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 Krum. Dr. Krum 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 learn from my discussion with Dr. Krum, 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. Krum'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. Krum'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 byproduct 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 root to overcoming their peanut allergy. It 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 Krum 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. Krum works on all these things. She was not only an incredibly accomplished tenured research professor, she's also a clinical psychologist and she was also a division one athlete and a 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 that Dr. Krum 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 now, my conversation with Dr. Aliyah Krum. Great to have you here. Great to be here. Yeah. For the record, it's Aliyah Krum but you go by Ali. Correct. That is correct. Dr. Ali Krum. Or just Ali. Okay. Great. Well, I've been looking forward to talking to you for a long time. Just to start off, you know, 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 jargonizing in this level. 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 are, 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 an orient are 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 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 even. 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 this implicit theories or core beliefs about the nature of intelligence or ability. 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 oversimplified 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 these things. But as humans we need these simplifying systems to help us understand a complex reality. So those assumptions that we jump to, oh intelligence is fixed or intelligence is malleable, they help us to simplify this complex reality. But they're not unconsequential, 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 and you're 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, 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 is aimed 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've 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, you know, 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 stresses 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 is 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, you know, 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. I'd love to talk about this notion of how our mindsets 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 a 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 mindsets 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 Salove, Peter Salove, had done a lot of work on really coining the term emotional intelligence study. He's not the president of Yale, yeah. He's done well for himself and for the university and society. 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 and exercise, and was in this sort of food domain and this emotions and food domain. 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 was, it's really not outrageous if you're coming from a place of having studied and depth placebo effects. So placebo effects are this row and medicine at least, or this 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, boost your immune system. So that 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 because of the clinical trial process in which all new drugs and medication are 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 new wants 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, you know, medications solving our health crises to behavioral medicine solving our health crises, 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. 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 a 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 a 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 peptide response to this shake. In particular, we were looking at the hormone, ghrelin. So as you know, ghrelin, a medical expert's called the hunger hormone rises in ghrelin, signal, 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 threefold 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. 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 taste, you know, and you're 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? And like, you know, just make sense. Like placebo effects, think you're healthy, you'll be healthy. 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 grellen responses. 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 this milkshakes contain affected a subconscious process, because I have to imagine that the grellen pathway is not one that I can decide, oh, you know, this particular piece of chocolate is going to really reduce my grellen because it's very nutrient rich as opposed to one, if you told me that a different piece of chocolate, for instance, is low calorie or sugar-free chocolate or something that sort. The grellen pathway, however, it seems based on your data that the grellen pathway is susceptible to thoughts, 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. But it raises a question that I just have to ask because increasingly so I'm involved in, you know, online discussions and social media and one of the most barbed wire topics out there, and that's being generous, is this topic of which diet or nutrients are best. So you've got people who are strictly plant-based, you've got people who are omnivores, you've 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 kind of plugs into a particular mode of eating that they feel works for them for whatever reason. But once they feel they sort of, 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 100%, 100% and has something to contribute. So I'm not going to weigh in on the debate, which is what I will most certainly weigh in on is the notion that, look, going back to the placebo effect, we have an outdated understanding of what that is, which is based on this randomized control trial. So if you're 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 oversimplified, 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 is going on in the placebo effect, which is, at least from our perspective, it's beliefs, it's social context, and it's your body's natural ability to respond to it. 