

## MindFIT Podcast – Mindfulness, Neuroscience and Emotion Transcript

Lauren Brown:

Hi, and welcome to the University of Toronto's MindFIT lecture series. My name is Lauren Brown, and I'm the Mindfulness Meditation and Yoga Program Coordinator for the division of Student Life. Thank you for listening.

I'd like to introduce Hela Kalicharran, who is one of the fantastic work study students who works with me at the Multi-Faith Centre. Hela is going to lead us in a land acknowledgement.

Hela:

Hi, everyone. Welcome to today's session. We're just going to begin with a land acknowledgement. We wish to acknowledge this land on which the University of Toronto operates. For thousands of years, it has been the traditional land of the Huron-Wendat, the Seneca, and the Mississauga's of the Credit. Today, this meeting place is still the home to many indigenous peoples from across Turtle Island, and we are grateful to have the opportunity to work on this land.

Lauren Brown:

Thank you, Hela. Today, we are so grateful to Dr. Norman Farb, who is here to speak about his research and experience in the area of mindfulness. Norman has his Bachelor of Psychology from the University of Waterloo, and earned his Master's and his PhD in Psychology from the University of Toronto.

He's currently an associate professor at UTM in the psychology department. His studies focus on the neuroscience of human identity and emotion, with a focus on how cognitive biases shape emotional reactions that determine wellbeing. Welcome, Norm.

Dr. Norman Farb:

Great. Thanks so much, Lauren, and thanks so much, Hela, for the land acknowledgement. Thank you all for coming on an increasingly snowy day and dedicating some of your time. I am going to share my screen and do, oh, can I do screen sharing, or is that not usually what's done? I'm happy to do if that's what you always do. Oh, I think something might've shifted.

Okay, I'm going to share my screen and do some slides, but as this might be an audio recording down the road, I will try to also talk through what I show on the slide. With any luck, there'll be 15 to 20 minutes to take the conversation anywhere. It's not a huge group. I'm hoping we can get into a bit more discussion and not just listening to me ramble on. In that good spirit, I'm going to... Sorry?

Okay. Yeah. In that spirit, I'll get started. I'll start this story with what many of you may be realizing around this time of year, it's a hard time of year. There hasn't been proper sunlight here for a long time, despite a few breaks in the clouds, and school, both on the teaching and evaluating and support staff neuroscience podcast (Completed 06/29/23)

sides, can be a very stressful sort of period. I think it's quite interesting when one gets into mindfulness work and other contemplative practices to really think about what is happening when we start feeling overwhelmed or stressed.

At the heart of it, stress is something that has stuck with us as a species because it's been quite adaptive, and I'm channeling a lot of week four or five of a mindfulness-based instruction course here. This idea that our bodies get prepared to protect us from things that in our evolutionary past, we needed a rapid deployment of metabolic resources in order to survive. As a predator that jumps out of the bushes at us, or all of a sudden, a huge storm comes and we need to find shelter, it's not really the time for a lot of contemplation and reflection. We really need to get ready to move fast, and to be relatively resilient to cuts and scratches.

Our bodies really get us into that mode in response to acute threats. That can be a good thing. When there's an acute threat even today, if you're walking at night and you feel like someone's following you, and you really want to get out of there, your body will get you as optimally prepared as possible to book it. An issue I think that we're dealing with, though, in contemporary society, is that we've actually done a really good job for the at least privileged half of the world to deal with a lot of acute stressors.

While we may have unpleasantness on the TTC, or get feedback on an evaluation that's not exactly what we wanted, having to dodge wild animals, having to avoid massive geopolitical-like natural disasters in many parts of the world, we've really been able to protect ourselves from them. Although we're very connected these days and can hear about bad things that are happening all over the world, the rates of infant mortality, of people living in extreme poverty, of being subject to daily physical assault, have actually gone down dramatically in ways that they've never been this low before in human history.

We found a way to resolve a lot of our more acute stressors, but you could argue there's been a trade-off here, and we've replaced them with chronic stressors, things that are sort of unpleasant and threatening, but not in a, it's going to end my life in the next minute or two sort of way, but oh, this means something bad for me in the future, in a sort of ambiguous and not really easily resolvable way.

Being at a job that seems meaningless and is just grinding you down, or being enrolled in a degree program, what am I going to do with this degree? Why did I make this choice? Why am I in this class? These are chronic stressors. What we see is, although things like violent death have gone down dramatically, rates of other problems have skyrocketed, including obesity and all sorts of mood and affective disorders. Depression and anxiety are very prevalent these days. Actually, our depression is the leading cause of disability in the world now.

It was prophesied five, 10 years ago, and now the prophecy has come true. This is a different kind of stress than we've had to prepare for in the past. You might wonder, well, why can't we leverage technology to protect ourselves or buffer ourselves from always feeling so stressed and overwhelmed? To be a little bit pessimistic about it, the reason that we don't do this in a widespread way is because there's a lot of money to be made out of people feeling stressed.

Social media and the general media now are paid in terms of how much attention you pay to them, like how many clicks or moments of contact they get. Anything that raises contact, even if it's in a self-defeating way, where you're going to get upset about a source and stop using it later, is rewarded in the short term. Threat signals are big business. You can see parodies now of what newsfeeds are is they're essentially a threat, and then something so that you don't get too freaked out and leave the media, because that would be bad that you're cutting down a click.

