



Mind & Life Podcast Transcript

Fadel Zeidan – Mindfulness and Pain

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Opening Quote – Fadel Zeidan (00:03): *Pain is an unpleasant, noxious experience. And I think there's a domino effect here—if there's one individual suffering, then whoever that individual meets or communicates or interacts with is going to share some of that suffering. And we have all met people that are the opposite side of the spectrum. You go around them and it's just a glow. And that's just as contagious as well. You leave them and think, "Wow, I feel lighter, I feel better." I feel that with this work, it always starts with one individual, and it has the capacity to change the entire society.*

Intro – Wendy Hasenkamp (00:45): Welcome to Mind & Life. I'm Wendy Hasenkamp. My guest today is neuroscientist and pain researcher, Fadel Zeidan. Fadel is one of the leading experts in understanding how mindfulness and other contemplative practices can be used to help relieve physical pain. He's brought some of the most rigorous tools of science to this question, and has found not only that mindfulness is effective for pain relief, but also that it works differently—through different physiological mechanisms—from other interventions like placebo, distraction, or simple relaxation.

(01:23) We get into all of this in our conversation, as well as how Fadel is extending his work beyond studying physical pain into the realms of more complex psychological suffering. He's been working with diverse groups of people, including police officers and grieving parents, to study how mental training can support compassion and empathy, and help bring healing to our emotional lives. In the course of our chat, we also talk about the role of the self in pain, the default mode network in the brain, using a kind of fake meditation for research purposes, studying psychedelics to treat pain, and many more topics. As always, there's more in the show notes, including quite a bit of media coverage that Fadel's research has received over the years.

(02:12) Pain is something every single one of us experiences. Whether it's acute physical pain, chronic conditions, or emotional struggles, pain is a part of life. And especially in the context of the ongoing opioid crisis in the United States, which is in large part a response to pain, be it physical or emotional, Fadel's work takes on extra relevance. I love the elegant approach that he's taken, really over several decades now, to understand more about how contemplative practices can help with all kinds of pain. I hope that this conversation gives you a new lens on how you think about pain, and what options there might be for help. It was a real joy to speak with Fadel for this, and it's my pleasure to share with you now Fadel Zeidan.

Wendy Hasenkamp (03:03): Well, I'm so happy to be joined today by Fadel Zeidan. Fadel, welcome, and thank you so much for being here.

Fadel Zeidan (03:10): Hey, Wendy. It's so great to be with you. I'm such a big fan of your podcast. Thank you for inviting me.

Wendy Hasenkamp (03:16): Well, as I think you probably know, I love to start with a little bit of backstory from the guest. So I'm really curious for you, how you got interested in contemplative practice, and then the application of that for pain.

Fadel Zeidan (03:28): Yes, thank you. Well, I'll try to be brief in the story, I guess. My interest in contemplative practices really came from trying to appreciate, even from a very early age, what it meant to be me. What being is all about, I guess, as a human. I had a pretty unique upbringing. I was born in Kuwait City. I'm a Palestinian refugee, so both my parents are from Palestine. And my dad was chief of surgery in Kuwait City, and that's where he met my mom, and that's where I was born. And I moved from the Saharan Desert in the Persian Gulf at the age of nine to the exotic land of Milwaukee, Wisconsin. *[laughter]*

Wendy Hasenkamp (04:13): What a shift!

Fadel Zeidan (04:15): Yeah, I don't think we had long sleeved clothes or anything. But it was a massive shift culturally, too. I was raised as a Muslim, and then I moved to the Midwest of the States where everything was different. Even sitting in the cafeteria was different. Where in Kuwait, all my friends were people of color and a whole spectrum of different cultures. And then Wisconsin, when I moved there it was like immediate segregation, where Hispanic people were sitting with Hispanic people, people of color with people of color. And here I am with my tray. And that's when I really started to become more introspective, I guess, and existential in the sense of, wait, where do I sit? I don't even know what I am from this kind of kaleidoscope of being.

(05:03) And so that's really where it started—being more curious and trying to navigate my own self-identity as we moved through the States, as at that time, a practicing Muslim, as an Arab, as a person that didn't even have their own country. And then so we moved from Wisconsin to Chicago, Pennsylvania, and then North Carolina. So I really struggled personally with trying to identify with my own being as it related to my immediate environment.

(05:36) So fast forward, I guess, a lot of turbulent years, getting in trouble academically, and not really finding my voice of what I wanted to be when I grew up. Of course, like many immigrant families, I had a lot of pressure to become a physician. And so I was pre-med for a while, but it wasn't really sticking with me. And I took this class called Introduction to Neuroscience as a junior. And they had two tests, a midterm and a final. And I made a 33% on my first test. And that's when I called my dad. I said, "This is what I want to be when I grow up. I want to study neuroscience." *[laughter]*

(06:16) And so this was, as you know, the time when neuroscience was emerging and functional MRI was emerging, and we were able to understand, or start to appreciate neurobiological manifestations in humans, and not only preclinical animal models. And that's really when it started to take that... we could start to study things like philosophical concepts and principles from a quantifiable biological perspective. And I was always fascinated with philosophy and death and life and existentialism and humanism. And as you might know, there's a lot of back and forth in philosophical discourse, where we never really come to a solution. And I felt like with the advent of human neuroimaging, we were able to maybe get a little bit closer to solving the hard problem, to quantifying some of these nuanced experiences of what it means to have collective consciousness, or to let go of self, to cultivate compassion and empathy.

