Introduction and Translational Neuroscience

Well hello everybody. Welcome back to another great talk. As part of our Solutions Summit. We have a wonderful innovator, a fellow clinical psychiatrist, but also, gentleman with so much background just heard about in his bio doctor Dave Raven.

Dave, it's such a treat to meet you just talking before the recording about all the cool, innovative stuff that you're up to. And I am so excited to share all of your wisdom and information.

All you're doing over at Apollo Neuro and in your clinical work with everybody in the summit. Well, welcome to the Depression and Anxiety solution. So thanks so much for having me, drew.

It's a pleasure to be here with you. Well, it's, you know, your focus has been, it's so enriching because you're a clinical psychiatrist like me. You see patients, but you also have this background in, in translational neuroscience.

And I just want to tell people what what what does that mean? Yeah. I think, a lot of people don't realize this field of translational neuroscience has been around for quite a long time.

But basically we have a big issue in not just in the neuroscience community, but in the scientific community in general, where, doctors are trained to do by the book, by the book work.

These days, all doctors used to be trained as researchers and doctors and clinicians. Now, most doctors are siloed and trained just as doctors. So here's your instructions on how to treat patients with these symptoms.

This is what you do. Don't think outside the box. And then scientists and researchers are like here's what we're doing. Here's all the gaps in in the research field.

Think outside the box. But then they don't meet in the middle anymore. And the same people are not doing both because the demands on both sides are so challenging that it's hard to split time.

And so going through, you know, I was always mostly fascinated in research. But I wanted to do research in humans and to do research in humans, effectively.

It's easier to do it as a doctor, as a clinician, because you work with patients. And I realized as I was, you know, in my early days of training, probably back in 2006, when I really started to get into the clinical, clinical and basic research lab, I realized as I was learning so much about what we had discovered in Western medicine, medical science, research that most of those discoveries had never actually made it to patients.

They never actually made it to doctors who were changing their treatments based on what we had discovered. And we're talking about Nobel Prize winning work, billions of dollars of research funding over the last 5000 years that had never actually made it to changing practice.

And so translational neuroscience really stood out to me as a field, which is how do you literally translate the discoveries that we do at the bench? The research bench, and then bring them forth to the bedside so that doctors, clinicians, nurses, CPAs, all all different clinicians of all different backgrounds can actually then take this new knowledge and apply it to patients to improve their outcomes.

So that's the field of translational neuroscience and is how do you translate the information from research discovery to practice and then down the road, even just giving it to patients and empowering them to take better care of themselves with this new these new learnings.

Now, some of I think the new knowledge that or the the discoveries that you really feel we haven't translated to patients is around the stress and stress response.

And can you tell us a little bit about some of these discoveries, some of what you've seen and come to understand about the stress response? Sure. Yeah. I love this topic.

So I think one of the most important discoveries of the last, century was actually, Eric Handel's work, who, is in your neck of the woods at Columbia?

I think he's is probably like 9098 now or something like that. He won the Nobel Prize in 2000 for discovering the origins of learning and memory and the mechanism of learning and memory, and that this is not unique to humans.

Meaning the way that we learn and remember and the way our neurons function to restore memory is actually the same as all animals. With it's sea slugs.

Their pleasure slugs, I think, is experienced by the sea. Anything beats any snail. They're these big, big neurons that you guys can study. Exactly. So these.

So if you and this is the history of neuroscience is you don't study neurons in live humans because that is, you know, hurts people. So when we study the nerve, the nervous system, it's often studied in these ancient animals.

See, the ability to see snail is 300 million years old, and it only has 12,000 neurons where we have like billions of neurons. Right. So when you think about how and their neurons are very big and so you can watch them change over time.

So Eric, Eric Kandel showed with on top of a bunch of other people's amazing work that led up to his discovery, of course, which he describes in his, autobiography, In Search of Memory, which is a wonderful book.

It's one of my favorites, and I highly recommend it. He describes effectively in this in his work one thing like I try to summarize it reductionist as reductionist as possible.

What's the one take major takeaway. The major takeaway is that his discovery showed that what our our moms and dads have been telling us our whole lives as kids is actually true, which is that practice makes perfect or practice makes mastery.

The more you practice doing anything as a human being, the better you get at it, because you're forming new neural networks in your brain and strengthening old neural networks in your brain and your body that make it easier to do that thing.

Because we've literally practice doing it. Neural pathways get stronger. There is a correlation between what we do think, feel and how much we do think and feel it and what's going on in here in terms of the actual wiring.

How Stress Shapes the Brain and Body

Right. And that is one of the most fundamentally important discoveries of our time, for not just the reason of showing us that what we do matters, right?

What we practice matters. If you think about yourself as a kid, I swear on this blog, on this interview, or should I keep it even? I mean, I think, you know, I'm going to like, try and take the pulse of everyone and listen, I think if you're feeling passionate, Dave, Go ahead.

Well, so as a psychiatrist, you know this, right? Like many of us are brought up with thoughts of inadequacy, feeling like we're shitty people. We're never going to be enough.

We're not worthy of love. Right? These kinds of, contextual thoughts are very common amongst all people. And, we

see that a lot in our practices especially.