They'll show you something really nice that you could feel safe with, and then another threat. This secret sauce, or not so secret sauce these days, is a sign of the times, that no matter what we do, if we're engaged with most forms of media these days, what will be happening is a continued presentation of threatening stimuli in order to get us to behave in predictable ways. We can feel like we're just sort of hanging on in a world that's gone mad.

I would suggest, and I think there's a lot of research emerging to support this, that the times you most feel this way, like the world is an unlivable place and you want to get off the ride, are probably coinciding with times you spend a lot of time exposed to mainstream media and social media. If you were to spend time not in those environments, you would not really feel that kind of chronic, unavoidable stress. We don't really have enough evidence and political will to address these things.

We're not really close, despite the occasional story that comes out about Instagram, finding out that time on Instagram predicts depression in adolescent and teenage girls, and then figuring out how they can get even more time. These kind of internal reports leaking are not enough to really change the political attitude. We are left in this sort of resistance mode. We're just taking this stuff in through the media all the time, and also through the unpleasantness and challenges of daily life. We can feel like we're sort of just stuck in this place where we're just trying not to break down.

This is actually a very well-characterized part of the stress response theory that was promoted now, I guess, 60, 70, 80 years ago by Hans Selye, who documented stress response both in other animals and in humans, where we have this initial kind of freezing when something happens, and then our body mobilizes resources to get us ready to dodge that saber tooth tiger run away from that storm. Then what happens to us if we keep getting hit with threat signals is we get stuck in this resistance phase.

You get used to this feeling of just having to tough it out. The problem with getting used to this feeling is slowly what is occurring in our bodies are the ingredient for catastrophic breakdown. Part of the stress response, for instance, is pulling the arteries and veins away from the surface of the skin, in case you cut yourself on something or a predator takes a slash at you, you won't bleed out. In the short term, that's really good. In the long term, that constriction of the blood vessel leads to arterio sclerosis, or the hardening of the arteries, and contributes in a major way to heart disease.

It will give you a heart attack. The stress hormones that are sent as quick messengers to cross through all the cell barriers throughout our bodies when we have a stress response, again, will do all kinds of useful things in the short term, but if you keep getting hit by these stress hormones, it causes inflammation in the body, and it also causes toxic effects in some of the most vulnerable parts of the body, including the bottom of the brain. You can have early onset dementia.

We know that if we can resolve these feelings of stress and depression, anxiety, even what seems like early onset cognitive impairment, can be somewhat reversed. There's a lot of physical consequences, as well as the emotional suffering that occurs of being stuck in its resistance mode. Unless you leave this mode of your own accord, it is inevitable, so the theory goes, that you will experience some sort of breakdown in terms of a physical or mental health problem.

You can see it's a bit of an issue if more and more of us, and in fact, a lot of the big machinery, what are some of the most prestigious jobs, working for Google, or Meta Facebook, or Twitter, or something like that are these really, really high paying jobs now. A lot of even the accolades, at least in the financial sense in our society, are all leveraged towards perpetuating this machine that keeps us in a state of chronic stress.

You can think of this feeling of resistance, if you feel like you need to resist what's happening in the world from it getting to you, there's another way to think about it is that your current story about the world is very stressful, and you don't have a way out of it. Then that shows up in all kinds of ways, right? We've heard in the UK, they actually appointed a minister of loneliness. Just sounds very like a sad position, but to deal with the epidemic of people feeling disconnected, or the languishing epidemic that has been written about the past few years, especially in the face of lockdowns, and feelings of hopelessness, resignation, and worry.

These are core symptoms also of depression and anxiety disorders. There's something that it really feels like, that kind of emptiness and just needing to trudge through life when you're stuck in this resistance mode. It has a real feel to it and it has a lot of physiological consequences. A question we might then ask is like, "Well, if we can articulate that this is what's happening to us, and we know to some degree that it's coming from the media, but also from just the stories we tell ourselves, then why do we so easily get trapped in this mode?"

I don't consider myself separate from this. On any given day, I could easily get triggered by something and find myself just totally strung out and just trying to hold on by the end of the day, despite having studied this stuff, and practiced mindfulness, and spend a lot of time thinking about how we can improve our life. It's very, very easy to get stuck in this mode. One reason why we get stuck is our brains are literally wired to keep the ongoing narrative alive, so that we can make sense of who we are, where we are, and what we're doing in the world.

All the way up from just regulating basic physiology, like your heart and respiration, your breathing should occur at natural cycles in accordance to what your body needs, all the way up to our sense of who we are and our place in society, the sense of self, is supported by what is thought to be one central network in the brain that's known as the default mode network. It was discovered by researchers giving participants a break while they're in these fMRI scanners. You're doing some math task, or mental rotation task, or memory task or whatever.

Then in between blocks of the task, they'd say, "Hey, you can just relax right now, take a rest, we'll start up again in another couple minutes while the scanner's going." You need those off periods to compare to the task periods. When researchers actually started looking at these off periods, they saw that the

brain was incredibly active along the cortical midline. You can think about right along the shark's fin of the brain, across the middle, as well as two extra hubs just above the ears here, became known as a default mode network.

