NAMI Ask the Expert:
The Impact of Sound and Music
Featuring Dr. Kiminobu Sugaya
December 8, 2022

Teri Brister (00:00:00):

Teri Brister, NAMI's Chief Program Officer, and I want to cover a little bit of housekeeping before we actually get started.

Making sure you all know that you are muted. The only people who have the option of unmuting are the panelists, so don't worry about your microphone, we've taken care of that for you.

Also want to let you know, if you're new to these webinars, and if you've done these before, then this won't be a surprise, we disable the chat for the Ask the Expert webinar. We have such a wonderful attendance in these sessions that we had people say that it was distracting for them to try to keep up with the chat and pay attention to the presenter, so it's not anything wrong with your computer, we've disabled that part. But we do want you to ask questions. So, you have the Q&A Pod you see at the bottom where you can submit your question. If it disappears, don't panic. We have a team of our colleagues on the backside of this webinar who are capturing the questions as they come in so that we're able to share them with our presenter after the presentation is done.

The call is being recorded and we'll be posting a link to the presentation on nami.org/asktheexpert. We want to make sure that you see that you do have the capacity to enable closed captions if that's helpful for you.

After the email, excuse me, after the presentation, we'll be sending an email to everyone who registered for this event that will have a link to the recording as well as the certificate of participation. Additionally, we'll have a handout or two about some related information that we'll be sharing from our NAMI team. Now, if we can go to the next slide, please.

All right. We want to remind you if you need, and it may actually be the next one if you will, there, the one about needing help. There we go. We want to remind you that if you need support during today's presentation or at any time to remember that you're not alone, we want you to feel free to connect with the NAMI helpline by phone, email, chat, or text.

On behalf of NAMI's, CEO, Dan Gillison, NAMI's, chief Medical Officer, Dr. Ken Duckworth, our board, our board president, Judge Joyce Campbell, I want to welcome you to this December episode of NAMI Ask the Expert. This one is specifically focused on the impact of sound and music. This topic fits nicely with the recent release of the NAMI Hearts+Minds program and when Christina and Hagan first introduced me to our presenter, I was just blown away. So many things that I think you're going to be fascinated. So, we're glad this day is here. And if we can go to the next slide, it may be the title slide, I hope. Oh, there we go.

Teri Brister (00:03:07):

I'd like to introduce our speaker before handing it off to him for the presentation. Dr. Sugaya has been a professor and head of neuroscience in the Burnett School of Biomedical Science, the College of Medicine, University of Central Florida since 2004. He's also the chair of the Multidisciplinary Neuroscience Alliance of UCF, an honorary professor of INDICASAT in Panama, the University of United Arab Emeritus, UAE, and a visiting professor at Tohoku University in Japan. He moved from Japan to the US as a post-doctoral fellow for the Mayo Clinic in 1992 when he was a lecturer at the Science University of Tokyo. He was then promoted to an associate consultant in 1994, then became an assistant professor of the University of Illinois at Chicago in 1997 and was promoted to an associate professor with tenure in 2002.

He invented iPS cells in 2004, a year before the Japanese group filed their invention, using overexpression of embryonic stem cell gene, NANOG, I probably butchered that so I apologize, from adult stem cells. He received the national honor plaque of Panama for exceptional contribution to neuroscience based on his study on stem cell therapies for neurodegenerative diseases. His research has been reported in the Washington Post, BBC, NBC, ABC, and other media worldwide. He teaches a seminar on music and the brain at Burnett Honors College, which always fills up, it looks like usually within the hour that registration is opened.

So, you see why we're so excited about having him here and would like at this point to hand it over to you, Dr. Sugaya, and we will see you on the other side in the Q&A. Thank you.

Dr. Kiminobu Sugaya (00:05:12):

All right, thank you very much. Yeah, too much introduction. Very nice. Thank you. So, I want to talk about music and the brain today, but before that, what is sound? What is music? Please think about it.

So then for the music, like they say, "that's music," but those music could be just noise for me. And then the noise and the music, that's the personal things. But the interesting thing here is that even 45,000 years ago, they made an instrument like a flute, and then this flute has the octave, do re mi fa so la ti do, right? So those octave, and then that's interesting. We are still using octave in our society. So maybe our brain made for the octave, although they set the pace of the music and then the noise could be personal things, but those basic music recognition or the perception of the music could be quite similar.

Next question, is that music only for the human? Maybe not. Like this finch. Yeah, he's using the stick to capture the worms in the hole of the tree. And the human think human is the only one animal to use the tool, but obviously he's using the tool. Not only that, he uses the music, he's singing to attract the females. And then Darwin, he found those singing and the musical ability; musical ability is very important for those creatures to attract the female so that if he's a good singer, he can leave his kids more than anybody else.

So, what the music can do - change your ability to percept time. Now for example, John Cage made the four minute 33 second. That's crazy, it's just the performer comes up, and then the open score and then the score doesn't have any notes, meaning that much of time is just silence. If you're put in the silence. If you're in those silence, huh, maybe you feel so long, long, long, long, long time. But on the other hand, like this Flight of the Bumblebee, Rimsky-Korsakov, (Flight of the Bumblebee plays) he made that.

Dr. Kiminobu Sugaya (00:08:40):

Yeah. So then the time is about the same, but if you listen to something like this, you don't feel its time.

Another example is that- (Flight of the Bumblebee ends) Another example is that when you drive long drive, you might switch on the radio, or these days not the radio, maybe the USB or those digital music things. But if you have music, if you have a radio, or listening music, or something, you don't feel the long drive. But if you don't have those, the drive could be long. And then like a shopping mall or any store, they use music, although maybe it's soft so you may not recognize too much, but they always have such music not for silence. And then that's the way you forget the time and spend more money in that kind of shop.

Another way to use music, repel, that's interesting. So then, like in New York Central station, they used to have the, unfortunately the homeless people hanging around, but at a certain point they started putting in classical music. So, the classical music, they didn't feel comfortable with it. So then now the station is clean, clean, no people hanging around.

