

Dr. Alia Crum: Science of Mindsets for Health & Performance | Huberman Lab Podcast #56

My guest is Dr. Alia Crum, Associate (tenured) Professor of Psychology at Stanford University and Director of the Stanford Mind & Body Lab. Dr. Crum is a world expert on mindsets and beliefs and how they shape our responses to stress, exercise, and even to the foods we eat. We discuss how our mindset about the nutritional content of food changes whether it is satisfying to us at a physiological (hormonal and metabolic) level. She also tells how mindsets about exercise can dramatically alter the effects of exercise on weight loss, blood pressure, and other health metrics. Dr. Crum teaches us how to think about stress in ways that allow stress to grow us and bring out our best rather than diminish our health and performance. Throughout the episode, Dr. Crum provides descriptions of high-quality peer-reviewed scientific findings that we can all leverage toward better health and performance in our lives.

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- Welcome to the Huberman Lab Podcast, where we discuss science, and science-based tools for everyday life. I'm Andrew Huberman, and I'm a professor of Neurobiology and Ophthalmology at Stanford School of Medicine. Today my guest is, Dr. Alia Crum. Dr. Crum is a tenured professor of psychology at Stanford university, and the founder and director of the Stanford Mind and Body Lab. Her work focuses on mindsets. How what we think and what we believe shapes the way that our physiology, our biology reacts to things like what we eat or stress or exercise. Indeed, as you will soon learn from my discussion with Dr. Crum, what you believe about the nutritional content of your food changes the way that food impacts your brain and body to a remarkable degree. And the same is true for mindsets about exercise and stress, and even medication. For instance, recent work from Dr. Crum's laboratory shows, that what we believe about the side effect profiles of different drug treatments or different behavioral treatments, has a profound impact on how quickly those treatments work and the effectiveness of those treatments. I just want to mention one particular study that just came out from a graduate student in Dr. Crum's laboratory, Lauren Howe, H-O-W-E, showed that, how kids react to a treatment for peanut allergies, can be profoundly shaped by whether or not those kids were educated about the side effects of the

treatment, such that if they learned that the side effects were a by-product of a treatment that would help them. And they learned a little bit about why those side effects arose and that the side effects might even help them in route to overcoming their peanut allergy, had an enormous impact on how quickly they move through the treatment and indeed how much they suffered or in this case did not suffer from those side effects. And that is, but one example that you will learn about today as we discuss what mindsets are, the number of different mindsets that exist, and how we can adopt mindsets that make us more adaptive, more effective, allow us to suffer less and to perform better in all aspects of life. I personally find the work of Dr. Alia Crum to be among the most important work being done in the fields of biology and psychology and the interface of mind, body. Everything that she's done up until now and published, and indeed the work that she continues to do, has shaped everything within my daily routines, within my work routines, within my athletic routines. And we probably shouldn't be surprised by the fact that Dr. Crum works on all these things. She's not only an incredibly accomplished tenured research professor, she's also a clinical psychologist and she was also a division one athlete and an elite gymnast at one period in her life. So she really walks the walk in terms of understanding what mindsets are and applying them in different aspects of life. I'm sure you're going to learn a ton from this conversation as did I, and come away with many, many actionable items that you can apply in your own life. In fact, as we march into today's conversation, you might want to just put in the back of your mind, the question, what is my mindset about blank? So for instance, ask yourself, what is my mindset about stress? What is my mindset about food? What is my mindset about exercise? What is my mindset about relationships of different kinds? Because in doing that, you'll be in a great position to extract the best of the information

00:03:15 Thesis, ROKA, InsideTracker

that Dr. Crum presents, and indeed to adapt those mindsets in the way that is going to be most beneficial for you. Before we begin, I'd like to emphasize that this podcast is separate from my teaching and research roles at Stanford. It is however, part of my desire and effort to bring zero cost to consumer information about science, and science related tools to the general public. And keeping with that theme, I'd like to thank the sponsors of today's podcast. Our first sponsor, is Thesis. Thesis makes custom nootropics that are ideal for the particular brain states that you want to be in. The term

nootropic means smart drug, and it is not a term that I like because there is no such thing as a universally useful smart drug. The reason for that, is that our brain can be creative. We can be focused, we can be good at task switching. And each of those different things, creativity, focus and task switching, involves different neurochemicals in different states of mind and body. So the notion that there's one best nootropic is just not accurate. There's just no way that could possibly be. Thesis understands this. And for that reason, designs custom nootropics that are designed to bring your brain and body into the states that you want, and that are specifically designed to your neurochemistry. They use only the highest quality ingredients, many of which I've talked about before on the podcast. Things like DHA, Gingko Biloba, phosphatidylserine, Alpha-GPC, is one that I particularly like, and is in several of the formulations that are customized for me. However, Gingko Biloba, which has a lot of research to support it and is well tolerated by many people, doesn't work well for me, it actually gives me headache. So that one is not included in any of the custom formulations that Thesis has made, particularly for me. Thesis has this tremendous asset, which is that they give you the ability to try several different blends over the course of a month and discover which nootropics work best for your unique brain chemistry and genetics. So the formulas that work for me, may not be the best ones for you and vice versa. But in a short period of time, you can dial in the exact nootropic formulas for the states of mind and body that you want to be in. I've been using Thesis for close to six months now, and I can confidently say that their nootropics have been a total game changer. I love the motivation formula, I also like the energy formula. I use those for different things, it turns out, but I love those. And I use their logic formula and their clarity formula that they've customized for me. In addition to their personalization, Thesis takes it a step further, they'll offer you a free consultation with a brain coach to help optimize your experience with the nootropics and dial in the best formulas for you. To get your own personalized nootropic starter kit, go online to takethesis.com/huberman, take their brief three minute quiz, and Thesis will send you four different formulas to try in your first month. That's takethesis.com/huberman, and use the code Huberman at checkout to get 10% off your first box. Today's episode is also brought to us by Roka. Roka makes eyeglasses and sunglasses that are of the absolute highest quality. I've spent a lifetime working on the visual system, and I can tell you that our visual system has to contend with a huge number of different challenges, not the least of which is when we go from a very bright, sunny spot outside into the shade, our visual system has to adapt in order for us to continue to see clearly. Many

sunglasses out there just don't allow that adaptation to occur in a seamless way. Roka eyeglasses and sunglasses are designed with all of the biology of the visual system in mind, so that you always see things with crystal clarity, no matter what environment you're in. They also have a terrific aesthetic. They have many, many different styles to choose from. So their eyeglasses can be worn to dinner, or out to lunch or to work. Their sunglasses can be worn essentially anywhere. They're very stylish and they were designed for performance. They won't slip off your face if you get sweaty, indeed, you can wear them while running or while cycling. They're really terrific, they're really versatile. If you'd like to try Roka glasses, go to Roka that's R-O-K-A.com, and enter the code Huberman, to save 20% off your first order. Again, that's Roka, R-O-K-A.com, and enter the code Huberman at checkout. Today's episode is also brought to us by InsideTracker. InsideTracker is a personalized nutrition platform that analyze the data from your blood and DNA, to help you better meet your immediate and long-term health goals. I've long been a believer in getting regular blood work done. For the simple reason, that many of the things that impact your immediate and long-term health, can only be assessed from a quality blood test. And nowadays with the advent of modern DNA tests, you can also get a window into how your genes are impacting your health in the short and long term, and the various things that you should do in order to adjust your health in the right direction. Now, one of the major issues with a lot of blood tests and DNA tests out there, is you get numbers back. And you learn whether or not your lipids or your hormones, et cetera, are within the proper range or not. But there aren't a lot of directives about what to do with that information. InsideTracker makes all of that very easy. They have a personalized dashboard that allows you to, of course, see the numbers that come back to you and to make various changes in nutrition, various changes in exercise, various changes in all sorts of lifestyle factors, that can bring those numbers into range. And so, if you have a particular value for a particular metabolic factor or hormone or so forth, you click on that, and it will actually bring up the full menu of things that you can do in order to adjust that factor into the ranges that you like, all based on quality peer reviewed research. If you'd like to try InsideTracker, you can visit insidetracker.com/huberman, to get 25% off any of InsideTracker's plans.

00:08:26 What Is a Mindset & What Does It Do?