And when people, learn that or back those thoughts up with, with evidence to support that you're not good enough as you are even just that simple thought.

And then you keep thinking about yourself that way you actually are strengthening neural pathways in your brain between your I'm not good enough, I'm I'm, you know, I might be this might be something wrong with me.

And how I feel is not okay. And my identity right. So now you've strengthened a connection between your identity and not being good enough. Those two parts of the brain get more tightly connected.

The more tightly connected they are, the more often we are likely to think of ourselves as not good enough. Not the opposite. It becomes harder to break the cycle.

And so this practice makes perfect. Thing is critical. It also leads into an dispelling another myth of science for probably since like the 1800s, which is Descartes separation of mind and body that got misconstrued over time, which is not actually true.

Descartes, René Descartes, you know, very famous philosopher of science, described the mind and the body as separate so that we can observe ourselves and do self-experimentation.

But what's actually happening is that the mind and body are connected when the mind is sick and we don't do anything about it, and we practice being sick, whether it's intentional or unintentional, our bodies will get sick as a result.

If our bodies are sick and we don't do anything about it and we remain sick and our bodies, our minds will get sick as a result. And it's the same with our emotions.

So all of these things are connected. And Erik handles this Nobel Prize winning discovery in 2000 was a huge part of helping us understand these. The, you know, the truth about the way the body works that I don't think was really accepted before.

I think the idea I've heard over time is it's like neurons that fire together, wire together. Exactly. I think it speaks a lot as, a lot of folks listening have been struggling with chronic symptoms.

And I think sometimes we hear this and we get a little scared, you know, I mean, you know, and I'm in a bad way. Yeah. The negativity bias is high. You know, I think a lot of folks get kind of plagued the thoughts, dark thoughts, you know, negative thoughts.

Less than thoughts, especially kind of middle of the night when we wake up. And it's really hard to hear because sometimes when that's happening, I'm thinking, oh, shit, you know, there I go again.

Now I'm, I'm, I'm wiring in this negative stuff, but you kind of can't shake it and it makes it sound a little bit, you know, like we've just got to practice more positivity and more optimism and self-compassion.

And we're going to wire that together and we're going to feel better. And I think it's going to, you know, be more complex in that in some way. Nope. It's I guess, but that's, that's it's so fascinating is that it's actually, it's we over complicated by making it personal.

Right. It's not personal. What Eric Randall's work shows. This is learned behavior. It's hard wiring of learned behavior. And if you can learn something, you can relearn something else.

And so if we learn from, for example, being bullied in school as children, which is a experience that many of us have had, that's included. If you learn that because you're bullied in school that there are certain parts of you like you're if you're a male, you're sensitive parts, you're compassionate parts that are not welcome.

Right? Because they're not accepted by your community. Then we shut those down and it makes us feel like there's something wrong with us for feeling that way.

So if we practice thinking about ourselves that way, based on the impressions that we got from others or what others taught us or how they treated us, we recapitulate or strengthen the neural networks around feeling inadequate or feeling like parts of ourselves are inadequate.

Like by by making those neural pathways fire together and then wired together. Like you said earlier, it's just practice to reverse it. But we but the key to being able to start practicing a new technique is also to be aware when you're taking the path that leads you to feeling unpleasant again without judging yourself right?

The judgment is where the personal the false percent personalization comes in, right? And so it's helping people to separate, non-judgmental observation from taking things personally.

And then once you can step into and this is where psychedelic medicines are very powerful and somatic techniques are very powerful because they allow a separation.

It's quite drastic between the way I perceive myself every day and the way I actually am, and ketamine, for instance, within an hour of administration in one hour, you can give someone an experience of what's called radical, non-judgmental, self observation.

Or in therapy we call the observer mind, where you're just watching yourself, watching your thought processes, watching the way you think about and and experience the world from over here instead of in here.

And you can see, oh, is this serving me? Where did this thought pattern come from? This was came from being bullied. This came from my parents telling me I'm not good enough.

Right. You can start to see the origins of where these things came from and realize this isn't actually me. I've just accidentally learned and practice associating this with my identity, and therefore practice being in a stress response in my own body for maybe decades.

So how do you fix it? You just reverse the behavior. And that's where CBT, cognitive behavioral therapy is actually such a brilliant technique, because it's really focused on the understanding of the relationship between thoughts, feelings and actions.

And as we start to change our actions, we start to change our thoughts and our feelings. And then they're all tied together in terms of our overall outcomes with those treatments.

That's why that treatment works so well. Give it a lot of talk has been around the stress response and how we respond to stress. In my work recently, it's really been focused on mental fitness with this notion that the modern world is a different beast that we're dealing with.

And, you know, if we don't have, real set, idea around our mental fitness, you know, we're weaknesses are things we need to strengthen, parts of it that maybe we're not working on things like self-awareness, but a lot of this is because it's just gotten quite stressful.

And and being a human has always been stressful, but the stressors are quite different now. And the stimulation feel likes, feels like it's reached, New heights. It's new heights, right?

