming on and telling us just really very quickly about yourself. And then, if you can tell us, from your experience, what are some of the struggles that you've seen from your seat that people struggle with when they're faced with addiction?

Yes, thank you, Dr. Nandi. I appreciate the information with the addiction and all. My name is Kevin Mariano-- former law enforcement, retired from law enforcement and been doing it for 23 years. And

as far as addiction goes, I think seeing the issue that we had to work with in regards to addiction, whether it be meth, cocaine, heroin, alcohol, prescribed meds, opioids, and such is that trying to understand the whole cycle behind that.

A lot of the individuals that we were working with and having to deal with, obviously, was repeat offenders, asking ourselves, why are we having to arrest a person over and over and not really understanding the side of addiction and knowing what was all behind that. But I think as we obviously, got more training behind addiction and understand the side of the cycle and the process of addiction and so forth was trying to figure out how we can actually work with individuals rather than just, obviously, we couldn't arrest our way out of the situation of problems that we were having within the community. But just trying to figure out and understand why this is happening.

And a lot of information that we were working with was really helpful and useful in understanding why individuals were going through situations and trying to work with them more closely. We were able to actually establish some programs. Within the programs, a lot of it came, obviously, from understanding how we could communicate with the individuals in other departments and programs and such. But I think a lot of it was just understanding of the addiction itself there.

A lot of challenges, obviously, were behind that and trying to work through it the best that we could. And a lot of it, actually, became like a training side of things. There was a lot of the understanding of addiction itself. And that was really interesting to learn about and also trying to train our officers and working more closely with those individuals that we saw as repeat offenders. Working with them more closely is what it was.

Thank you. I so appreciate what you said. We cannot arrest our way out of this problem. That's so, so true. And you talked about experiencing some of the same people over and over, and that's such a hallmark of addiction, that piece about relapse. And there's a slide a little bit later on that we'll talk about, where most of the folks who keep coming back to us are a particular set, right? They're folks who are deeply addicted to a particular substance. And then we, of course, have all of these other folks.

But what the people who are deeply addicted, what they need is different from what other folks need. So training becomes so important. And I appreciate that you attended to that as well. Thank you.

So let's keep talking about craving and then talk a little bit more about the brain, and then we'll start to move away from this. So craving, again, I think you all have experienced craving at some point in your life for something. The craving increases when certain things are in place. Craving goes up if I

know that whatever my drug of choice is is available.

So I'll make this applicable to all of us on the webinar. One of the first things that people tell us to do when we're trying to clean up our eating habits is to empty out our pantry of all of the wonderfully delicious but not-so-healthy foods, right? That's the first thing they tell us. Clean out your pantry.

And I know for me, if I know there are cookies in the breakroom, for example, when I'm at work-- yesterday, when I was at work, somebody made biscuits and gravy. And I know this is sitting in the break room. So I have a cognitive awareness that it's there. The image of biscuits and gravy in the breakroom keeps coming back, and my craving goes up.

If I know the cookies are available, if I know that something's within reach, craving goes up. And unfortunately for me, I have stashes of chocolate in all parts of the house, at my office, in my bag, in the car. I really don't want to run out. So because I know it's always there, I'm always consuming it, or at least always craving. So cognitive awareness of the availability increases this craving.

Another thing that's pretty obvious but I think we sometimes forget about is if I see the drug, craving increases. So this becomes important when we have clients who are still hanging out with people who use or people who are drinking, who are using the substances or alcohol or whatever it is-- they are being used around them. Craving goes up.

Craving also increases in times of stress. In fact, stress is the number one predictor of relapse. So it tells us something about how to support people, right? We ask them to get rid of anything that reminds them about their drug of choice. We ask them to stay away to the best of their ability around anybody else who's using. And we support their ability to manage stress.

We also know that craving goes up when anything that's associated to drugs or whatever their drug of choice is is around. So examples of this-- for some of my clients, they talk about a particular street. They walk down a particular street where they usually buy their drugs, and immediately, craving is going up.

One of my clients talk about the sound of a can opening. Immediately, there's craving. So those are stimuli associated with drugs. And often, we call this people, places, and things. [DING] --places-- [DING] --and when we're exposed to these, craving goes up.

So I'm going to show you some images of brains. And I'll try to clarify what I'm showing you, so just hang in there with me for a second. At the top towards the left of your screen, you'll see the surface

of a normal brain, right? It's kind of bumpy.

And what we're showing is blood flow. This isn't your actual brain. This is not what your brain looks like. This is what the blood flow in the brain looks like.

