



Healthy Minds
 LIVE

The Aging Brain: Developing Well-Being for Your Future

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TRANSCRIPT & SLIDES

The Aging Brain: Developing Well-Being for Your Future
August 16, 2021

RICHARD J. DAVIDSON

Good evening, everyone. I am Richie Davidson. I'm not in my usual location now. So if there are any Internet problems, I sincerely apologize. But I'm really happy to be with you for this special Healthy Minds live event. I am the founder of the Center for Healthy Minds at the University of Wisconsin, Madison. And I also am the founder of Healthy Minds Innovations, an affiliated nonprofit that helps us to take the insights from the science and bring them out into the real world to both measure and cultivate well-being at scale. I'm especially pleased tonight to introduce the moderator for this panel, who bitter-sweetly is the former Director of Marketing and Communications for the Center for Healthy Minds, Marianne Spoon. Marianne is really an amazing woman and did so much for our center during her tenure with us. She has moved on to become the Associate Dean at the School of Education at the University of Wisconsin, Madison, where she is directing the communications for the entire school of education. And for those of you who don't know, the School of Education at UW Madison is one of the two or three top-ranked schools of education in the country. And Marianne very deservedly has accepted this role. And it's great to see her thrive in this context. We're very sad to see her leave. But she's still, as you can see, very closely affiliated with us. And so she will be moderating this evening's program, which is on such an important topic, which we know is of deep concern to so many of us, including me, as I near my 70th birthday. So with that, I will turn it over to Marianne. And then I will see you all a little later this evening. Thank you.

MARIANNE SPOON

Thanks so much, Richie. I am so honored to be here and excited to be hosting and moderating this event with the Center for Healthy Minds and Healthy Minds Innovations. As Richie mentioned, I'm now at the UW Madison School of Education and a center collaborator. And I'm just going to go over a few things before we get started this evening. So for those of you who need it, we have closed captioning that should be shared. Instructions should be shared in the chat box on how to access that. And we are also going to be asking questions throughout the event. But we ask that you put them in the chat box, and then we will get to them later for the Q&A. So to begin, we want to hear where you are from. There's so many people joining us from around the world. So feel free to enter in the chat box, who you are and where you're from. I saw some folks posting earlier from Australia, South Korea, Dallas, Texas, California, Mexico, all over the place. Madison, Vancouver. Wow. Charlotte, North Carolina, Brazil. Thank you all for joining us. Minneapolis, Marietta, Georgia. I'm from Georgia. That's fun. Idaho, Rhode Island. Amazing. Thank you all for taking your valuable time to join us for this. So we're really honored to be in the presence of so many people and to be sharing the science of well-being with you. This is the third event in the Healthy Minds live series, where we explore ways that well-being research can affect our daily lives in society. So with everything that's transpired in the past year, especially, it's clear that we need these resources and an understanding of well-being now more than ever. So before we get started, I want to thank our sponsors and our donors, Jim and Judy Hirsch, and without them, this event and others might not be possible. So if you're interested in supporting the Center for Healthy Minds, we'll have a link to do that in the chat box and know that at least half of our funding comes from the generosity of people like you who make events like this possible. So as I mentioned before, there's closed captioning. We're going to get started. Also, add some questions as we go along in the chat box. We'll have our fine team at the Center for Healthy Minds, and Healthy Minds Innovations be moderating that and pulling your questions for the Q&A portion. So we're very happy to offer this event, The Aging Brain Developing Well-being Practices for your Future. So joining us for this event, our esteemed panelists. We have Dr. Ozioma Okonkwo, who's the Associate Professor at the Wisconsin Alzheimer's Disease Research Center at UW Madison. We also have Dr. Melissa Rosencrantz, who's a faculty member at the Center for Healthy Minds and Assistant Professor of Psychiatry at UW Madison. And in addition, we have Dr. Stacey Schaefer, who is an Associate Scientist at the Center for Healthy Minds at UW Madison. So each of our esteemed panelists will be sharing a little bit more about their work in a short presentation. And then, we will jump into the Q&A and the panel discussion to get to as many of your questions as possible. So I believe Stacey is going to kick things off. So take it away, Stacey.

DR. STACEY SCHAEFER

Thank you, Marianne. And thank you, everybody, for joining us. Hello, my name is Stacey Schaefer. And as Marianne said, I'm a Research Scientist at the Center for Healthy Minds here at the UW Madison. I lead the neuroscience project of the midlife in the US study or otherwise known as the MIDUS study. It's a large longitudinal national study that's been going since the mid-1990s. In MIDUS, as well as in other studies, I examine how people's typical negative and

positive emotional responses rise and fall. Or what I'm really looking at is the time course of their emotional responses and how those emotional time courses are associated with cognition, mental and physical health, the brain, and well-being as we age. As well as our ability to cope with stress and adversity, such as the impacts of the COVID-19 pandemic. So you'll see on their screen a made up graph. But it summarizes several findings we and others have had, some of which are already published and others which are still being prepared for publication. As you can see in this graph, participant A responds quickly and strongly to an emotional stimulus that is presented for four seconds but quickly recovers and returns to baseline after the emotional stimulus goes away or ends. Participant B, in grey, on the other hand, has a much slower response. It doesn't rise as high in magnitude and lingers and takes so long to return to baseline. It isn't even depicted on this graph. What we and others have seen is that if someone tends to respond quickly, which is appropriate to an unpleasant stimulus or event, and then even more importantly recovers quickly from an unpleasant event that is associated with better cognitive and health outcomes. Blunted responses like participant B that linger and exhibit poor recovery from negative events are unhealthy. So as most of you are probably aware, depression and anxiety are risk factors for poor health with aging, including the development of dementia. Rumination and worry and what has been termed repetitive negative thinking patterns, even in the absence of clinical depression and anxiety, have been linked to cognitive decline as well as the deposition of harmful Alzheimer's related brain proteins. By examining emotional responses over time, we hope to better understand the mechanisms and learn what aspects of emotional responses need to be changed to improve health outcomes and delay aging-related disorders. We measure with both psychophysiology and brain imaging how people respond to different emotional stimuli and situations in laboratory. And through experience sampling via text messaging in their day-to-day lives, we can examine how the responses unfold over time, at home and at work. So how are differences in the time course of emotional responses associated with health well-being and brain aging processes? Well, you could think of it as prolonged negative emotions and negative thinking providing fertilizer for the development of chronic health conditions and faster at cognitive and brain aging. On the other hand, the ideal time course for positive emotional responses appears to differ from the ideal negative time course. Instead of quickly returning to baseline from a positive publication, what appears to be healthier and beneficial are prolonged and sustained positive emotional responses. Being able to savor the good appears to be a protective factor against the experience of stress and adversity and possibly slow down or even maybe delay some aging processes.

If we ask what factors influence or modify the time course of emotional responses, it is honestly an area of active research. Higher levels of finding purpose and meaning in life is protective. Those are well-being factors. And we have found that higher purpose in life, greater purpose in life is associated with faster recovery from negative provocation. And many people have found that those people who have a greater purpose in life and find greater meaning in life, see protective benefits against cognitive decline, the development of Alzheimer's disease and even mortality from all causes. Personality styles such as conscientiousness and greater self-control are also associated with better recovery from negative provocation. And also, our social

relationships, whether they are supportive or strained, really impact our emotional processes and can even blunt our positive emotional responses to the point that it might actually increase our vulnerability to depression. Whether health behaviors that are critical for better aging, such as good sleep, quality nutrition, physical activity and exercise, and good stress and disease management, impact the time course of emotional responses are open questions. And something that I would like to look at further in future research. I would predict that those health behaviors impact our emotions greatly and are indeed critical for maintaining the healthiest of emotional response styles. But also that the relationship is reciprocal. So, in other words, poor emotional styles impact the food we choose to eat, the quality of sleep we obtain, our motivation and ability to be active and purposeful, as well as the choices we make when it comes to stress and disease management. Clearly, more work is needed to gain a better understanding of these possible relationships. And where we can best intervene in our emotional responses to optimize our emotional health to then optimize brain aging and our cognitive health. Thank you. So now, I'd like to introduce Dr. Ozioma Okonkwo, who has made it here through much tribulation tonight, and we really appreciate him being here.