Just use the code, Huberman at checkout. And now, my conversation with Dr. Alia

Crum. Great to have you here. - Great to be here. - Yeah, for the record, it's Alia Crum, but you go by Allie, correct? - That is correct. - Right, Dr. Allie Crum. - Or just Allie. - Okay, great. Well, I've been looking forward to talking to you for a long time. Just to start off, you've talked a lot and worked a lot on the science of mindsets. Could you define for us what is a mindset, and what sort of purpose does it serve. - Of course, yeah. Mindsets have been described or defined in a lot of ways. We define mindsets as core beliefs or assumptions that we have about a domain or category of things, that orient us to a particular set of expectations, explanations and goals. So that's kind of jargony, [chuckles], a little. I can distill it down for you. So mindsets are an assumption that you make about a domain. So take stress, for example. The nature of stress. What's your sort of core belief about that? And mindsets that we've studied about stress, or do you view stresses enhancing good for you, or do you view it as debilitating and bad for you? Those mindsets, those core beliefs, orient our thinking, they change what we expect will happen to us when we're stressed, how we explain the occurrences that happen or unfold when we're stressed, and also change our motivation for what we engage in when we're stressed. So we have mindsets about many things, mindsets about stress, mindsets about intelligence as Carol Dweck's work has shown. Mindsets about food, mindsets about medicine, you name it. It's sort of distilling down those core assumptions that really shape and orient our thinking in action. - I've heard you say before, that mindsets simplify life in some way, by constraining the number of things that we have to consider. And it sounds to me like we can have mindsets about many things as, as you said. What are some different mindsets? I think many people are familiar with our colleague, Carol Dweck's notion of growth mindset. That if we're not proficient at something, that we should think about not being proficient yet. That we are on some path to proficiency. But what are some examples of mindsets, and how early do these get laid down, or do we learn them from our parents? Maybe if you could just flesh it out a bit for us in terms of what you've observed in your own science or your own life. - Yeah, sure, so I think it's important with Carol Dweck's work. A lot of people kind of get focused on growth, motivation and all these things, but her work really originated from thinking about, what she called as implicit theories or core beliefs about the nature of intelligence or ability, right? So do you believe that your baseline levels of intelligence or your abilities, are fixed, static, set throughout the rest of your life? Or do you believe that they can grow and change? Now, those are over-simplified generalizations about the nature of intelligence. And the reality is as it always is complex, and it's a bit of both and

it's all the things. But as humans, we need these simplifying systems to help us understand a complex reality. So those assumptions that we jumped to, oh, intelligence is fixed or intelligence is malleable, they help us to simplify this complex reality, but they're not in consequential, right? They matter in shaping our motivation. And as she has shown, if you have the mindset, that intelligence is malleable, you're motivated to work harder, to grow your intelligence. If you have a setback in your learning, you think, okay, there's something there that I can grow and learn and build from. If you have the mindset that it's fixed, you know, why work harder at math, if you don't think you're good at it. So, in retrospect, it's pretty clear how these mindsets can affect our motivation. What our work has and to do is to expand the range of mindsets that we are studying, focused on, and also understand and expand the range of effects that they have. So by and large, we focused on mindsets in the domain of health and health behaviors. So I mentioned mindsets about stress, we've also looked at mindsets about food and healthy eating. So do you have the mindset that foods that are good for you, healthy foods are disgusting and depriving, or do you have the mindset that healthy foods are indulgent and delicious? Now, it could be a variety of different foods. You might have different thoughts about different healthy foods. But generally people, at least in our culture in the West, have this view that, stress is debilitating, healthy foods are disgusting and depriving. And those mindsets, whether or not they're true or false, right or wrong, they have an impact. And they have an impact, not just through the motivational mechanisms, that Dweck and others have studied, but as our lab has started to reveal, they also shape physiological mechanisms by changing what our bodies prioritize and prepare to do. So those are just two examples. Mindsets about stress, mindsets about food we've looked at. Mindsets about exercise, do you feel like you're getting enough, or do you feel like you're getting an insufficient amount to get the health benefits you're seeking. Mindsets about illness. Do you view cancer as an unmitigated catastrophe, or do you view cancer as manageable or perhaps even an opportunity. We've looked at mindsets about symptoms and side effects. Do you view side effects as a sign that the treatment is harmful, or do you view side effects as a sign that the treatment is working? Again, these are sort of core beliefs or assumptions you have about these domains or categories, but they matter because they're shaping, they're synthesizing and simplifying the way we're thinking, but they're also shaping what we're paying attention to, what we're motivated to do, and potentially even how our bodies respond.

00:14:45 Mindsets Change Our Biological Responses to Food

- Yeah, I'd love to talk about this notion of power of the mindset shaping how our bodies respond. And maybe as an example of this, if you could share with us this now famous study that you've done with the milkshake study, if you wouldn't mind sharing the major contours of that study and the results, because I think they're extremely impressive and they really speak to this interplay between mindset and physiology. - Certainly, yeah. This was a study that I ran as a graduate student at Yale university. I was working with Kelly Brownell and Peter Salovey. Peter Salovey had done a lot of work on really coining the term emotional intelligence, studying [mumbles]. - He's now the president of Yale, right? - He's now the president of Yale, yes. - So he's done well. - He's done well for himself and for the university and society. And Kelly Brownell, who was doing a lot of research on food and obesity. And I had come in doing some previous work on mindsets about exercise and placebo effects in exercise, and was in this sort of food domain and this emotions and food domain. And it really occurred to me, that there was a very simple question that hadn't been probed yet. And that was, do our beliefs about what we're eating change our body's physiological response to that food, holding constant, the objective nutrients of that thing. So that question might sound outrageous at first, but it's really not outrageous if you're coming from a place of having studied in depth, placebo effects. Placebo effects, in medicine, at least, are these sort of a robust demonstration in which simply taking a sugar pill, taking nothing, under the impression that it's a real medication that might relieve your asthma, reduce your blood pressure and boost your immune system, can lead to those physiological effects even though there's no objective nutrients. And we have more evidence on placebo effects than we have for any other drug. - Really? - Because of the clinical trial process, in which all new drugs and medications are required to outperform a placebo effect. So we have a lot of data on the placebo effect. Now, you know, we can get nuance there. We don't have a lot of data comparing the placebo effect to doing nothing, which is important for distilling mindset effects or belief effects from sort of natural occurring changes in the body. But anyways, going back to this question, it was like, all right, we've moved from medications solving our health crisis to behavioral medicine solving our health crisis, increase people's exercise, get them to eat better. To what degree are these things influenced by our mindsets or beliefs about them. So to test this question, we ran a seemingly simple study. This was done at the Yale center for clinical and translational research. And we

brought people into our lab under the impression that we were designing different milkshakes with vastly different metabolic concentrations, nutrient concentrations, that were designed to meet different metabolic needs of the patrons of the hospital, right? So, you're going to come in, you're going to taste these milkshakes, and we're going to measure your body's physiological response to them. This was within subjects design. So it was the same people consuming two different milkshakes, two different time points separated by a week. And at one time point, they were told that they were consuming this really high fat, high caloric indulgent milkshake. It was like 620 calorie, super high fat and sugar. The other time point, they were told that it was a low fat, low calorie, sensible sort of diet shake. In reality, it was the exact same shake. It was right in the middle. It was like 300 calories, moderate amount of fats and sugars. And we were measuring their body's gut peptide response to this shake. And in particular, we are looking at the hormone ghrelin. So as you know, ghrelin, medical experts call it the hunger hormone, rises and ghrelin signal, you know, seek out food. And then theoretically, in proportion, the amount of calories you consume, ghrelin levels drops signaling to the brain. Okay, you don't need to eat so much anymore, you can stop eating, and also revving up the metabolism to burn the nutrients that were just ingested. What we found in this study was that, when people thought they were consuming the high fat high calorie indulgent milkshake, in response to the shake, their ghrelin levels dropped at a three-fold rate stronger than when they thought they were consuming the sensible shake. So, essentially their bodies responded as if they had consumed more food, even though it was the exact same shake at both time points. So this was really interesting and important for two reasons, really. One was that it was, to my knowledge, one of the first studies to show any effects of just believing that you're eating something different on your physiology. Lots of studies have shown that believing you're eating different things changes your tastes and even your satisfaction and fullness after. But this shows that it has a metabolic or a physiological component. But the second piece was really important as well. And especially for me, this was one study that really transformed the way I think about how I approach eating. And that was the manner in which it affected our physiology, was somewhat counterintuitive. So, I had gone in thinking, the better mindset to be in when you eat is that you're eating healthy, right? Like, you know, just makes sense. Like placebo effects think you're healthy, you'll be healthy, you know. But that was a far too simplistic way of thinking about it. And in fact, it was the exact opposite because thinking that they were eating, when these participants thought they were

eating sensibly, their bodies left them still feeling physiologically hungry, right? Not satiated. Which could potentially be corresponding to slower metabolism and so forth. So, if you're in the interest of maintaining or losing weight, what's the best mindset to be in? It's to be in a mindset that you're eating indulgently. That you're having enough food, that you're getting enough. And at least in that study, we showed that has a more adaptive effect on ghrelin responses. - So interesting. And especially interesting to me as a neuroscientist who has worked on aspects of the nervous system that are involved in conscious perception, like vision and motion and color perception and so forth. But also, our lab has worked and is increasingly working on autonomic functions that are below our conscious detection. In this case, a lie about how much something these milkshakes contained affected a subconscious process, because I have to imagine that the ghrelin pathway is not one that I can decide, oh, this particular piece of chocolate is going to really reduce my ghrelin 'cause it's very nutrient rich, as opposed to one, if you told me that a different piece of chocolate, for instance, is a low calories or sugar free chocolate or something that sort. The ghrelin pathway, however, it seems based on your data, that the ghrelin pathway is susceptible to faults, which is incredible. But then again, there must be crossover between conscious thought and these subconscious or kind of autonomic pathways. So, it's really remarkable. It raises a question that I just have to ask,