Multitasking is. And I don't even think that's a concept anymore. It just because it's always happening. So can you tell us a little bit about the modern world and especially, you know, are there is there kind of research around are we having more stress?

Is it a more stressful world or, you know, we just kind of, I don't know, creating that narrative? Yeah, it's an interesting question. So a lot of this comes down to like the fundamental understanding of our neurobiology of

stress.

So like how does the body react and respond to stress. So the easiest way to understand this is to to to close your eyes and imagine yourself going back into being a human in the jungle, you know, with your family, your tribe, and keeping each other safe when they're when there are only five real major uncertainty fears that can stress you out that trigger fight or flight responses.

Those five major fears are the same for all humans and basically all animals. They are lack of food, lack of water, lack of air, lack of shelter and physical safety, and lack of connection to our community.

And then you could, if you wanted to throw a lack of sleep in there, you can throw that in there too, right? So if you. Don't, they are scared of it. They just go to sleep, right? It's like, oh well, rough night.

Like you're going to cause it. But if you can't but your body will let you sleep if you're constantly under threat. That's true. Right. And if you can't sleep, you can't recover.

Because most of our recovery happens during sleep. So that's why I kind of add that as a six, on the side, because it is critically important for us, our survival.

We have to sleep to survive and thrive. But it's not one of the major five because it won't kill you right away. So the major, those major five things are what all of our bodies are hardwired in our brains.

The amygdala of that little fear center in the middle of our brains are literally, unconsciously hardwired to respond to. Then you start to think about, well, what is the incoming signal, for instance, when there might be a threat around the corner?

When we're in the jungle, the incoming signal is uncertainty or unfamiliarity. Familiarity and certainty. On the other hand, our safety signals right.

Safety is what stimulates the vagus nerve system, the recovery nervous system that helps us sleep. It helps us focus. It helps us be creative, empathetic, recovery of, recover, metabolize and absorb our food.

Fight off illness. Right. All of that is governed by the vagus nerve. But that entire system gets deprived of resources when we are constantly stressed out or in constant, uncertain, unfamiliar environments that we perceive as threatening, and our bodies and brains have evolved to perceive uncertainty and, and, unfamiliarity as threat.

And when we're under stress, especially like chronic stress, like most of us are today, threat is everywhere because we're constantly overstimulated. So overstimulation in and of itself, meaning there's more coming in than we have time to process, will trigger by accident.

So it's called an aberrant response. It's like it's like triggering the fear center to fire off when it shouldn't, just because there's too much incoming and not enough time to process it.

Then we do something that's called misappropriation of threat. Meaning we interpret that something around us, like our emails are getting stuck in traffic or what have you might be threatening to us in terms of the hitting one of those five key survival threats from the jungle days, even though it's not actually a threat to our survival, we're just completely overstimulated.

Modern Overstimulation and Chronic Stress

And to give you a little statistic that I think is really interesting, just to wrap this up, in modern times, it is estimated that within 30 minutes of being awake and looking at your phone or a screen, you're consuming as much information in that 30 minutes as the average human being consumed.

In a week of being alive in the 1950s. So just put that in perspective, right. In terms of overstimulation, 30 minutes

one equals one week in the 1950s.

Incoming information content. Right. So then multiply that times your entire day in that many hours you spend in front of your phone looking at the news doomscrolling whatever it is you're compounding that into constant overstimulation.

And our bodies are learning to be in a chronic stress state. Going back to Kendall, we're training our bodies to be stressed. The longer we spend in stress states, the more our nervous system learns that stress is a new norm.

And so inflammation goes up, blood pressure goes up, heart rate goes up, respiratory rate goes up. And this is what we see in the average human who walks in the doctor's office right.

Yeah. And I you know I like the idea of training us to, you know, in some ways untrain ourselves. But I also maybe, a little bit of the healthy skeptic in me feels like, boy, I'm.

I'm very busy. I have my patients. I've got, you know, of a book, I've got the summit, you know, I've got, some, wonderful family kids, you know, who need a lot more attention than, wife, friends.

Don't forget my friends. I've got professional. I mean, and so I like this idea for me and for everyone listening. I think you like this idea, but, it's, a little, almost skeptical because I feel very seduced also by all of the stimulation of the modern world.

And as much as I agree, my cortisol and, is probably through the roof and I'm consuming hoovering up content like never before, I think we're also kind of all hooked on that.

And so I wonder if you can share a little bit with us how you work with people and work with, you know, sick, overworked individuals like myself. David, to just start.

I'm in the under that boat too. Don't worry. Well, I. Think we are. You know, I'm glad to hear you say that. We're. It's like, I'm working some of this probably better than before.

The summit's really inspired me, actually. Co-hosting. It's. I find my, like, you know, my favorite form of therapy recently is I took. I've taken tennis lessons for the first time in my life.

And the impact and the kind of, meditative focus kind of tips from this very Zen Buddhist. Edie, my tennis coach, is incredible. And the place I get to in there, I mean, it is definitely on par with the great psychoanalytic session for me.