In the other images, you'll notice what look like holes to us. And just to be really clear, these aren't holes at all. It's just lack of blood flow in certain areas.

I use these images with clients just to show them the impact of their use, whether it's weekend use, or daily use, or whatever it is. And then I also show them to the bottom-right of your screen one year free from alcohol and drugs and the way that the brain is recovering, the blood flow that's increasing.

So there's a lot of possibility here. And I'll show you a similar picture. It just is more colorful. This is a SPECT scan of a normal brain put next to somebody who's been using meth. And again, these are not holes. It's just lack of blood flow in those areas. So it's just helpful to think about what is addiction doing to our brain?

So it's a complex system. It's not just impacting dopamine. It's not just huge cravings. It's more than that. It's impacting the connection between our reward system and our thinking brain, meaning our thinking brain takes a lot longer to get online, to come to, so to speak.

Sometimes, I'll ask my clients, gosh, what happened before you started using? What was going through your mind? And they'll say, nothing. I was just using. I couldn't think of a single thing. I was just using.

Because what's happening there is when we start to use substances that are so gratifying and make us feel good, we develop neural connections for use. And there's a term that we use. Neurons that wire together fire together, meaning that the things we do around our addiction will remind us of our addiction.

So a very simple example that a client used was she was trying to quit smoking-- smoking cigarettes. And she'd say, every time I get in my car, I think about smoking because in the past, she's always smoked in her car. And so getting into the car, which is a particular neural pathway, was also linked with smoking.

And for me, it's dessert always comes after a meal. So I finish a meal. And immediately, I think about dessert, no matter how good the meal was.

So we develop these neural pathways that are all interconnected around the addiction. We call them a self-organizing system, and they stabilize in that way. So in order for us to change that, we have to take all of that apart.

We have to slowly build new pathways, new highways, new neurological highways that we're trying to build. It affects gratification, delaying gratification. We talked about that a little bit.

It also affects something called elasticity. Elasticity in our brain means the ability to learn new things. And that process to learn new things is negatively impacted. It's much harder to learn new things when we're addicted to substances because of the drop in elasticity in our brain. And then we talked about how it's not just a synapse adaptation, but it moves to a bigger reward system, a smaller frontal cortex, and an impact on the connection between the limbic system and the thinking brain of the frontal cortex.

So I know I've been talking for a while. I'm going to invite your participation with this next poll, and this is just a curiosity poll. I'm wondering whether your clients find it interesting to learn about the impact of addiction on the brain. So Joann, if don't mind launching this poll please.

The question that we have--

[INTERPOSING VOICES]

--as our second poll is do you find your clients appreciate understanding about the impact of addiction on the brain? Dr. Nandi, it looks like almost 40% of our attendees and participants answered "Sometimes" to our question, with the next biggest segment coming to us with the response so that they haven't shared brain info yet. Dr. Nandi, please continue.

Thank you so much, Joann. So it sounds like some of you have shared this information, and then some of you haven't. And for those of you who had sometimes find it helpful.

So I talk a lot about the brain with my clients. And I do my best to talk about it not from a place of, gosh, you're so messed up or your brain is so messed up. It's definitely not coming from that place.

It comes from a place of wanting my clients to understand what they're up against, but also wanting them to understand that this is fixable, that we actually know how to support their brains. Because if we know that there's damage to the relay and that the frontal cortex is not coming online, then let's do things to support that, to support the strengthening of their relay and to support their frontal cortex growing.

And a lot of that has to do with the kinds of conversations we have. It has to do with building empathy with our clients, which really strengthens the frontal cortex. It has to do with social support. It has to do with learning skills, CBT skills in particular, Cognitive Behavioral Skills. We'll talk more about some of these ways to support the building of their brain.

But I've found that clients tend to respond really positively when I talk about the brain. Occasionally, I'll get people who say, gosh, I'm really messed up, or they use other language, and feel hopeless. But I try and use this to the best of my ability to provide hope and to provide a pathway.

So let's talk a little bit about relapse rates. We mentioned this earlier. I talked about relapse rates of alcohol or drug addiction compared with different things, like diabetes. And so on the screen here, you'll notice drug dependence or a drug addiction and the relapse rates there, so the percent of people who relapse-- about 40% to 60%-- compared to type 1 diabetes-- 30% to 50%.

And if you're wondering what does relapse mean for somebody who has diabetes, someone who has diabetes is required to do certain things-- monitor your insulin. Take your medication. Stay away from sugar. Monitor what you're eating, exercise, those kinds of things. And then relapsing into old behavior-- not taking my medication, and not checking my insulin, and so on and so forth is what we're talking about in terms of relapse.