Another way to use the, this is the sound in the bookstore, you might recognize if you are young, some of the bookstores having a very high pitch sound, very high, high, high. So, unlike my age, I don't hear it because humans hear from the two kilohertz to 20 kilohertz sound, and then the high-pitched sounds, by aging, we've lost hearing. So, then those high-pitched sounds, we don't hear like a dog whistle. That's an extreme case. But in the bookstore, they put such a sound because young kids, they just pull the book and start reading it and then they never buy it. So those young people, they can listen to it and then it's just a noisy thing. So, then they don't want to stay there. But for the senior people, we don't hear, so we don't care.

We can use those things, so many things. This is not the human, but like a mosquito. If you go to the camp and then worry about the mosquito, sometimes you carry these small things which make a high-pitched sound. Do you know why? Because the mosquito biting you is the female; the male, they don't bite. And then particularly, the female before laying egg, before mate, before may- sorry, right after mating with the male, those females, they need lots of nutrition. So then those females start to bite you. But the small instrument making such a sound, that's a sound for the male flying sound. And then those male flying sound - after the mating with the male, the female doesn't like to have male anymore around. So then the female goes away from the sound and then they're not going to bite you. That's the trick we are using.

Well, and then the next thing is that music can fool your mind. Fool your mind. This is not music, but the visual trick is much easier to understand. Which one, A and B, which one is darker? If you don't know this trick, everybody say A is darker than B, but the fact is that this A and B, they're the same. Because our brain assume the things in the shadow, you see the pillar and then that making the shadow? So then the things in the shadow looks darker than the outside. So that's why we believe, "oh, A is darker". Our brain just assumes it.

Here again, I just put the color, of course this color looks darker than this, but if I move it, I didn't change the color, but I just moved it and then you can see, it's much lighter. And then this is very famous things. He's going up, up, up, going up, up, up. Never ending. This is just illusion, visual illusion. But we can do the same thing with the music. Sound illusion. (Pitched tone plays) This sound always going up, never ending. We can repeat again, again, again, forever. (Pitched tone ends)

Dr. Kiminobu Sugaya (00:15:12):

What happened was this, these two sounds - octave apart. Now because this sound is bigger, larger, I mean more, you can think, "okay, you are listening to this sound" and then now you are listening to this sound, but always going up because most of us are using the relative pitch. So, we are comparing this sound and this sound, this sound, this sound, this sound, this sound. And then going to hear, comparing this, this, this, that. So that's the way, always sound going up.

Another thing is that this is a very famous Dali picture. You can see the torso of Venus here also, you can see the face of the matador fighting a bull, even you can see the bull here, right? The eye, nose and then the horns. Although, you know, it's not perfectly drawn, but your brain makeup, try to make sense. If I say, "we have a dog here," can you point out? Yeah, some of you might. This is the dog. Here's the head, forearm, limb, hind limb, and then the tail, right? Like a Dalmatian type of dog right there. But the dog is just drawn as dots, still our brain recognizes the dots.

Yeah, something like this. Okay? The definition of a triangle is three angles. So, if we have three angles, almost, you can see the triangle here. Same thing for the square. You can see here, right? And then here there's no sphere in the middle, but your brain tells you there's a sphere and the panda bear without closing out. So then the other brain tries to make sense based on such information.

We can do things with the violin, the sound. So within the violin, bridge is like this, bent, not flat. So that means the player, they can play only two strings at once, at a time, at once. So if they push hard, hard, hard, they may be able to play three strings, but no way to play four strings. But Bach, this is the very famous Bach Chaconne, and then he asked to play four notes (Bach's Chaconne in D Minor plays). Four notes at once. Yeah, four notes everywhere. So then why does that happen? Because your brain has some short memory, like a movie. When you watch the movie, your eye, having a previous image memorized, so then when the picture is coming so quick, your brain connect them to each other and then it seems like it's moving. So then the same thing could happen, the sound, memorized a little bit, and then during such a short period, the next sound comes in and your brain connect each other. And also that, these are in harmony with the harmony you... In the harmony, when you start hearing like this sound, two notes, and then start hearing the third, and you expect this sound to be played, that's the harmony. So then your brain is comfortable guessing all four notes. And then if the violin is played fast enough, then your brain says, "ah-ha, ah, yeah, that's four notes, harmony."

So music can tap into your emotion, obviously the emotion fear, music can make fear, and then many things. (Dramatic music plays). This could be fear. I like motorcycles, but I don't do this kind of thing, so [inaudible 00:21:24], and then the music can enhance those feelings (Motorcycle engine revving). All right, so then those things, emotion, we are using the part of the brain called the amygdala. And then this part of the brain is very important to save our life. They call it the amygdala reflex. If you look at a dark cave or something and something came out, if it's a tiger or something, then the amygdala recognizes, "oh, that's so dangerous!" And then makes a response like freezing or run, those things happen without thinking. That's a reflex. Because those sensory data comes into the brain and then such information goes to the cortex. Our cortex is taking so much time, so then it's too late, sorry, it's too late to respond.

Dr. Kiminobu Sugaya (00:22:46):

Now, the easiest example is that when you touch something hot, always you pull the hand without thinking. That happened in even not the amygdala, that's in the spinal cord reflex, but-

In a spinal cord reflex, right? But, if you don't have that kind of reflex, you touch the thing and then you feel those sensation got into the brain and start thinking, "Oh, I'm touching the hot stuff. If I don't pull my hand, I might get burned." Yeah. That's already got the burned. Right? So then, that's the things, so the amygdala can do that. And then, that's the emotional cent center.

But, not only the amygdala, like this things, all this sweets, money, the, yeah, car and boob. You do things make you feel happy. Those things acting on the center called the pleasure center.