I mean, just absolutely a sense of connection and understanding. Not even a sense of mastery, like a sense of progress and flow. And so besides tennis lessons with Edie, which I would highly recommend when you meet folks, like, I think most people watching myself can tell us a little bit about some of the techniques used to help us buy in and actually start making changes.

Yeah, absolutely. And I think you touched on two really important points, actually. Three, which is first and foremost, getting back into your body. Right?

Because one of our minds can be anywhere. Our minds can be in the past, our minds can be in the present or the future, but the only place that our minds actually have power to make positive change in our lives is when they're in the present.

The past has already happened. We can't change it. The future hasn't happened yet. We can't change it unless we change our decisions in the right now.

So this is a practice in therapy, in psychotherapy, and also in ancient eastern and tribal traditions that is referred to as somatic embodiment. It can be done by taking a tennis lesson and just bringing yourself into the moment, being

aware of your body, what position you're in, how you get the rope.

Sorry, I just did my tennis stroke and not so good. You're like, yeah, I thought that was a good forehand coming at me. I was yeah, right. Hang on one. It's like, let me just clean up this coffee.

That was really funny. So. Yeah. So I think it's the idea of, like, somatic embodiment, right? Is just bringing yourself back into your body, the mind centering the mind back into your body, which could be a tennis stroke.

It could be taking a deep breath, it or a few deep breaths. It could be getting a hug it, giving somebody a hug consensually. It doesn't really matter how you get there into the present moment.

The key is the body does not ever leave the present moment. Our mind can go in the past, our mind can go in the future, or it can be in the present. But the body never leaves the present.

It's always just right here, right in the in the now, just like the animals are. So if we do the somatic techniques, whatever they are, if you don't have access tennis lessons, just take a couple deep breaths right now where you're breathing in for five seconds through your nose or mouth and breathing out for five seconds.

And just repeat that a few times and you or or pick up an animal and snuggle an animal, you will feel the same thing we're talking about. And so that is from the mind being grounded into the body.

Somatic embodiment feeling present in the moment. So that's in that wiring. And I'm just thinking about with the snuggling my Bernard doodle, I had a dog, I would have a dog and and I notice when I first got this new dog, family dog.

You know, I like the puppy as attached, but there is something that, like in my heart, didn't feel like it was fully attached until maybe a few months ago.

And I and I wondered, is that like an example of this where I've, my nervous system has spent more time with this dog, happy always in the present, and more neurons are kind of wiring to enjoy that have pleasure with it.

So now I found like, like you had me download the Apollo device and we'll talk about this thing, but I put I got a little this special vibration in my chest, and the first thing I thought of was my puppy, because I had the same kind of feeling in my chest when I told her.

Exactly. And that's why we designed Apollo the way we did, which is technology I'm wearing on my chest that you can feel anyone who's listening can just feel it.

If they want to download the Apollo Neuro app on their iPhone as a as a, a test. But what Apollo is, is just gentle, soothing vibrations that tap into the body's natural vagal response to center our minds back into our bodies in the present moment.

And if you what we discovered in my research at the University of Pittsburgh is, as you said earlier, it's really hard to access these states, right? Like as as much as we're describing the science supports, you know, relearning how to how to function as a human being by these, you know, principles of modern neuroscience.

It's still hard to get there because we spent years training and practicing to do things the way we've always done them. So it's not that it's not possible, it's just tough.

Meditation is tough. Mindfulness is tough. Regular yoga practice is tough. Deep breathing practices, right reads. Restarting a new routine is tough. Why?

Because it's unfamiliar, right? Unfamiliarity, even though it might be good for us, triggers that stress response again in the amygdala. So Apollo it was designed to work by delivering soothing sensations to the body that remind us that it's safe to be in our bodies and be in the present moment.

And then you don't need to have I mean, obviously, it's better to hold a pet or get an actual hug or get, you know, you know, some kind of natural, you know, natural, non technological somatic experience.

But for those who have never had that or don't know what that feels like, we designed Apollo to be able to give people that experience and then train the body how to access those states more, more often.

And then that once you start doing that, it leads into the other two things, two key concepts we teach people, which are autonomy that you alluded to earlier, being able, being the arbiter of your own decisions, being the arbiter and sovereign of where your attention is and where your intention is going.

My attention is on the tennis ball. My intention is to focus on the bouncing of the ball and where it is, so that I can make good contact with it and hit it right back across the across the court.

If you're distracted about anything else, the chances of you getting that ball back are much, much lower, right? So autonomy is always there, but we have to acknowledge that it's there and then step into the sovereign state of being the arbiter of our decisions, our intention, our intention, which is where our energy is going to be able to take control of that.

And once you start to do that, it's incredibly empowering because you're like, oh, I'm in control. So my anxiety starts to go down. My stress response starts to go down.

And then that leads into this third thing, which is mastery that you also alluded to. Right? As you start to be able to take control over yourself in the moment, you start to see incremental improvement and you're like, oh, I'm mastering something new.

This is awesome. Yes. More. Right. And then you get on the path and then relearning becomes a lot easier. Of getting to mastery level of Bernadette or Snuggles.

If anybody wants to DM me for tips on that, it's, highly recommended. We have Bernadette all too, so I totally get it. Oh my gosh, return a doodle tad.