00:22:28 Beliefs About Our Food Matter

because it increasingly, so I'm involved in online discussions and social media, in one of the most barbed wire topics out there, and that's being generous, is this topic of which diet or nutrients are best? You've got people who are strictly plant-based, you've got people who are omnivores, you got people who are carnivores. You have every variation. You have intermittent fasting, also called time restricted feeding. And it seems like, once a group and it plugs into a particular mode of eating that they feel works for them, for whatever reason, energy wise, mentally, maybe they're looking at their blood profiles, maybe they're not. But once they feel that it works for them, each camp seems to tout all the health benefits and how great they feel. Could it be that mindset effects are involved there? That people are finding the nutritional program that they feel brings them the most enrichment of life, but also nutrients. And that their health really is shifting in a positive direction, but not necessarily because of the food constituents, but because of

the community, and the ideas and the reinforcement. - Yeah, and the belief that this is the right way of doing something. I think, a hundred percent it has something to contribute. I'm not going to weigh in on the debate. What I will most certainly weigh in on, is the notion that, look going back to the placebo effect, right? We have an outdated understanding of what that is, which is based on this randomized controlled trial, you compare a drug to a placebo. If the drug works better than the placebo, you say, great, the drug works. If the drug doesn't outperform the placebo, you say the drug doesn't work. That's really over simplified. It's a good test for the specific efficacy of the drug. It's not a good test for understanding the total impact of that drug. Because in the reality of things, if a drug outperforms a placebo, then you start prescribing it. But the reality is, that the total effect of that drug, is a combined product of the specific chemical attributes of that drug and whatever's going on in the placebo effect, which is, at least from our perspective, its beliefs, its social context, and it's your body's natural ability to respond to something. So, that's in the placebo effect example. The same is true for everything we do or consume. So when it comes to what diet you're eating, both are true. It does matter what it is and it matters what you think about that diet and what others around you in our culture think about that diet. Because those social contexts inform our mindsets, our mindsets interact with our physiology in ways that produce outcomes that are really important. So let's not get dualistic and say, it's either all in the mind or not in the mind. Let's also not be unnecessarily combative and say, oh, it should be all plant-based or keto or whatever. It's all of those things are a combined product of what you're actually doing, and what you're thinking about. If you believe in it, if you don't, if you're skeptical, or in some cases, you think you should be eating a certain way and then you don't live up to that. It might have even an adverse effect because of the stress

00:25:57 Placebo vs Beliefs vs Nocebo Effects

and the anxiety associated with that. - Very interesting. Along the lines of belief effects, could we call these belief effects or mindsets? - Sure, yeah. - Is there a difference between these what I'm calling belief effects and placebo effects? I mean, are placebo effects distinctly different from mindset effects or they more or less the same thing. - They're related? So I think placebo effects, maybe should be reserved for the conditions in which you're actually taking a placebo, which is inactive substance. When you get out of that sort of placebo versus drug realm, and you start looking at placebo effects, I use

quotes with my hands here, in behavioral health, the term kind of becomes confusing because you're not-- In the milkshake study, we didn't give people a placebo milkshake, right? We just changed what they believed about it. So, how I like to think about it is that, placebo effects, as they're traditionally construed are made up of three things. It's the social context, mindsets or beliefs, and the natural physiological processes in the brain and body that can produce the outcomes. And so, we could just call them belief effects because the beliefs are triggering the physiological processes, and the beliefs are shaped by the social context. Does that make sense? - It makes sense. - Yeah. - Yeah, there was a paper a year or two ago published in science magazine about brain regions involved in psychogenic fever. That if people or you can actually do this in animal models to think that they are sick, you get a genuine one to three degree increase in body temperature, one to three degrees Fahrenheit increase in body temperature is pretty impressive. - Yeah. - And I guess it plays into symptomology generally. So, I'm a believer in belief effects. - Just say that, you know, the term that we use in our field is nocebo effect for that, which is sort of the placebo's ugly stepsister. It's when negative beliefs cause negative consequences. So, you are told you will have-- It's very well demonstrated that when people are told about certain side effects, they're far more likely to experience those side effects. When people think that they're sick or going to get sick, sometimes that can create the physiological symptoms. And there's various debates. That it's not only that physiology changes, it's also that your attention changes. So we're experiencing things like fatigue and headache and upset stomach all the time. And then when you take a drug and somebody says, you're going to feel fatigue and headache, you start noticing that you're tired, and that headaches attributed to the drug.

00:28:57 Mindset (Dramatically) Impacts the Effects of Exercise

So, some of the mechanisms are attention, and some of them are real changes in physiology. - I'd love for you to tell us about the hotel workers study. - Yeah, sure. - I know you get asked these questions all the time, but I find just these results also amazing. - Yeah, no, I think that this is a really good example of this phenomenon, right? That the total effect of anything is a combined product of what you're doing and what you think about what you're doing. So this was a study that I ran with Ellen Langer way back when I was an undergrad actually. We started this study. Ellen Langer is a professor of psychology at Harvard, and she's done a lot of really fascinating work on her flavor of

mindfulness, which is distinct from a more Eastern mind, Buddhist sort of mindfulness-based work. She actually was the one who said to me originally, you know, I was an athlete at the time. I was an ice hockey player and I was training constantly. And one day I'll never forget it. She said, you know the benefit of exercise is just a placebo, right? And I was like, well, that's outrageous. Ellen's known for saying very provocative, but also very wise things. And that statement really got me thinking about that. So we designed this study together and that was to look at, how would you study? If the benefits of exercise were a placebo, how would you even test that? Because, what does it mean to give a placebo exercise? So we sort of flipped it on its head. And we found a group of people who were getting a lot of exercise, but weren't aware of it, that they were, right? So this, we settled on a group of hotel housekeepers. So these are women working in hotels who were on their feet all day long, pushing carts, changing linens, climbing stairs, cleaning bathrooms, vacuuming. It was clear that they were getting above and beyond at least the surgeon General's requirements at that time, or which were to accumulate 30 minutes of moderate physical activity per day. But what was interesting was when we went in and surveyed them and asked them, Hey, how much exercise do you think you're getting? A third of them said, zero. I don't get any exercise. And the average response was like a three, on a scale of zero to 10. So it's clear that even though these women were active, they didn't have that mindset, right? They had the mindset that their work was just work. Hard, maybe thankless work that led them to feel tired and in pain at the end of the day. But not that it was good for them, that it was good exercise. So what we did was we took these women and we randomized them into two groups, and we told half of them that their work was good exercise. In this case, it was true factual information. We oriented them to the surgeon General's guidelines. We oriented them to the benefits that they should be receiving. And then we had measured them previously, on their physiological metrics, like weight and body fat and blood pressure. And we came back four weeks later and we tested them again. And what we found was that these women, even though they hadn't changed anything in their behavior, at least that was detectable to us. They didn't work more rooms, they didn't start doing pull-ups or push-ups in between cleaning hotel rooms, as far as I'm concerned. They didn't report any changes in their diet, but they had benefits to their health. So they lost weight. They decreased their systolic blood pressure by about 10 points on average. And they started feeling better about themselves, their bodies and their work, not surprisingly. - That's amazing. How do we conceptualize that result in light

of all of our efforts to get more out of exercise, right? Because earlier you mentioned it from the milkshake study and our perceptions about nutrient density, that the right message that is actually a little bit counterintuitive. That if you think, oh, this is very low calorie, nutrient sparse, then it's good for me in the context of losing weight for instance. But it turns out the opposite is true, because as you told us, the body responds differently when you think something is nutrient dense and can actually suppress hunger more. So, in light of this result, if I were to say, okay, my current understanding of the literature is that getting somewhere between 150 and 180 minutes per week of cardiovascular exercise is probably a good idea for most people. If I tell myself that it's not just a good idea, but that it's extremely effective in lowering my blood pressure and maintaining healthy weight, et cetera, et cetera, according to these results, it will have an enhanced effect on those metrics.