(07:19) So I finished with a bachelor's degree in psychology. And I was able to work as a special education teacher, where I worked with kids, grades three through five. And they were intelligent, very intelligent. They just had behavioral problems that impeded their learning. These were kids that were sexually abused, had anger issues, severe ADHD. And so at that time, I was starting to get into mindfulness. Well, let me back up. I'm sorry.

(07:51) So working on my BS in psychology, I was introduced by Dr. Susan Johnson, (who ended up being my future dissertation chair) in our Introduction to Health Psychology class, to mindfulness, where she showed us a videotape—and this is how old this was, this was 1998—and she showed us a Bill Moyer video of this guy named Jon Kabat-Zinn who was giving chronic pain patients raisins, and taking minutes to enjoy and "be with" this raisin. And if you recall, the first studies with Jon Kabat-Zinn were focused on chronic pain patients. And I was completely blown away that something like a meditation practice can be studied to impact health, and can be studied as a science.

(08:38) And I was hooked. Completely hooked. No matter how many times my professors told me to stay away from meditation research, I was totally hooked. And I owe that to Jon's bravery, and of course, Dr. Johnson (I still call her Dr. Johnson) introducing this to us. So as a senior, I did an honors thesis, and it was to study the effects of anxiety change by mindfulness meditation. And it was Jon's lake meditation, it was on tape, and we measured that with the state anxiety inventory before and after it became a poster. This was like 2000.

(09:14) So that's when I said, okay, I need to do something. I didn't know about master's degrees or PhD programs to study mindfulness. So I became a special ed teacher in elementary school. And again, these kids were incredibly intelligent. They just had emotional problems that impeded their learning. And so in the morning we would practice mindfulness for 10 minutes. In the afternoon, we would practice mindfulness for 10 minutes. And these kids would make all these immature sounds and play around. And they ever took it seriously until they had what we called then, I don't know what's called now, emotional meltdowns. A lot of triggers.

(09:49) And this is when we would work with them with the techniques they were learning. And what we found was that the frequency and the intensity of these meltdowns would attenuate as a function of the school year. We had that year the highest academic growth in the state of North Carolina in that program. They called them BED programs, behavioral emotional disability programs. I don't know what they're called anymore. And so they plucked me out of that school, and they put me in another low performing school, BED program, and we replicated the effects integrating mindfulness. And these were kids, grades three through five.

Wendy Hasenkamp (10:24): Just to clarify, were the kids having these "meltdowns" during the practice, like because of the practice? Or just throughout the day and the practice was helping?

Fadel Zeidan (10:36): Great question. Yeah. The meltdowns were so random. And it really was predicated by what was happening at home. If mom didn't come home that day or that night, there was definitely going to be an emotional meltdown. I've been attacked by staplers. I've had chairs thrown at me. I mean, full-on meltdowns. And so it wasn't during the practice. The practice was happening 20 minutes a day, but whenever these meltdowns would occur, we would revert through the mindfulness instructions, and over time, they were able to incorporate them to the point where... Let's say, I had eight kids. That was the state law. You couldn't have more than eight students. Out of all those eight kids, they were all on psychotropic meds. By the end of the year, only one of them was still on the drugs.

(11:22) And we had this incredible academic growth. And it wasn't only mindfulness. We had an incredible team. I'm not trying to say that. But what it really did was it opened my eyes to what mindfulness can do, and who it could do it for. Because it's such a nebulous context, to practice mindfulness... I didn't think it would be feasible for these kids, but it was.

(11:41) And so that's when I decided to get a Master's degree in cognitive science. And I also got one in philosophy. I didn't know what I wanted to be. I really wanted to be a philosopher. And that's when I started to research mindfulness (in my Master's). And then I got into a PhD program, experimental health psychology, and that's where I worked in three labs, one on affect and mood, one on attention, and one on pain. And we'll get to this later, but pain really encompasses all those things.

Wendy Hasenkamp (12:11): Interesting. Yeah.

Fadel Zeidan (12:11): Yes. So I actually had three dissertation projects, and we were doing mindfulness work. I was lucky enough to have professors that, yes, some of them discouraged me from doing this work, but other ones said, "Well, okay, go ahead and pursue these questions." And so that's how some of the earlier stuff that I published, what came out in graduate school, it was really the freedom that I was given to kind of learn the IRB process, to coordinate, to collect the data, to analyze from the beginning to the end.

(12:38) And then in that time period between Master's and PhD is really when everything changed from the first Summer Research Institute that Mind & Life Institute hosted. And that's because that's where I met you the first time, 15, 16 years ago... and there was this community that was promoting rigor and at the same time experiential exploration. And that really changed everything because I didn't feel alone anymore. And so I got into it because I was curious, and just felt really lucky that I could test how changes in consciousness can impact our well-being.

Wendy Hasenkamp (13:15): That's awesome. So for you personally, did you start practicing because of that Jon Kabat-Zinn video? Or had you already kind of been exposed?

Fadel Zeidan (13:23): Yeah, so I had experiences, whether it was music, whether some other types of personal explorations, whether it would be in nature, that resembled the samadhi experience, what I was reading about. So it was reading His Holiness's work, reading some of the ancient Buddhist contemplative texts, and then the more experience came from listening, yes, to Jon Kabat-Zinn teach. And then it really blew it off the lid in Mind & Life when I was introduced to Sharon Salzberg and Roshi Joan Halifax and Jack Kornfield, and these kind of household names in our world, to dive into deeper practice. But yeah, Jon, I accredit him for a lot of my life events and transformations.