Steve, I feel so close to you now. I mean, you know. Exactly. And aren't they just. But. The nicest.

Somatic Techniques, Apollo Neuro, and Safety Learning

David, I want to hear a little bit about, your research and the idea of Apollo where that came from. And, and encourage people to, to check it out. It's a fun app. Apollo neuro, right before we got on the call, I tried it out.

David had this really cool idea to use the phone to create some of the vibrations. So instead of just the. You get this really interesting somatic sensation.

And, David, it's such a gift to give to the world because mental health can be so elusive and so complex. And there's so much controversy and some what works and, you know, new school versus old school and all this stuff.

And when you feel, something working for your mental health, it's incredible. Whether it's a psychotherapy technique like CBT or psychodynamic or IFRS or any of these techniques.

Right. Or whether it's medicine or a supplement or whether it's Bernard Doodle, or tennis lesson. But, you know, when you feel that, sense of some autonomy, that you're separate from some of these experiences and feelings and, and have some say in what you're doing and then that you can create some mastery.

And I like the idea of mastery a lot. I think for everyone, listening is a really important idea because we often think about mastery as being symptom free.

And that's not been my experience of having some sense of mastery in my life. That that, you still have powerful

emotional states that you have a lot more tools to deal with.

You have a lot more, I find the orientate. I get a certain depressed, existential feeling when I haven't eaten enough, and I happen to be. I get really into my work, and, you know, that that, moment talking about earlier, really being able to have the self-awareness, recognize that, see it for what it is and then take that action, that first step of, okay, well, you know exactly what to do if you're hungry in your boots, bed.

Right. And so the subject is complicated. But if you're not aware of it, what happens. Right. Everybody around you labels you as a hangry, unstable human.

I think that's true. And I think we also then create a lot of narratives. I think one of the challenges that we have in mental health is and around kind of symptom and symptom management is what deserves a narrative.

You know, if you're if you're not sleeping well, you're drinking lots of alcohol or you're living on processed foods, you're not invested in your relationships, don't move your body at all.

And you don't have a sense of purpose, a connection. You know, there's I think we can all agree that's a real set up for massive mental health problems in the modern world.

And, and so, you know, there is really, you know, a set of these mental fitness kind of skills I also think about has buckets for each day. I'm like, okay, you know, can I, can I do a little can I think a little bit about my self awareness today or there are moments that I'm, you know, communicating in a way that I don't feel good about.

Or is there a feeling that I don't understand I'm upset about and try and sit with that and have more awareness? David, I want to go back to the University of Pittsburgh, ruin.

And thanks for saying this is your. But I just love this moment when someone takes a discovery from the lab and brings it to a device where millions of us can have an experience of vibrating our vagus nerve, like, just right after this talk.

And so you take us back there. What did you discover? How did your team see it? You really like looking at like like cell longevity and stuff like this back in the day?

Yeah. It actually started, with my work when I was at Albany Medical Center, working with doctor Sally temple, who actually won a MacArthur for being one of the very first scientists to discover that the adult human brain and the adult mouse brain still retains the capacity to make new neurons and effectively learn new things.

So she was one of the first people back in, I think it was the 70s or 80s when she was still in the UK. To discover that you, in fact, can teach an old dog new tricks.

So this was a big discovery, like when I finished medical school and I started residency was a 2000. We didn't know if it was like, hey, all the other cells divide.

You get new cells, new kidney cells, new skin cells, but you don't get any new brain cells. They're like, don't mess up with those brain cells. And like, we went to be a doctor, right?

And that really shifted. Yeah, it really shifted. And and I think and Sally's contribution to the field was immense in this capacity and, and really changed the way that I thought about the way the brain works as we age.

And so I spent probably about a decade studying aging in human cells, in culture, in the lab and really trying to get to the heart of, like, why do our cells respond to stress the way they do?

What makes certain cells respond better than others and, and be able to tolerate immensely high levels of stress for our entire lives, like our heart cells, our neurons, heart muscle, neurons, certain cells in the eye are literally the same exact cells in our body.

From the moment we're born to the moment we die, other cells turn over every 90 days, right? So how is it possible that there are certain cells in our body that can withstand lifetimes of stress without succumbing to disease and dysfunction, and others?

No chance. Right. And then some people do have disease and some people don't. And this led me down this path of looking at oxidative stress, reactive oxygen species, and then the impact of psychological and emotional stress on inflammation and the cellular functioning.

Right. Because that's kind of the next logical conclusion when you start to look at mental health and we start to see people who have mental illness, when you give them, when they are stressed out, their symptoms get worse, almost invariably.

Right. Stress makes symptoms of mental health worse and the same for many physical illnesses. Actually. So there's a direct, like, heart, like cardiovascular illnesses, right?

What's the biggest reason why people get cardiovascular, AFib episodes, high blood pressure, high heart rate hypertension, right. All these things stress.

And that's what essential hypertension basically is. It's like, we don't know why, but it's probably because you're really stressed out all the time. Do you know what day and time of the week more people die of cardiovascular episodes than any other time?