One of the only ways that you could on purpose activate this network, other than just letting people's mind wander, was to ask them to think about themselves. Researchers started to think, oh, okay, maybe what people are doing when they're mind wandering in the big scary magnet machine that is an MRI is thinking about themselves, "How did I get here? How much longer do I have to be here? When will I get to leave? Me, me, me. I, I, I."

These kinds of thoughts that where most of us go when we mind wander are to sort of self-centered thoughts. If you get bored of this lecture, you'll probably think about your state and how you got into it, and when I'm going to stop talking, and so on and so forth. This type of storytelling about ourselves is part of what the default network does. It happens when we're not busy doing anything else intentionally.

We can see that this can spin out of control in studies of depression, where the default mode network is much larger. It's grown beyond its proper boundaries. In the bottom panel here, it says C and D, in depressed folks compared to healthy people. This is when they're just at rest in the scanner. You can think of depression as almost like a really negative, hopeless story that has taken over the default processing in the brain, to the point where actually now, it's getting in the way of you doing other things. This leads to dysfunction, and which is why we think it's a disorder and not just someone having a bad day.

In our own research, this is research I did as a grad student at U of T, we would show people sad film clips in the scanner to try to understand different ways of handling negative emotion. We compared that to watching neutral film clips from Home and Garden Television, which is usually not too emotionally provocative for most people. What we would see, again, is that this default mode network would activate really, really powerfully in response to sadness. The medial prefrontal cortex in the front of the brain, and the posterior cingulate and surrounding areas in the back of the brain.

You didn't have to tell people to think about themselves. Just by putting them in a sad situation, you start to see a lot of this activation spin up. Then when you ask people, "What happened when you're watching the movie," they're relating it to themselves, as we do with most strongly evocative pieces of art or entertainment. You start thinking, oh, saying goodbye to this character, saying goodbye to their sick mother. Oh, I have to deal with a sick relative in my life, or there's this loss. Oh, when have I experienced a loss like this?

You kind of see this pattern spinning up in response to negative emotions, without any special instructions, just watch the film. That's what happens. It's actually correlated a bit with how much people say the film is making them feel sad. We can see that strong negative events elicit these sort of negative emotions that are correlated with this storytelling, spinning up this default mode network.

The question that I'm sort of been feeding into this first 20, 25 minutes of talking has been that it seems to be unavoidable, but we should be desperate for how we can escape this cycle. If there's this thing that's happening by default that gets us stuck in feeling like the world is hopeless, or our future is hopeless, or so on and so forth, then how do we break out of this mode? Well, I think for most of the past century of clinical psychology emerging, and thinking about these sort of ideas, most approaches have been about let's rewrite the story into a more positive story. Let's talk about what you believe about yourself, and let's challenge that belief and replace it with a better belief.

Let's tweak the contents of storytelling and to make the story more empowering, or at least less disempowering. That definitely can be a very important facet of doing work on the self, whether it's in a clinical context, or just you trying to improve your lot in life and your emotion regulation skills. There's something else that happens that I think has been relatively ignored when people are exposed to stress.

The other thing that we saw in this film provocation study was that not only was all this storytelling default mode network stuff spinning up, but we also started to see the deactivation of sensory parts of the brain, so the top blue blob there is the somatosensory hairband that is a map of what's happening, which you can feel on the surface of the skin. Then if you tuck under the ears at the bottom here, right where the mouth part of the map would be, because it's an upside down map, actually, feet at the top, mouth over here, and you tuck in past the gums, you get to the insula, which represents the feeling state inside the body.

These regions were turning off when people said they were feeling sad, which is kind of weird. You'd think like, oh, I'm feeling more sad, so shouldn't I be having more sensation from my body, more sensation of a clamminess, or a tingling, or butterflies in my stomach, or whatever it is that you feel like when you feel sad? Instead, we saw that sadness was really being represented by this storytelling network to the exclusion of taking in new information.

When we looked at how that related to how depressed people were who signed up to be in the study, because they were signing up to do mindfulness training for stress reduction, because they weren't feeling so great, they were feeling really stressed, what we could see is that as there was more inhibition, especially in this insula region that is the felt sense inside the body, we believe that this represents the feeling states inside the body in the brain. The more this region was turning off, the more depressed people were.

Even though people would say, "Oh, I'm like a four out of seven for feeling sad," a four out of seven sometimes would be made up of a mixture of storytelling and body sensation. For other people, it would be pure storytelling and total strong inhibition of body sensation. It was the people who were inhibiting sensation were the worst off, not differences in how much they activated the default mode network. It seemed like that was somewhat unavoidable, that there'd be storytelling when watching a movie.

This took 15 years of grant writing, and then running this huge clinical trial, and then finally analyzing data and starting to publish it, have extended and replicated a lot of these findings by looking at groups of people who have a history of recurrent depression we know are at risk for relapse. We can put them in that same kind of situation when we show them sad film clips. We can show in this top panel here,

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that sad mood powerfully deactivates a lot of the sensory parts of the brain. You can think of a lot of sensation happening in the back half.