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 an arculpture think about that diet, because those social context 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. So 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 an adverse effect because of the stress and the anxiety associated with that. So it's very interesting. Along the lines of belief effects, can we call these belief effects or mindsets? Is there a difference between these, what I'm calling belief effects and placebo effects, I mean, or placebo effects distinctly different from mindset effects or they more or less the same thing. So I think placebo effects, maybe should be reserved for the conditions in which you're actually taking a placebo, which is an 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 embodied 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. There was a paper a year or two ago published in Science Science Magazine about brain regions involved in psychogenic fever that if people or you can actually do this in animal models too, think that they are sick. So the genuine one to three degree increase in body temperature, one to three degrees Fahrenheit increase in body temperature is pretty, pretty impressive. And I guess plays into, you know, symptomology generally. So I'm a believer in belief effects. And I just say that, you know, the term that we use in the, in our field is no seabull effect for that, which is sort of the placebo's ugly step sister, you know, it's when negative beliefs cause negative consequences. So you are told you will have, you know, it's very well demonstrated that when people are told about certain side effects, they're far more likely to experience those side effects. And people think that they're sick or going to get sick. Sometimes that can create, you know, the physiological symptoms. And, you know, there's, there's, you know, 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 headaches and attribute it to the drug. So some of the mechanisms are attention. And some of them are real changes in physiology. And I think that's a good example of for you to tell us about the hotel workers study. Yeah, sure. And then you get asked these questions all the time. I find these, just these results also amazing. Yeah, no, I think 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 I thought about this study that I ran with Ellen Langer way back when I was an undergrad actually who started this study. Ellen Langer's 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, you know, Eastern mind, you know, Buddhist sort of mindfulness-based work. She, you know, 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 on there, I forget it. She said, you know, you know, the benefit of exercise is just a placebo, right? And I was like, well, that's outrageous. Ellen's for 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, you know, how would you study if exercise, the benefits of exercise were a placebo, how would you even test that? Because, you know, what does it mean to give a placebo exercise? 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 were women working in hotels who were on their feet all day long, pushing carts, changing linens, climbing stairs, you know, cleaning bathrooms, vacuuming. It was clear that they were getting above and beyond at least the surgeon general's requirements at that time, 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. Like, 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, you know, 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 should we take conceptualize that result in light of all of our efforts to get more out of exercise? Because earlier you mentioned it from the milkshake study and our perceptions about nutrient density that it's a little bit, the right message that 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, it's 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, 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 large, here's what you need to get. Here's what you need to get enough benefits to receive the health benefits. The problem with that approach is that most people aren't meeting those benefits yet or 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 useful for us. It's one of the things we have the best data on. So I'm not saying, oh, exercise is 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's art, who is a grad student, 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? So the audio you're listeners, you could all answer this. And then in these data sets, 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 is 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. Or miss perceive. They miss perceive. And or, you know, who's to say it's miss perceiving, there's just everything's relative, right? If you're 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, you know, natural, 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 some, in one of those 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. So, yeah. That's a big deal. That's a big deal. And again, you know, that study is cross-sectional longitudinal. It was not experimental. But, you know, combined, these really sort of, you know, coalesce 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, I was an unhealthy mindset about that. I never felt like I was getting enough. I would, you know, come off a two-hour practice into a weightlifting session. And then I would get on the elliptical for 30 minutes, because I thought I had to do that also. My teammate, who were with me at the time, could have tested that. And so that study was really helpful for me to realize that I needed to 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. 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, by very much. But it seems like the message from the milkshake study and what we're talking about now in terms of exercise would be to really communicate to the general public that, 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. Is that an accurate way to state it? Total, 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's both matter. Both exercise and what you think about it matter. Both what you eat and how do 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. I wanted to maintain her, you know, whose weight looked fit. And so I thought, well, I should diet, I should have low calorie, low carb, low this, low that. 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. You know, stay hungry because 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? You know, based on the latest science and what we know to be true about nutrients and our bodies response to them. But try to do so in a mindset of 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 end of public facing health communications, I, this comes up again and again. 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 are coming through again and again. So I have a question about this. I don't know if the 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. It's 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 sleep and 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 finds 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 then it's not going to kill us or give us Alzheimer's? Could that help us deal with a poor night sleep or even two or chronic sleep deprivation? Certainly I would guess. There's been one study to my knowledge that's tested that, Dragonaw and colleagues. They looked at, they had people come in and they gave them sort of, I think it was a sham sort of EEG test to sort of figure out how, you know, this was done a number of years ago now we actually have devices to test this. There's was this sham test and then they gave people fake feedback about the quality of their sleep and you know 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 the sham feedback if they were told that they had gotten lower quality sleep led to deficits and a variety of cognitive tasks. And that was sort of decoupled from their actual qualities of sleep at least as self reported. So that's one study that attests to this I think certainly I mean I would, you know, I would bet a lot of money I haven't run this myself but that your mindsets can push around your cognitive functioning physiological effects of sleep. But once again it's 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 it that 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 the 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 my sleep my recovery score my sleep scores poor I shouldn't expect much for myself today or I 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 good subjective score for myself if I wake up in the morning I just decide okay did sleep well or not I don't like seeing a number I don't like getting a read out from a device that's me I know a lot of people. 