00:33:44 Motivational Messaging & Mindset About Fitness

Is that right? - Definitely. So this is a really important point, because what this reveals is that we have to be more thoughtful in how we go about motivating people to exercise or teaching people about the benefits. Our current approach is just to basically tell people, writ large, here's what you need to get. Here's what you need to get good for. To get enough exercise to receive the health benefit. The problem with that approach is that, most people aren't meeting those benefits yet, they aren't meeting those requirements yet. And the risk with that is that, well, the intention with that is to motivate them because public health officials think, well, if I just tell people you need to get more exercise because it's good for you, they'll do it. We know now that that doesn't work, that these guidelines are not motivational. They don't change our behavior. And what our work adds to that, is that not only is it not motivational, it also creates potentially a mindset that makes people worse off than they were without knowing about the guidelines. So again, it's tricky. I'm not saying that mindset is everything. Certainly exercise is good for us and is helpful for us. It's one of the things we have the best data on. So I'm not saying, oh, exercises all a placebo. What I am saying is that, we need to be more mindful about how do we motivate people to exercise, but how do we help people to actually reap the benefits of the exercise they are already doing? Now, Octavia, who is a grad student in my lab, ran a number of interesting studies along these lines. One in which she looked at three nationally representative data sets, which had this interesting

question in them, which was how much exercise do you get relative to others? Do you get about the same, a little more, a lot more, do you get a little less or a lot less, right? So, the audience, your listeners, you could all answer this. And then in these datasets, what she did, was she had pulled from data that tracked death rates over the next 21 years. And a couple interesting things revealed themselves. One was that, the correlations between these perceptions of exercise relative to others, and people's actual exercise as measured through accelerometer data, as well as more rigorous sort of what did you do today, kind of data. Those don't correlate much at all. - People lie. - Well, people lie, but also... - Or misperceive. - ...They misperceive. Or who's to say, it's misperceiving, everything's relative, right? I used to do triathlons very seriously. So if you were to ask me now, I feel like I'm totally inactive, right? Because I'm not doing anything near what I used to. And if that's my focus set, right? I feel like I'm not exercising much. But if I think about, you know, compared to other people, given what I know about national representative statistics, and I could feel like, oh, I'm getting a lot, right? So you can see how these perceptions are decoupled from objective reality. And what we found in these studies, is that, that one question mattered in some cases, more than objective activity, but in all cases controlling for objective activity and predicting death rates. And in one of the samples, it was a 71% higher risk of death rate. You know, if people rated themselves as feeling like they were getting less activity than others. - Wow. That's a big deal. - It's a big deal. And again, that study is cross-sectional, longitudinal, it was not experimental. But combined, these really sort of coalesced to say, Hey, this is important too, right? Like, let's figure out ways to be active and get people active, but let's also not make people feel horrible about themselves when they're not getting enough. And going back to the hotel study again, I mentioned that I did that at a time when I was a division one ice hockey player at the time. We were training all the time. And I was in an unhealthy mindset about that, I never felt like I was getting enough. I would come off a two hour practice into a weightlifting session. And then I would get on the elliptical for 30 minutes, 'cause I thought I had to do that also. My teammates who were with me at the time could attest to that. And so, that study was really helpful for me, to realize that I needed pay attention, not just to what I was doing, but also take care of my mindset about that. And I think the essence is how do you get people to feel like they're getting enough? It's a sense of enoughness that really matters. - Yeah, I can see the dilemma because you don't want people thinking that exercise and its positive effects are so potent that they can get away with a three minute walk each day. And that they're good

because most likely they are not. But again, you don't want them to be so back on their heels psychologically that they don't even do that or that they never exceed that by very much. But it seems like the message from the milkshake study and what we're talking about now in terms of exercise

00:39:30 The Power of a 'Potency & Indulgence' Mindset

would be to really communicate to the general public that food has a potency, even healthy foods have a potency to give us energy, to fuel our immune system and endocrine system, et cetera. And that exercise has a remarkable potency, and that that potency can be enhanced by believing in or understanding that potency. - Exactly. - Is that an accurate way to state it? - Totally, that's exactly right. And that's where I really feel like we need to push. And what I try to do in our research, is to not just show, oh, mindset matters, isn't that interesting? But it both matter, right? Both exercise and what you think about it matter. Both what you eat and how you think about what you eat matter. And so, we really, as individuals and as a society need to work on, what is the right way to cultivate both behaviors and mindsets about those behaviors that serve us? And in the food context, this-- Again, that milkshake study really changed me on a personal level, because I had been somebody who was constantly trying to restrain my eating, right? I wanted to maintain or lose weight, look fit. And so, I was like, well, I should diet and I should have low calorie, low carb. Low this, low that. But what that was doing, was putting me into this constant mindset of restraint. And what that study suggested, was that that mindset was potentially counteracting any benefit or any objective effects of the restrained diet. Because my brain was saying, okay, you're restraining. Maybe my body was responding to that. But the brain was also saying, eat more food, stay hungry 'cause you need to survive. And so, the answer isn't, oh, we'll throw everything into the wind and just drink indulgent milkshakes all day long. The answer is, eat healthy foods, right? Based on the latest science and what we know to be true about nutrients and our body's response to them, but try to do so in a mindset indulgence, a mindset of satisfaction, a mindset of enjoyment, right? That is really the trick. And that's what I at least try to do in my own life. - I love that, and as I get more involved in the anti-public facing health communications, this comes up again and again, you know, how should we conceptualize our behavior? How should we think about all these options that are offered to us? And I'm excited that the potency of mindsets

00:42:03 Mindsets About Sleep, Tracking Sleep

are coming through again and again. So, I have a question about this. I don't know if this study has ever been done, but a lot of these mindset effects are something that years ago, I felt I did vis-a-vis sleep. Because I was in graduate school, and as a postdoc, and even as an undergraduate, I had so much work to do that I decided I would sleep when I was "dead". Not a good idea from what we know. However, I found that a couple nights of minimal sleep or even an all-nighter and I could do pretty well. Eventually it would catch up with me. Has there ever been a study exploring whether or not the effects of sleep deprivation can be impacted by these mindset effects? Because over the years, I keep learning more and more about how much sleep I need and I've really emphasized it, but I do feel much better when I'm getting it. But as new parents know, or students know or athletes know or anyone that lives a normal life find sometimes that they don't get a good night's sleep. Would believing that we can tolerate that and push through it and function just fine, and that it's not going to kill us or give us Alzheimer's. Could that help us deal with a poor night's sleep or even two or chronic sleep deprivation? - Certainly I would guess. There's been one study to my knowledge that's tested that. [indistinct] and colleagues, and they looked at-- They had people come in and they gave them sort of a, I think it was a sham sort of EEG test to figure out how-- This was done a number of years ago. Now we actually have devices to test this, but there's was this sham test. And then they gave people fake feedback about the quality of their sleep and how it had been the night before. And they also asked the participants how they felt about their sleep. And essentially what they found was that this sham feedback, if they were told that they had gotten and let lower quality sleep led to deficits in variety of cognitive tasks. And that was sort of decoupled from their actual [laughs] qualities of sleep, at least as self-reported. So that's one study that attest to this, I think certainly, I would bet a lot of money, I haven't run those myself, but that your mindsets can push around your cognitive functioning, physiological effects of sleep. But once again, it's not all or nothing, right? There are real important benefits of sleep, and how far we can push around that through our mindset, is an open question. - You know what? The result that you mentioned is really interesting because a lot of people use these sleep trackers now. They're using rings or wristbands. In fact, my lab has worked pretty closely with a company that they supplied us data on how well people are sleeping, and you get a

score, people get the score back. When they see that score, they might think based on these results,

00:45:00 Making Stress Work For (or Against) You

oh, my recovery score, my sleep score is poor. I shouldn't expect much from myself today, or it makes sense that my memory would be going. For this reason, and I'll probably lose a few friends for saying this, but hopefully I'll gain a few as well. That's why I like to just do a subjective score for myself. If I wake up in the morning, I just decide, okay, did I sleep well or not? I don't like seeing a number. I don't like getting a readout from a device. That's me, I know a lot of people like it, and they can be very useful. But gosh, it seems that these belief effects are weaving in at all levels. I'd love for us to talk about stress, because your lab has worked extensively on this. And if you would, could you tell us at some point about the study that you've done about informing people about the different effects of stress. But also, if there's an opportunity, some takeaways about how we could each conceptualize stress in ways that would make it serve us better as opposed to harm us and our mental and physical performance. - Great, yeah, so I'd come off the heels of doing some research in exercise and diet and finding these provocative and also counterintuitive effects with respect to how we should try to motivate people, right? And, as I was thinking about this, and this grouping of going from medicines to saving us to behaviors to saving us, and how those behaviors might be influenced by mindsets. The obvious next thing to think about with stress, right? Because it's like, okay, well you want to be healthier and fix your diet, fix your exercise and stress less. And so I started doing some digging into the nature of stress and a couple things were clear. One was that the public health message was very clear, right? That stress was bad, right? Unmitigated and harmful on our health, our productivity, our relationships, our fertility, our cognition, you name it, right? And the messages that were out there, by and large over-simplified messages focused on the damaging consequences of stress. But as you know, if you actually dive deeper into the literature on stress and the origins of stress, what you find is that, the literature like most literatures is not so clear cut. And in fact, there's a large amount of evidence to support the fact that the experience of stress, meaning encountering adversity or challenge in one's goal related efforts, does not have to be debilitating. And in many cases, the body's response was designed to enhance our ability to manage at those moments,