The top of this brain picture is more the front of the brain and the default mode network, little side hubs are activating in response to sad mood. We see that the moment of being exposed to sad content in a movie clip is turning off a lot of these brain regions. We could also look at their clinical history, and the more episodes of depression in the past that they'd had, or a sample range from one to 10 past episodes of depression, so people have really been struggling with depression throughout their lives, the more past episodes they had, the more they shut off these regions.

It was like a scar or an accidental learning of being depressed in the past was being able to block out sensation. If they had leftover symptoms of depression, even though at the time of scanning, they were no longer clinically depressed to get in this study, they were recovered from the most recent episode, again, residual symptoms predict more of a shutdown along the somatosensory cortex, and insula, and these body sensation regions.

Critically, when we followed these people for the next two years, not every day in a trench coat or something, but checked in on them by phone or email every month or two, we could see who ended up relapsing again. We knew that based on their clinical profile of having all these past episodes, they were at much higher risk of relapse than the average person as a group. Maybe it's like a coin flip whether they're going to become depressed or not, a 50/50 chance over a two-year period.

We could see that, again, on top of all these other tendencies that suppress sensation, suppressing the somatosensory cortex, the insula, visual cortex, even parts of the motor strip, so for doing action, so being engaged with your body in response to sadness, was predicting future relapse from the time when we scanned. You can see at the panel at the very bottom here shows a difference between the people who are in the top 50% of not are inhibiting sensations, they're inhibiting the least in the blue bar, and then the red bar is the other half of the group.

This is 85 participants, so quite a big sample for neuroimaging. These are the people who inhibit sensation more in response to sadness. By the end of the two years, there is a massive difference in the proportion of people who have relapsed. In the half of people who inhibit the least, maybe 5% of them, 6% of them relapse. You can see close to 90 something percent are still surviving, which means they haven't become depressed again.

In the group that's inhibiting a lot, the rate of relapse or recurrence or depression is like 35 to 40%, so a really big swing, like a 30 to 40% swing in your risk of becoming depressed again if you're a strong sense inhibitor versus not. Again, I should say, if you look at these bars, which shows the amount of deactivation in these somatosensory regions, people who don't relapse are still depressing a little bit. Like everyone is shying away from sensation a bit when they're exposed to sadness, but it's at a much greater degree in these red bars. They're much further below the zero level, which means no inhibition.

Of course, they're spread across within each group, but these are the kind of overall trends. Now we have really powerful evidence that this tendency to inhibit a sensation, although it may feel protective,

like we're getting away from the bad feeling, we're seeing a neural account of how we get caught in these downward spirals, how we get stuck. You feel bad, you avoid the negative emotion, you maybe get a little bit of a reward, like negative reinforcement, because you get away from the negative feeling, but now you're stuck with a story about feeling bad. How would that story change?

Well, only if new information came in, but what you're doing is protecting yourself from feeling, so you're not taking in new information. Now, we get to what is known as these downward spirals that lead into real dysfunction and distress that would accompany a diagnosis of being in a mood disorder and affective disorder, post-traumatic stress, and so on. Sensation is no joke, I would say, based on some of this research. Losing track of sensation, even if it feels like relief in the short term, might be disastrous in the long term. It's a sign of being stuck in what this resistance mode that I talked about before.

Now, I don't want to be all doom and gloom because I started with the sad stuff. On the good side is that there are lots of traditions, some of which are very modern, and some of which are very ancient, and have been sort of translated/appropriated and there's difficulty in that. What's beautiful is that we have access to a whole bunch of different techniques by which we can leverage sensation to improve our wellbeing. If part of the problem is losing track of sensation in a way that maybe we're not even aware of, that locks us into a negative story, then learning to sense again, especially sensing in the face of stress, might be a tonic to that.

Even the most basic initial mindfulness instruction, if you go back in the Buddhist tradition, at least, in the Satipatthana Sutta, or Sutra, depending on how you're translating, the instructions are just to pay attention to their breath. Do what with it? No, that's the whole point. Don't do anything with it. Stick with the sensation. What are you supposed to do if the breath is long? Just notice you're having a long breath. What are you supposed to do if the breath is short? Notice that was a slightly shorter breath.

All you're doing is paying attention to the sensory quality of the breath. What do you do after that? Don't worry about it. That's the tendency to try to get back into that conceptual storytelling mode. Yes, there are things that come afterwards, but this is the initial practice. While that might seem basic, it's basic in a delicious way, because it's basic on purpose to disrupt the advanced machinery that gets us caught in a storytelling mode.

Interest in mindfulness and other contemplative techniques has really soared in the past 20, 30 years. There's now really good meta analytic, which means summarizing across many different studies, evidence that mindfulness techniques can be really helpful in depression, anxiety, and chronic pain conditions. There's this massive proliferation of different specialized targeted mindfulness interventions or practices to help in a whole bunch of other disorders, where the evidence base is starting to grow as well.

Mindfulness also seems to be very useful for reducing burnout in people in healthcare professions. It doesn't take much to think, well, I could also use the protection from burnout too, no matter what your profession is. It's a really exciting time. At the same time, the way our society is structured is people want to sell things. In a non-ironic way, you'll see headlines like, "Five healthcare startups monetizing health and wellness for the blockchain."