(14:06) – *musical interlude* –

Wendy Hasenkamp (14:25): Well, let's jump into all of your great work on the relationship of mindfulness to pain. It's really been such a joy to watch your career over the years as it's built these insights. It's just fascinating. So I'm excited to dig into it with you. Maybe we could talk a little bit just to begin about the history of what we know about these kind of practices for pain—when you were coming into the field, the questions that were still there, but what we did know.

Fadel Zeidan (14:56): Sure. So we know from historical accounts that meditation practices can uniquely impact the subjective experience of pain. One of the sutras that comes to mind is called the Sallatha

Sutta, it's known as The Dart or The Arrow. And here it states that the pain system, or the way that pain is communicated within the body and mind (it's known as nociception), that in this pain experience, it states that there's a physical dart and a mental dart. Which is true—we know this today from physiology of pain, that there is a medial and a lateral system of pain that correspond to attending to a noxious or painful stimulus, and then reacting to one, emotionally.

(15:43) And they say in the sutra that, with practice, that the well-disciplined practitioner feels only one type of dart—the physical dart, but not the mental dart. And I'll fast forward to later, but basically this is true. We are seeing this from neuroscience evidence, that this is actually what is happening during mindfulness and painful experience.

(16:06) The first known study, that I know of at least, about meditation and pain was a 1970 *Science* article by a husband and wife that were backpacking Nepal. It was Clark and Clark. And they found that what they called these Nepalese porters, which we may call them Sherpas, had higher tolerance for electrical stimulation than age-matched people. They required more electricity, higher electrical intensity, to report the same amount of pain as someone that was their same age.

(16:41) And in the discussion, the last two sentences state that this is likely attributable to ethnocultural factors such as their religion. And we may know that the Nepalese are largely Buddhist. That was the first inclination that meditation would have an impact on pain. And then there were a couple of other studies on one yoga master or one Zen master, and they had higher pain tolerance. But it wasn't really until Jon Kabat-Zinn's 1982, then 1985 papers that found that something like Mindfulness-Based Stress Reduction, which was then a 10-week program, can produce dramatic—50%—meaningful differences and improvements and pain symptomology. Yet this work was uncontrolled, but it was a great first step. Seminal first step.

Wendy Hasenkamp (17:29): I just want to clarify one distinction, which you were bringing up there, between the physical experience of pain and the emotional experience of pain—which is so fascinating that that goes all the way back to the ancient Buddhist texts. So is that the same thing as sometimes is talked about I think in pain research, the intensity of the stimulus and the unpleasantness of the stimulus? And those things are actually often distinguished, right, with mindfulness?

Fadel Zeidan (17:54): Absolutely. That hits it on the nail. So in our laboratory, we look at pain intensity. How intense was that experience to you from zero (no pain), to 10 (worst imaginable). And then the other, we looked at pain affect, pain unpleasantness. How much does it bother you? And we use an analogy to help our participants understand. So if you're listening to the radio, and a song comes on that you really don't like, how loud that song is, is the intensity. How much it bothers you is the unpleasantness. And it was derived from, like you were saying, pain research, not necessarily the fact that these contemplative texts were saying you should separate these two dimensions. It was just standard. We just didn't expect to see differences between intensity and unpleasantness as we have in our studies.

Wendy Hasenkamp (18:40): Right, right. And it is the case that often the meditation interventions are changing more the unpleasantness than the physical experience or intensity?

Fadel Zeidan (18:50): Yes. Every mindfulness study ever done on pain has shown that the affect of the unpleasantness component of the experience is dramatically more impacted than the intensity. If you look at Richie Davidson's work, Antoine Lutz's work, you could find that, in those long-term practitioners, those Tibetan practitioners, their intensity of pain doesn't actually change at all. They

report the same amount of pain intensity as controls. It's only on the unpleasantness side that there's a significant reduction. So over time, as you become more adept with greater frequency of practice, the sensory dimension, the intensity starts to go back up and becomes almost normal, if you will, but the way that you're appraising the experience is significantly modified.

Wendy Hasenkamp (19:43): Great. That's helpful. Sorry if I derailed you...

Fadel Zeidan (19:46): No, no, no. I just want to give shout-outs to the right people. Because there's been some people before me that have done this work and have really seismically moved the field, like Josh Grant and Pierre Rainville. Josh got a Varela award from the Mind & Life Institute and studied the effects of painful heat stimulation on Zen monks versus age-matched controls. And he published this work in 2009, and found that these monks required a significantly higher level of pain stimulation to report the same amount of pain as these age-matched controls. And what was cool is that these folks weren't meditating during the stimulation. So it kind of gives rise to this idea of plasticity, where the state of meditation starts to develop more into a trait.

(20:33) So right around this time, I started to really get into studying pain. And again, I was surrounded by professors that were just kind of saying that this work was frou-frou. It could just be placebo, it could just be relaxation, it's probably just distraction. So we just put it to the test. So we just compared mindfulness to math distraction, relaxation, and just regular rest. And found that mindfulness after just three days of training significantly reduced, while they're meditating, significantly reduced pain.