right? So some research showing that stress narrows our focus, increases our attention, speeds up the rate at which we're able to process information. There was some research out there showing this phenomenon of physiological toughening, the process by which the release of catabolic hormones and the stress response recruit or activate anabolic hormones, which help as you know build our muscles, build our neurons, to help us grow and learn. And there was a whole body of emerging research on post-traumatic growth or this phenomenon in which even the experience of the most traumatic stressors, the most chronic and enduring stressors, could lead not to destruction, but in fact, to the exact opposite, to an enhanced sense of connection with our values, connection to others, sense of joy and passion for living. And so, I found that to be interesting. And my work since then has been not to try to argue that stress is enhancing and not debilitating, but try to point out that the true nature of stress is a paradox. The true nature of stress is manifold and complex, and lots of things can happen. But to question, what's the role of our mindset about stress in shaping our response to stress. So some work had already been done looking at your perception of the stressor, right? So, do you view a stressor like a challenging exam or a health diagnosis as a challenge or a threat. And that had shown pretty convincingly that when you view stressors more as a challenge, less as a threat, that your brain and body responds more adaptively. What our question was, was to take the sort of psychological construal one step higher in abstraction. So not just the stressor, but the nature of stress, right? At that core level, do you view stress as something that's bad, is going to kill us and therefore should be avoided, or do you view some stress as natural and something that's going to enhance us? And so, we set out to design a series of studies to test the extent to which these mindsets about stress mattered. We first, this again was with Peter Salovey and Shawn Achor, originally. We designed a measure to test people's mindsets about stress. Simple questions like, what extent do you believe or agree or disagree with statements like, stress enhances my performance and productivity. Stress heightens my vitality and growth, things like that. And we found in a number of correlational studies that a more enhancing stress mindset was linked to better health outcomes, better wellbeing and higher performance. So then we set out to see if we could change people's mindsets. And in our first test of this, we decided to do so by creating these multimedia films that showcased research, anecdotes, facts about stress, all true, but oriented towards one mindset or the other, right? So you can imagine one set of films showed basically the messages that were out there in the public health context. The other showed, Hey, you know, stress has been

linked to these things, but in fact, the body's stress response was designed to do this. Did you know it could do that? And we had empowering images like LeBron James making the free-throw in the final minute versus missing it, right? So all of these things are true possibilities but oriented to two different mindsets about stress. - So either people saw a video that basically made it seem like stress will diminish you, crush you, reduce you, or a video very similar, stress will grow you, bring out your best, and maybe even take you to heightened levels of performance that you've never experienced before. - Exactly, exactly. So, yeah, examples in the sports, we also had like true leaders emerge in the moments of greatest stress, you know, Churchill. And so, all those examples are out there for both the enhancing nature and the debilitating nature. And our question was, does orienting people to different mindsets change how they respond to stress? So this study was done in the wake of the 2008 financial crisis. We worked with UBS, a financial service company that was undergoing pretty massive amounts of layoffs. So these employees were stressed about being laid off. They were taking on more pressure. It was just a tough time. And we randomized them into three conditions. And this was all pre-work before getting training on stress, but the three different conditions, some watched no videos, some watched the stressful crushy videos and some watched the stress could enhance you videos. And what we found was that just-- It was a total of nine minutes of videos over the course of the week, led to changes in their mindsets about stress, which led to changes in their physiological symptoms associated with stress. So people who watched the enhancing films had fewer backaches, muscle tension, insomnia, racing heart, and so forth. And they also reported performing better at work compared to those who watched the debilitating videos. Now interestingly, we didn't make anyone worse with the debilitating videos. - Wow, that's good. - Which was good. We were told that the IRB we didn't expect that because that message was already out there, that's what they were already seeing, that wasn't new to them. It was more of this enhancing perspective that turned out to be inspiring. - I love that study, and I know we both have friends and ties in the special operations community through just sort of happenstance and maybe we'll get into that a little later, but a good friend from that community always says, there are only three ways to go through life at any moment, which is either back on your heels, flat-footed or forward center of mass. And I said, well, well, what's the key to forward center of mass? And he said, "Stress is what places you "in forward center of mass," meaning leaning forward and into challenge. And I know that you've actually looked at that community and it does really

seem like that's a mindset that either they have going in or that they cultivate through the course of their training. But this notion that stress is what puts us in forward motion, is true physiologically, right? I mean, adrenaline's major role is to place us into a moment of, or bias us towards action, that's why we tremble. It's the body trying to initiate action. But actually this is probably a good opportunity. If there was anything interesting to extract from the study on SEAL teams, what was it? - Yeah, no, I loved working with the SEALs. And one of the interesting things we found, so we've studied this, measured this mindset in several different populations. And in every single one that we have tested so far, the average had been on the debilitating side of the scale. - People just saying stress is bad. - Stress is bad, right? Like with measures of growth and fixed mindsets about intelligence, people are in the middle, but oftentimes have a more positive mindsets about intelligence. That was not the case with stress, [chuckles]. It's still not the case. I'm trying to get the message out there. Except for this group of Navy SEALs. When they were actually recruit, so people who were going through basic training in order to become Navy SEALs. And we found that they on average had stresses enhancing mindset, perhaps not surprisingly, right? If you're going in to devote your whole life to being a Navy SEAL, you must have some inclination that stress is a source of strength for you. But what we found with them, we measured this at the beginning of their basic training, of buds training, and then looked at how well they succeeded through that program. So as you know, this is an extremely rigorous program. At the time it was only like 10 or 20% of trainees. - Still is, the numbers have never shifted from about that. No matter how hard pressures on the community change, the numbers are still about on average, about 15%. - Yeah, wow. So, what we found was that our measure predicted that rate. So people even within that range had a more stresses enhancing mindset were more likely to complete training, become a SEAL. They also had faster obstacle course times, and they were rated by their peers more positively. So, again, let's break this down, right? This doesn't mean, and people get this wrong sometimes. They think that I'm saying, that a stresses enhancing mindset means you should stress, right? Well, maybe SEALs do. But that's not what we're saying, right? Having a stresses enhancing mindset doesn't mean the stressor is a good thing, right? It doesn't mean it's a good thing that you have to go into combat and it's not pretty, right? It doesn't mean that getting a cancer diagnosis is a good thing or being an abject poverty is a good thing. These are not good things. But the experience of the stress associated with that, the challenge, the adversity, that experience can lead to and enhancing

outcomes with respect to not just our cognition, but our health, our performance and our wellbeing. So that mindset, right? How does that work, right? Well, it works through a number of different pathways. One is that it changes fundamentally what we're motivated to do. So if you just imagine we're stressed about something, maybe a global pandemic, for example. - For instance. - For instance. And you think that stress is bad, then what's your motivation, right? Your motivation is to, well, first you get worried about the stress, right? Now not only do you have the pandemic, you're stressed about the stress of the pandemic. But second is, your reaction is typically to do one of two things. It's either to freak out and do everything you can to make sure that this doesn't affect you negatively, or to check out and say, oh, it's not a big deal. I'm not going to deal with that. You're basically in denial. So, people who have a stresses debilitating mindset and we've shown this in our research, tend to go to one of the other of those extremes. They freak out, or they check out, why? Because if stress is bad you need to either get rid of it and deal with it or it needs to not exist, right? If you have a stressors enhancing mindset, the motivation changes, right? Then the motivation is, how do I utilize the stress to realize the enhancing outcomes? What can we do here, right? To learn from this experience, to make us stronger, fitter, have better science and treatments for the future, deepen my relationships with others, improve my priorities and so forth, right? So the motivation changes, the affect around it changes, it doesn't make it easy to deal with. But what we've shown in our research is that, people who have a stresses enhancing mindset have more positive effect, not necessarily less negative effect, and it potentially changes physiology. We have a few studies that show that people who are inspired to adopt more enhancing mindsets, have more moderate cortisol response, and they have higher levels of DHA levels in response to stress. So, more work needs to be done on the physiology, but I'd love your take on the mechanisms through which that's possible. - Yes, and DHA of course is an anabolic hormone in both men and women. Very interesting, because we had a guest on this podcast. He actually he's a PhD scientist who runs the UFC Performance Training Institute, his name is Duncan French. And his graduate work at Yukon stores was very interesting. It was in exercise science and physiology. What he showed was that, if you could spike the adrenaline response... I think they did this through first time skydive or something like that. ...That testosterone went up. Now, this spits in the face of everything that we're told about stress and testosterone levels, right? And this has also been looked at in females with estrogen. Although of course, there's estrogen and testosterone, both males and females, but that's how they had designed

the study. So it turns out that at least in the short term, that a very stressful event can raise anabolic hormones. And I think that people forget at a mechanistic level that adrenaline is epinephrin, and epinephrin is biochemically derived from the molecule dopamine. If you look at the pathway, and even just Google it and go images, you'll see that adrenaline is made from dopamine. And dopamine and these anabolic hormones they're sort of close cousins. They work together in the pituitary and hypothalamus. So it makes sense that one could leverage stress toward growth, and towards anibalism as opposed to cannibalism, which is not saying cannibalism as in eating other people, but catabolic processes, is I guess, the right way to refer to it. But what's again remarkable to me, is that all of these brain structures that control dopamine, epinephrin, testosterone and estrogen, they're all thought to be in the subconscious, meaning below our ability to flip a switch and turn them on or off. - [Alia] Right. - And yet mindset seemed to impact them. So I've all that to say, that there's a clear mechanistic basis by which this could all work. So on the one hand I'm surprised, because these are incredible results. On the other hand, I'm not surprised because there's a physiological substrate there