We're going to figure out a way to sell you this stuff, even though the instructions might be so basic that they ought to be free. It can be a bit difficult to adjudicate between, well, what is going to carry the secret sauce of really helping me reengage with sensation, and what is someone trying to sell me something? I think we all have to be sort of careful consumers in our practices. Someone will try to sell you a mindful bath mat, or a mindful aromatherapy candle or something like that. Maybe it works for you, but maybe not.

Understanding what the mechanisms are that makes mindfulness helpful will help us each to make good choices for ourselves, to the extent that we want to sort of pursue the training path. The question I would like to try to address in the next 10 or 15 minutes, and I think I've already sort of laid the feed for it, is why is something like sense foraging, going out not only exactly what we're going to find, but valuing sensation helpful, of pulling us out of this resistance mode, of pulling us out of chronic stress?

Well, in that study I showed from when I was in grad school, we showed people shutting down sensation in response to seeing these sad film clips. We had half of the participants, and they're the blue dots here, were people who just completed mindfulness based stress reduction in eight weeks, meeting once a week group-based class, where people learn different meditation techniques, and discuss their experiences and also in theory.

Then they're supposed to practice for about an hour a day. Most people, if they're a good student, will practice a couple of the days a week at least. People who just completed that training are the blue dots here. People who are on the wait list, who are about to do the training, are the red dots here. We were able to point out that relative to the people who had yet to do the training, people who had mindfulness training with no special instruction to be mindful, were not shutting down the insula as much.

They're closer to this no inhibition line, the blue dot side than the red dots, in response to sad film. They're still feeling sad, they still have a story about what's going on, but the story is not operating to the exclusion of sensation. It doesn't have to be this full trade off, where, oh, I'm not going to feel anything else. The people with a history of depressions, this is the larger sample that is much more recent study, we don't actually see them totally able to bring back sensation.

What we do see is people who are responsive to doing mindfulness therapy, or even just kind of savoring cognitive therapy are able to stop turning on a part of the front of the brain when they're exposed to sadness. The more that front of the brain area turns on, the more it acts as a brake pedal to shut down sensation, but the scar of just automatically turning off sensation of people with a history of recurrent depression may be too deep to be addressed in just eight weeks.

At least these people can take their foot off the brake in response to stress. They're no longer pushing an even greater inhibitory signal, even if it isn't enough to let sensation recover. Recovery might take much longer than eight weeks, especially for someone who has years and years of practicing avoidance. Even learning not to push the brakes has important implications for wellbeing. Again, there's like this 30 to 40% swing in relapse risk if you're the kind of person who can learn to stop inhibiting or setting the inhibitory signal, even if sensation hasn't come back yet.

This is very similar to what we see in neuroimaging studies of addiction, where before, people can feel pleasure in a way that shows up on a PET scan, and their reward circuitry coming back online. There might be a full year, year and a half of abstinence from the substance before reward circuitry kicks back in. With mood, and feeling overwhelmed, and stressed all the time, it might also take longer than an eight-week program for you to actually start feeling everything again, seeing things back in technicolor when the world has become black and white, and so on.

I think part of this is also pointing to this idea that what we're trying to do is not just get rid of a bad story or anything. We're not just trying to stop telling the story to ourselves, but we're actually trying to create a space where new meanings can grow. Meditation isn't just about a bare, non-judgmental attention, where you're never going to have a judgment again, where you're just going to forget everything you know about yourself by focusing on sensation, and then your life will be fine.

Instead, I think what we are starting to appreciate, although this is the kind of second step after a lot of research on basic mindfulness, sensory attention, the present moment on purpose, to what kind of comes next is the idea that really, we're playing a game where there's a tension here, where we want to let change in, but we also need to make sense of the stuff that's coming in. Otherwise, we're just exposing ourselves to chaos. That's not necessarily good.

A little bit of chaos can be deliciously disruptive to the status quo, but we're not just trying to completely lose sense of meaning in the world, either. Part of a mindfulness practice is using sensation to just break away from how dominant a narrative is about the world. Even if it's a positive narrative, it's limiting 'cause it's always the same story. We would like our stories to be able to change. Definitely, if it's a very negative, dysfunctional or disempowering story, we would like to break that up.

There's that idea of freedom from all the bad stuff we know, at least not having to tell that same depressing, pessimistic story all the time. Also, there's this kind of idea that part of what we're trying to do when we get into sensation as we're really letting new information in is maybe we'll have find new knowledge, new stories, insight. Some translations of mindfulness translate to insight, or sometimes remembering what's really important is another way it can be translated, not just bear attention to the present moment.

We've done a lot of work, which I don't have time to go through all of it today, but I'm happy to talk a little bit about it. I do want to leave time for discussion. Looking at, well, what really happens on a neuroscience level and in a psychology experiment when people start paying attention to their breath? We just have people breathe along in the scanner, or breathe along doing a task. We compare that to some other kind of condition, like paying attention visually to what's happening on a screen, let's say.