(21:06) And so I was in the South, I was in North Carolina, and we were working with patients, we were working with healthy people, but we kept losing participants because of how long the training was, the eight-week trainings. And we started to meet with patients and they said, "I just don't have time for an eight-week intervention." So something that was really important to me was to try to find a way to make this as clinically applicable and translatable to folks that maybe don't shop at Whole Foods. And if it didn't work, great, then we know that more dosage is required.

(21:40) But we kept seeing that brief training, three, four days of training, was enough to teach people to independently practice, to then use the technique to immediately, directly attenuate the subjective experience of pain. So moving forward, I ended up landing a Varela award, and I took this to Wake Forest University School of Medicine. And I landed a postdoc there with Bob Coghill, who was one of the first people to image pain, and really changed my trajectory, and really changed me to become an independent neuroscientist, a pain scientist. And someone that... really my goal was always to bring rigor to this game. And Bob taught me that. Bob was very adamant that he did not like mindfulness research.

Wendy Hasenkamp (22:29): It's great to have a skeptic helping you along. [laughter]

Fadel Zeidan (22:31): Yes. So he took me in and took a risk. And we published a paper in the *Journal of Neuroscience* that showed a meditating brain during painful heat. And were able to show that meditation deactivated brain regions that were very unique to the pain experience, like the thalamus. And the greater the deactivation of this area, the greater the analgesia. And the thalamus is super cool because it's like a gatekeeper from the brain to the body. Everything except for the sense of smell has to go through this thalamic gate before it enters the brain. And what we kept seeing is that meditation would almost close the gate on ascending nociception (or painful information) from reducing the elaboration of pain processing. And the greater this attenuation, the greater the analgesia.

Wendy Hasenkamp ([23:26](#)): The pain relief.

Fadel Zeidan ([23:27](#)): Yes, the pain relief. Thank you.

Wendy Hasenkamp ([23:30](#)): So maybe we could talk also a little bit about this experimental design that you developed known as the sham meditation, which is kind of like a fake meditation—which I think is really fantastic in terms of experimental rigor. And you are the first person I knew of to put this in place. So maybe you could describe that.

Fadel Zeidan ([23:48](#)): Yeah. So I was really determined to end my career. *[laughter]* This was around the time where studies that were using sham surgeries and showing benefits. Where people would just make an incision, tell the patient that a surgery was performed, when in fact it wasn't, and the patients would feel better.

Wendy Hasenkamp ([24:04](#)): So it's a big placebo effect.

Fadel Zeidan ([24:06](#)): A huge placebo effect. Yes. And the first paper we published didn't have a control group. And so we got lucky with some grants, and we created three controls to compare to this mindfulness intervention. A placebo cream group, a book listening control group, and yes, the infamous sham mindfulness meditation intervention. Because if you're looking at the brain while someone has placebo cream on their leg, versus someone's practicing mindfulness meditation, it's going to look different. Of course it's going to look different.

([24:38](#)) So what we wanted to do was to create an analogous, something as closely matched to the mindfulness intervention, without the explicit instructions to non-reactively attend to the breath. If this technique, if this non-reappraisal, this unique reappraisal process that corresponds to mindfulness is really the magic sauce, then we should be able to parcel that out biologically, psychologically, and psychophysically. So we created this intervention where we told people that they were randomized to a mindfulness intervention. They were introduced to the intervention, just like the mindfulness group. They were taught to sit with their eyes closed in a straight posture, and to "take a deep breath every two to three minutes as we sit here in mindfulness meditation." And everything was matched, including the time spent giving instructions.

([25:29](#)) So guess what? It's super effective. It was so analgesic.

Wendy Hasenkamp ([25:34](#)): So those people experienced a lot of pain relief.

Fadel Zeidan ([25:38](#)): They sure did. Like, more than a clinical dose of IV morphine.

Wendy Hasenkamp ([25:43](#)): Wow, that's significant.

Fadel Zeidan ([25:44](#)): Yes. But mindfulness was more effective than sham mindfulness meditation, and it engaged different brain processes than the sham technique. So we then did the same design, and looked at heart rate variability changes. They both were analgesic, the sham technique and the genuine technique. They both increased heart rate variability, which is a marker of good health. But the way that heart rate variability interacted with the pain response was totally different between the two groups.

([26:19](#)) So then with the brain imaging study, with the heart rate variability study, we then started just to go down the line to appreciate what the mechanisms [were] that were specific to practicing

mindfulness meditation as opposed to just this deep breathing meditation—which I now know resembles pranayama. So it's not really a sham meditation.

Wendy Hasenkamp (26:41): Right. You are inadvertently studying breathing practice.

Fadel Zeidan (26:43): Exactly. Exactly. And it's so much easier to do than genuine mindfulness. *[laughter]* So the body's primary pain relieving system is called the endogenous opioidergic system. We have endogenous opioids, endogenous means inside the body, scattered throughout our whole body. And so if you stub your toe, your body releases a cascade of endogenous opiates to reduce the pain. So in 1978, Jon Levine injected, I think, a rat with naloxone and did a placebo study, and found that naloxone reversed pain relief from placebo. In other words, when you block the opiate system from working, placebo doesn't work anymore. Which means placebo is opioidergically mediated. It's being driven by the body's opiate system.

Wendy Hasenkamp (27:32): Okay, right. So does that mean if, in a placebo condition, you think you're getting something that's going to relieve pain, somehow that belief is increasing your endogenous opioids in your body, and that's causing the pain relief?