Like Monday morning, 4:30 a.m.. Monday morning at 9 a.m.. As close, right? Or 8 a.m. or something. It's like right when you're waking up to go to work after a weekend, right?

I it's this is fascinating. Not a single other animal in the universe known universe has a pattern like that, right? Only humans, because we create a sense of negative meaning and stress around.

Going back to work on Monday morning and when you already are cardiovascular compromised, that little amount of stress can be enough to trigger you into a cardiovascular episode or incident that could kill you so no other animal dies.

More from Cardiovascular Episodes in 9 a.m. on Mondays or any day of the week. But humans do, right? So that so the impact of stress can't be ignored.

And what's the opposite of stress? If we think about, like Eric Kandel, if stress triggers fear, and fear is then learned over time as we practice being stressed, then what is the opposite of that?

Well, it's safety, right? Safety and fear counteract each other when you're safe, when you're when you're under under threat, the body gets into a response to a call to fight or flight or freeze response to get you to safety.

And then once you're safe, the fight or flight response, which is called the sympathetic nervous system, gets turned down. The vagal parasympathetic nervous system gets turned up, and then resources are allowed to go back to recovery.

And so what we discovered while I was at the University of Pittsburgh is, is that I started to look outside the box to other techniques that use safety as a as a fundamental component, including regular, old and empathetic eye to eye contact psychotherapy, soothing touch, soothing music, biofeedback, breath techniques, and then things like psychedelic assisted therapy with MDMA and ketamine.

And in 2016, I and I got three and, myself and three of my colleagues trained in MDMA assisted therapy and, by maps and, and what I realized in that training, what was so fascinating was that the way MDMA was being used in the treatment is it was being used as a safety like enhancer.

And when you look at the like a safety learning enhancer, as a molecule, I. Mean, when you learn that, it gives

people a feeling of being safe. It so it does feeling it enhances that feeling.

So, so psychedelics are interesting because, they truly are like nonspecific amplifiers of awareness. That's what the famous psychiatrist Stan Groff in the 1950s coined them as or 1960s.

They are nonspecific amplifiers of awareness. So if you are in an unsafe place and you take a psychedelic medicine, it can amplify your awareness of being and feeling unsafe.

However, if you're in a safe place where you have two therapists that you really trust that you do, you know aren't judging you, that you know you can just be yourself and bring anything that comes up in your mind and share it, and you're not going to be judged.

You're just going to be helped and supported and held. Then MDMA and psychedelic medicines radically amplify that awareness. And so what we discovered, psychologically speaking, and then down the road in a 2022 publication in Frontiers in Psychiatry, looking at the epigenetic regulation of cortisol and safety pathways in the body is that MDMA seems to be working.

And this is also piggybacking from some results in animal studies. MDMA seems to be working by quite literally, molecularly amplifying safety pathways in the emotional brain.

And that tells your amygdala, the fear center, hey, hey, fear center, we're not under threat right now. We're actually safe. You don't need to be firing off like crazy.

Just settle down. And as soon as that settles down, the subject, the person experiencing the medicine, MDMA in this case, actually can feel safe enough to go back in time into traumatic memories and remake meaning around past traumatic experiences from the context of safety.

Now, right? So if you can reappraise what a traumatic event did or how it impacted you 30, 40, 50 years ago, or even two years ago, from a perspective of safety, what naturally comes to mind is, oh, wait, maybe this wasn't my fault right?

Maybe I was just doing the best I could with what I knew at the time, and shit just happens to us, right? Have you seen this? Shit happens. It happens to everyone, right?

This was just when shit happened to me. I just did the best I could. It's not my fault that this happened. And what's the biggest? No, no. About what happens all the time when people come out of a traumatic event and then tell somebody about it, the first thing they hear, especially traumatized women, which is absolutely tragic, is why did you let that happen?

Right? Why did you let that happen? And that is a blame statement that compounds the traumatic event. It makes the person feel more unsafe in their own bodies, because now they're perceiving themselves as the source of the threat.

They there's something wrong with them. If this happens to them, then that creates a fracture or a fracture of self-trust. Fractured self trust means if I can't trust myself to keep myself safe, who can I trust?

Now I'm a victim of circumstance. Now I have a sense of danger coming from my own body. Now my stress response is always firing off. So then you do the MDMA therapy or the ketamine therapy properly with the therapy is the core component.

The MDMA or the ketamine is the catalyst that accelerates the molecular learning process. And all of a sudden you extinguish the fear learning and you replace it with safety learning.

And that's how these medicines work. So Apollo was the way that we translated that understanding of how MDMA works into a technological experience. That is no side effects, it's just soundwaves just gently being delivered to

your body.

That activates the nervous system in the emotional cortex in a very similar way to what MDMA does and what. The device all the time have, you know, I mean, it's probably hard.

You're biased. You created this thing, but but have you are you like, like, headgear? Dan, you're sweeter, kinder, more vibrationally positive guy all the time.

Is that like. I mean, I don't mean to joke, but like, oh. Oh, is that it? You're wearing it now. I'm not. I would, you know, I'm kind of. It is the chronic stimulation.