Like I said before, letting in that breath and paying attention to that sensation is a kind of sweet chaos. You're literally taking in moment by moment changes from the world. We'll have people in the scanner, for instance, press a button as a circle gets bigger and smaller as a visual kind of condition. Then we'll have them press a button as they breathe in and out. We can see that they're doing the task, because they're pressing the buttons, and we can even see that they're pressing along with their breath 'cause

you have a little elastic around their chest. We can see when they're breathing in and out or that they're pressing along with the circle.

We know they're doing it. The really interesting question is, well, what's the difference between just tracking something out in the world versus tracking this kind of sensation coming inside of you, and the feeling of your breath? Surprisingly, really surprising, almost too surprising to be published, I would say, because we've had trouble publishing this because reviewers think we're just messing up our analysis, a lot of the brain actually quiets down when people start reporting on their breathing, as opposed to reporting what's happening on a screen.

Part of it is a default mode network, but part of it is also just other association parts of the brain. It's a really widespread deactivation that's really surprising, and we've done a lot of work to control for just like, are they breathing slower? Something like that. It's not just that. There's this kind of quieting of the brain that happens just by paying attention to physical sensation that might, because I often get this question if there's something special about the breath or body sensation compared to visual sensation. I think maybe there is.

To pay attention to the breath, it seems like part of it is not letting the brain actually become less active. I'll talk about why that is in just a moment, or why I think it is. We can also use questionnaires to look at who's doing better with their body awareness. A questionnaire that I really like is the Maya. It looks at people's tendency to pay attention to their body, but also how much they value and trust that information. It's associated with positive mental health outcomes.

People who score really high on the Maya might respond differently when they pay attention to their breath than people who score really low, who don't pay attention to the body or don't trust their body signal to feel that they're very threatening, and not really worth the risk. What we see is that although a lot of the brain is actually turning off, the yellow, kind of orangey stuff here is all parts of the brain that look like it's getting quieter. People pay attention to the breath.

Part of that region doesn't turn off in people who show a lot of trust and valuing, and tendency to look at their bodies as a source of important information who score high on this Maya scale. While a lot of the brain is still quiet, again, for them, the parts of the brain that monitor things and also some language parts of the brain that can label and report on things, they manage not to turn those parts off.

We can kind of see from this study that I'm still struggling to publish, I just got rejected again two days ago. You can talk about dealing with rejection if you want, is that there's these two different elements of a foraging breath. One is a quieting, quieting a lot of the other stuff that's going on, but the other part in someone who's really skilled at it who would report a high score on the mindfulness questionnaire, the Maya questionnaire, is also learning to attend within this quiet space.

You can see a lot of the conventional attention networks are becoming more connected even though brain metabolism is going down, so highly connected, but not as active. You can think of this almost as a metaphorically, as if you really want to pay attention to sound inside your house and there's a lot of street noise, well, one thing you could do then is close the windows, shut the blinds, and stop letting all

this outside information in. Then you're more able, not by turning up the volume on what's happening inside your house, but by getting rid of distraction, to notice what's there.

It really seems like paying attention to the breath has that built into it, without any sort of contemplative training. It's kind of how you learn to know what's happening in your body. It's just quieting down other processes. In some ways, it makes sense, because of course your brain is always representing what's happening inside your body to keep you alive. It has to regulate whether you pay attention or not, your heart rate, and your breathing, and things like that.

The signal's already there, there's nothing to turn on. The problem is we can't access that signal because there's so much else going on, so much distraction, so much internal monologuing, so many things happening outside of our bodies, that if we were to turn all that stuff away, or off, or down, at least, we would then be present to sensation. We would also be getting that sort of reward of turning off a lot of that conceptual stuff that might be driving us crazy.

This could be taken to an extreme. There's accounts of these super soundproof rooms, I don't know if you've ever read about them, where people can't handle it because it's so quiet in their room that they could hear their food passing through their intestines and stuff. I think that also lends credence to this sort of explanation that if we can quiet down the right amount, we can really notice things that were there the whole time.

In the interest of time, I'm not going to focus too much on the behavioral studies, but we've done some behavioral analyses of people trying to notice changes in their breathing when they breathe along with a pulsing circle on a screen. What I just want to say from those kind of studies, I'm happy to elaborate on them more, but I do want to make time for questions, is that when you're breathing along with one of these circles and trying to notice if your breathing is changing, you could be tested on how accurate you are at detecting those changes.

You could be tested on how confident you are in the whole process, or you could be tested on whether you're only confident when you're accurate, which some people call a type of meta awareness. Here's a situation where the breathing is actually speeding up. When we look at these three things across the hundreds and hundreds of participants, we can see that the thing that actually correlates with mental health with these higher Maya scores and higher mindfulness scores, lower depression scores, is your confidence in this process.

It doesn't actually matter whether you're the best person or not the best person at detecting small changes in your body. It seems like that's not really the point. It's learning to value and trust these sensations as important sources of information is actually predictive of mental health. Now, I'm sure there's boundary conditions. If you can't feel anything in your body, or you're feeling it super intensely all the time, that's not good for you. For the average person being in the 80th percentile or the 20th percentile, it doesn't really matter in terms of detecting small changes in your body.