DR. OZIOMA OKONKWO

All right, thank you. Thank you, Melissa. Sorry, Stacey. I appreciate that. And thanks all of you for being on this event tonight it's such a pleasure to be here with all of you and to share the work that my colleagues and co-panelists and I are doing on the forefront of well-being and aging and how to maintain our wellness going forward into the future. So as Stacey said, my name is Ozioma Okonkwo. I'm an Associate Professor in the School of Medicine and Public Health at the University of Wisconsin in Madison. And the work that my lab focuses on is around the concept called Resilience to Alzheimer's disease. As you can see on the little cartoon on the slide here if you imagine on the x-axis the concept of time or just aging in general. And also, imagine on the y-axis and attributes like your thinking skill, your cognitive functioning. If you also imagine there is this hypothetical threshold called the Impairment Threshold, below which if your thinking abilities, your cognitive skills dips, then you will be deemed to have cognitive impairment. So imagine all of these three. The passage of time, which is really what age is. Your thinking skill, and this benchmark, this threshold below which is cognitive impairments. Then imagine two individuals, one of them is low on resilience, and the other one is high on resilience, for a number of reasons that we're going to get into in a little bit. What the concept of resilience proposes is that the individual who is lower on resilience hits this impairment threshold at a more proximal point in time. They hit that threshold sooner than the individual who is high on resilience. In the concept of Alzheimer's, which as we all know is a terrible disease that robs you of the ability to function in daily life. The time that the person who is high on resilience, the time advantage that they have can be understood in the context of additional opportunities to enjoy life, to enjoy family, enjoy friends, enjoy the things that they do every day before they eventually might hit that impairment threshold. Now that again, assumes that both individuals are on the path to Alzheimer's. They may very well not be. But at this point in time, because there is no proven cure for Alzheimer's, if both individuals are on this path to Alzheimer's, the person who is high on resilience would eventually hit that threshold, but they have a time save. They have additional time to continue to be the independence in daily life before they hit that

benchmark. Next slide, please. And so what my lab does tries to tease apart, what are some of the lifestyle factors, and also some genetic factors that might contribute to higher resilience in these individuals? And what we have here are just results from one of our numerous studies. This is a randomized control trial, looking at the effects of aerobic exercise, six months of aerobic exercise, and the effect it has on the brain's ability to take up and use glucose. Why glucose? Because glucose is the primary fuel of the brain. That is what your brain cells, my brain cells, our brain cells need in order to thrive and do the work that all of us are doing, including paying attention to what is being said on this event. So for this exercise study, there were two groups of individuals. The exercise group who were put through a progressive series of six months of aerobic exercise. And then there is the control group who did not get a similar type of exercise. They just got instructions on how to live a healthy life. The brain scans that you see here are the difference between their brain at the point they entered the study. That is a baseline compared to when they were done at six months. So it's almost like a difference, a subtraction. And on this type of brain glucose imaging, red is a good sign. Red means that the brain cells, the neurons are taken up by using glucose as appropriate to do work. So red is a good thing. What we can appreciate here is that if you look on the image to your right, at least to my right, that is the person enrolled in the exercise group. What you can appreciate that, by the time they finish the six months of this aerobic exercise, their brain has shown a remarkable improvement in its ability to take up and use glucose to do work. Conversely, the person on the right who was, sorry, on the left, who is enrolled and in the control group, we do not see a similar improvement from baseline to six months, in their brain's ability to take off and use glucose. So we believe that exercise and physical activity is one of several tools, several approaches that an individual can utilize to improve well-being, to improve resilience, to improve protection against Alzheimer's, even with the passage of time, which all of us are going to undergo. We all undergo the passage of time. We all age. But here we present that aerobic exercise might be one potential avenue to buffer, to attenuate, to mitigate the adverse impact of aging on the brain, as all of us ages. And we're going to discuss this a little bit and further. But I want to, at this point, just to give you a resource that you might find helpful is the National Institute on Aging website for physical activity in older adults is also called Go4Life. This website is a treasure trove. Honestly, it has a ton of helpful materials, resources and data on how any individual, even if you have not been physically active, and you already are in the latter stages of life. It provides you with tools and tips to help you begin and sustain a physically active lifestyle that is then going to carry on for the rest of your life. And again, help you develop this attribute called Resilience to Alzheimer's. And so that's, in a nutshell, the work that my lab does. Again, you know, physical activity is just one of the many tools that is accessible to all of us and that the lab studies in trying to understand what confers resilience up to Alzheimer's. And now it's my absolute pleasure to introduce the next speaker on this panel, Dr. Melissa Rosencrantz, who is going to share her own amazing work with all of us. Thank you.

DR. MELISSA ROSENCRANTZ

Thank you, Ozioma. And thank you all for attending this event tonight. My name is Melissa Rosencrantz, and I'm an Assistant Professor in the Department of Psychiatry and faculty at the Center for Healthy Minds.

And my work is focused on, how the health of our brain and the contents of our mind by the contents of our mind, by the contents of our mind,

I mean, things like stress, emotions, worry, impact inflammation in our body, and likewise, how inflammation in our body impacts the health of our brains and our psychological state. And you might be wondering why my work is so focused on inflammation. Well, if you look at the leading contributors to years lost to disability in the United States, you'll see that chronic inflammation is a major factor in at least the top six. And -- can you advance the screen please? There you go. And in fact, inflammation is a major factor in nearly every highly prevalent chronic disease in the developed world.

And in addition to diseases that we associate with the body, like cardiovascular disease or cancer or chronic pain, we're now learning that inflammation can be a factor in diseases that we associate with the mind, like depression and dementia. Although this mind-body connection is something that we typically think about in terms of the problems that it can cause, this connection can also be harnessed to promote well-being. Over the last several years, I've done research that examines the ability of interventions that target the mind and the mental content to determine if those interventions can buffer the effects of stress on inflammation.

And in two of those studies, I've used the inflammatory response that's generated by capsaicin cream. Now capsaicin, for those of you who aren't familiar with it, is what gives chili peppers their hotness. When you apply it to the skin, it causes this red inflammatory response that you see in the image on your screen right now. In one study, what we did is we randomized participants to training in mindfulness or to training in a different type of intervention. We measured this inflammatory response when the cream was applied to the skin before training, and then again after the training was completed. We measured this inflammatory response in the context of a stressful experience. And what we found is that those who were randomized to receive that mindfulness training, which is in the yellow bar on your screen,

They had a much smaller inflammatory response to that capsaicin cream than the group of people who are randomized to the other training, which is the turquoise bar. And we did the same experiment again. But instead, we compared individuals who had a long-term meditation practice to people who didn't have any meditation training. What we found was the same thing. The meditators had a significantly smaller inflammatory response that you see in the red bar on your screen, compared to the non-meditators in turquoise.

And what this tells us is that behavioral interventions that target the mind can help to protect the body of some of the negative effects of stress.

And more recently, we've extended these types of experiments to study people who actually have some sort of chronic inflammatory disease.

And in this case, we've studied people who have asthma. And found that training and mindfulness was able to significantly improve their asthma control over time.

And in the future, we're hoping to address these similar questions in determining if training and mindfulness and other forms of meditation can also be protective of brain health from the negative consequences of stress.

And so with that, I will end there and pass that mic back to Marianne.

And thank you so much for your time and attention tonight.