Right, so then the already we know that the drug, illegal drug increase the dopamine in those area. And then also, the music can do the same thing. Let me explain a little bit detail here. That's the part called ventral tegmental area. That's the middle of the brain. Okay. Yeah. Here's the dopamine neurons and then if dopamine is activated and that goes to the nucleus accumbens, which is here, and then the send the such a signal, previous signal all over the brain. That's happen, then you can feel the reward.

Yeah, pleasure center also called reward center. Okay? That's the pleasure [inaudible 00:25:05] things. And then, if you have the little bit, the more high class, I hate say that, but yeah, even a sad music can give you the reward, feel nice. And those things goes to the amygdala and then the amygdala send the signal to the hippocampus.

Hippocampus is the like a CPU to your brain. It's a center of making a memory and so on. And then, that's a hippocampus sending a reward signal. And usually, these things suppressed by the GABA, gamma-aminobutyric acid. Okay. And then, when you drink alcohol, this GABA things, that suppressed farther and then the suppression go away. That's why if you drink one shot or something, the people start doing crazy things because this center got so much activated without the suppression.

And then, enkephalin, enkephalinen is the endogenous opioid. And then, the illegal drug, opiate also can suppress this GABA. That's the way the [inaudible 00:26:34] system activated. Music also can do the same thing. Music can increase the dopamine and activate this part of the brain.

This is the Mozart. I would say that's the happy music. Happy, happy music. Right? So then, when you are listening, your brain respond like this one Ventral pigment area, straight area. Okay? And then, the nucleus accumbens, nucleus caudate, in this case. Yeah, so then the happy music, just going straight to the such a reward happy thing. On the other hand, maybe I need to skip a little bit.

Itzhak Perlman (00:27:32):

I believe how authentic he got everything to sound and-

Dr. Kiminobu Sugaya (00:27:37):

No, I couldn't. All right.

Itzhak Perlman (00:27:47):
I couldn't believe how authentic he got everything to sound.

Dr. Kiminobu Sugaya (00:27:51):
Just a second.

Itzhak Perlman (00:27:53):
And I said, "John, where did it come from?" And he said, "Well," he said, "I had some practice with Fiddler on the Roof and so on and everything just... It came very naturally." And that's the way it sounds.

Dr. Kiminobu Sugaya (00:28:08):
I don't have a good control.

Gene Shalit (00:28:09):
When you were first asked to play for Schindler's List, did you give it a second thought?

Dr. Kiminobu Sugaya (00:28:14):
Yeah. No, he said, "Schindler's List." So then, when you're listening to such a music, like Schindler's List-

Itzhak Perlman (00:28:18):
No, that never occurred to me because-

Dr. Kiminobu Sugaya (00:28:19):
You can see that's a sad song.

Itzhak Perlman (00:28:21):
That particular case, the subject of the movie was so important to me.

Dr. Kiminobu Sugaya (00:28:23):
That makes the occupation of this amygdala.

Itzhak Perlman (00:28:27):
And that I felt that I could-

Dr. Kiminobu Sugaya (00:28:28):
And then hippocampus area.

Itzhak Perlman (00:28:30):
... contribute simply by just knowing the history.

Dr. Kiminobu Sugaya (00:28:34):
You know this music, right? Schindler's List.

Itzhak Perlman (00:28:34):
And feeling the history.

Dr. Kiminobu Sugaya (00:28:36):
And then, that's the movie.

Itzhak Perlman (00:28:39):
Indirectly, actually being the victim of that history.

Dr. Kiminobu Sugaya (00:28:42):
Schindler was the gentleman tried to help the Jewish people, but he couldn't help all the people, obviously. And then, this is the music for that movie. Yeah, I still remember this movie was black and white and then only the color was the small girl in the red. But anyway, okay, so like this music activate the different part of the brain, as you can see here. But still, you feel some kind of reward things.

Okay, little bit switch the gear. This is the, we call Pachinko parlor you can find in Japan. This is something like a sort of machine parlor. They bet the money and then when they win they get the money. Okay? And then, in there, they pray, like this music. All the time.

Because, yeah, even they lost, with this music, they don't care because this music activated such a dopamine system a lot. And then, they bet the money, bet the money, bet the money.

I think parlor get more money. They know that. By the way, this music was made for the Japanese Navy during the World War II to encourage the soldier.

All right, another thing is that our brain is lazy. That's the story I want to talk about. You know the consonance and the dissonance. We like the consonance, we don't like the dissonance. From the baby, if we give the consonance music, dissonance sound to the baby, like a three months old, two months old, the baby always face to the consonance. They don't like the dissonance.

Of course, if we have always consonance, that's boring, so then sometime the musician, I mean the composers, they use the dissonance to make a punch or something. But still, our brain like the consonance.

If we put the one sound on the Y-axis, another sound wave to the X-axis and then we check the crossing point of those wave and then the dissonance, they're seeing each other so much everywhere. Measures seventh, wow, so much crossing point. But the consonance, it doesn't have much of the... is such a crossing point.

So then, the brain is not necessary, brain doesn't have to do the so much processing to recognize this sound. So then, that's the reason that we like the consonance over the dissonance.

Dr. Kiminobu Sugaya (00:32:15):

Okay, music can make you a better communicator. Why? This is the PET scan. Okay, this is the resting stage. And then, the bottom is somebody listening along, you can see this part, left side of the temporal lobe side of the brain got activated. And then, when we listen to music, right-hand side of the brain of the same part of the brain activated. We call this area language center. We have a language center on the left and then language center on the right. We have two pairs of the language center called Broca's area and Wernicke's area. Those are the language centers we have on the side of brain.

But interesting enough, language and the music, they use the same part of the language center to recognize their such a input. Yeah, you can see here, if somebody listening language with the music, music with the lyrics or something, then they both side of the brain got activated. Yeah.

So then, because of that, this happened. Ask the people to find the error in the music and in the language. And then, we compare the musicians.