Fadel Zeidan (27:47): Yeah. It's the mechanism that's creating the pain relief. If you stub your toe or you hit your head, you rub your toe, you rub your head, that is supposed to engage the release of endogenous opiates. So placebo, acupuncture, hypnosis, distraction, transcranial magnetic stimulation, prayer—all these things are using the body's opiate system to reduce pain. Because when you inject them with naloxone, the techniques don't work anymore.

Wendy Hasenkamp (28:19): And just to remind the listeners, naloxone is the substance that will block the opiate system in your body?

Fadel Zeidan (28:25): Absolutely. Every EMT, every cop, every fireman, and now Narcan, which is the commercial product of naloxone, is available over the counter. They all carry it because it immediately reverses an opiate overdose, by inhaling it nasally. But if you inject people with enough of it, you could reliably block the opiate system from working.

(28:48) So you'll see a trend here, we're just asking very low hanging questions. Does mindfulness meditation, as compared to the sham technique, use the body's opiate system to reduce pain? And across three studies now, we have shown the same thing. Mindfulness works when opiates are being blocked, and sham meditation does not work when opiates are being blocked. So again, we're showing that there's similar efficacy, in other words, the effects of pain relief between the two conditions, but they're using different systems to accomplish that pain relief.

(29:25) And especially with pain, there's so many components of mindfulness that engage placebo type responses. The belief that you're meditating, facilitator attention, expectations. And if we're really going to increase the rigor and the standards of this type of work, all of our studies should be at some level placebo-controlled. And especially in the field of pain. And so this has really kind of been our motif for how we move forward with our clinical trials by using as many different placebo controls as possible to really parcel out what's happening.

(29:59) – musical interlude –

Wendy Hasenkamp (30:19): Okay. So you then learned that the mindfulness effect on pain, or the mindfulness-induced reduction of pain, is not using our body's endogenous opiate system, but all the other interventions that we know of do. So how did you then go about next steps about how is the mindfulness working?

Fadel Zeidan (30:40): Right. That's such a great question. I don't know how to test that question right now. Maybe we could use some radioactive PET imaging to target the neurotransmitters that are at play. We're working on it. But the cool thing about naloxone, the opiate blocker, is that when you inject someone with it, they don't actually feel any different. (Unless they were on opiates. If they're on opiates, they'll go through withdrawal. So we test for that.) So it's really about using a technique or an antagonist that won't unblind, or reveal the drug's label, to the patient. So that's really the tricky part. So it could very well be something that is using the body's serotonergic, the serotonin system, the endocannabinoid and/or the dopamine system. So we're hoping to figure that out. We're also getting into gut microbiomes.

Wendy Hasenkamp (31:41): Fascinating.

Fadel Zeidan (31:42): Yeah. I mean, we're trying to just go as "whole person" as possible right now. And so we're doing clinical trials currently in chronic low back pain patients where we actually, instead of using painful heat to elicit the pain, we're actually evoking their own chronic pain. So if let's say you have sciatica, I can actually lift your leg up and perform this thing called the straight leg raise test.

Wendy Hasenkamp (32:05): Ouch.

Fadel Zeidan (32:06): Yes. And so we can lift their leg up to produce the sciatic pain. So there's nothing out there that can immediately reduce one's own chronic pain. Nothing. And so the question is, if we evoke this chronic back pain, can someone, after brief training, immediately use mindfulness to reduce the pain, immediately use non-mindfulness or sham mindfulness to reduce the pain? And we're writing the paper up now, and I can tell you, they both work incredibly well.

Wendy Hasenkamp (32:37): Wow. In an immediate way?

Fadel Zeidan (32:39): Yes.

Wendy Hasenkamp (32:40): Fantastic.

Fadel Zeidan (32:42): And in a most amazing way. They're both doing it significantly, except the mindfulness group is more effective than the non-mindfulness group. So there is something additive there. I mean, we're hacking the respiratory system. We have two orifices dedicated to respiration. And if you're in Sunset Cliffs here in San Diego, and you're on a 20-foot cliff and you're about to jump in the ocean... and I watch these people, what every single one of them does is they take a deep breath. But I guarantee you no one's taught them to do that. There's something ingrained in us that can tap into our breathing, that can give us this kind of resolve to take that next step.

(33:20): And I think what we're doing as contemplative researchers is hacking that system to create a recipe that could promote the most well-being for everyday folks. That's really my thing right now is, how can we get this work to folks that need it the most? That don't necessarily have that time to spend at Spirit Rock. Which by the way, I love Spirit Rock, don't get me wrong, but a lot of people, they have

two jobs. They're single parents. They suffer from chronic pain. And what mindfulness is uniquely doing, what we're seeing, is that it's not treating the symptoms, it's treating the person.

(33:56) There's so many comorbidities, which means problems that are outside of the primary issue of a pain, the pain symptoms. The depression, the anxiety, the sedentary lifestyle. These are things that mindfulness can uniquely impact that can then produce this trickle effect, that eventually gets to the symptoms. And that's what we're seeing now. And if I may give a plug for pain, real quick too, Wendy...

Wendy Hasenkamp (34:22): *[laughter]* By all means.

Fadel Zeidan (34:23): Pain is the coolest thing in the world. I never really got into pain for the clinical component. I started studying pain to study consciousness. Pain is made up of our sensory, the cognitive, the emotional, our prior beliefs, our prior experiences, our expectations. I was listening to the podcast you had with Norman Farb, and he so beautifully described his model, updating the model. And there's, in my opinion, no easier way to test that kind of updating of the Bayesian model than with something as fundamentally malleable as pain, as the subjective experience of pain. It wasn't only until later I got into the clinic that I saw the actual human element of suffering from chronic pain. But before I was just geeking out on trying to study consciousness.