MARIANNE SPOON

Thank you so much, Melissa. It's really fascinating to see all of the different tools we can have in our toolbox for addressing well-being. Whether it's exercise or sense of purpose, or something as simple as a few moments of mindfulness and meditation. So I have some questions to start out with. And one thing I'm really curious about from our panel is how they take care of their own minds? What do they do in their daily lives? And what do they recommend their loved ones and family members to do? So I'll throw it to you all, and start with you, Ozioma, if you're willing. What do you do to take care of your mind? And what advice can you give to the rest of us?

DR. OZIOMA OKONKWO

Well, thank you for asking. So I've been the exercise guy, which is what I've come to be known for. I am a big believer in fitness and exercise. And again, and then when we talk about exercise. We're not talking about, you know, going to the gym for hours, hours, hours, you know. We're talking about, you know, pretty much a lifestyle approach to health, something that will build into our everyday life.

So it could be something as simple as, you know, I'm going on a walk with a friend. Or if I know that I'm going to be getting a long phone call, either from a family member or even these days of virtual and work, if it's a work call that's going to last for a few hours, I pretty much, you know, I put in my headsets, and I go on a walk, you know while the phone call is going on.

So these are little things I try to build into my routine for wellness and well-being. Now I will also fess up and say that there is an area I still struggle with, and that is sleep, you know. Like every day, I say, okay, I'm going to sleep more tonight, not happening. So that is still an area of growth for me. But sleep is very critical.

And the work my lab and other labs have done have shown that sleep really is an important ingredient to having mental and physical wellness. So that is my target to have improved sleep every night.

MARIANNE SPOON

Wonderful, Stacey, how about you? What are things that you do in your day to day life to take care of your mind?

DR. STACEY SCHAEFER

I think I try to get my entire family, so I'm a mom, and you know, wife, and I try to get my family to do everything we can. So we do exercise, walking the dogs and sleep is definitely something we have a strict schedule with around our house.

One piece, in addition, is nutrition. I just looked at the mind diet, which is one of the recommended diets from Mayo Clinic. And was a little surprised at how closely I've been unconsciously following it. So it's a diet based on the Mediterranean diet that has added components that's meant to potentially improve brain aging, and be protective.

And in particular, they have a lot of science behind it. But then the additional piece, of course, is trying to work on emotion. And I probably study emotion because that's the thing that I fail at the most is in terms of emotion regulation. I'm not so good at it. So I'm working on that at all times.

And part of the things now, especially when we're all hearing so much stress and adversity every day, is to try to really concentrate on what's good. And finding the simple moments like Ozioma was talking about, taking a walk, see what you notice that is beautiful. Or somebody helping another person, or just where you can appreciate the good in life and really try to, you know, revel and take what joy you can from it.

MARIANNE SPOON

That's beautiful. Thank you for sharing, Stacey. Melissa, how about you?

DR. MELISSA ROSENCRANTZ

Well, I'm with Ozioma. I'd say that my biggest way of taking care of myself these days is exercise. I've been a meditator for, you know, about 25 years now. And that will always be part of my repertoire of ways that I deal with life's slings and arrows. But I find that in the moment. And on sort of just an ongoing daily basis, exercise is so very helpful in helping me manage the overwhelm of life. And something actually that I've been trying lately that I have found really effective is laughter. So I'm not naturally a super-buoyant person, as those people who know me will attest to, but I have really been appreciating the power of laughter lately and just like seeking joy when I can. And it's amazing at sort of the stress-buffering capacity of that and just the ability of it to like, lighten everything. So I'd say that those are my best strategies at the moment.

MARIANNE SPOON

Great, I already feel like I have a checklist myself of things that I need to start adding to my calendar, reminders, and I'm sure our audience is finding a lot of value out of these comments too. So Ozioma, one of my first questions for you and then just a couple of others, and we'll open it up to the group.

So you mentioned the importance of exercise, and why exercise? What happens in the brain? What mechanisms are at play that enables this buffering or resilience effect to happen? And what science do we know so far about that?

DR. OZIOMA OKONKWO

Fantastic question, Marianne. And you know what, before actually I dive into answering the question you asked about, what does exercise do to the brain, you know? I will give you a personal anecdote, but actually, its fact that for as long as I have been building exercise and physical activity into my daily life. In the pre-COVID era, I went to the gym six days every week at 4:30 in the morning. I know, crazy, you know. But I'm one of those guys that if I don't get it done first thing in the day is totally like out the window, because work and life and this and that gets in the way. However, where this story is going is that for as long as I have built this into life, when my alarm goes off at 4:30 in the morning, I do not want to go to the gym. [brief laughter] I'm like, oh, gosh, no, not today please, snooze, you know. But here's what happens. The minute I walk into my exercise class, and I hear the music, I see people, people are smiling and laughing, I just feel this just inner joy, just this joy of being there. And you know, as Stacey you know, said, you know, joy is such a big part of wellness and well-being. So even outside of whatever exercise might be doing to my brain, just the joy I feel in that moment, seeing people smiling, happy, joyful, to be there, and the music is pumping, I'm like, let's do this. I'm good. I'm good, you know. So exercise is such a powerful mood booster. And I want to emphasize again, because that is, you know, in the work that we do, one big, I want to say misconception that people have is that exercise has to be going to the gym and working extremely hard and breaking a sweat. Yes, it is that, but it is not only that, that is just one form of exercise. So again, you know, being outdoors and enjoying nature is a huge component of exercise and physical activity. So, that definitely does, you know, something wonderful for my mood. And the research seems to suggest that it does that for people's mood in general. Now, to get to the question you asked, though, about how exercise helps the brain. So in the slides I showed earlier on, we had data to suggest that just six months of aerobic exercise, and these are individuals in their mid-60s. And they have not really lived a physically active life for pretty much the majority of those 60 plus, you know, years. And now they show up, and they are randomized, and they are helped to initiate and sustain for six months only an aerobic exercise program. That there is a huge improvement in their brain's ability, the neuron's ability to utilize glucose for work. In other words, the neurons are more alive, more vibrant, more active, more engaged in whatever thinking skills, these individuals are engaging in. That, to me, is phenomenal. And this is data. It's not an anecdote. It is data, you know. So that is one great thing that exercise does for the

human brain. The other thing, which somewhat is connected but also different, is that so as you may know, the brain, you know, is a small organ, you know, in the body, but pretty much it is an energy and resource-hungry organ. So you know, it uses about 30% of the entire blood flow in the body. So what exercise does is that it improves not just blood flow through our bodies but also blood flow to the brain. And the transmission and the flow of blood is how the brain and also other organs in our body have access to the nutrients that the body and the brain needs to do work. So when you exercise, and your heart rate increases a bit, you know, that is your brain getting more blood, more oxygen, more nutrients. And that is how it receives the nourishment it needs for everyday engagement. So these are just two of the many ways exercise helps to boost brain health, even in individuals who are in their 60s and 70s. And who may never have been physically active all through life.

MARIANNE SPOON

Great, thank you so much. And I see some comments coming in on the chat. I think what we're going to do is link to some of the papers that Ozioma is talking about. So you can find out a little bit more about who was included in the study, how long they did it, the types of exercise, so you can dig into that. So I see a lot of folks are really hungry for information and digging in, which is really exciting. So my next question is for Melissa. A lot of your work talks about this multi-directional relationship between the mind and the body. What do we know so far about how our psychological health and emotions play a role in inflammation, which is known to be a factor in these chronic conditions related to aging? So what do we know so far? And what are you curious to learn? And what new frontiers are coming up?

DR. MELISSA ROSENCRANTZ

Yeah, thanks for that question, Marianne. Well, we're learning more every day about how things like stress and emotion impact inflammation in the body and vice versa. This is really a cyclical relationship here. And it can start in one place and propagates to another, but then, you know, but then keep going. And so, really, wherever you're able to tap into that cycle to disrupt it is helpful. But in terms of the mechanisms, we know a lot about the effects of stress hormones on the function of our bodies. Stress hormones are important; we wouldn't want to be without them. But when we're exposed to them for long periods of time, they can impact our body's ability to respond to other types of signals that it's receiving. And that can lead to inflammation. It can lead to weight gain. It can lead to all sorts of problematic dysfunction in our body. We also have mechanisms that go through the sympathetic nervous system. So you can think about that as sort of the flight or fight response, what you feel like when you get an adrenaline surge.