Okay? And then, in adult, of course the strong error, everybody can tell, so not much the people having a problem. But the weak error, music of course, the with non-musician like me, very hard to say, "Oh, that's something wrong." But, the musician can do the same way the language musician can recognize the slight error. Okay, slight, the difference, but the non-musician, difficult.

And then, that's also happening with the kids. Dyslexics, these people, very famous people, Winston Churchill and then Albert Einstein and so on and so on. And then, if you have any of these symptoms, maybe you have a dyslexics, I do. Anyway, okay, and then those people having a hard time, even a strong error recognition.

They have a hard time. But, after music training, only music training, painting training doesn't do this. Only the music training, we can fix such a program with those people. You may know that Einstein, he was a very good violinist, a violin player. He loved the violin and yeah, he was pretty good. If he didn't play the violin, maybe we didn't have the nuclear power. Because, the language is very important to think. Think, think. When you think something you are using the language.

Now, I'm talking in English, so then the I'm thinking in English, but after a while, everything automatically translated into the... Yeah, I look at the questionnaire answer. Wow, so much writing. But anyway, all right, so then, I'm from Japan, so then the, I'm used to Japanese.

And then, when I think hard, I'm thinking Japanese, like mathematics, everything in the Japanese. So then, you are using your language to think. The language ability is very important for the thinking. That's another way music can affect. Music can make you stronger. Make you stronger. No fear, no pain.

Yeah, those people, they don't feel pain because they prepare themself with the music and dancing. And then, even you can see they don't breathe too much because of the music. Music can change the blood vessel, blood flow or in the skin. And then, they don't have much of the breathing.

Dr. Kiminobu Sugaya (00:37:17):

Like this, right? Yeah, that's, it's too painful, right? But he don't feel it, right? Because of this music. And then, to kill the pain, we used to use the soothing music. That was wrong. We have to use the very rhythmical music. So then, maybe the dentist, they start using, they should start using this rhythmic music. Maybe this is too much. But some pop song with yeah, dance music, ABBA or something. Those are the very nice to prevent or keep you from feeling pain.

Okay, yeah, yeah. Boost your immune system. Somebody might say, "No way. Why immune system?" Let me explain, when we expose the stress, the we release the cortisol. Cortisol is a hormone, stress hormone. And then, the try to prevent the effect of the stress. But, on the other side, maybe sometimes you use the cortisol for the treatment for the inflammation. Yeah, that means the cortisol, that's reduce your immune response. Okay. Yeah. So then, if you get stressed, the cortisol level shoot up. And then, your immune response suppressed by this cortisol. But, the music can suppress such a increase of the cortisol. That means the music can preserve your immune response even after there's such a stress.

Okay, music can repress the drug means the drug. Drug means the illegal drug. Yeah, so music is the drug. Already I mentioned that the music acting on the same part of the brain reward system. And then, also now we know that we are using the sound to leverage your brain wave like this way. So then, if we have the very close, maybe 440, 442, the sound wave, and then we can hear the two hertz, one, one, one things. You can hear that...

Yeah, so using those, we can control the brain wave, put the one sound to the right ear, put another sound to the left ear. And then, in the brain, you going to merge those sound and make those one, one, one, one, one. Those sound. And using those, we can create a alpha wave or even a theta wave.

If we make it to the very strong, like a beta or gamma wave, than they, yeah, that's the drug, right there. And then, the music can repair your brain damage. Brain damage. That's weird. Okay, so I'm a stem cell researcher. This is the human brain cells derived from the human stem cells. You can see the astrocyte. That's a glial. And then, there's tiny cells moving along the edge of the astrocyte. Those are the neurons.

Our brain is moving like this all the time. Although, this is in vitro. And then, I took the picture every five minutes, but our brain is active. The first things, a canary. Why canary, the bird? That's where we found the stem cell first. This is the first paper, 1993, seeing the bird had the stem cells in the brain. We didn't know that. That's why I started the stem cell research. I tried to fix the Alzheimer's disease with the stem cells. That's what we do. Yeah, so then the birds, they start learning the singing during the spring to attract the females. And then, those birds forget the singing during the summer. Oops. So then, they have the special cells, here's the stem cells, and then from the stem cells, they create the neurons every spring to learn the music.

The light information comes into the eye and stimulate these cells to differentiate into the neurons. And while that they listening that somebody else's singing and then learn. And then, that they make this neuro connection every spring. But, this connection go away during the summer. Maybe the music can induce the neurogenesis. That's what it is. Increase the stem cells, increase the neurons in your brain. And then, the very famous things that music can make you smart. Maybe you heard about the Mozart Effect. If you give the Mozart music to the kids, they become smart. Baby, even though they sometimes try to use in the tummy. Wow, fetus. Okay?

Dr. Kiminobu Sugaya (00:43:52):

Yeah. But we did some of the study like this. Yeah. Double piano concerto, Mozart. And then, we give this music to our student, and then we checked the frontal lobe function. The frontal lobe function increased 50%, five-zero percent after listening to this music. Can you believe it? 50%. We thought Wagner, that could increase the brain power because the Wagner, as you may know, they have been used by Nazi or even the American, the soldier, to encourage the soldiers during the fight. But, we didn't see any effect with the Wagner. Zero. While the Mozart can increase 50% of your brain function. And then, the interesting is that already I introduced the song in the Pachinko parlor, that song we just gave to the student. They never listened to Japanese music, but their brain respond. Their brain increased the power like 30%. But definitely, music can increase your brain power. But, maybe you don't want to listen such a music with lyrics while you're doing the homework or something. Or, hard thinking, because already I showed that the music using the language center, but the language lyric use the left side and music use the right-hand side. Your brain could be occupied and then it's not good for the work. Okay, so next.