Wendy Hasenkamp (35:13): Yeah, that's interesting, that shift into more maybe real-world application for relieving suffering. It's also making me think, you mentioned earlier about the links of studying pain, and then emotion and attention, and how they're kind of all linked. So I'm wondering what you think about the relationship of your work and studying pain, which is a fairly simple kind of physical pain (that's the easiest of course to study). How does that translate—or does that translate—to emotional pain, or more kinds of complex pain that we experience as humans?

Fadel Zeidan (35:49): I love this question. So emotional pain, there's existential pain, there's trauma pain. There's that pain that we get when we're super nervous about something that's coming up, and we feel it in our gut. I see it with my daughter when she gets nervous about stuff, and "my tummy hurts," right? So we have two studies we just wrapped up where we recruited parents and family members that lost a child or an immediate family member to a gun. So these are parents that lost a child in the Aurora Theater, Columbine School, Parkland School, Sandy Hook parents. The worst thing that can happen in the human condition is what our study volunteers have gone through.

(36:32) And what's unique about the healing process of mourning and the worst type of grief is that relieving the grief, to these parents and these stakeholders, is almost to them a way of forgetting about their kids and their family members that they lost. So they don't want to heal in that way because they don't want to forget. There's guilt that arises from that as well. And so working with them, and Pandemic of Love, Jon Kabat-Zinn actually introduced these projects to my lab, and Moms Demand Action, and Survivors Empowered, we've been working with a lot of organizations.

(37:13) And we came up with the idea of integrating mindfulness because mindfulness isn't necessarily putting the grief away. It's providing the skills to allow someone to stay with the grief and maybe attenuate or accept some of these negative emotional aspects that impact their health. So they're able to hold the grief, the mourning, in the present moment, but at the same time regulate the emotions that arise when dealing with those catastrophic thoughts. And so what we're doing is we're training these individuals in mindfulness interventions, standardized manualized interventions, MBSR, Mindfulness-Based Stress Reduction, Mindful Self-Compassion, Compassion Cultivation Training. And they will go through these trainings, and then themselves will eventually learn how to become teachers

for other victims of gun violence. Because Wendy, you and I know that there is no shortage of that in this country.

(38:18) And so what we found were dramatic reductions, dramatic reductions in post-traumatic stress and stress. Depression went down by 70%. I mean, dramatic. And what was driving these benefits were significant increases in dispositional mindfulness, trait mindfulness. And for your listeners, this is the mindfulness that doesn't necessarily that you experience while you're meditating, but rather than being more mindful when you're not meditating. It's thought to be more temperamental. So in these studies, we found that the eight weeks actually produced stabilized long-term improvements in depression, trauma, PTSD, grief. Forgiveness went up. So that to me is probably the worst case pain condition there can be, including the physical ones, right? The physical, chronic pain conditions.

(39:17) We're also working with police officers, law enforcement officers that had a lot of difficulty regulating the stress. And we all know what happens when you can't regulate the stress. It's the community that gets impacted. It's reciprocal. And we found the same effects that we found in our victims of gun violence. Significant improvements in burnout, depression, PTSD (they're traumatized too). And mindfulness was the driver of those things.

(39:48) So we're continuing this work with community folks, and we're doing other stuff right now in the laboratory with psychedelics as well. So we're doing cannabis research and psychedelic research. We're administering high dose psilocybin, which is the active ingredient in so-called magic mushrooms, to chronic phantom limb patients. These are patients that are amputees that still have that suicidal type pain, as if the limb was just removed and amputated. And what we're finding is that, even if your amputation is planned, let's say it's to remove a toe that has a tumor in it, and it's going to save your life, even at that level, it's traumatic to lose a limb.

(40:31) So what we're finding that psychedelics are doing is that it's treating the trauma almost. It's treating the whole person, not the symptoms. There's no reason these people should be feeling pain. There's no peripheral input. There's no information from the body going to that missing limb. Why are they feeling that pain? That pain is a survival metric of something much bigger, of the infarction of their being. And maybe those natural products, maybe mindfulness practices can help these individuals attenuate or decouple the self-reference of the experience from the symptom, if you will.

(41:10) We just published a paper that actually found that meditation-based pain relief is being driven by greater deactivation of the so-called default mode network (which you've published very well on), where we found that greater decoupling from that thalamus area, from this area called the precuneus, which is an area heavily involved in self-consciousness, self-appraisal, self-value, the greater the decoupling, the greater the pain relief. So we wrote this kind of theory that maybe mindfulness is engaging an egocentric filtering mechanism. You're filtering out the value of experience as it means to you in a way to really appreciate the inherent nature of reality. Maybe this is just the way we always should be experiencing things—non-attachment. Maybe that's just the way things are and we're just getting in the way of ourselves.

Wendy Hasenkamp (42:13): That's interesting that the thalamus is coming back in your research. That was one of the first things that you identified, which is this kind of filtering or gating, very early gating system in the brain from our periphery into our central nervous system. So just to make sure I've got that right, it's like decoupling or kind of dissociating the activity between that thalamus and the default mode network that's related to pain relief?