And that is also super helpful if you're facing a stressor in which you need to escape. Or if you're, you know, you're feeling a lot of excitement because you're about to fall off of a, you know, a canyon wall or something like that, to give you the strength and energy to hold on.

But it's not super helpful when you're giving a talk to 4,000 people. Mobilizing that kind of response is not very helpful. And what that's going to do is it's preparing your body actually for what those stressors would have been when you were evolving.

And so it's mobilizing your immune system to respond to potential pathogens that you're going to have to contend with if you like, cut yourself, or if you're injured in some way. And it's preparing your muscles for the energy that they'll need by mobilizing glucose from stores in your body. And unfortunately, when we have stressors, like giving a talk to 4,000 people that aren't well-suited for those responses, the effects of the activation of those systems, long term leads to things like chronic inflammation and obesity, and insensitivity to glucose and diabetes and things like that, and insensitivity to insulin. And unfortunately, those effects in the body, the chronic inflammation in particular, which is what I spend most of my time studying also, have effects on the mind, and so they don't just stay in the body.

And so when you have inflammation that's chronic, it's ongoing for a long time or these repeated ups and downs of like, I'm super stressed, I'm not stressed, I'm super stressed, I'm not stressed, you know, those like constant up and downs, they can cause deleterious changes to our brain function. What I'm particularly interested in right now is the changes that are more fundamental to our brain function which suggests that there may be changes to the underlying brain structure. In terms of the brain function, it can cause things like being hyper-vigilant in terms of people who have experienced trauma or feeling fatigued and unmotivated, and related syndromes that people who are depressed experience. So those are sort of the things that we see associated with brain function.

Anhedonia, where things that, you know, used to give you a lot of pleasure don't give you pleasure anymore. Those things are affected by inflammation in the body. But when we start to see brain structural changes, then we really start to worry about if those structural changes persist for long periods of time. Are we then vulnerable for some of the problems that Ozioma is talking about in his work? Where, when you have these inflammatory processes that are chronic throughout our lifetime, they build up. And the effects that they may have on brain function, this is all still really speculative. We're really just learning about this. But the speculation is that they could lead to a situation in vulnerable people, where those are the people who need the resilience factors that Ozioma is talking about. And fortunately, we're studying those too, both in terms of exercise and the work that Ozioma is doing and the work that I'm doing in terms of mindfulness and other types of meditation practices. But those are just two. There are lots of different practices that we can think about in terms of how to protect ourselves from inflammation in our body. If we do have that prime, some of us do. Some of us have inflammation there's really nothing we could do about it. We are born with it. In terms of having asthma, or rheumatoid arthritis, or lupus, or any number of chronic inflammatory diseases. There are things you can do to help protect yourself.

But otherwise, you know, adopting some of the lifestyle strategies that we've been talking about to minimize the entrance into that cycle, you know, that just perpetuates this inflammation and effects on the mind and brain and vice versa. So I'll stop there and see if anybody has any questions.

MARIANNE SPOON

No, I think that's really fascinating, Melissa, because, you know, again, we're talking about things that, you know, cards that might be dealt to people and life circumstances and how to best cope and become more resilient with what you have. And so, a lot of this work is relevant to each of us because we're all on our own space in the spectrum of resilience and what we can be doing to improve our well-being. My question for Stacey is related to a sense of purpose. We've talked about this a little bit a while back, Stacey. And I know that this is really a great finding from your longitudinal work and your partnership with the MIDUS project. Why do you think purpose has a protective effect? Like what do you think is at play, and what speculations and or data do we have at this point in time?

DR. MELISSA ROSENCRANTZ

I think right now, there's the underlying mechanism is still pretty much unknown. But understanding all the findings about purpose in life, and finding meaning in life might provide some reasonable speculations. So people know the history of who first hypothesized purpose in life, as being important. It was actually Viktor Frankl, who was a psychotherapist and Holocaust survivor. So he lost his entire family in concentration camps in Germany and survived the concentration camps. And his experience in that horror taught him that his own purpose in life, while he was going through that, was what kept him going and survived that hardship. And that ability to really think I have a plan, I know what I need to do today, it can be very simple. It doesn't have to be saving the world or some grand plan. But just not having a plan for your life, feeling like your life has meaning and waking up in the morning and knowing that you need to do something, whether it's run to the gym, or you know, take care of your children or clean your house. You have a plan, and you're not just sitting. And so it seems to be a very, very good coping mechanism. There's data that's come out of the COVID-19 pandemic, where people who have higher levels of purpose in life are doing better with stress of the pandemic. But in terms of mechanisms, you can think about some of the things we've talked about here, in terms of, you know, if you're somebody who wants to even just clean your house, that's your purpose in life, you'll be more physically active doing that, or you feel like you need to as part of your purpose, go to the gym in the morning at 4:30 in the morning, even though you don't want to, it gets you out the door, and so you're getting that activity. But also, when we think about some of the rumination or worry that we might all have. If you have a purpose that's driving you and you're thinking about it because it's your focus, it will take your mind away through some of that process, from the things that are perhaps the repetitive negative thoughts that can be so detrimental moving people into a really negative emotional state. So help the old mechanism out of it, in other words.

MARIANNE SPOON

Yeah. So it's a little bit about less focusing on the self and connecting with others and or larger meaning and purpose around you and your life, which I think there's science to back up the importance of that as well. So thanks for answering my set of questions that I gathered from watching your wonderful presentations. We're going to open it up for all of the folks watching around the world to ask their questions. So I'll be introducing my beloved colleague, Shaun, who's also at the Center for Healthy Minds who is gathering questions. And we'll kick it off with our first question.

SHAUN

Thank you so much, Marianne. And just a reminder to everyone. All the materials that you'll have, including the video recording, will be available 2 -3 days after this event has commenced. So just be on the lookout for that. So our first question comes from Patriana [assumed spelling], actually, an email in question. If you had to summarize what the daily mind practices we all would benefit from doing, what would this specifically include? What to do? How much to do? What level each day? And this can go to --

MARIANNE SPOON

So Shaun was sharing this, can go to any panelist, and I'm assuming everyone heard the majority of that question.

So does anyone want to kick it off?

DR. MELISSA ROSENCRANTZ

Yeah, I can try. So if we're talking about, you know, mental practices, I don't think there is a prescription that's right for everyone. I think, and there's not a dose that's right for everyone. It's going to vary by person, by you know, the time that they have available. What I've really learned over, you know, my 25 years of having mindfulness and other types of mental practices is that different practices help more with, you know, sort of different periods of time or different things that I'm experiencing in my life. But what's important is that you take time every day to check in with those practices and engage with them, and you don't get swept up sort of in your daily life. And I think even just the act of stopping your routine, stopping the flow of that river that sweeps you away, to check-in, and to do something to take care of yourself, that in and of itself, regardless of what it is, is helpful. Personally, I really find practices that are focused on gratitude to be super helpful. And practices that are geared toward fostering strong connections with the people in my community and my loved ones are really helpful for me and keeping my priorities and focus. But that's just for me. I mean, I think that's going to differ for everyone. Some people could use more help in stabilizing their attention or in disrupting the types of rumination that Stacey was talking about in terms of, you know, cultivating a purpose in life, or in, you know,

developing a plan to do something that brings you joy or helps you flourish. So I don't think that there is a prescription, which may sound like a cop out, but that's what I'm sticking with.

MARIANNE SPOON

Stacey or Ozioma, do you have anything to add to this question?