01:01:50 Mindsets Link Our Conscious & Subconscious

that could readily explain them. - Yeah, and I think figuring out exactly how it works is really, [chuckles]. - We should do that. - We should do that. - We should collaborate. - Let's do it. - We've got common friends in both departments, so we should do it. - But I did want to mention, the way I think about mindset, and again, I think we need to study this. I'm not a neuroscientist, so I haven't looked at this, but this is something we could do. But the way I think about mindset, is that mindsets are kind of a portal between conscious and subconscious processes. They operate as a default setting of the mind, right? So, if sort of programmed in there, you have stress equals bad, right? That is going to be something maybe conscious, right? But it doesn't have to be conscious, right? People don't have to know their mindsets about stress until they're asked really. That's been programmed in through our upbringing, through public health messages and through media and other things. And it kind of sits there as an assumption in the brain, and the brain is then figuring out how should it respond to this situation? And if the assumption, the default, the programming is, stress is bad, that's going to, through our subconscious trigger, all the things that's like, okay, well, I need to rev up the things that protect me versus rev up the things that help me grow. And so, that's at least how I think

about it. And what's cool about it is that, because it operates as a sort of portal, it communicates with more subconscious physiological processes, but it can also be accessed through our consciousness, right? So just talking about this, right? For your listeners, they're now invited to bring their stress mindsets up to the consciousness and say, what is my stress mindset? How am I thinking about stress? Can I reprogram that? Can I start to think about it as more enhancing? That takes a little bit of a conscious work potentially, but then once you do that, that can kind of operate in the background, influencing how your body responds and you don't have to say, okay, I'm stressed, I better tell my anabolic hormones. - Right, right. - That doesn't work that way. - No. - But these mindsets can help with the translational process. - I love the idea that mindsets are at the interface between the conscious and subconscious. And I think there's a lot to unpack there. But it clearly is the case, that the mindset, they sort of act as heuristics, right? And as we talked about earlier, they can limit what the number of things to focus on. Because one thing that is really stressful is trying to focus on everything all the time. I've been trying to navigate the public health around anything. The public health information around anything it's kind of overwhelming. As you mentioned for stress, you see a lot in the stresses will crush you,

01:04:50 3 Best Ways to Leverage Stress

and then you can also find evidence that stress will grow you. How should we, the listeners, think about stress and what's the most adaptive way to think about stress? And should we talk about our stress? Should we not talk about our stress? Is there a short list of ways that we can cope with stress better? - Yeah. - I should be careful with the word cope. Is there a way that we can leverage stress to our advantage? - Great, yeah, and that's an important nuance in your language, which people have by and large come from a place of how do you manage stress? How do you cope with it? Which implies, how do you fight against it, right? - Vacation, massages, yoga classes. - Fight against or check out from it, right? - Exactly, exactly. - And yeah, the real challenge is, how do we leverage it? How do we utilize it? How do we work with it? And yeah, I have a lot of thoughts on this. The first and most important thing is to clarify our definition of stress. So I think people often associate-- The negative stress mindset is so insidious, that now people define stress with its negative consequences. So the first step is to decouple that, and to realize that stress is a neutral, right? Yet to be determined effect of experiencing

or anticipating adversity in your goal related efforts. So let me unpack that a little more, you can be in the midst of it, or you could just be worried about something happening. That's one aspect. Second is, adversity or challenge, or something that's working against you. But the third piece is critical, and that is in your goal related efforts. What that means is that, we only stress about things we care about, things that matter to us. So this is really important, right? Because stress is linked with, it's the other side of the coin of things we care about, right? And so, I think that's the first thing to realize, right? That as humans, we stress because we care, and we don't stress about things we don't care about. So the simplified example I like to use is, you know, if Johnny was failing school, that wouldn't stress you out, unless Johnny was your son or you were Johnny, or you really cared about educating the Johnny's of the world, right? It only becomes stressful to the extent that you care about it. So, why are we trying to fight or run away or hide or merely cope with our stress or overcome it through our massages, when the stress is connected to the things we care about. So then the question becomes, okay, if that's true, how can I better utilize or leverage or respond to the inevitable stresses that we're going to experience? I'm not saying go out and seek out more stress. What I am saying is that, you're going to experience stress if you have any cares or values or passions and most all of us do. And so, then what do you do? And we've developed a three-step approach to adopting a stresses enhancing mindset, and briefly, the first step is to just acknowledge that you're stressed, to own it, see it, be mindful of it. The second step is to welcome it. Why would you welcome it? You welcome it because inherently in that stress is something you care about. So you're using it as an opportunity to reconnect to what is it that I care about here? And then the third step is to utilize the stress response, to achieve the thing that you care about, not spend your time, money, effort, energy, trying to get rid of the stress. Does that make sense? - Makes sense and I love it. As somebody who's laboratory studies, the physiological effects of stress, the effects that impressed me the most are for instance, the narrowing of visual attention, that it then drives a capacity to pass time more finely, which then drives the capacity to process information faster. It's almost like a superpower. - Right. - And yes, it can feel uncomfortable often, but I love the idea that, acknowledging it, embracing it and then understanding its power and leveraging that power. I think what I like so much about that framework is that the stress response is very generic. Unlike the relaxation response, we don't actually have to train up the stress response. So we all kind of get this as a freebie. And then it sounds like it's a question of what we end up doing with that. - Right, and

Hans Selye, father of stress said himself, it's a nonspecific response, right? So it occurs, it's what you're doing with it. It's how you're channeling it. And yeah, like we talked about before, what most people do is they stress about the stress, which then over exacerbates it, or they check out from the stress, which leads to depression and anhedonia. Because by checking out from stress, you're also checking out from the things we care about. - And substance abuse. - Exactly. - Our colleague Anna Lembke, who also we had the good fortune of having as a guest on this podcast, talked a lot about this. I mean, so much of substance abuse, because she runs the addiction clinic over on the med side of campus. It takes over people's lives because of this increased stability to find a solution to the stress, that then eventually becomes its own stressor

01:10:40 4 Things That Shape Mindsets, Influencers & Mindsets

and its own problem. Well, I love that mindset and framework. I'd love for you to tell us just a bit about what you're up to right now, and what's most exciting to you now. If you are able or willing to talk about some of the work that's on the way. I saw a brief mention of something on your publications website of a paper about influencers, online influencers and nutrition. Now, that might not be the main thrust of what you're up to, but if you're able to tell us about it, sort of interesting given that a lot of the communication in and around this podcast takes place through social media. And I've kind of launched into this landscape now where constantly bombarded with health information and influencers, right? At the time I didn't even know until couple of [mumbles]. - You are one. - One could argue one way or the other, but what is the deal with influencers? Are they doing something good for health information or are they ruining the landscape? And don't try and protect my feelings. 'Cause I now know that stress is actually an asset. - Yeah, well, that work is part of a body of work that we've been sort of venturing into, which is to understand where do these mindsets come from, right? And I mentioned sort of public health entities as one source of, say our mindsets about stress. But I think that our mindsets are influenced by four different sources. First is our upbringing, how our parents talked about, things like when we're stressed or food or other things. Second is culture and media. So movies, podcasts, and now social media. Third is influential others. So what doctors say to us or close friends or peers. And fourth is your conscious choice. So, we talked about that a little. We have as humans have the ability to be mindful of, and to change our mindsets. But the social media and influencer stuff has