Hypertension is similar. People who struggle with hypertension are asked to do certain things-- reduce their stress, manage their salt content, et cetera. And then there's for asthma as well. So this is just to show you that when we talk about relapse, it's not just about addiction. It's about a lot of different kinds of chronic medical conditions.

Again, I don't provide this information to excuse a relapse. I want to be really clear that I'm not saying that relapse is OK, or that we say to the client, well, don't worry about your relapse. Everybody who has chronic medical conditions relapses. No, not at all.

This information is just for us to understand and be prepared that relapse is a part of the process. And therefore, what can we do to arm our clients so that they don't relapse? What can we do to prevent a relapse? Because if we know it's coming, we can be really prepared and help our clients to build the skills that they need to prevent a particular relapse.

So we've talked about much of this, but I just review here for a second. Addiction is about craving something, but craving something more intensely than you and I have ever experienced. It also means that we can't control its use, meaning we tend to use more than we initially intended. And any

of you who intended to eat two cookies and then have eaten the whole bag knows what I'm talking about. And then we stay involved despite negative consequences, right?

We've talked about how it changes the brain, first by changing how we experience pleasure, and then impacting dopamine so that we reduce learning and motivation and become dependent on this particular external substance. And it's not just limited to external substances. It could be gambling, or shopping, or sex. Any of these behaviors that provide us so much pleasure can also be addictive.

So let's talk some stats. This is, after all, an introduction to addiction, so let's talk a little bit about statistics. Almost 1 in 10 Americans are addicted to alcohol or drugs. And tribal communities are overrepresented-- and I'll cover some more specific numbers here in a second. More than 2/3 of people with addiction also abuse alcohol. And then, if we're just talking drugs, the top three drugs of abuse are marijuana, some kind of narcotic pain relievers, and cocaine.

So let's hone in a little bit and talk about our tribal communities. And in the current research, the percentages of folks over the age of 12 who are American Indians and Alaska Natives who've used the following substances in the past year are as follows. You can take a look. I'm not going to read these out to you because it is on your screen.

But I just want you to see these rates. And these rates are anywhere between 1 and 1/2 times, sometimes twice as many as any other racial group. In a different training, perhaps we can talk about why that is and what are some of the things that make us more susceptible, perhaps, to drugs and alcohol, but I just want you to absorb these numbers for a second.

And then let's take a look at something that Kevin said earlier. He talked about folks who he's seen over and over, right? Sometimes we call these folks frequent flyers. I don't know if any of you on the webinar use that term. So let's take a look at this.

90% of all of the alcohol sold is consumed by only 30% of the drinking population. So I know that's confusing. So I want you to think about this. Most of the alcohol that's sold is consumed by a small group of people. That's essentially what that number is saying.

Most of the alcohol 90% of the alcohol sold consumed by 30% of people who drink, meaning it's those folks, that 30%, that drinks a lot of alcohol, and it's those folks that we need to be paying attention to. It's those folks who need to have extra support, not the other 70%. The other 70% only consume 10% of the alcohol sold.

So this goes back to what Kevin was talking about earlier about our frequent flyers and how do we pay more attention to them? How do we support them a little bit more? Kevin, I just want to invite you back in. Is there anything else that you want to share before we move on and change course a little bit?

Yes, Dr. Nandi, I think as far as understanding the addiction that they're having to deal with and being able to have some services that, obviously, you can refer individuals into, that's really helpful for law enforcement and all. Again, to go back to that side, we can't arrest our way out of the problems that are happening, or occurring within the community, but trying to figure out, what is the best method of trying to offer some help and assistance to individuals that do have some type of addiction and understanding that addiction behind that side of it there. And a lot of it goes back to the training and understanding what services are available it's always best to have and be available.

Yeah, very true. Very true. Kevin, thank you. And that's such a huge portion of this, right? What services are available?

So before we talk about the available services and what treatments seem to be more supportive than others, I would love to ask another poll question of our audience. This poll question is something that we're going to talk about here.

But the question really is about what do you think contributes more to developing alcohol or drug issues later in life? Is it genetics, is it environment, or both? So when we talk about nature, we're talking about genetics. When we're talking about nurture, we're talking about environment, or upbringing, or the family that I'm growing up around. Or do you think it's both equal?

Thank you, Dr. Nandi. Again, our options for the question of which do you think contributes more to predicting alcohol and drug issues later in life are nature, i.e., genetics, nurture, i.e., upbringing, or both equally? Dr. Nandi, approximately 63% of our attendees and participants responded both equally, indicating that both genetics and upbringing contribute. Our next largest segment is 26% for nurture.