Fadel Zeidan (42:38): Yes. It's decoupling the thalamus from the default mode network. And the greater the decoupling, the greater the pain relief. And I can get geeky about the physiology of it, but it's not the pain-specific thalamus. The thalamus is divided into different systems. It's dedicated to different systems—visual systems, sensory system, auditory. The thalamus can also integrate the systems into one cohesive stream to make up our conscious experience at a very low level. It's those areas of the thalamus that are decoupling from the default mode network. So it's the stream of information and how that relates to you that we feel is the mechanism that's driving this in mindfulness. And of course, if this is how it's working for pain, surely this is how it will work for other conditions like depression or anxiety.

Wendy Hasenkamp (43:28): Right. It's reminding me of Cathy Kerr's work and her theories about sensory gating and shifting where our attention is—away from perhaps stuck thoughts or patterns that can be repetitive. So there's some resonance there.

Fadel Zeidan (43:42): Absolutely. She nailed it on the head too, with her somatic markers too. It was a lot of that recontextualizing from somatic experience because she was doing a lot of sensory work too. Had many conversations with the great Cathy Kerr on this one. Yeah. I'm so glad you brought her up.

[\(43:57\)](#) – musical interlude –

Wendy Hasenkamp (44:17): Something you were saying before, when you were speaking about working with people on self-compassion and teaching those kinds of practices for the parents of children who are killed by gun violence... You were also just sharing about how meditation-based pain relief might be related to, I don't quite know how to say it, but maybe removing these stimuli from our ongoing model of the self, or self-referential processing in the brain. And so I'm just thinking about things like compassion training, or other forms of meditation that aren't purely mindfulness-based, that also can have effects on the self and maybe expanding our notion of self to include more others, or loosening our tight grip on the self. Those kinds of things. Have those ever been looked at in metrics like yours, with specific pain relief?

Fadel Zeidan (45:08): Yeah. I swear I did not plant this question with you. *[laughter]* So we just finished a study that was just funded by UC San Diego's Institute for Empathy and Compassion, where we took romantic partners—they were in a relationship for more than three months—and it was always a female and her romantic partner. And she came into the lab, and we scanned her brain while she got pain. And then she watched her partner get the same painful stimulus.

Wendy Hasenkamp (45:39): And is this like a shock or heat stimulus?

Fadel Zeidan (45:41): Heat. Yes. And then she watched a stranger, a lab technician, get the same pain. So then behaviorally, she reported higher empathy for her romantic partner than the stranger. No big deal. We looked in the brain. Sure enough, the default mode network predicted higher empathy for the romantic partner. So the default mode network is associated with self-reference, what something means to me. So the more empathy she felt for her romantic partner, the greater this activation of the self-referential network. The paper's going to be called *I Feel Your Pain*, because she's resonating more with her partner's pain.

[\(46:25\)](#) So then after this Time 1, we randomized them to three different meditation interventions, Mindful Self-Compassion, Compassion Cultivation Training, and Mindfulness-Based Stress Reduction. We haven't looked at those brain data, but we basically repeated the experiment after four weeks of training and eight weeks of training. She comes in, she gets pain, she watches her romantic partner, she

watches a stranger, she gives us the ratings. After four weeks of training, there were no differences between the romantic partner and a stranger. They both went up in empathy significantly after four and eight weeks. And it actually stabilized after four weeks. So there wasn't a significant increase after eight. It just stayed there.

Wendy Hasenkamp (47:08): This is with the compassion training?

Fadel Zeidan (47:09): Compassion, MBSR, and MSC.

Wendy Hasenkamp (47:12): All three.

Fadel Zeidan (47:13): All three of them did the same thing.

Wendy Hasenkamp (47:14): Okay. Interesting.

Fadel Zeidan (47:15): Yeah, yeah. So we were able to show that the training itself can actually make you feel more connected to people you love and/or don't love. Which is exactly what contemplatives have been saying for eons of time.

(47:29) We do have a study that we're analyzing now where we actually separated each component of a meditation practice. We have breath awareness, body scan, mindful self-compassion, compassion for others (like loving kindness for others), and the sham group. And so they did five days of just those things, and we looked at compassion and all these other things. So I don't know what the results are, but I'm very much interested in your line of questioning because I want to find what the active ingredient is, isolate it, and then optimize it, right? I'm not necessarily married to the way. But by peeking at the data, I think that maybe combining these things is the best way to go forward. Which is really incredible, I think.

Wendy Hasenkamp (48:13): That's fascinating. I love that you're already well into doing this kind of research. I hadn't heard anything about compassion related to pain, but you're on it, of course.

Fadel Zeidan (48:22): Yeah. It's an interesting thing. It's an interesting technique. There is mindfulness in these compassion things. A lot of people think you have to stabilize mind before you can cultivate compassion. But Vitaly Napadow, and I think his student, Dan Berry, published a small paper on Mindful Self-Compassion for pain and found it to be quite effective.

Wendy Hasenkamp (48:39): Fantastic. I'm wondering, you spoke a little bit about your shift in interest to helping people who are experiencing pain in daily life, and giving them tractable resources. And I'm wondering too about the relevance of your work, particularly around the endogenous opioid system, in the context of the opioid crisis here in the United States. Just wondering if you could share any thoughts on that.