Okay, so next thing is the cure of the Parkinson's disease, cure. All right, so then the top brain is the Parkinson brain, fresh cut, post bottom brain. And the bottom is the fresh cut of the control brain. You can see this brown deposition. Those are the cells lost in Parkinson's disease. That's the cells sending a signal to this globus pallidus and the putamen. And the putamen is the center for the rhythm. And then you need the rhythm to do many things. You can behave, you can work, you can do things with the rhythm. So, then the rhythm, very difficult to do. And then the Parkinson patient, they lost the ability to create the rhythm in the putamen. That's the problem with them. So, the Parkinson patient, they have the hard time walking, start walking and then the walking. He wanted to continue to walk, but a bit difficult. And then you can see the rigidity in his hand here. But he's going to put the music pretty soon. Let's see. I don't have ability to change here somehow. Maybe because of the point. Ah, yeah, because of the point. Okay. Now he put the music. Very rhythmical music. See? Almost Parkinsonism is gone because his brain start using the rhythm from the outside. He doesn't need to make a rhythm in his brain, so he's using this music as a rhythm. So, music definitely, but the temporary cure of the Parkinson's disease.

So then the hospital started using this, the Parkinson patient get together and do the call us or something like that. All right, so then the last thing is the memory. So this is the normal brain and then this red part of the brain is active, picking up the glucose. This is pet scan. And then the mild cognitive impairment, you can see this lung at the center start losing the signal. And then Alzheimer disease patient, almost gone. So our memory reside everywhere in the brain, not just one place. And then if you give the certain music, which you are listening, when you had a good time, good feeling, good emotion. This Hotel California is good for me. Eagles. I love it.

But when I go to the ocean drive with my girlfriend and switch on the radio and this music came out, that's how this music connect with the emotion. And then such a emotional memory never fade out. And they using those emotional memory. Already I told you that, we put the things everywhere in the brain. But the problem with the Alzheimer's disease or the [inaudible 00:50:44] here, they lost the function to retrieve. We forgot where we store those things. But using the music, we can recall the things and then connect each other, put together and then start to make sense.

Dr. Kiminobu Sugaya (00:51:05):

So then maybe I can start from here. So this is the late stage of Alzheimer patient. She tried to reach out him, but he never respond. Very depressed, in other words. Not much response. But if we give such music, particularly the music he was listening when he was young, having a good time, and then those music recall his memory and increased the arousal, and then you can see the amazing effect of such music. This is what you see after just listening the five minutes of those music. See? That his eye open up. That means that his arousal going up.

Speaker 1 (00:52:25):

It gives me the feeling of love. I figure right now the world need to come into music singing, you got beautiful music here. Beautiful, lovely. And I feel band of love.

Dr. Kiminobu Sugaya (00:52:39):

So that's the end of this lecture. And if you have any questions, I can more happy to answer.

Teri Brister (00:52:50):

Dr. Sugaya. That was fascinating. I remember being intrigued when we met with you early on and you hit some of the high points for us, but it was fascinating. Thank you so much for the presentation.

Dr. Kiminobu Sugaya (00:53:05):

You're welcome.

Teri Brister (00:53:06):

I'm going to share some of the questions that have come through already and then I'll be mindful of the other ones that come through as we're going. And these are in no particular order. Somebody asked, "When anxiety causes a person to get stuck in a certain physical response, can music reset the body's response?"

Dr. Kiminobu Sugaya (00:53:29):

Yeah. So many of the anxiety coming from the amygdala function. And then, not necessary the soothing music, but also some sort of rhythmical fun music. For me, like Mozart. For somebody else, something different. But those music can reset. And also, the people say that ear warm, some of the music stuck to your ear. Now some of the music phrase, stuck ear, ear. And then if you find those music and then the fun music, that may be another good way to forget about those anxiety response. Like my father. He passed away a while ago, but in the hard time when something happened to him, he started singing. Always. That's the way he recognize, okay, he has some problem. So then that kind of things also might help. That's my feeling.

Teri Brister (00:55:02):

Terrific. So you mentioned earlier, and I was especially interested in this too because I have a three-month-old granddaughter, you mentioned the differences between dissonance and consonance in music. And someone asked if you could explain that a little more. What is dissonance? What is consonance? Or maybe give some examples?

Dr. Kiminobu Sugaya (00:55:23):

Yeah. A little bit far away, the sound, that's the consonance. The good harmony. Domiso is a good harmony. But if you have a dole or a do sharp or something, and then, like I showed you, that's going to hit each other too much. That's the dissonance. And then a good example is more talent, classical music, I hate it. I mean such a composer using lots of dissonance sounds crazy, it's not going to make sense. That kind of music, the sound is a dissonance.

And then the other brain already knew that from the birth. That's why the baby, they start responding those dissonance and consonance very early. That's what I said. So put the baby in the middle and then put two speakers on the right and the left, and then the put the dissonance on the right, consonance to the left, baby always face to the consonance. You can test that. I did that to my son when he was baby, and then he did. So that's the things. And then from the verse, we like the consonance, we dislike the dissonance, but they already say that if we have too much consonance all the way in the music, that's boring. You might fall asleep. So that's the reason the composer putting some dissonance in a effective way. Terrific. Does that answer enough?

Teri Brister (00:57:47):

So this is a simple one, and this is more about you and your research. Several people wanted to know if you ever collaborate with music therapists or have done any research with music therapists?

Dr. Kiminobu Sugaya (00:58:00):

Yeah. Because my major is Alzheimer, so I wanted to have a cure for the Alzheimer, and we are getting somewhere. But anyway, so the two ways to think. One way, I collaborated with those people giving the music to the Alzheimer patient, particularly the music. Those Alzheimer patient loved here when they were young with his girlfriend or her boyfriend or something having a good time. So those music, we put into the USB chip and then gave to those patient. But we did the law and then even the local and then the nationwide. And we saw a tremendous response, tremendous.

The Alzheimer patient, when they were in the late stage, they become depressed or become anxietic. Upset easily. But after giving those music, all those behavior corrected. And then our student also, she did that for her grandmother who had dementia. And then my student say that, "Oh, that was wonderful, my grandmother totally changed." Although the grandmother still couldn't recognize her much, but her behavior, much better and easier to communicate. That's what she said. And then in the class, she showed all the record of change in the video. That's what we had.