Does it does it do something for you over time? Yeah. I mean, I mean, it does something over time for me psychologically. And then it does something over time for you physiologically that you can measure that.

Is evidence of the psychological change. Right. So for me, I grew up, you know, you look at my training record and you're like, oh, this guy never struggled in school, but I struggled in school.

School was really, really hard for me. I always struggled with focus. Teachers would tell my parents I have ADHD, my parents not believe in ADHD, so I was never medicated or treated.

I never was given any kind of psychotherapy for it did. My parents were just like, you're gonna learn to focus on figure it out. Me like it's harder, focus harder.

Let's go. Three, three. But I was never really taught properly how to focus on things that were boring or uncomfortable for me. I just had to sit with it over time and figure out how to do it on my own and ultimately practice again.

Going back to Eric Kandel, right? It was the forcing myself to practice over and over and over again how to focus, to get myself to actually learn to do it.

But even at my best, I was scoring in like this, you know, mid-range of the class, like I was right in the middle, introduce a pollo into my life. I was one of the I was one of the first users.

And on a daily basis, I've now been using it for five years, almost every day, as have hundreds of thousands of other people now. And for, you know, every day use not five years, but, the my I went from middle of the middle of the road and of the class struggling to focus and really having to put tons of extra time in to be able to get the same kinds of grades that everybody else was getting to, basically feeling present and being able to focus without so much effort, being able to speak publicly without being nervous and putting in so much effort.

It was like the amount of effort that I had to put in to overcome my stress. Thoughts about, maybe you can't do this, maybe there's something wrong with you.

You know, all these silly thoughts that aren't actually about what you're doing right now.

Heart Rate Variability, Recovery, and Mental Fitness

I was able to recognize that I was in control of my attention when I'm calm, right? And normally when I was stressed, I felt completely out of control of my attention and seeking distraction and that kind of thing.

It was like very characteristic ADHD behavior. So as I started to use Apollo, what I noticed immediately was I can feel calm in a situation that used to stress me out.

When I'm calm, I can focus and I'm in control of my attention. Right? And then I proved to myself, day after day, every time I was calm and focused, I was that much more likely to achieve my the goals I set out for that day.

Right? And so I was proving to myself I was I was reversing the cycle and proving to myself that I could do it rather than what I was taught, which is you're going to struggle in doing this, right?

So that was the very first thing that I noticed within days, weeks of of using Apollo back in the early days in our first prototypes that we made in like 2017, I guess it's more than five years now.

And then from there, I actually use it to train myself out of my public speaking anxiety, which was the single biggest impact that Apollo had on my life.

And then from there, I started tracking my heart rate variability in my sleep. Because we've done double blind, randomized, placebo controlled trials in the lab.

But I wanted to see how does Apollo, because Apollo doesn't prove heart rate variability and vagal tone. But I wanted to see if that improve continuously over time, because if I'm feeling better and more calm, I should see my heart rate variability in my vagal tone improve.

And I did, and now this has been proven that we've seen, not just in me, but in thousands of people that, that these soothing vibration patterns actually improve your what we call the physiological, biomarkers of stress, which are heart rate, resting heart rate, blood pressure, breath rate, heart rate variability, and other metrics like sleep as well, and my heart rate variability.

I run the idea. I run three companies. I'm still sane. I still get 6 to 7 hours of sleep a night, and I'm highly emotionally regulated, and nobody would know how much stress I'm under, because Apollo using Apollo over the years has taught me to be more mindful and present in my day to day, and not be focused on all the chaos.

It's constantly going on that might normally throw me off, and my heart rate variability over the last few years jumped from like 20 to 120. Right. And it's still trending up.

Why do we want more heart rate variability or a higher heart rate variability. So heart rate variability is the or HIV is the rate of change of our heartbeat over time.

So it's basically how adaptable our body is to stress. So if you think about it in relation to resting heart rate, we know that if your resting heart rate is too high, that's a sign your body's under stress, right?

If you're resting heart rate high, that means each beat of your heart is closer together. And that means in over a minute, right? If you're if your heart is beating at 60 beats per minute, then there's going to be a certain amount of time to each beat.

You increase that to 80 or 90 beats per minute. There's that much less time in between each beat. And then your variability goes down. And it's it's well known that under stress, heart rate, very chronic or acute stress, heart rate variability goes down because, the heart rate goes up to feed more blood to the body in under stressful situations.

But we don't want that to happen when we're sleeping or when we're writing emails or when we're in traffic. You know, we want to maintain our level of even calmness.

And so heart rate variability is become such an interesting metric over the last 20 years, because there's a direct correlation that is highly statistically significant now between mental health and well-being with high heart rate variability.

High heart rate variability predicts adaptability, which means like how quickly you bounce back from emotional and mental stress, how likely you are to recover from illness, how likely you are to actually get sick in the first place, how likely you are to perform consistently, injure yourself, or perform inconsistently.

And now, in the most recent studies of folks in blue zones, what's really interesting is all the people who live the longest and have the longest, healthiest lives in blue zones of the world have the high heart rate variability as the

best predictor.