Fadel Zeidan (49:05): Absolutely. Yes. The opiate epidemic has always been a massive problem in this country, and surely the pharmaceutical companies had a lot to do with this. We should never have been giving Oxycontin out to pain patients, ever. Like maybe after surgery, but we know very well that opiates actually make chronic pain worse. They have no impact on chronic pain. (I will get patients, chronic pain patients will write me and tell me that they don't agree with me. But there's a lot of data that shows that. So I'm just listening to the data.) We are always looking at opiate use. We do see that, with greater pain relief, there will be less use of opiates. And we do think that mindfulness will be particularly

advantageous to assuage chronic pain and opiate use. In fact, I think, other than the state anxiety, pain is the easiest target for mindfulness to move.

Wendy Hasenkamp (50:01): It's one of the main ones that's been found repeatedly in the literature really consistently too. Yeah.

Fadel Zeidan (50:06): Absolutely. And I think it's because mindfulness and pain are engaging overlapping mechanisms and systems. They just go hand in hand. So Eric Garland, who you know, he and I just got an NIH grant to study his Mindfulness-Oriented Recovery Enhancement (MORE) intervention, which is multimodal. It's mindfulness-oriented, but it's hypnosis, it's cognitive behavioral therapy, it's mindfulness, it's positive reappraisal, like the James Gross version, all into one. And it's created for opiate-using chronic pain patients.

(50:43) And Eric has been incredibly successful at demonstrating the efficacy of this intervention on opiate use, on chronic pain. And that is because it is a multimodal issue that requires a multimodal therapy. I do not think that there's a silver bullet. I don't think you just pass a five-day mindfulness intervention—voila, it's over. Maybe you learn the recipe, maybe you learn the technique to know how to independently practice.

(51:10) But really for addiction, for chronic pain, the brain is analogous to a bicep. And now we have the technology to actually see, just like a bicep, that the brain can get stronger and can become more resilient with more mental training. And so we are running multiple studies to look at opiate misuse. I'm not really in the space yet of cocaine or meth, or other types of alcohol use disorder. But definitely these things go hand in hand. And they're not as much of a problem in the rest of the world. It's a uniquely American issue.

Wendy Hasenkamp (51:46): I guess as we're coming to a close, I'm thinking broadly... and I'll throw out a question that you may or may not have thoughts on, because I'm linking between a lot of things we've talked about. Just thinking about your experience that you shared as an immigrant, and when you came to the States, and feeling not included or not being sure of who you were in a lot of different settings. And then thinking about self and how meditation practice can shift the way that we incorporate information about the self. And then I'm thinking about pain, and not only physical pain, but emotional pain and maybe even societal pain, if you want to get metaphorical about it. So I'll just throw those things on the table and see if you have reflections.

Fadel Zeidan (52:34): Yeah, Wendy, I think these things are all connected. What is it? The first law of physics, that energy cannot be created nor destroyed. That's not a theory. This is just the way it is. That's the law. And it's kind of turned into my religion, Isaac Newton's first law of thermodynamics. I think that they're all connected. And pain is an unpleasant noxious experience. And I think there's a domino effect here. If there's one individual suffering, then whoever that individual meets or communicates or interacts with, whether it's implicit or explicitly, is going to share some of that suffering. And you've met people that are the opposite side of the spectrum. You go around them and it's just a glow. It doesn't rain at their house. And that's just as contagious as well. You leave them and think, "Wow, I feel lighter. I feel better." I feel that with this work, it always starts with one individual, and it has the capacity to be contagious to the societal level.

(53:43) From my own experiences with self-identity... and it's still difficult for me. You know, I'm an American. I was lucky enough to make it to this country. It was before Saddam Hussein invaded Kuwait. But I still can't go back to Palestine. And that's okay, because the idea even of nationalism is something

that's fabricated. There's so much nationalism in self-referential processing, but that's just an interpretation. It's a flawed judgment. Doesn't mean I don't feel for suffering for other people.

(54:18) It's a fluctuating dynamic experience that has the propensity, the capacity to change one person, to change the entire society. We have seen this over and over and over again. Jon's study in 1982 with 33 chronic pain patients that were eating raisins was a significant component of this movement that you and I kind of got to see, and be a part of from the beginning. And only now can we even imagine how much more that we have to go. Because the research is still just coming out, showing that these practices make you kinder, make you more altruistic. Yes, healthier. Yes, I feel less pain. But these same people that are saying they feel less pain, feel like they want to donate more money to help people.

(55:07) We're doing similar studies with organ donors here at UC San Diego. Can mindfulness training get folks to change their organ donation status on their license? Can we do this with kids? Can we do this with earlier generations, to kind of cast this renaissance of altruism? I don't know. I've got my popcorn out. I'm looking forward to watching the show. *[laughter]* And thank you for broadcasting it. I mean, people can read these science papers, but it's not translatable. It's work like yourselves that's really helping move the needle. So I think we all as a community are very grateful for you, Wendy.

Wendy Hasenkamp (55:44): Oh, well, thank you so much. Thank you for all of your work. I really appreciated all of your sharing, and thinking more deeply about the implications of this work. And I'm so happy to have you in the community and doing the work that you're doing in the world. So thanks for being with us today.

Fadel Zeidan (56:00): Absolutely my pleasure. My honor. Thank you.

Outro – Wendy Hasenkamp (56:07): *This episode was edited and produced by me and Phil Walker, and music on the show is from Blue Dot Sessions and Universal. Show notes and resources for this and other episodes can be found at podcast.mindandlife.org. If you enjoyed this episode, please rate and review us on Apple Podcasts, and share it with a friend. And if something in this conversation sparked insight for you, let us know. You can send an email or voice memo to podcast@mindandlife.org.*

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