Thank you so much, Joann. So yes and no. I love asking this question because when I started in this field, I was convinced that it was upbringing. It was the environment. It had to be, right?

I mean, come on. Genetics cannot contribute that much. It's got to be the environment that we grow up in. I think I also really wanted to know that we could make a difference. And then, the more and more I looked at people's histories and they shared with me about their biological parents, even

when they were adopted or in foster care, I started to think maybe it was both equally.

And now we have a small little bit of an answer to this question. And this was based on a very large, longitudinal study, a 40 to 50-year study that was done in Harvard looking at folks for quite a long time to see what happened. And is it nature, or is it nurture?

And what they looked at was folks who maybe were adopted out to a different family, and looking at the biological family, whether the biological family, the parents, for example, had addiction issues, if they were adopted out to families who did or did not have issues, were there differences? So let's see what we find.

We find, interestingly enough, that addiction does run in the family. I want to be clear, though. It's not causative, meaning that just because my mother struggled with addiction doesn't immediately mean that I will. It just means that I have a genetic predisposition. It's very similar to other medical conditions, like cardiac health, for example.

I'm not sure if you've noticed, but when you go to the doctor, they often ask you about your family. Do you have this history or that history in your family? And I've had some cardiac issues in my family, and so I'm often asked what kind of issues do I have, and what's happened, et cetera?

And then they look at me. And we know that it's not a definite that I'm going to develop cardiac issues, but that I have more responsibility than, let's say, somebody who doesn't have cardiac issues in their family. I have to be a little more careful. I need to exercise on a regular basis. I need to watch what I eat. I need to manage my stress, all of these things.

And if I don't, then I, of course, have a greater likelihood to develop cardiac issues than you, for example, who doesn't have that in their history. It doesn't mean that you can't develop cardiac issues too. I mean, if you eat really badly, don't exercise, drink a lot, et cetera, you'll develop cardiac issues too. But I would develop them sooner than you because I have it in my history.

And that's what they're finding with addiction as well, that it's not a definite, but it's an increased likelihood, an increased susceptibility. So it provides what we call a biological risk.

So what they found in this really large, longitudinal study was that kids who were raised by adoptive parents, whether the adoptive parents had addiction or not, they had the same levels of developing addiction if the birth parents had no trouble with addiction. So does environment matter? Sure, it does, but it goes both ways.

You have probably known people who grew up in environments where there is addiction and they develop addiction. You have known people whose parents use, and they commit to never using because my parents used, right? So you've experienced this. With kids whose birth parents struggled with addiction, they were four times more likely to struggle with addiction whether or not the adoptive parents, meaning the environment, had addiction in it. So that's the really interesting piece here.

They also found that if there was alcohol addiction in the family, it increased the likelihood of drug addiction as well. And so a couple more things around that, that all of us are born with an initial level of tolerance that's determined by our genes. If our parents used a lot, we will come into this world with a higher level of tolerance, meaning we can drink more or drug more. So hang with me with this example.

Let's say you and I are going out to the bar, and I have an initial higher level of tolerance because I have parents who were addicted to alcohol. I can then out-drink you, but I will still look fine because I have a higher level of tolerance. So it actually puts me at more risk because, even though you and I, let's say, have had the same amount of alcohol, you are falling over stumbling around.

And because I have a higher tolerance, I look fine. And we now need to drive somewhere. Guess who's going to drive? I will take the keys from you and say, oh, I look fine. You're the one who's drunk, even though we've consumed the same amount.

So it puts me at a higher risk because of this genetic impact. And of course, tolerance increases as we use more. I mean, any one of us, whether we have history or not, can develop higher tolerance.

As tolerance increases, there's a distinction between physical tolerance and mental tolerance. Physical tolerance is staggering and stumbling around, slurring speech, those kinds of things. That tolerance increases faster than my mental tolerance. Mental tolerance is the ability to make good decisions, think about the consequences, et cetera.

So even though I might look fine-- I'm not staggering and something around-- I don't have the same mental capacity. My judgment, perhaps, is impaired a lot more easily than it shows up in my physical tolerance.

But there are a lot of other risk and protective factors. It's not just genetics. Genetics is one piece on this list. It's also the timing of when I started using substances. And I think you all know this, but the younger we start using substances, the longer the course that my addiction will be, and the harder it will be to quit.

So ideally, we like to delay the start of people using substances. And I know that sounds terrible. But the younger we are, the greater the negative impact on our brain. We talked a little bit about the environment and what's modeled for us.