been in part in attempt to understand where do our mindsets about things like healthy foods come from. And Brad Turnwald, who was a former grad student in my lab has done a series of really interesting studies on this, showing that, if you rate the nutritional quality of the top grossing movies in the last 20 years, or you look at the Instagram accounts of all the most influential people on Instagram, and you analyze the nutrition content of what they're eating, what he's shown is that, depending on the study, 70 to 90% of those movies or influencers would fail the legal standards for advertising in the UK. So they're putting out their nutrition contents that are, maybe not surprisingly, but undeniably unhealthy. And to me, that's interesting and important. It shows that where are we getting this mindset that those unhealthy foods are pleasurable, desirable. What's maybe even more interesting than that is some of the work that he and others in our lab have done to show that the ways people are talking about the foods they're eating really matter too. So generally what we've found is that when people talk about unhealthy foods, they use a language that connotes a sense of excitement, fun, sexiness, danger, indulgence, basically anything good and desirable, right? - These should be cookies, cakes, high sugar. - Exactly, like truly unhealthy foods. That's actually-- The objective, what? Helped me is it's challenging, but yeah, high fat, high sugar. - Yeah, I think there's pretty good agreement now that excessive sugar isn't good. - Yeah, and highly processed. - Yeah, highly processed, et cetera, et cetera. I think there's general consensus. I'm sure someone will-- If you're going to come after anyone come after me, I'll stand behind [mumbles]. - But on the other hand, when people are talking about, if they do, which, you know, healthy foods aren't portrayed in media, they aren't portrayed by influencers rarely ever. And when they are, they're often talked about with language that conveys a sense of deprivation. It's nutritious, but it's sort of boring, it's bland. It's not tasty. - Recovering from the holidays. Sort of the post-holiday reset, right? - Exactly, and this is really important because you're doing all this work trying, and others are doing all this work, trying to inform people about what actually is good for them. And meanwhile, there's this hurricane of other force that's telling people, that seeping in our minds, sure, those might be good for you, but those foods are not fun or sexy or indulgent or desirable in any way, shape or form, right? And it's also paid advertising for fast foods and sugary beverages and other things. So it's not surprising that we have this mindset, that healthy foods are the less desirable thing to eat because of those cultural and social forces. What our work has just tried to do is to reveal that, quantify it, as a way to say, all right, let's maybe be a little bit more mindful about how we talk about

healthy foods. If you're a movie producer, can you be a little bit more mindful to showcase healthy and delicious foods and have the characters talk about them in ways that are more appealing? There's a lot of room for people who produce this content to have an impact, not just on what people do, but what they think about the foods they're eating. - It's really interesting. I hadn't thought about it until now, but it makes sense that any food that's packaging can be sold as, can be woven into a film or promoted by a celebrity influencer, not a health influencer per se, but a celebrity influencer because they'll get paid, right? It's part of the ecosystem that allows them an income and it feeds back on sales to the company. Whereas things that can't be commoditized, it's more difficult, right? It's hard to the whoever makes oranges and sells oranges is unlikely to promote oranges in a celebrity post or in a movie because oranges can be purchased from many, many sources. That there's no identifiable source of oranges as there is with a packaged food, for instance. - Yeah, but the interesting thing we found in those studies is that it wasn't driven by promoted content or branded content. There was some of that certainly, and yeah, all of the promoted and branded content is usually for processed high sugar foods. But 90% or more of these foods that they were showing were not promoted or branded. And so, there's a lot of flexibility in what these producers or influencers could show on their media. Although it goes both ways, right? It's not just the producers and the influencers responsibility, the public is reacting to this. And we showed too that people respond more positively, there are more likes on posts about unhealthy foods. So it's a sort of distasteful and in neck it, you know, it's a distasteful culture around healthy eating and we really have a lot to do to change it. - Yeah, it's dopamine circuits through and through, just the site of some very calorie dense, extremely tasty food drives those dopamine circuits. And I realized that there are people out there who derive the same sort of, or similar levels of pleasure from healthy foods. And that's a wonderful thing if one can accomplish that. So we just need more of that, is what it's sounds like. - Yeah, exactly. And that's what's really inspiring. To me at least, is that, it is possible, right? I mean, people think, oh, well, vegetables are just inherently less tasty than ice cream. And it's like, well, that's not necessarily true. Also it doesn't have to be a competition, right? I don't have to get my three-year-old to hate ice cream in order for it her like broccoli. There's a lot more I can be doing to help shape a more positive approach oriented, indulgent mindset around healthy, nutritious vegetables and fruits and other foods, right? In addition to having her like ice cream, right? And that's totally fine. - So, it's a really interesting study. When it's published, let me know and all. -

Yeah, I think it was actually released this week, yeah. In JAMA Internal Medicine.

01:19:40 Mindsets About Medicines & Side Effects

- JAMA Internal, okay, great journal. I will definitely talk about it on social media and elsewhere, sounds very interesting. What else are you up to lately? My favorite question to ask any scientist or colleague by the way, is what are you most excited about lately? What are you up late thinking about and getting up early thinking about? - Yeah, so hands down, the thing I'm most [mumbles], well, I guess there's so many things. The thing that I'm most into right now, we're doing the most work in is, you know, I started by getting inspired by placebo effects in medicine. I did a long stint in placebo or belief like effects in behavioral health. And now we're moving back into medicine. So I'm really interested in looking at how we can work with active drugs and treatments, to make them better and make the experience of them better by instilling different mindsets. So, one study we did along those lines, we worked with kids or undergoing treatment for food allergies. So allergies to peanuts, for example, this was with Kari Nadeau, who's the head of the Stanford Allergy Center here. She has a great treatment for food allergies. Basically kids take gradually increasing doses of the thing they're allergic to, like peanuts. And over the course of six or seven months, these kids become less reactive to peanuts. And the problem with that treatment is it's really difficult because they're having all sorts of negative symptoms and side effects. These kids are getting itchy mouths and upset stomach, they're puking and it's scary, because they're literally eating the thing that they've been told might kill them, right? And what we did in the study, was we attempted to improve the experience and outcomes of that, by reframing mindsets about the symptoms and the side effects. So as it was being conducted before, the kids were told, look, these side effects are just an unfortunate by-product of this treatment, and you have to sort of endure them to get through it. But what we found in our conversation with Kari, was that the reality of those side effects was not so negative. In fact, they were mechanistically linked to the body learning how to tolerate peanuts or the allergen. And so what we did was we worked within a trial. They were all getting the treatment, but half of them were helped to see this more positive mindsets. That symptoms and side effects from this treatment, were a positive signal that the treatment was working and their bodies were getting stronger. And what we found was that that mindset led to reductions in anxiety, fewer symptoms, when at the highest doses and most interestingly of all, they

had better outcomes. So based on immune markers, that were assign of the allergic tolerance, those who had this mindset throughout had better outcomes to the treatment. So that's just one example. I think, my goal is really to move us beyond the placebo versus drug, mindset versus behavior, to get to a place where we can blend them together and maximize the benefit of these treatments. So we're doing a lot of studies like that, you know, how can we improve treatment for cancer with different mindsets? We've done some work recently with the COVID-19 vaccine, and symptoms and side effects. So that's what I'm really passionate about right now. - It's incredible. I can't wait to read that study. Is that one out or on the way? - Yes. - Okay, well then I will also read and communicate with you and then about that. So who knows, maybe you would come on Instagram and do a little Instagram live to make sure that I don't screw up the delivery and that we can hear it direct from the person who ran the study. I find this issue of side effects really interesting. I don't take a lot of prescription drugs, but recently I was prescribed a few, and the list of side effects is, it's incredible and it just goes on and on and on. I realize some of that is legal protections. It's hard for me to believe that they're actually expecting anyone to read those because you need a high powered microscope to read this, print is truly fine print. But I did realize that in reading over the side effects that one prime is themselves, to experience those side effects. And so now I just rip up the side effects thing or the sheet, and just throw it away. I just take it as recommended. Do you think it works in the other direction to where if an effective medication is supposed to have result A, B or C, and you are told again and again, how effective it is for that treatment, that it could amplify the effect. So in other words, it's strictly a placebo. It's not nocebo, as you described before. But that perhaps at a lower dose, a given medication could have a amplified effect or at a appropriate dose, if you will, it could have a super physiological effect. Has that ever been demonstrated? - To some degree. I think where it gets tricky is, for a long time, people thought the effects of placebos were expectancy based. So you expect to get a benefit and that benefit occurs. There's certainly some, some truth to that, but I think the mindset approach is more powerful because it helps us understand the mechanisms, right? So if you just expect that your blood pressure will go down, what are the mechanisms through which that expectation would lead to your blood pressure going down way? It's hard to even understand that, right? But if you have the mindset that, you're in good hands, that this is being taken care of, that this illness is not going to kill you, right? That you're being treated well. Then you can start to unpack the mechanisms through which blood pressure could be

relieved. Maybe it's anxiety reduction, maybe it's changing the sort of anticipation of what are the prioritization of what the body needs to focus on. And so, I really think that, the work of the future needs to be on getting more sophisticated about what is the mindset that we're instilling when we say something will work or it won't work. And how do we understand the mechanisms through which that changes physiology? So to answer your question, I think that that could be true, but it depends on what actually is the mindset