Teri Brister (01:00:00):

Fascinating. There are a couple of questions, and they're coming through rapid fire now. They were slow coming during the presentation because everybody was so engaged and now they're just really coming in. A couple of them are getting at the same thing, and I'm likely in the older crowd on the call, but I remember growing up people saying that rock music was going to do all these terrible things to us and hip hop music was going to do all these terrible things. So a couple of people are asking is there really any evidence to suggest that heavy metal music... Talk about that for a minute.

Dr. Kiminobu Sugaya (01:00:45):

Actually, believe it or not, heavy metal music is good. That prevent suicidal people sometime. Yeah, heavy metal musician, they play the classical music in the heavy metal way too. I love those things. And the rock music isn't too bad. Yeah, I think it's good. But rock music, this is a study already established that people grew up with the rock music, they become aggressive. That's inference they might get. Obviously the music can affect peoples way of thinking, that's the environment. But I would say the heavy metal isn't too bad. And I was in the psychiatry department in Chicago and we sometimes use the heavy metal to help so much depressed, so much suicidal people. The people thought the other way around.

Teri Brister (01:02:03):

I was thinking exactly the same thing. It seems counterintuitive and just again, fascinating. So several questions and I'm going to do my best to try and lump them together in a way that will make sense to you I hope. Several people are asking about the connection between music and memories. Someone asked, "Does it really help you retrieve the memory or is it just helping you recall a feeling?" And then someone else is asking about music actually helping to bring back lost memories?

Dr. Kiminobu Sugaya (01:02:42):

Yeah. Yes it will. So I like to mention that memory connect with the emotion, never fade out. If you have the emotional memory, that's very difficult to lose. And then those things, even a certain moment of the memory, but such emotional memory, not all the time, this time emotional, this time emotional, this time emotional. And the people without Alzheimer, they can connect all those things together, so then we can recall the quite old memory and then so on. That's one. But the music can enhance the recall of the emotional memory, not just the music.

Another way to recall is the scent, sense of smell. So the sense of smell is very close to the area of the brain, little bit the inside of the temporal roll. And that part of the brain connecting those emotions and then the sense of the scent and the sound and other scents together, and then making those memory. So that's why the ladies or even male, they wear perfume. And that's the way they give such emotional or very strong impression, and the other people don't forget about them. So that's one.

Dr. Kiminobu Sugaya (01:04:42):

Another one is the Alzheimer patient, still he can play piano. That sometimes happen, because two things, one is that this emotional memory recall, another one is those finger memorized. So then without this emotional memory calling back, of course even just the finger itself doesn't move. But put together, that's the way he can play piano. And then this finger memory, that reside in a cerebellum, not in the frontal lobe. And then cerebellum memory is like riding the bicycle. Once you get it, you never forget it. So that's the finger memory. But the finger memory needs some trigger, that's the emotional memory. So the music can trigger those things.

The music can improve such a combination and prevent getting dementia. That's also already known. I told you that music is the temporal role, which is the language center. That's part of the brain. The layman, like me, we are losing the thickness every day by aging. Thickness means that we are losing the neurons. But the musician, they never lose the thickness because they're training those part of the brain very well by learning the memory. So not just listening the memory doesn't help much, but if you play instrument, that's the things. So maybe you can recall that quite a few conductors, they don't get the dementia and then they live like nineties. Just a clean memory, clean brain because two things. One is that they express themselves in the music, almost playing a instrument. That's important. And then that stimulate those [inaudible 01:07:16] center and then that they don't lose the thickness of the [inaudible 01:07:20] center. On the top of that, conductor does the, not hard exercise, hard exercise is bad for you, but a little bit exercise, cardio, exercise all the time. So that's the reason they can live long.

Teri Brister (01:07:40):

And that goes directly to a question someone had put in earlier, that you had talked about the effect of listening to music, but what about the actual musician? And I'm assuming what you're talking about with the conductor is the same as for the musician themselves?

Dr. Kiminobu Sugaya (01:07:59):

Yeah. And then the violinist. My wife is violinist. Unfortunately, she cannot be here today. But when we look at those musician's brain, very interesting. Already I told you that they don't lose the temporal thickness, longest center of thickness. And also, when they listening to the music, the visual cortex light up. Why visual cortex? I showed you that brain scan showing the temporal robe lights up when you're listening to the music. But the musician, they used the occipital cortex, which is a visual cortex. Maybe they're opening the musics core in front of them, when they're listening the music, they turn the page one by one. So, then the visual things, they are creating. Musician's brain is so much different.

Teri Brister (01:09:01):

We talk ...

Dr. Kiminobu Sugaya (01:09:01):

Musicians' brains so much different.

Teri Brister (01:09:03):

We talk frequently at NAMI about how complex the brain is, and how hard brain science is and why it's so difficult to find specific treatments for mental illness. Listening to you today, it, and I know I keep saying that it's fascinating, but it is. I'm just reminded again of just how complex the brain is on so many different levels in wellness as well as in illnesses. It's complex, and things you don't think about being connected. Something that you said made me think of another question someone had asked earlier. My brain seems to continue to create music even after I turn the music off. Is that normal or typical?

Dr. Kiminobu Sugaya (01:09:55):

Yeah, that's normal and then typical depending on the music. Okay? If I listen a lap music and then turn off, I never think about those music. But if I was listening the beautiful music which I like and then even turn off the music, such a things, already I told you that ear won, stick to my ear. Right? Then sometimes I do the humming and so on. That's very normal, and then that's the typical brain function. If you dislike, forget it. But if you like it, stick to the brain. That happens.

Teri Brister (01:10:41):

Wow. Excuse me. I recall, and partially because the music was startling, the percussion. Someone asked the question about the differences between rhythmic music without an actual melody and the impact on that versus melodic music. I seem to recall from what you were saying, the rhythmic, it all has an impact.