We can also talk about reinforcement. Around us, what gets reinforced? So if we grow up in a family where using drugs is the norm and we get reinforced for that-- yeah, you're part of the family-- then that's the behavior that we learn. And in comorbidity-- comorbidity is when we have both a mental health issue and we're exposed to substances. So when we have a mental health issue and addiction, that's called comorbidity.

I'd like to focus a little bit on THC because we have new research now that several states have been gathering research on the use of marijuana and the impact on driving. And then, there have been a lot of simulator studies, as well, that people have conducted to just look at the impact of THC on the brain. Oftentimes, when people use marijuana, they report increased focus. They're reporting that they can focus on things more.

What they're finding is that is the case, but it's because of a reduced ability to multitask, meaning it's much harder to multitask, to do multiple things. Maybe multitasking is the wrong word-- maybe task switch. You know how when we're driving, we have to constantly move from task to task?

We're looking at the road. We're using our turn signal. We're looking to the side to see if a car's coming up. We're watching the exit. There are a lot of things that we're doing, multiple things we're focused on.

And using THC impairs the ability to focus on the different things that we're required to focus on. So even though people report that they focus better, it's actually a reduced ability to focus on multiple things, and so they just focus on that one thing. So it impairs our ability to track multiple things and moving objects, in particular, which we need to be able to drive.

It impacts our peripheral vision, which is another reason why people say they feel more focused. Our side vision goes away. It impairs our ability to multitask.

And what they've found is that when we have greater than 5 nanograms of THC in our blood-- and I want to be really clear about this. This is blood, not urine. In urine, it's entirely different because we're looking at metabolites of THC and not active THC. So when we have more than 5 nanograms in our whole blood, per milliliter of whole blood, we are six times more likely for a fatal crash.

And that's very similar. It's dangerous to make comparisons between THC and alcohol because they function so differently. But I was trying just to give you an idea. When we have a blood alcohol of about a 0.1, a blood alcohol level, that's similar crash risk as a THC of greater than 5 nanograms in whole blood.

And then, among regular THC users, 90 minutes after smoking 94% of them failed a roadside sobriety test. And a 2 and 1/2 hours after, 60% of them failed. Another interesting piece about THC is that when people are most impaired neurologically is actually different from when they feel most high. So it's tough for people to say, oh, I feel fine because that's not a very accurate predictor of impairment.

In simulator tests, what they found was drivers who had used THC, they tended to drive more slowly. They also put more space between their cars and the cars that were in front of them, but they also crashed 50% more frequently, they had difficulty reacting to anything that was in the middle of the road, and they had trouble staying in their lane. So those are some of the things that were found. And I like to just share this because this is the newer stuff that we're able to read now that enough states are gathering some of this data.

And I'm going to make a hard turn to talk a little bit about personality before we launch into treatment. And I talk about this because, oftentimes, clients will say to me, oh, I have an addictive personality, and we're learning that there's no such thing. But there are some common factors. There are common things that is true about people with addiction. But these commonalities are true about other people too.

So most often, people who have addiction tend to be impulsive. They also tend to be gregarious, which is outgoing and social. They tend to get bored easily, and they try new things, which is sensation seeking. And they tend to be rebellious. They like to do things their way.

But these are not negative traits. All of these are not negative traits. In fact, these traits are common not only among people with addiction, but they're also common among entrepreneurs, among people who start up their own businesses, among inventors. So there isn't something known as an addictive personality because these common personality traits are also common for other folks who don't have addictions.

So I share this with clients because I want them to know that some of the things, some of the characteristics or personality traits that they find troublesome are actually pretty cool. They could potentially harness these and use them in slightly different ways. I mean, some of my clients are so extremely creative about how to beat their UAs, or the kinds of excuses that they come up with

sometimes-- incredibly creative. And if they can use that creativity for other means, for other purposes, they might be more successful.

So let's talk a little bit, then, about treatment. So what happens in treatment is, ideally, we are supporting the process of self-change. We're supporting a really larger picture that some of us see these folks for maybe six months, sometimes a year, maybe two years. And the process of recovery from an addiction is a lot longer than two years.

So we're meeting them in a time-limited event in the middle of a very large change process. And so we're trying to facilitate a natural recovery process. We're a facilitator of some of change. And there are certain things that help and certain things that don't help.

One of the things that helps is skill building. So skill building is about cognitive behavioral skill training, right? How do I stop and think? How do I think through the consequences? How do I problem solve? Those are some of the thinking skills.

How do I start up a conversation? I had a client tell me, I've never had a conversation with somebody, a true, honest conversation with somebody sober. So how do you start up a conversation? How do you deal with conflict? Those are social skills.