01:26:25 How to Teach Mindsets

you're evoking. - I know you're a parent, and to the other parents out there, but also the kids and people who don't have kids, what is the best way to learn and teach mindsets? I mean, clearly a conversation like this informs me and many other people out there about mindsets and how we can adopt them. But it also seems to me that if we have the opportunity to teach mindsets and really cultivate certain mindsets, that the world will be a much better place. - Yes. - How does one go about that? Given that there were kids and we are all being bombarded with conflicting information all the time, how do we anchor to a mindset? - Yeah, and you're getting at my other major passion right now, which is what we're calling in our lab, meta mindset. I'm working on this with Chris Evans and others. And that is, how do we consciously and deliberately change our mindsets? And the first step is really simple, and that's just to be aware that you have them. That the world, your beliefs, aren't sort of an unmitigated reflection of reality as it objectively is. They are filtered through our interpretations, our expectations, our frameworks, and simplifications of that reality. And as you know, your work and then you're as you know, so well that most of what goes on in our brain is an interpretation of reality. Mindsets are just the simplified core assumptions about things. And the first step is to realize that we have them. The second step is to start to think about, what the effects of those mindsets are on your life to sort of play out the story, right? Okay, I have this mindset that stress is debilitating. How is that making me feel? What is that leading me to do? Is this mindset helpful or harmful? The question isn't is the mindset right or wrong? Because you can find evidence for her against it. We can fight about it until we're exhausted. The question is, is it helpful or harmful? And then, you can go about seeking out ways to adopt more useful mindsets. So, we've been doing a lot of work on how to actually do that. How do you consciously change it? Sometimes it's really simple. I think in cases where we don't

have a lot of prior experience, like the kids with allergies who are getting treatment, they didn't have any other mindsets about symptoms. So we just had the luxury of setting it, right? When it comes to healthy food, I think it's harder to change people's mindsets because we have a lot of baggage weighing us down. As a parent, for me, I guess my number one piece of advice is to lighten up, trying to get your kids to do certain things and focus more on helping them to adopt more adaptive mindsets. So, I'm by no means an expert at this, but I'm testing it with my own child. - Your child real, real child. The real kind of experiment. - It's how do I resist the urge to force my child to eat her dinner so that she can have her dessert, right? Because that's the real urge. It's like, no, you need - Or you're negotiating. - to do that. Because when you start thinking about it in terms of mindset, you realize, oh, that's just reinforcing to her, that the dessert is the exciting, fun thing to have. And this thing that I have to do must be horrible. So horrible that my parent is forcing me to do it, right? So it's letting go a little bit of the behavior, the objective reality, and really thinking about the subjective reality and focusing on adaptive mindsets. So my goal as a parent has been to try to help her instill a healthy mindset about eating, that healthy foods are indulgent and delicious. That the experience of stress is inevitable, that it's natural. And that going through stressful experience can help her learn, grow, and become a more connected and happier individual. And with exercise and physical activity, we haven't really gotten to that yet, but [laughs] we will with time. - Yeah, that's great. I wrote down and I'm going to keep this in the front of my mind, going forward, to continually ask what is the effect of my mindset about X? And just to evaluate that. About exercise, about food, about school, about stress, about relationships, about relationship to self, et cetera. And to really think about that in a series of layers that you think that would be a useful exercise? - Definitely, and you know, and your work speaks to this. I mean, the mindful, it's not-- I would really urge against people getting dogmatic about their mindset also, right? Like, oh, I need to have the right mindset. Or, and if I don't have the right mind-- It's like, okay, mindset is a piece of the puzzle. It's a piece of the puzzle that's really empowering because we have access to it and we can change it. But it is just one piece of a puzzle. So treat yourself like a scientist, look at your life, look at your mindsets, see what's serving you, see what isn't. Find more useful, adaptive, and empowering mindsets

and live by those. - I love it. Now, in one version of this kind of discussion, I would have asked the question I'm going to ask next at the beginning, but I'm going to ask it now close to the end, which is, you're unique constellation of accomplishments and attributes, and I only know a subset of them, of course, because today's the first time that we've met in person, even though I've known your work for a long time and we're colleagues across campus. So you run your laboratory, where you do research. You were also an athlete in university, a serious athlete, and then you're also a clinical psychologist, is that right? - I was trained as a clinical psychologist. So my PhD is in clinical psychology. And I did all my pre and post internships that dealt with stress and trauma. - Do you see patients or did you see patients at that time? - I did. Yes, I don't anymore. - Okay, that's a very unique constellation of practitioner and researcher. So what are the mindsets that you try and adopt on a regular basis in as a consequence or in relation to those things, sort of athlete, researcher, clinician? For yourself as you move through life, do you have an overarching mindset that all challenge's good, or do you have any kind of central mindsets that help you navigate through, you know, it was passed to be a pretty complex set of daily routines given everything that you juggle. But I think that people like you are unique, in that you have the inside knowledge of how this stuff works, and you've also existed in these different domains. And I know a lot of listeners have a more athletic slant to their life or a more cognitive or some are raising kids, or some people are doing any number of things. So, this is where I think it would be useful for people to hear kind of, what do you do? This is what I'm asking. - Yeah, well, it's certainly true in my case, that research is me search. Everything that I study as an intellectual has come from my own experience or my own failings, right? And when I was really intensely exercising and training, those were the questions I asked when I was dealing with eating and concerns about my weight, those were the questions I asked. When I was stressed about my dissertation. I decided to do my dissertation on stress, right? Now I think we're in the midst of a global pandemic. How can our mindsets be useful here? I don't think there's a obvious answer to your question other than the guiding light for me has been an undercurrent of understanding that our mindsets matter. I think I got that very clearly and deeply as a child, both through my experiences as an athlete. I know many of you listeners are athletes. Any athlete knows that you can be the same physical being from one day to the next one moment to the next, and perform completely differently, just depending on what you're thinking. I was a gymnast growing up. And if you can't visualize, if you can't see something in your mind then you have no chance when you

get up there on the balance beam, right? And also, my father was a martial artist, a teacher of meditation. So this kind of mind body work was baked into me from an early age. And I think what I've done recently, is to try to understand it scientifically, and more importantly, to figure out how can we do better with this, right? We're all talking about AI taking over the world, and technology this and all the personalized medicine that, and it's like, we have done so little, relatively, so little with the human resource, our human brains, that the potential for which is so great. And we've done almost nothing. Take the placebo effect, we know a lot about what it is. We've done almost nothing to leverage that in medicine consciously and deliberately. So, what keeps me going, what gets me through the hard times is just that burning question of, what is going on here and what more can I do with the power of my mind? - Well, I and millions of other people are so grateful

01:36:20 The Stanford Mind & Body Lab, Resources for Stress

that you do this work. It's so important and it's truly unique. Tell us where people can learn more about your research, where they can find you online. I'm going to try and persuade you to take more of a social media presence going forward. But whether or not I succeed in that effort or not, where can people find you, ask questions, find your papers, learn more. I'd love to have you back for a conversation in the future, but in the meantime. - Yeah, it's been such an honor getting to chat with you and just you have such an impact on the world. And I look forward. I hope we can do some science together also. - Absolutely, absolutely. - Yeah, all our papers and materials and interventions are housed on our website, mbl.stanford.edu. We also have a link there too, that takes you to Stanford SPARK, which stands for social psychological answers to real world questions. We have a lot of toolkits on that website, including a toolkit for this rethink stress approach of acknowledging, welcoming, and utilizing your stress. And then I guess I'm on Twitter, Alia Crum, [chuckles], I don't do much there, but maybe I will start to. - Well, those are all great resources. We will provide links to all of those for our listeners and viewers. And I also hope to convince you to write a book or many books in the future. The world needs to know about this, but thank you so much for taking time out of your exceedingly busy schedule to talk to us about these ideas. I learned so much. I'm going to definitely think about what is the effect of my mindset about blank in every category of life and really, on behalf of everybody and myself. Thank you so much.

- Yeah, thank you. And I guess I just want to end by saying, I think this work is really the tip of the iceberg of what can and should be done. And so, I really invite you, your listeners, and anybody who's inspired by this work. If they want to share stories or want to partner on a collaboration to please reach out. - Great, well, and the comments section on YouTube is a great place to do that as well. You will hear from them. - Great, [laughs]. - All right.

01:38:30 Synthesis, Participating in Research

Thank you so much, Allie. - Thank you. - Thank you for joining me for my conversation with Dr. Alia Crum. I'm guessing by now, you can appreciate the enormous impact that mindsets have on our biology and our psychology, and how those interact at the level of mind and body. If you'd like to learn more about Dr. Crum's work, and perhaps even be a research subject in one of their upcoming studies on mindsets, you can go to mbl.stanford.edu. There, you will also see a tab for support, where if you like, you can make a tax deductible donation

01:39:04 Subscribe, Sponsors, Patreon, Instagram, Twitter, Thorne

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