DR. OZIOMA OKONKWO

I think that the answer that Melissa gave is right on point. And no, I don't think it's a cop-out. It is the fact that, you know, that is not a one-size-fits-all in terms of what to do to be mindful and to just have an overall state of mental and physical well-being. So I really think that you've covered the gamut, you know. I believe that at heart, each one of us knows what it is that feeds our soul. What it is that when we're in that space, in that moment, we feel the most alive. And that is really what the goal to me of living, the art of living is related to like, laser focus on those situations, those activities, those events and really like, cultivate them to really feed them. Because whatever we feed grows, right? So to really, you know, take the time and the attention for each of us to feed those aspects of us that really allow us to be the most us, the most vibrant human that we can be. And for me, you already know it. It's walking into the gym in the morning and hearing the music starting. The music, man, it gets me all the time, it gets me. It just sets the tone for the rest of my day.

I'm like, okay, I can do Monday. I can do Wednesday. I can do Saturday, you know. And it just kind of puts me on a positive path towards embracing whatever the rest of my day brings. But again, that might not be it for everybody else, you know. I have friends who would rather die than wake up at 4:30 in the morning [brief laughter]. And that is a fact, you know, there you go, there you go, you know. So that definitely would not work for them. And that cannot be a prescription that I would dare make to anyone because I realized that that's just not how everybody is wired. So Melissa, you are right on point there.

MARIANNE SPOON

Yeah. And what you're saying to me, also connects with what Stacey was saying earlier about, you can create fertile ground for, you know, having more negative emotions or more positive emotions. And so feeding into that cumulatively makes a difference. I will share I'm not the person to wake up at 4:30 every morning. So I really, I'm hoping there's people in the chat who are similar to me, you know, you're an inspiration. Show us the way, but maybe there are small steps that we can take, you know, toward that greater fitness. Stacey, do you have anything to add, or do we want to kick it back to Shaun?

DR. STACEY SCHAEFER

I think I just want to accentuate that the individual differences and what people do for practices. Now we've heard very kind of physical active ones in terms of the mental training exercise. But for some people, what really works are simple things like focusing on knitting, or, you know, the attention in doing a very intricate knit coding stitches is a great mental attention. Calming influence that a lot of people find is coping. If you watch the Olympics, you might have seen the awesome British diver who knits to cope with his anxiety and worry. So things like knitting, cooking, gardening, playing music, there's so many avenues to well-being that it doesn't have to be one or the other, you know, pick or use whatever works for you.

MARIANNE SPOON

Great, thank you. Shaun, what's our next question? I know we have a lot to go through, I bet.

SHAUN

It's quite a bit, but it's okay. Our next question comes from Barbara. And it asks can you talk a bit about levels of awareness? And how it might be important to our ability to manage our behavior and thoughts?

MARIANNE SPOON

Does anyone want to take this? I'm looking at Melissa, as someone who has experience with studying meditation, but I don't want to assume. Does anyone want to take this one?

DR. OZIOMA OKONKWO

Melissa is good for it.

DR. MELISSA ROSENCRANTZ

Well, I'm not sure exactly what she means about levels of awareness. And you know, what angle she's coming from. Can you put the question back on the screen, Shaun, so I can finish reading it?

Can somebody reiterate the question on any levels of awareness are?

MARIANNE SPOON

So it says -- Yeah. Can you talk a bit about --

There we go.

Yep, levels of awareness and how it might be important?

DR. MELISSA ROSENCRANTZ

Well, I think that the levels of awareness that are most relevant, sort of, for a broad audience to talk about are, the type of awareness where you're -- well, I guess, there are two ways to think about this. Where you're really just caught up in your thoughts or your reaction to what's happening. And sort of like a way that you don't have -- you don't have awareness that there's a broader context here that you're really, you know, I think embarrassment is a perfect example of when we've done something where that's embarrassing for us, and we're really just all consumed with that emotion of being embarrassed. And we've really lost sight that really, this is just our interpretation of a set of events that have happened, and maybe these emotions that we're experiencing aren't warranted or that the people who we think were embarrassed to be around did not actually perceive it that way. And so the ability to separate our experience from the reality of that event, I think, is one way in which gaining that level of awareness that little bit of space or distance is really helpful in managing the experience in the moment. I think another example of this is, people who have particular phobias or traumas where they're hyper-focused. And so you think about focus as a good thing, right? Where like when we're focused, we can be in that sort of Zen state or flow. We're like super-focused in really like in the moment. You can also have hyper-focus in a bad way, where you have too much focus on something that you're worried about or something that you're afraid of. And then you see that like everywhere you look, you know. The elements that are predicting that thing that you're afraid of just pop out and sort of you find it where it may not exist. And I think those are maladaptive types of awareness that when we can broaden our attention, and sort of take in more of what is around us. That's sort of a different focus of attention and level of awareness that can be really helpful for us. In terms of the levels of awareness that one may go through in a meditation practice. I think that's a little bit different than the levels of awareness that we may experience just in our day-to-day life, at least for most of us if we're not like super accomplished Yogi's or something like that. But I think that's really all I'll say, you know, for this audience, in terms of the levels of awareness and how it relates to our ability to manage our emotions and our thoughts.

MARIANNE SPOON

Great, thanks. Shaun, do you have another question?

SHAUN

I do indeed. Our next question comes from Nancy. And it's, what is the number one thing we can do to build our resilience?

DR. OZIOMA OKONKWO

Oh, wow. [brief laughter] Oh, wow, that is a big one. I am not sure that there is a number one thing that we can do. And I will even go further to say that, the aspect of resilience that I discussed is really just one very narrow, narrow aspect of resilience and in the context of resilience to Alzheimer's. There are other forms of resilience, you know, as Stacey mentioned, you know, the work of Viktor Frankl, you know, who survived some very horrible things, and other folks like him, you know. The ability to come through all of that and bounce back and lead a fully engaged life. That, too, is resilience. Because, as we all sadly know, there are individuals who go through similar types of trauma, and they somehow are unable to overcome the harm that that trauma had caused them, you know. So it will also be very interesting. And I believe that Stacey and other folks in MIDUS are doing this type of work to understand what helps an individual to go through adversity, or struggle, or strife, or conflict, and come out of it bigger, better, stronger. And how we can actually begin to like, you know, almost like distill that, and inoculate other people with those types of trades. That's really where all of this is going. So I couldn't tell you the number one thing that you could do to build resilience. Just, again, because there are different forms of resilience and different things, as we've discussed earlier, different approaches, activities, situations, bring out the best of us differently. And yeah, so I'm sorry, but I don't think I can prescribe the one thing. And my lab, we're studying a host of behavioral and genetic factors that confirm resilience. And so far, we don't have evidence that one of them is the be-all, end-all, of the story.

MARIANNE SPOON

Stacey or Melissa, do you have anything to add to that about what are things people can do to build resilience?

DR. STACEY SCHAEFER

So obviously one of the top things for resilience, one of the findings from MIDUS, for example of seeing children who grew up with different kinds of adversity isn't necessarily something that you can do or build, but it's having one person who's stable in your life. And so if there are things that you can do to build quality relationships, or even better, be that stable person for another person, then you're spreading resilience, right? It really is our social relationships that, in many ways, are the final saving grace for us, you know. We can eat well and sleep well and get exercise and have purpose, but have our social relationships are really kind of, in many ways, I think the strongest piece to our health and well-being.

MARIANNE SPOON

So there was another question that came in. I think we lost Shaun, his Internet connection was unstable. So we'll see if he's coming back in. But I'm looking at some of the comments. And one that seems really salient in this moment is, I think you alluded to this Stacey is, whether people respond differently to the stress of something like COVID.

And, you know, what data are we aware of about the types of people who are more resilient in the face of adversity and during the global pandemic versus those who may not have as much?