And then, how do I manage my emotions? How do I deal with stress? How do I tolerate uncomfortable emotion? All of those are emotional skills.

So cognitive skills, emotional skills, social skills, these are skill building techniques that no matter whether we are treatment providers, probation officers, law enforcement, we can really support these skills with our clients. So that's one of the things in treatment that really seems to work.

Another piece of treatment is positive reinforcement. So sometimes we call that contingency management. Sometimes we call it behavioral reinforcement. Sometimes we just simply call it incentives and sanctions.

But positive reinforcement, what it does is it makes up for that reward that we're not getting from drugs and alcohol. And it doesn't fully make up for it, but it tries to. It helps that intense reward that we're seeking from drugs, and it stops that interaction. So we're really trying to help people find what is it that gives them that positive reinforcement? What supports them?

That could be hobbies. It could be people, supportive, sober folks in their lives. It could be getting involved in community in some way or their spiritual practice, for example. It could even be getting

involved in mindfulness activities, whether that's coloring, or painting, or being outside, or walking, or whatever it is. Some kind of mindful activity really seems to support the brain.

And then, for some, we also need medication-assisted therapies. And medication-assisted therapies-- oftentimes, when I talk about medication-assisted therapies, people think I'm only talking about opiate addiction. And that's probably the most common. You've probably heard of methadone, and suboxone, buprenorphine, those kinds of drugs that support our recovery from opiate addiction. But there are also drugs that support our recovery from alcohol as well.

So medication-assisted therapies, what they do is they mimic their drug of choice but don't provide the same amount of reward. So the intensity of the reward is much less, and it lasts for a more prolonged period of time versus the drug of choice. So alcohol, for example, or opiates have a really huge intensity, but it lasts a short time, as opposed to methadone or suboxone, where the intensity is lower, but the duration is much longer.

Medication-assisted therapies, I just want to be clear, we're talking about medications assisting in treatment, not being all of the treatment. So medication-assisted therapies only work when they're coupled with ongoing treatment, whether it's CBT or D-- I mean, we can throw out a bunch of acronyms. But whatever the treatment is, it still continues and is just supported by medications.

The other piece we're finding in treatment is to focus less on what people should not be doing and focus more on what people should be doing. So we call this getting clear about what we are saying yes to. What are we saying yes to? So it provides less reward or no reward at all when we say I should not eat those potato chips, or I should not eat those cookies, or I should not relapse and use cocaine, for example.

That helps us less than saying I am saying yes to being a good parent. I am saying yes to another successful day of sobriety. What am I saying yes to? What are the components that really support me, support my growth, support my development? What am I saying yes to?

So it's really helpful in treatment to help people develop lists of positive things, as opposed to just focusing on all the things that they have to give up now that we're asking them to stay sober. So just thinking about what are they saying yes to?

So in the last couple of slides, I'm going to summarize what some of our evidence-based principles are for supporting addiction recovery. And one is that no single treatment works for everyone. We have to individualize our services. We get to know the human that's standing or sitting in front of us,

and we try and find out what's most supportive for them. And just because something worked for me doesn't mean that it's going to work for them, so really understanding what is it that's most helpful for this particular individual?

And of course, I need to have the resources available. Kevin touched on this when he was talking as well. What resources do we have around? What's available?

And we attend to multiple needs, not just addiction. Because remember, in one of the slides, we talked about it being a complex system that involves a lot of other different behaviors. So it's not just addiction treatment. It's also social support. It's community. It's spirituality, for example, or it's healthy eating, sleeping well, managing stress. So it tends to multiple needs. And if we're talking about survival, we're talking about people who just have basic needs that they need met. Let's help those as well, rather than just prioritizing the addiction treatment.

That folks need to be in treatment for enough time. And I know "enough" is vague, but it really depends on what's most supportive for them. For people who are truly addicted to substances, sometimes it's a minimum of nine months in outpatient services. So remaining in there for an adequate period of time is really helpful.

And then, of course counseling, and CBT, and all of these other things are critical components. Medication is also helpful when it's combined with counseling or whatever the behavioral therapies are that we're talking about.

That folks who have comorbid disorders-- we talked about comorbidity earlier. They have a coexisting mental health condition-- both need to be treated in an integrated way. Oftentimes, at least maybe 10 years ago, we used to say, oh, you need to treat the addiction first. No, you need to treat the mental health issue first. We actually treat them both. We support both in an integrated way.

That sometimes the first step is detox, but detox in and of itself doesn't change long-term use. It's not good enough. We need to do more.