A lot of what we have to deal with in life are not these tiny, ephemeral subtle changes. We have to deal with the big feelings coming up. Confidence is more important than being the best detector. I think

that's actually an important little side note for people getting into practice and also teaching. They're not really playing the game of being the best noticer of body sensation. We're playing the game of being one of the most skilled at trusting and valuing, and having the habit of looking towards this sensation, no matter whether we're gifted with high or low levels of accuracy.

If we're going to make use of this information in a way that can break us out of stories and also provide new insight about, well, what really is our conditioning? What really is setting me off? What happened before? What happened after? Well, for me to do that, I have to be confident and not snap into avoidance. Confidence, I think, is going to be, I think personally, is going to become a sort of newer kind of construct. How do you develop confidence as you attend?

I don't really think we think about it that way, but maybe I'm just using different language than how skilled teachers already try to communicate this idea. This comes back to this kind of big picture of the arc of what happens in contemplative training and mindfulness, whereas these unexpected, stressful life events happen, and the surface of our lives seem really, really rough and rocky. Underneath that, we actually have to get beyond the surface. We have to navigate our way through this chaos of sensation that can seem really, really threatening.

By doing it, we also disrupt just the status quo of knowing exactly what's happening on the surface, which can be really constructive. Then hopefully, we can eventually get deeper than that, and also start noticing and sensation the possibility for new patterns and meanings. Noticing, well, oh, these are the kind of situations that make me feel this way, or I expected this to be really important and gratifying for me, and it's not, so why am I still doing it?

Actually, a researcher named Judd Brewer in the States has done some amazing work on dismantling anxiety, eating disorders, and smoking through apathy design, which just get people to pay attention to, well, what's it actually like when you eat or when you smoke? Just by noticing, oh, it's not what I thought. I thought it was pure pleasure, but actually kind of gross when I have that second serving, or cigarettes, they taste horrible. Why am I doing this? It's that realization that helps them break the chain, not telling themselves that their story is stupid, or that they're bad, or so on and so forth.

It's confidence in interpreting your own sensation as new information to change your story. Okay. This all comes into a broader theory called Mindfulness to Meaning Theory, which suggests that mindfulness training helps people get perspective and break out of their stories, and then come up with new meanings, reappraise them, and that can lead to wellbeing. We're doing a lot of work now in trying to see how much this pathway really explains why mindfulness interventions are helpful. It turns out that there's a lot of benefits just to breaking away from the stories. You don't always have to have insight.

We've seen that a lot in my own practice and teaching people. Sometimes, you just love that feeling of being able to relax and let go. We're not trying to take away from that. There's probably actually many different pathways by which a mindfulness practice is promoting wellbeing. One final note I'll have, then, when I talk about practice is in this depression study and in the larger group of people who both included those who did and didn't get scanned, we tried to figure out what was predicting this ability to

de-center, or break away from a regular way of knowing, and see things from a more objective or at least different perspective.

What we found was that when people took a mindfulness course, all that really predicted in terms of their long-term health, again, this is talking about the group of people with the history of depression, was how much they might practice after the course was done. Then how much they practiced after the course was done during the two-year follow-up still didn't really predict whether or not they relapsed or not, but it did predict that they would get better at de-centering at this part of perspective taking, at seeing things without being fused in the moment, and seeing, oh, this is another experience I'm having, but it's not necessarily the truth about me.

Then if they grew in decentering, that's what predicted them not relapsing. If all this brain stuff didn't work for you, this is another way of looking at it. Practice in a course is good because you can internalize practice and practice on your own. Practice on your own is good because then you can start having this skill of breaking away from the default narrative, and kind of seeing things as experiences that arise and pass over time. If you get good at that kind of skill, then you're probably going to be more resilient to getting stuck again in the future.

To sum it all up, and then I'll stop talking for a bit, developing wellness, developing resilience is an ongoing process. We really want people to be able to internalize that process if we're teaching, or we want to internalize it for itself. We don't want to just do it because the app said so, or the teacher said so. Self-care techniques shouldn't just be about instant happiness and gratification. That's part of what gets us stuck.

It should be more about skill building, and the skills matter if they can both give us a sense of relief from being burdened by always seeing the world in the same way of feeling like we're getting kind of stuck. Also, if it gives us the chance, at least if we're interested, in finding insights about, well, what are the things we're programmed to react to? What do we really value? Are we living our life in accordance with those insights?

I don't know. We can try to form acronyms or ways of pitching it to people as sort of take home. There's a lot of different access points that aren't even just meditation that break us out of our default, assuming our default is not already like saintly, equanimous existence. I just want to kind of leave that as food for thought, that this is really the kernel of it, whether it's called mindfulness or not.

I hope as we get better at articulating these practices, and applying them, and learning them for ourselves, and teaching them to others, that we really can find that there's a balance between letting ourselves be full of sensation, and still understanding the world, and actually being able to make some choice instead of having the story about life just programmed for us.

Thank you very much for your attention and at this point, as promised, I'll stop for a bit and take some questions and/or stories. I'm just really interested to hear your perspective on things. Thank you.

Lauren Brown:

Thank you so much, Norm. If anybody has a question, you can raise your hand or go on mic, use your emojis, or even pop it up in the chat. Whatever works.