Dr. Kiminobu Sugaya (01:11:13):

Yeah. Then, of course, it depend on the rhythmic things that stimulate your pressure center and also the putamen. That's where the dopamine signal going. In the putamen, your brain making the rhythm. Right? Then those rhythmical things give you the pleasure like a strong drum. That's why the ancient old time people, they drum before the war. Right? They don't do the beautiful music before a war or something so that's different. On the other hand, when you wants to stimulate your hippocampus or something, think something or the, hmm, what can I say, the more high level of thinking or something, then the rhythm doesn't help, melodious things don't help.

Teri Brister (01:12:37):

Interesting. If I'm hearing you correctly, it's almost like the more complex, whatever it is that you're dealing with, the more melody helps rather than just the ...

Dr. Kiminobu Sugaya (01:12:51):

Yeah, I think so.

Teri Brister (01:12:53):

Goodness. Yeah. Several people, I'm sorry.

Dr. Kiminobu Sugaya (01:12:56):

Yeah. Now another example is that, yeah, this is slightly off, but when you show the boy's picture to the girls in the city and then ask them to pick a score, they might say like 5, 6, 4 because their mediocre. Right? But if you do the same thing after those people did the bungee jumping or something, everybody put the score 10 because their brain released the dopamine a lot. They got excited. That's why they say, oh, 10, 9, 10, so much different. Okay. Then those things happen after listening to music, rhythmical music because the rhythmical music increased your dopamine in the pressure center. Okay. That's why I say that when you date, don't put the melodious music. Put the rhythmical music, then the girl look at you, oh you are so good.

Teri Brister (01:14:20):

We've gotten several different questions, but related to schizophrenia specifically. Several times you talked about Alzheimer's, you talked about dementia, you talked about depression. Someone has specifically asked, can you talk a little bit more about schizophrenia and music? Someone had a question in there earlier, did you say music could cure schizophrenia? I don't think you said music could cure anything. What I think I heard you say was it can alleviate the symptoms for a while. I remember the guy who ...

Dr. Kiminobu Sugaya (01:14:56):

Temporary. Temporary, yeah.

Teri Brister (01:15:00):

Can you talk about schizophrenia and music specifically?

Dr. Kiminobu Sugaya (01:15:03):

Okay. Schizophrenia having more dopamine in the brain to start with. Using the music to reduce the dopamine, that's the things we need to think about. That's the very difficult task. Yeah, even if we put the calm down very slow temple music, the production of dopamine never reduced. Then I hate to say that that's a very difficult task. Only one thing though I can say is that the lullaby might help. You know the lullaby, right? Yeah, of course everybody know lullaby. Then the lullaby is the speed of what? What kind of speed? The tempo is like a 60 70. Right? Not the 120, obviously, not the hundred. Okay. That's the speed of the heartbeat of the mother in the calm situation. Then when you are a baby in mother's tummy, you are listening to those heart beat. Then if the mother heartbeat is 60, 70, then you are okay. That's why the lullaby always that speed. Then sometimes you tap the baby when you try to put them into sleep or something. That's the same thing.

Teri Brister (01:16:55):

When you're lowering the speed.

Dr. Kiminobu Sugaya (01:16:56):

Yeah. The same reason schizophrenia patient, still they have a memory when they were in the fetus, I mean in the mother's tummy. Then that might help. But again, very difficult and then the temporary things. Pushing up the dopamine easier, pushing down is not that easy, so unfortunate.

Teri Brister (01:17:29):

There are a couple of questions about, there have been several questions about specific music and specific disorders versus just music and mental health symptoms in general. Know that those questions are out there somewhere. This is one though that may have an easier answer. I don't know if that's the right word, a more concrete answer. You mentioned music specifically being helpful with decreasing suicidal symptoms with people. Could music be used to control anger management? Could it be preventive and acute management of behaviors or management of acute behaviors?

Dr. Kiminobu Sugaya (01:18:15):

The anger things, before the anger, maybe the brainwave shifted to the beta wave or the gamma wave from the alpha. Alpha is coming down, sort of. Right? That's the reason, if we use the binaural sound, I mentioned the wah, wah, wah sound, and then put that sound in the background of the music, and then give to the certain person, we can control the brain wave. Then that's the way we can increase more alpha wave. That's the very strong wave to control the anger, soothing down. Anyway, quite a few music can with those binaural sound, music can create the more alpha wave to start with. Yeah, we are using those music therapy for the, I forgot. I'm getting Alzheimer's, so I lost the sometimes word. Right.

Teri Brister (01:19:43):

We have so many more questions, and I prefer to look at it that our CD rom is getting full. That's what it is. That's what happens to us as we lose those quick memories. Several questions about autism, about music and autism spectrum disorder, and related to that, a couple of different questions have come through about autism and sensitivity to music.

Dr. Kiminobu Sugaya (01:20:13):

Sensitivity.

Teri Brister (01:20:16):

People with mental illness or with autism being hypersensitive to music. Two different people wrote in to ask if that was a myth or if that really was a thing.

Dr. Kiminobu Sugaya (01:20:28):

That could happen. Depend on the serotonin contents. Serotonin ...

Teri Brister (01:20:33):

Serotonin.

Dr. Kiminobu Sugaya (01:20:35):
Huh?

Teri Brister (01:20:35):
Serotonin.

Dr. Kiminobu Sugaya (01:20:36):
Serotonin, yeah. Serotonin is upstream of the dopamine, controlling the dopamine as well. Then the autism subject, some of them are very low serotonin. Some of them are still the highest serotonin. Maybe those high serotonin autism patient might be more sensitive to the music. Unfortunately we haven't done any study, just that's my hypothesis. Maybe I can test that. Now we are doing the study for the autism in this area and then we are checking the serotonin level in the brain using the peripheral or sample.