So it's a very important biomarker that you can just measure through your skin, through any wearable tracker. Wow. This has been so much fun, everybody.

We could just keep going. There's so much, information here. And I love the idea that there's something quite actionable from this thinking about vibrations, thinking about how they affect our nervous system and inflammation, and then hearing, about David's experience, starting a polo or wearing a polo and using it in clinical work.

I hope, as with all of these talks, everybody, you hear the real powerful message. There's a lot of hope. There are a lot of solutions. We're here to kind of sift through the wheat from the chaff as best we can.

And this is definitely, I guess we can't call you a piece of wheat, David. That's not, you know, wellness trendy right now, but we can certainly call you a nutrient dense, knowledge filled kernel.

How about that? I love it. If you were a piece of wheat, ferment you into sour dough. But, you want please check out the Apollo Neuro app. Please, think about this conversation.

Most importantly, I think for both of us as clinical psychiatrist, I think about this conversation and how it can affect you in the present. Today, I really, sit with, that, idea that was shared around.

We spend so much time in the past. I'm a psychotherapist. I love going into the past and thinking about it, but doing that in the proper context, the context of safety, a context of understood bonding and transcending, a sense of helplessness or victimhood and into a sense of self and cohesion and the recovery that is necessary, especially around trauma.

And thank you for, all of your, your work. Really, I'm sure you've hit a lot of headwinds over the years, as you know, thinking you're going to take an iPhone, make it buzz, and it's going to change our nervous system and improve our mental health.

And so I just wanted to thank you from all of us, watching for your strength and your fortitude to innovate and to hold your chin up high and to challenge what's going on and say that patients and clinicians all deserve better.

That's a really, really hard veneer to hold. And you do a really great job of it. So, it's really fun to meet you and speak with you. Thank you so much. I wonder if you can launch us all out.

And today, wherever you are, anyone is. You're listening. David, with a kind of final piece of maybe mental fitness advice for everybody, something you'd want us to do today to, to get ourselves in in good shape mentally?

Yeah, absolutely. And, thank you so much for having me. It's a pleasure to get to chat with another fellow psychiatrist. It's a rare treat for me these days.

And, you know, I think the two things I'll leave everybody with today are, number one, that this is arguably the most exciting time in the history of psychiatry and mental health ever.

So if you are one of those people who's been struggling with mental illness, hope is hope is real. Hope is alive and even though we are facing headwinds, things are getting better and they're getting better rapidly.

And, Apollo's just one example. Psychedelic medicines are another example. There's other technologies and tools out there, but the point is that even if you don't have access to these tools, you can access all of their neuroscience is shown, you can access all of these these states.

We're talking about a calm peacefulness from the comfort of your home with or without a Bernardino. So this is the most exciting time in the history of psychiatry.

So more good stuff is coming. And I think just to send everybody home with, with something, you know, that that everybody can do today for free to help you feel better and start the cycle of and process of retraining your brain to feel better on the go forever.

Self gratitude, which is an ancient technique from tribal traditions and eastern traditions, is one of the single most important skills that we have emotionally.

Self gratitude is literally just saying thank you to yourself and finding things to be grateful for in yourself. And if we can be grateful for ourselves, for all the parts of ourselves, for the parts we consider vulnerable and weak, the parts that were scorned or suppressed in the past and the parts that are protecting us every day and helping us get through.

Right. It's really honoring ourselves with gratitude. That starts the repairing and, healing process off by reminding us how much we have to be thankful for right here.

Like I got here today to listen to this, to participate with you. Even though, you know life is not always easy. I'm so grateful. Just that I was able to get up and have another day, right?

And that bring my set my best self or, you know, the best self that I can to today, even though it's not always easy. And every single time I face a challenge, I can find gratitude in the fact that that challenge is not personal attack on me.

It's this challenge is an opportunity for growth, right? And and failure is an opportunity for growth. Right? So finding gratitude in these different situations, in ourselves, in everything that we can is literally the path towards living a life of grace and living a life that is towards what the Buddhist call enlightenment.

And that's such a simple idea that we've been talking about forever, but we still don't do it, you know? I even forget to do it sometimes. So it's just constantly reminding yourself, what can I find in myself or around me to be grateful for right now, even though things might be hard?

And if we start that, even just that one thing, it can be life changing for people. Such wonderful advice, everyone. And I really ask you all to take up that challenge.

I think it's so hard when, Or can be hard when we're struggling with symptoms, depression and anxiety, this idea of being grateful. But I have experienced you can really hold both in your mind at the same time.

There's certainly a way to, and it's important to do that in the midst if you're struggling with symptoms, to kind of work the gratitude muscle and to, use your mindfulness and your awareness of the present.

Everybody, there's been another wonderful episode four of the Depression and Anxiety Solutions Summit. I am Doctor Ramsey, your co-host. This is Doctor David Raven, who has founded Apollo Neuro, a clinical psychiatrist like myself.

I hope you feel the hopeful, positive message that we are living in an unparalleled era in terms of information technology and new science around mental health, and it's trickling down rapidly, more rapidly than ever.

I look forward to seeing you in the next episode. Thanks so much for your time and for joining us. Thanks for having me.