Speaker 4:

I'm kind of curious about neurodivergence. I don't know if you know anything about if some people's brains are maybe more constitutionally, they're more sensitive to, say, these types of stories that you might tell yourself, and they're more prone to falling into them and being stuck in them, or more prone to, say, hearing those sad stories, and being more sensitive to it, to hearing sad stories and then getting more sad, if that makes sense.

Dr. Norman Farb:

Yeah, I think we're all a bit different. Some people are more on the extremes of continuums than others in all sorts of different ways. Some people are very sensitive to sensation, and sometimes it's a particular sensation, people who can't stand perfumes or bright lights, and sometimes it's all the way across the board. For them, falling into a type of avoidance pattern to protect themselves is much more likely, which leaves them with their stories.

Other people might have a great facility for language and explaining, and I've seen this as a sort of, I would still say rookie, mindful teacher's been a rookie for a long time. Some people, they can't even understand where the motivation to go into sensation comes from unless there's a really good story to explain it already. Then sometimes, those teachers pick at that, like, "What does it feel like for me not to give you the concept?"

I don't know if that's skillful or not, but whatever. My point is that I think we all could have facility. You could look at it as a superpower, or be better at certain types of processes than other people, but in the wrong kind of context, that facility can create problems. If I'm a super smeller, I can tell if there's mold in a building or a gas leak when no one else can tell, but I'm also going to get a migraine if someone's wearing perfume around me.

If I have too much sensation coming in all the time and I have trouble regulating that, it's going to be very hard for me not to become anxious about all the things I feel. People who have an intuitive ability to feel their heartbeat are at a much higher risk for anxiety and panic disorder than the average person. Conversely, people who are awesome at cognitive representation and storytelling might find it really threatening to leave that place.

I think we all have different things to work with, and a skilled teacher will try to get to know what it's like for that person, I think. Part of even doing contemplative practice is like, "Well, what is it like for you?" I think what's really interesting is to think about the idea that it's not always just about opening up to more sensation. There's also the ability to go back and reflect, and put things into language and concepts. I think the initial arc of the mindfulness movement had been like sensation can do no wrong.

Now, I think we're starting to realize, no, it's more about realizing it's a skill to choose how much you're going to be able to tell stories and conceptualize experience. It's a skill to be able to immerse yourself in sensation, and let yourself be changed by the world. Ideally, we have the ability to shift between these modes. Healthy living really requires the ability to adjudicate between these modes, and even realize these are options.

I think that's still conceptually, theoretically, is something that's still being explored and articulated. Hopefully, that helps address your question a bit.

Speaker 4:

Yeah, that's really interesting. Thank you.

Dr. Norman Farb:

Yeah. Ilana was asking the difference between inhibition when we were breathing and feeling like inhibited and depressed. I think this is the surprising thing from neuroimaging is that we would normally think of being depressed or anxious as being overcome by sensation, and that if we were able to block that out in a way, we would not feel so bad. Then at the same time in depression, you can hear stories of feeling numb, and there's anhedonia, the inability to experience pleasure, and so on and so forth.

None of those feelings, those visceral feelings, are probably playing out in the prefrontal cortex. The part of the brain that's activating too much is trying to control or regulate the feeling experience. When I say that what people who have recurrent depression are doing that's helping them not relapse, they're learning to turn down the part of the brain that's trying to fix the feeling, but they're not actually learning to turn down sensation more. They're already experts at turning down sensation. That's part of the recipe of their depression.

Sometimes people will be like, "What have you ever learned from a brain scan?" For me, one of the things we learned was being stuck in a depressed state is yes, there are periods of anguish and melancholy, and stuff that bubbles up, but the predominant mode is actually this weight of not being able to feel anything, and then feeling like nothing's ever going to change for me. Then it's obvious why suicide becomes a step. Nothing's changing and nothing can change.

All you're stuck with is your thoughts. People aren't magically thinking about the world. They know bad things have happened to them or likely to happen in the future, and that's where the hopelessness sinks in. I think one of the insights there is, and this is consistent with what happens in the first few months of mindfulness practice, is you have to let stuff in, even though some of that stuff is going to be bad and threatening. Hopefully there's some skill and some protection to titrate that, but you might feel worse before you feel better, but it's better than feeling nothing.

Getting people to value sensation even when it's unpleasant or challenging, and have the skill to not let it completely flood and overwhelm them, that's part of the richness and why we do still need nuance



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teaching. I don't think an Apple Watch is going to just replace that all of a sudden. I'm not too worried about that, because it's very complicated.

Lauren Brown:

Well, Norm, thank you so very much. We're right on 6:30. Couldn't have timed that more perfectly. Thank you so much, and thank you to everybody here for bringing your attention and for your great questions. I'd like to just say thank you on behalf of MindFIT, the division of Student Life, and the Multi-Faith Center.

We have another wonderful speaker next week. Carol will be speaking on decolonizing wellness spaces. Another important topic. Thank you, everybody. Have a wonderful night

On behalf of MindFIT, the Multi-Faith Centre, and the Division of Student Life at the University of Toronto, thank you for listening.