DR. STACEY SCHAEFER

Oh, well, I'll share some data that are not published, but I'm working on writing it up right now, where we found a group of people that were part of a large study. And we are collecting data from them prior to the pandemic, the eight months prior to the pandemic. And then the pandemic hits. Our large study plan, like everybody else's got shifted. Data collection ended, and-- or at least was paused for a significant amount of time. And we followed these people up after they've experienced over six months of the pandemic, so in the fall of 2020, from October to December. And we had collected a lot of measures on these people prior to the pandemic. And wanting to see what was associated with better coping or more susceptibility to the changes, you know. Probably a lot of people are aware that the rates of anxiety and depression have really escalated during the pandemic. And what we see in the sample of people is that some people have really increased in anxiety, depression, and perceived stress. And some people haven't. Some people have actually things have gotten better, but they have all been affected by the pandemic. Some of them have lost jobs, have had to relocate, move in with family members, lost houses, you know. They've experienced it. And one piece that really predicts who has seemed to survive the mental health effects of the pandemic is our measures of most responses we obtained prior to the pandemic. So those people who were able to prolong their positive emotional responses in the laboratory are showing the least change or actually maybe even improvements in anxiety, depression, and perceived stress. And that's true even when we take into account what kind of levels of positive and negative effect they had prior to the pandemic, their anxiety and depression levels prior to the pandemic, as well as the coping styles they reported using prior to the pandemic. So that's a piece of data that we have. But there's a lot of other groups who are, you know, really trying to see who can survive this kind of chronic stress and who really is most vulnerable. So that -- should this continue, we can intervene faster and better where needed.

MARIANNE SPOON

Great. So I'll take one last question. And this is from Kristin. And I think it relates to how in addition to physical exercise, there are types of things that are cognitively stimulating for the mind, like playing the piano, learning a new instrument or a language. What can we say about the value of those kinds of activities and whether or not they might be protective or buffering against some of the aging effects that we've been discussing tonight?

DR. OZIOMA OKONKWO

That is a fabulous question. And it's a terrific one to end on because it's right up my alley, of course, [brief laughter] this is fabulous, right? So engagement in cognitively stimulating activities actually is one of the behaviors and activities that my lab has studied. And again, the evidence from our group and other groups across the US and pretty much the world shows that individuals who, even later in life intentionally take up engagement in cognitively stimulating activities, that there are clear differences in their brain and thinking skills, compared to similarly aged individuals who do not engage in such activities. In one of the studies that we published, you know, we assessed individual's frequency of taking part in activities that challenge the mind, like playing cards and puzzles, and things like that. And then, we put these individuals through an MRI scanner. And also, we give them a paper and pencil test, a very challenging test of memory skills. A test where we read 15 random words to you. And we ask you to repeat those words back to us. And what we found -- this was surprising is that, the individuals who reported engaging more frequently in these types of mentally stimulating activities that a particular area of the brain that is known to be affected by both aging and Alzheimer's is called the hippocampus is the memory seat of the brain. That that particular region of the brain was bigger in those individual who actually engaged in this activities. And this brings me back to something I may have said earlier that the brain is like a muscle. The more you exercise it, the more you use it, the stronger and bigger it gets, in this case, in a very literal sense. That these individuals who apply their minds to taking part in all of these types of mentally stimulating activities have bigger hippocampus. And then, they also perform better on this challenging test of memory than those individuals who didn't. And yes, so I say go for it. Go for it. Yes, absolutely.

MARIANNE SPOON

So we need to all reconnect with those new year's resolutions of learning to play an instrument or --

DR. OZIOMA OKONKWO

Yes, yes.

MARIANNE SPOON

you know, writing a book or learning a new language.

DR. OZIOMA OKONKWO

Yes.

MARIANNE SPOON

So thank you all for your time. And I apologize that we lost Shaun. Thank you, Shaun, for fielding a lot of these questions. It's my pleasure to bring back Richie to reflect on, you know, things that we've been talking about the past hour. And then, we'll share more about what's to come from the Center for Healthy Minds and Healthy Minds Innovations.

RICHARD DAVIDSON

Thank you so much, Marianne. And thank you to Ozioma, Stacey, and Melissa for a wonderful set of presentations and juicy responses to these questions. I think that, you know, for me, there are a few common themes that are really important. One is the idea of plasticity. And our brains are continuously changing. And the evidence that you heard this evening suggests that this quality of plasticity persists for our entire lives. There's never too late to actually begin to exercise the muscle in the way that Ozioma was describing. And a second really important theme is that one size does not fit all. And that there are many different pathways to cultivating well-being and many different pathways to having a healthy brain in the course of our lives, in the course of aging. And what you heard about this evening are many different strategies that have been examined scientifically. And one of the key unanswered questions in science that we and other scientists are focusing on is, how can we do a better job in specifying which kinds of people may benefit from which kinds of strategies as they age. And this is something really important and can help people to be more specifically focused and strategic about what they may do to optimally age over time. So this has been great. And I'm so thankful for all of the audience. The questions were wonderful. And I want to apologize for not being able to address all of them. There are so many great questions. But the talks will be available up on the internet in a few days. So you can at least look at them again. And there'll be associated links to material that various people have mentioned. And this is one of many different offerings from our center, through the Center for Healthy Minds and Healthy Minds, Innovations that we are making freely available to the public. And Marianne, maybe you can just share a little bit with people about some of the upcoming events that are occurring.

MARIANNE SPOON

Absolutely, I would love to. So we've been working on these all summer, and I'm really excited to see how they're going to turn out. Coming up in October, we have a virtual series of three events called The World We Make, where we are going to be exploring the next decade of well-being. It's free and open to the public. So in the chat box, you'll see a registration link. You'll also be hearing from us, I'm sure, over email with the link to follow up as well in case you miss it, but we hope that you can join us. Also, Healthy Minds Innovations, the nonprofit affiliated with the Center for Healthy Minds, is offering a special founders edition of its master class. So this is a six-week workshop, and it's your chance to learn from Richie himself and as well as Dr. Cortland Dahl, who is another founder of the well-being framework.

And it's something that has had really positive feedback and has been transformational for so many people. So we encourage you to visit that link and check that event out and share it with your friends and family. Other Healthy Minds alive events that are part of this series. You can also watch the YouTube replays of them. So we'll be sharing those in the link box. And then also a chance to connect with the Center for Healthy Minds and Healthy Minds Innovations. There are ways to follow us on social media, to sign up for our newsletters. And to generally stay in touch to learn more about all that great science and the outreach and events happening across both organizations. So again, we're so grateful to our panelists, and for everyone joining and especially our sponsors, Judy and Jim Hirsch, and other supporting donors who make this work possible, who helped the center pursue its vision of a kinder, wiser and more compassionate world. You can help be a part of this and bring this kind of work to thousands more with your support of the Center for Healthy Minds. So thank you for considering, and you can find that link in the chat box as well. Again, thank you all so much. And thanks for our fantastic panel and scientists and for Richie. And we wish you well-being, and we'll see you next time. Thank you.