Teri Brister (01:21:33):
Terrific. We don't have much time left. I want to ask a few, just to give you an idea of the conversations that are going on and coming through in the Q&A. Several people have shared their own experiences with music and what a difference it's made for them. We've had several people chime in about being part of drum circles, being part of different groups that get together and share music. You're really, no pun intended, striking a chord with a lot of the people that are on the call. At least one person has said they would love to have your wife on the next time you join us so that she could play the violin.

Dr. Kiminobu Sugaya (01:22:17):
Yeah.

Teri Brister (01:22:20):
What's your favorite music? Let's close with this question. You mentioned Hotel California.

Dr. Kiminobu Sugaya (01:22:29):
Yeah, I love it.

Teri Brister (01:22:29):
You mentioned that one, but do you have, and I'm going to take it a step further, do you have particular go-to music for different things or is Hotel California just all?

Dr. Kiminobu Sugaya (01:22:43):
Yeah, another music I love is the the Bach. The one I put into this presentation, that's the Chopin. That's concerto the number two last movement. That's the music I love it. Before I met my wife, I liked it, but after I met my wife, I love it because her Chopin is, I would say, the best Chopin in the world.

Teri Brister (01:23:26):

Well you know what, I'm sure you are not objective, but I bet you're right. I don't doubt that. If I remember correctly, you play an instrument as well. I can't remember if you said that in this presentation or if maybe it's something we talked about in the prep meetings. Do I remember correctly?

Dr. Kiminobu Sugaya (01:23:46):

Yeah, I just have fun with the musical instrument, but I usually play computer with her. I make the media sound and then I record from the Steinway piano and using those sound to play media. That's almost like a real sound. Then on the top of that I put the LR, the human, we cannot play like a robot. You know that these two fingers, you can move very fast, but you cannot move these two finger fast because these two fingers sharing the ligament here. Those things, if I, yeah, I introduced to the media making the some LR then sounds like people praying. That's kind of way I'm doing. Yeah, like this picture, the paint, that's my hobby too.

Teri Brister (01:25:01):

Did you paint that?

Dr. Kiminobu Sugaya (01:25:03):

Yeah. Yeah. It's oil paint.

Teri Brister (01:25:05):

Oh my goodness.

Dr. Kiminobu Sugaya (01:25:07):

Oil paint.

Teri Brister (01:25:08):

The girl with the pearl, the girl with the pearl earring. That's, again, I keep saying fascinating, but genuinely this afternoon has been fascinating. I think it's demonstrated by the number of people who've stayed on for the Q&A. We had almost 500 people on the webinar, so this is one of our most popular topics and I just can't thank you enough for sharing your time with us.

Dr. Kiminobu Sugaya (01:25:32):

If I have one more minute, maybe I can share some interesting facts.

Teri Brister (01:25:39):

Sure.

Dr. Kiminobu Sugaya (01:25:40):

Because I'm in Florida.

Teri Brister (01:25:42):
Sure.

Dr. Kiminobu Sugaya (01:25:42):
Okay. Yeah. Then you never ever wants to play B flat in the swamp of Florida. Do you know why?

Teri Brister (01:25:55):
I'm guessing it had something to do with an alligator.

Dr. Kiminobu Sugaya (01:25:57):
Yeah, yeah, yeah. You get attacked by the male alligator.

Teri Brister (01:26:03):
Now see who knew we were going to get that useful fact this afternoon.

Dr. Kiminobu Sugaya (01:26:08):
Yeah, yeah. Actually the people did that such a study and then they played that cello, B flat, and then the alligator start become very aggressive because that B flat sound, that level, the male alligator makes while they are mating. Then the other alligators are, somebody doing the fun, somebody doing something. Then they start to become so aggressive. Yeah. That's another fact.

Teri Brister (01:26:42):
Again, fascinating. I can't say it enough. Thank you so much, Dr. Sugaya. If you will click to the next slide, please.

Dr. Kiminobu Sugaya (01:26:53):
Okay. Yes.

Teri Brister (01:26:53):
This has just been terrific. Quick reminder that NAMI's book, You Are Not Alone, is now available and out there and has made several of the bestseller lists, so encourage you to look for it or learn more about it if you're interested. Then if you will go to the next slide please. Terrific. Again, remember you're not alone. NAMI's, Ask the Expert series is not intended to give you medical advice, but we want to share all the information that we can with you so you can make the best decisions possible for yourself. We're able to provide these free to participants because of generous sponsors who continue to support the work of NAMI. We want to thank any of those of you that are on the call. If you will go to the next slide please.

Dr. Kiminobu Sugaya (01:27:46):
I don't have any.

Teri Brister (01:27:47):

That may be it. That may be it. We usually have the one coming up about the next Ask the Expert webinar.

Dr. Kiminobu Sugaya (01:27:53):

Ah, I didn't get that. Sorry.

Teri Brister (01:27:55):

Well that's okay. We don't have those scheduled yet and I wasn't paying attention to my deck or would've known that. We will be launching the series again, continuing the series in 2023. We want to encourage you to please stay tuned for announcements about upcoming webinars. We want to give a huge shout out before we end. I would be remiss if I didn't thank the group of staff that are behind the scenes that helped with moderating the Q&A, that helped you with any technical issues that you had. We have senior producer, Hagen Stauffer, Jessica Walthall, Leticia Enos, Christina Botts, Chelsea Kavanaugh, Dawn Grittmann, Zahira Correa, and Divanna Eckels. I want to thank each of them for helping us make this happen. What a wonderful presentation to close out 2022 with. Can't thank you enough, Dr. Sugaya. Thank you.

Dr. Kiminobu Sugaya (01:28:54):

Thank you.

Teri Brister (01:28:56):

We wish all of you on the call, Happy Holidays and a healthy and peaceful 2023. Thank you all.

Dr. Kiminobu Sugaya (01:29:04):

Bye-bye.

Teri Brister (01:29:07):

Bye-bye.