It doesn't have to be voluntary to be effective. This was a really cool finding in the research, that even people who are forced into treatment do just as well as people who volunteer into treatment. Which is awesome, given that we're in the business of providing services to people who are forced to be there.

That monitoring UAs, monitoring sobriety matters. If I had a medical condition-- let's say I had a thyroid condition. Would I be OK if my doctor said to me, here, try this amount of medication. We're never going to check your thyroid levels.

We're never going to check it, but just try it. We'll see how you feel. Maybe we'll increase it. Maybe we'll reduce it. Don't worry, but we're never going to do a blood test. We wouldn't trust that doctor.

And so why should we not also check if our treatments are working? Having people submit to UAs is not just about them and their use. It's about our case plan or our treatment plan. Is the plan actually working? Are we supporting them, or do we need to tweak something and do something different?

So it's a long-term process that requires multiple episodes of treatment. And sometimes, we only meet them on one of these episodes. So just to remember that this is just one part of something that's much, much larger.

Of course, I can go on talking for days about this issue. There's so much that we can cover. So here are some resources that might be helpful. There's some excellent books, and there's so much stuff available online as well. NIDA and NIAAA online have really fantastic resources.

And then, at the bottom, that last website that says Amen Clinics, that's Dr. Daniel Amen. He's the one who put together those brain scans that I showed you all earlier. So if you wanted to take a look at it, I've included that website.

So let's move to some questions. I'm going to invite Joann back in to take a look at some of the questions that you all are asking.

Thank you, thank Dr. Nandi. Yes, we are moving into the question and answer portion of our webinar. Does the brain relearn to make dopamine in time after usage stops?

Yeah, that's an excellent question. And thank goodness, yes. So our ability to manufacture dopamine recovers once we remove the external substance, but it takes a little while.

Sometimes, it only takes about three months. For some people, it takes six months. And then, for some, it takes years, but it does come back. It just depends on how much they used and for how long. So that determines the negative impact on the brain. But yes, dopamine does come back, and we're able to manufacture dopamine again, which is why I always say those first three months are brutal. Imagine not having the ability to view life as even worth it.

I'll give you all an example, one of my clients said to me-- he had just had a baby, and he said, people say that this should be the best time of my life, and I feel nothing. What kind of a bad father am I? I feel nothing. And that's an example of not having dopamine. It's not that he's a bad father. It's just

that his chemicals aren't working yet. Great question.

So we have another question that is along those lines. Can the brain ever fully repair itself after prolonged marijuana use?

Yeah, so far, we're learning that the brain can recover. There are a few instances where the brain has experienced so much damage that it won't. But in terms of marijuana use that you were talking about, yes, we are able to fully recover. And it takes time, though. It takes time, it takes support, and it takes a lot of patience.

Thank you. Our next question is as follows. Treatment doesn't need to be voluntary to be effective. I understand that someone has to want to want treatment for it to be different. Can you reconcile the difference?

That's a good question. So when people come into treatment, at least in our world, they don't want to be there. They're only doing it because of external reinforcement or external motivation.

I've had clients tell me the only reason I'm here is because the judge sent me, or my only goal is not to see you any longer. I had a client say that to me. I've had clients say, there's not a single part of me that wants to give this up. In fact, as soon as I'm off paper, I'll be right back to using again.

So all of these statements tell us that there's zero intrinsic or internal motivation, but there's external motivation. And so we capitalize on that. We say, that's fine. I totally hear you, and my job is supporting you getting through whatever your term is on probation, or parole, or community corrections, or wherever we're meeting them. That's all my goal is.

And we start with supporting their external motivation. But the cool thing about addiction recovery is that, slowly, sobriety becomes rewarding in and of itself. We start to experience benefits from sobriety that we didn't before.

So clients will start to say-- these are actual examples. A client said to me, now, when a cop pulls me over, I'm not worried anymore because I know that no matter what they do, I'm clean. Or somebody else said, when they do UAs at work, I don't worry because I'm not using anymore. So things are good, they can UA me anytime they want.

Somebody else told me, I didn't realize this, but my kiddo has been telling me how much he enjoys spending time with me. And it never occurred to me how my substance use was impacting her. So slowly, addiction recovery becomes rewarding in and of itself, that's when it moves to intrinsic

motivation. So yeah, they don't have to be internally motivated when they start. The external motivation is just fine.

Thank you, Dr. Nandi. Our next question is does the effect on the brain due to addiction that you talked about today apply also to sex offenders.