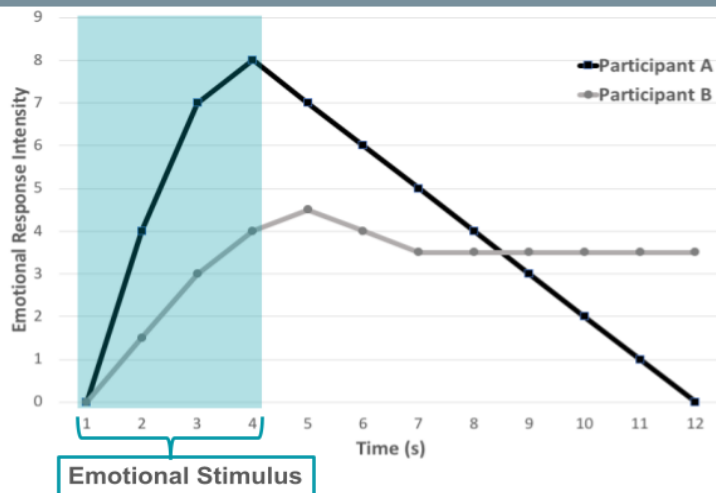
PLEASE SCROLL DOWN FOR MATERIALS

MATERIALS FROM CONVERSATION

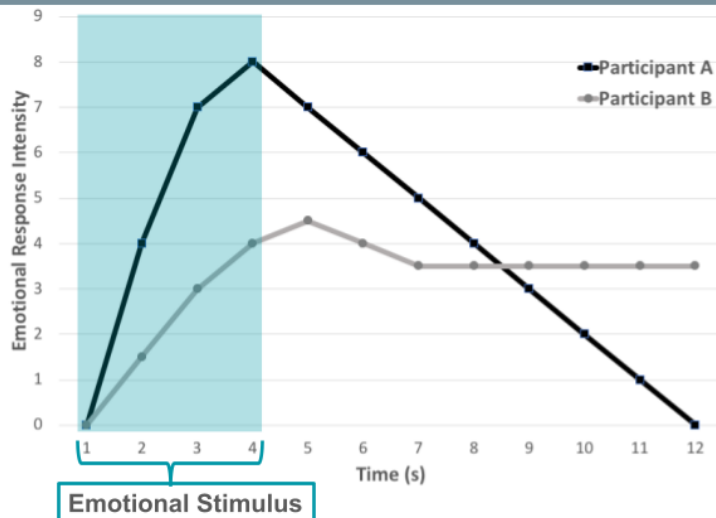
SLIDE IMAGES FROM PRESENTATION

DR. STACEY SCHAEFER:

Individual differences in the time courses of negative and positive emotional responses.



How are differences in the time courses of emotional responses associated with health, well-being, and aging processes?



Physical and mental health

Stress coping and recovery

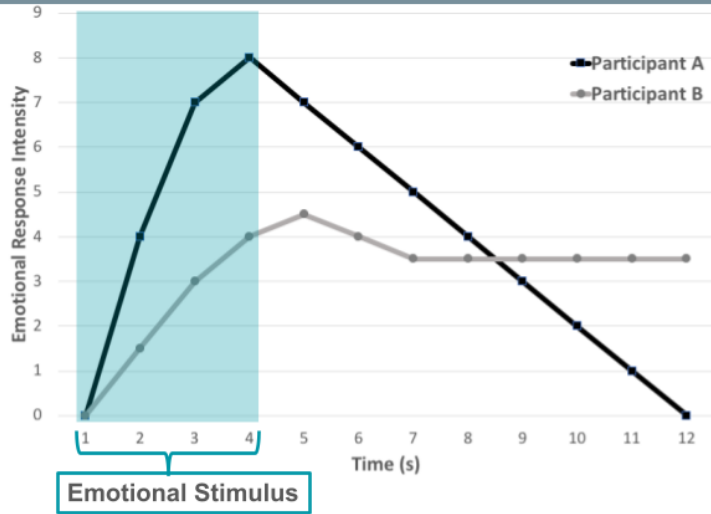
Inflammation

Glucose regulation (diabetes)

Cognitive and brain ageing

Mortality

What factors influence or modify the time courses of emotional responses?

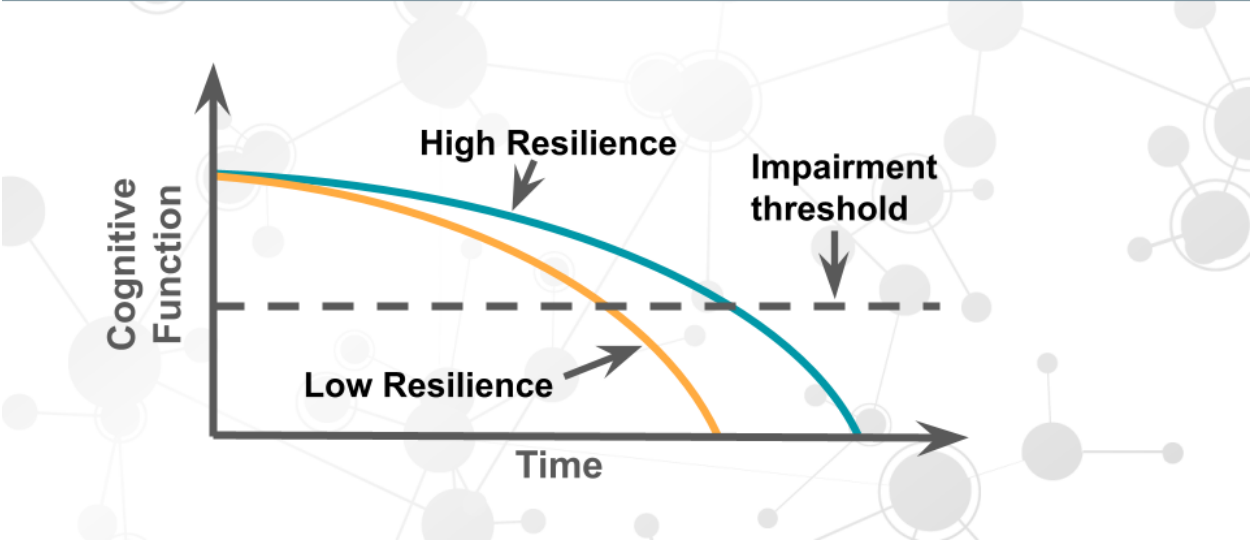


- Well-being Factors
- Personality
- Social relationships
- And possibly health behaviors?

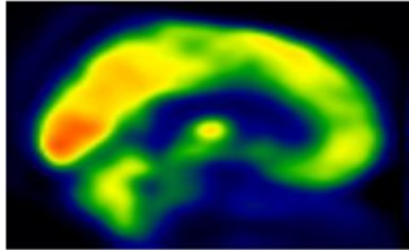
DR. OZIOMA OKONKWO:



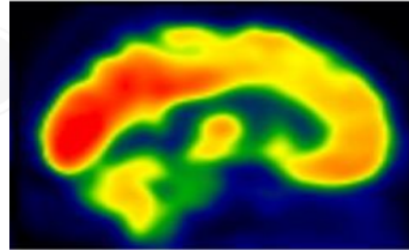
Resilience to Alzheimer's Disease



Exercise Study



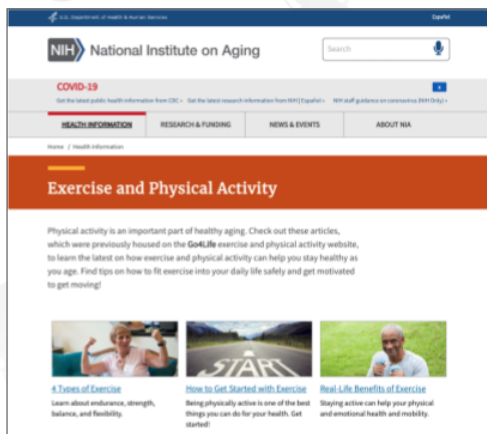
Person enrolled
in Control Group



Person enrolled
in Exercise Group

Gaitan et al., *Brain Plasticity* 2019

NIA Website for Physical Activity



go4life.nia.nih.gov

- General Information
- Helpful Tips
- Online Coaching
- Free Resources
 - Booklets, CDs

DR. MELISSA ROSENCRANTZ:

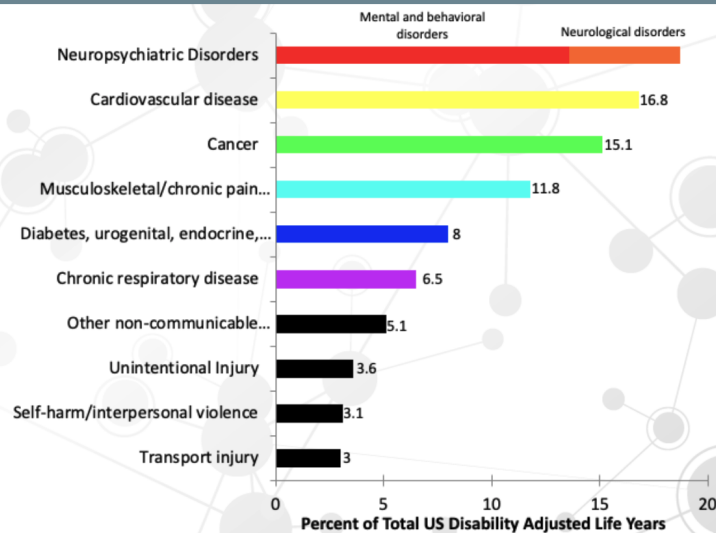
The Mind-Body Connection

Brain health impacts inflammation in the body

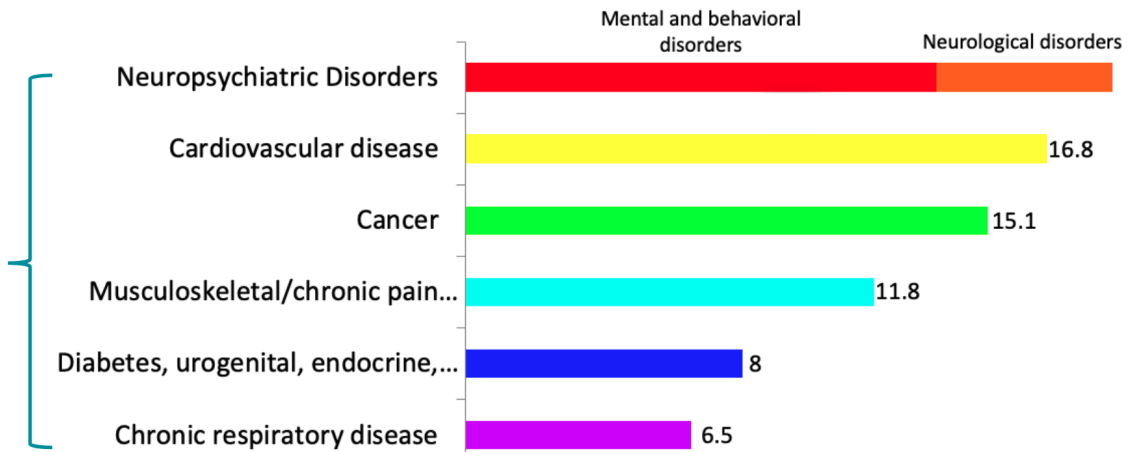


Inflammation in the body impacts brain health

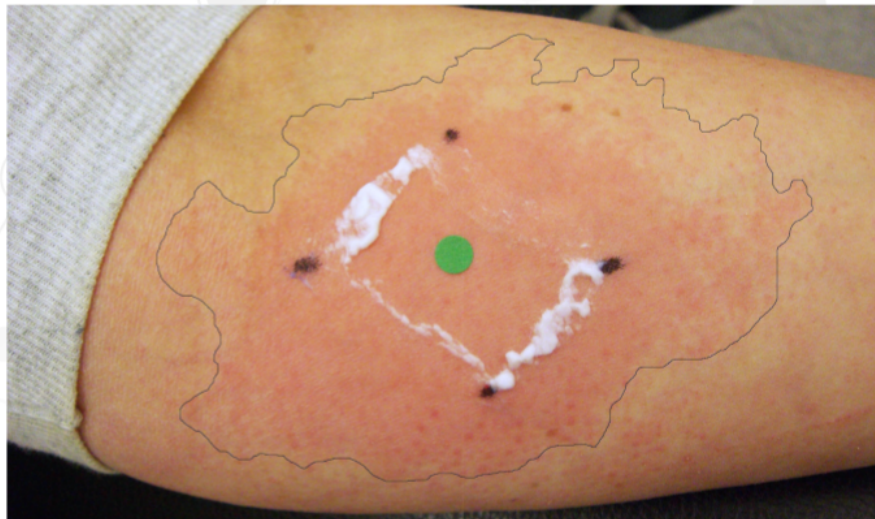
Inflammation is an important component of the most prevalent chronic diseases



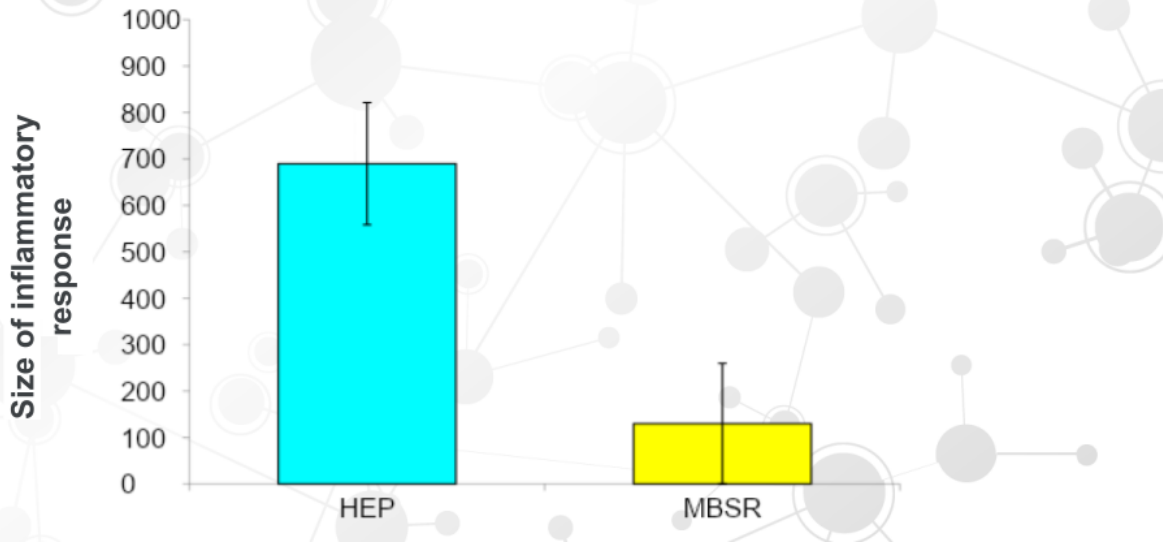
Inflammation is an important component of the most prevalent chronic diseases



Are there practices that can be protective?



Are there practices that can be protective?



LINKS MENTIONED:

Learn more about MIDUS here: <http://midus.wisc.edu/index.php>

A paper on the topic of Dementia linked to Rumination is nicely summarized here: [Rumination and Worry Linked to Increased Dementia Risk](#)

Here's a link from the American Federation for Aging Research (AFAR) to webinars related to aging on sleep, exercise, nutrition, gaming, cognition, as well as COVID: <https://www.afar.org/afar-webinars>

See the long list of aging-related links on this page from the Institute on Aging: <https://aging.wisc.edu/resources/>

Here's the paper about purpose in life, loneliness, and protective health behaviors during the COVID-19 pandemic: <https://academic.oup.com/gerontologist/article/61>

The paper on the exercise study can be found here: <https://pubmed.ncbi.nlm.nih.gov/31970...>

The NIA Website for Physical Activity can be accessed at this link: <https://go4life.nia.nih.gov>

Find small moments of delight to boost happiness. Check out the Joy Generator: <https://apps.npr.org/joy-generator>

Visit <https://hminnovations.org/meditation-app> or explore Healthy Minds Innovations other well-being tools at <https://hminnovations.org/well-being-...>

Here's information about the MIND diet that Dr. Schaefer referenced: (Mediterranean-DASH Intervention for Neurodegenerative Delay diet): <https://www.rush.edu/news/brain-healt...>

This link has information about aging and sleep: <https://www.sleepfoundation.org/aging...>