That's a great question, and it kind of depends. It depends on whether sexual offending is an addiction for that particular person. If it is, then, yes, indeed. If it's not-- I mean, just like addiction, with sex offenders, you get quite a continuum, right? You get folks who feel intense remorse, never going to do this again, I realize my mistake.

Then you have all the way to the other end of the continuum-- victim's fault. Don't know what you're talking about, and then they continue to do whatever their sexually deviant behaviors are. So in that case, absolutely, it has become an addiction, and very, very similar brain change has happened for sure.

Thank you. Our next question-- do we know why some people get addicted, while others can consume occasionally without ever getting addicted?

This is such a fantastic question, and people have delved into that very thing. There's no clear answer, so I'll give you everything that we know so far. We know that if two people start using, the person who has a family history, a biological history, meaning genetics, will get addicted faster than the other person. If you don't have a family history and I do, and we both use the same amount, I will develop an addiction before you do. You can start and stop and no problem.

Another reason-- it depends on the age that I started. If I start young, the greater the likelihood that I will develop an addiction. If I start using substances much later on in life, lower the likelihood.

It also depends on what else is going on around us that makes our brains a little more susceptible to getting addicted to a substance. Trauma makes us more susceptible to developing addiction. Adverse childhood experiences increase the likelihood that I will develop an addiction because it makes my brain more susceptible. My brain is not as well developed. It's already impacted negatively, and so addiction-- developing those neurological impacts come much easier for somebody who's experienced adverse childhood events.

We mentioned trauma, also, historical trauma has an impact on developing addiction. Stress is a huge one. People who are under chronic stress-- increased likelihood of developing an addiction. So those are some of the reasons why some people do and some people don't.

It's not as simple, though, as taking a questionnaire to find out who can and who can't, which is very unfortunate. But that is such a good question because it's a question that all of us ask, and it's a question that my clients ask too.

I've had a client say my brother uses just as much as I do. He can stop anytime he wants. Why can't I stop? So it goes back to your question. Excellent, thank you.

So our next question refers to the medical-assisted treatment. Does medical-assisted treatment otherwise sometimes called MET, M-E-T, actually help with the cravings since it doesn't give the same amount of dopamine?

Great question. So it doesn't give us the same high. Medication-assisted treatments do not kick dopamine in the same amount, but it does provide more dopamine than our body is producing for sure. So it reduces craving. It reduces withdrawal, which is really helpful. And it reduces the intensity, not just duration, but intensity of both cravings and withdrawal, and that way is really helpful.

Thank you, everyone. This does conclude the question and answer portion of the webinar. In closing, we would like to share brief information on additional training and technical opportunities.

NCJTC is a training and technical assistance provider for Coordinated Tribal Assistance Solicitation Purpose Area 3 grantees and non-grantee tribal agencies focused on implementing system-wide strategies to address crime issues related to alcohol and substance abuse in tribal communities. We are also a TTA provider assigned to assist Tribal Comprehensive Opioid, Stimulant, and Substance Abuse Program grantees focused on developing, implementing, or expanding comprehensive efforts to identify, respond to, treat, and support those impacted by illicit opioids, stimulants, and other drugs of abuse.

ETA services for both programs include customized on-site and virtual training, regional trainings, conferences, webinars, peer-to-peer support, on-site or virtual meeting facilitation, written resources, community planning, justice system collaboration, and sharing grantee best practices. For additional information on general TTA services, links to featured offerings, and to request TTA, please visit our program website as shown on the screen for more information.

Please follow the on-demand link to view upcoming webinars and our robust library of webinar recordings and self-paced online training opportunities. We have several relevant upcoming webinar opportunities in this series that can be found on our website. Please watch your inbox for information

on registration and additional details on these future webinars.

Another valuable resource is the COSSAP Resource Center. A screenshot of the COSSAP Resource Center is shown here along with the web link. Featured resources available include funding opportunities, COSSAP grantee site profiles with data visualization tool, information about demonstration projects, peer-to-peer learning, and recordings of all previous COSSAP webinars covering a range of substance use disorder-related topics and strategies.

Of particular significance is the ability to request training and technical assistance whether you are a COSSAP grantee or not. The COSSAP TTA program offers a variety of learning opportunities and assistance to support local tribal and state organizations, stakeholders, and projects in building and sustaining multidisciplinary responses to the nation's substance abuse crisis. For more information, you can contact the COSSAP Program at cossap@iir.com.

Thank you, again, Dr. Anjali Nandi and NCJTC project coordinator Kevin Mariano for the excellent presentation today. And thank you both for sharing both your time and expertise. We are grateful for your attendance. Please enjoy a wonderful day.