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 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 take a ways 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 had you know I'd come off the heels of doing some research and exercise and diet and finding these provocative and also counterintuitive effects of with respect to like how we should try to motivate people. And you know I was I was thinking about this and this you know grouping of going from you know medicines is just saving us to behaviors to saving us and how those behaviors might be influenced by mindsets the obvious next thing to think about was stress right. It's like okay well you want to be healthy or fix your diet fix your exercise and stress less and you know so I started doing some digging into the nature of stress and. 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 at the messages that were out there by and large oversimplified 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 you know the literature like most literature is not so clear cut in fact there's a large amount of evidence to support the fact that the experience of. Stress meaning encountering adversity or challenge in ones goal related efforts. Does not have to be debilitating 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 in the stress response recruit or activate anabolic hormones which help as you know build our muscles build our you know 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 you know I found that to be interesting. And you know my work sense 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 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 response. More more adaptively what our question was was to take the sort of psychological construal one step higher and abstraction so not just the stressor but the nature of stress right do you you know at that core level do you view stress is something that's bad is going to kill us and therefore should be avoided or do you view some stresses 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 Salave and Sean acre originally we designed a measure to test people's mindsets about stress simple questions like what extent 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 that more enhancing stress mindset was linked to better health outcomes better well being 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 is you know stress has been linked to these things but in fact the body stress response was designed to do this did you know could do that and we had some empowering images like LeBron James making the free throw in the final minute versus missing it right so all of these things are true you know possibilities but oriented to two different mindsets about stress so either you know stress will be a video that basically may 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 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 company financial service company that was undergoing pretty massive amounts of layoffs of 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 a training on stress but the three different conditions some watched no videos some watched the stress will crush you videos and some watched the stress could enhance you videos and what we found was that just you know 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 watch the enhancing films had fewer backaches muscle tension and somnia racing heart and so forth and they also reported performing better at work compared to those who watch the debilitating videos now interestingly we didn't make anyone worse with the debilitating video which is good we had told the 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 was more this enhancing perspective that turned out to be inspiring I love that study and I know we both have friends and and ties in the special operations community through just sort of happen stance and we can maybe we'll get into that a little later but a good friend from that community always says you know that 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 it stresses 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 major role is to place us into a moment of or it buy us towards action that's why we tremble it's it with the body trying to initiate action but actually this is probably a good opportunity if it was if there's anything interesting to extract from the study on on seal teams what what was it yeah no I love working with with the seals and one of the interesting things we found so we had we've studied this you know 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 so people just saying stress is best right and you know it's like with measures of growth and fixed mindsets about intelligence attends people are in the middle but oftentimes have a more positive mindsets about intelligence that was not the case was still not the case of trying to get the message out there except for this group of Navy seals so they're actually recruits so people who were going through basic training in order to become Navy seals and we found that they on average had stresses enhancing mindsets perhaps not surprisingly right if you're going into 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 you know at the time it was only like 10 or 20% of trainees the numbers that never shifted no matter how hard pressures on the community change that the numbers are still about on average about 15%. So what we found was that our measure predicted that rate so people who 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 you know again let's break this down right this doesn't mean and other people get me people get this wrong sometimes they think that I'm saying that a stresses enhancing mindsets means you should like stress right well maybe seals do. But that's not what we're saying right having a stress is enhancing mindsets doesn't mean the stresser 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 diagnosed a cancer diagnosis is a good thing or being an object 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 enhancing outcomes with respect to not just our cognition but our health our performance and our well being. 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 you know just imagine we're stressed about something maybe a global pandemic for instance for instance. You know 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 your stress 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 you know negatively or to check out and say oh it's not a big deal I'm not going to deal with that you know you're basically in denial so. People who have a stress is 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 of stress is bad you need to either get rid of it and deal with it or or it needs to not exist right if you have a stress is 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 you know have better science and treatments for the future deep in my relationships with others improve you know my priorities and so forth right so the 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 minds and have more positive affect not necessarily less negative affect and it potentially change the way that we do it. And it potentially changes physiology we we have a few studies that show that people who are you know 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 love your take on the mechanisms through which that's possible. Yes and DHA of course as an anabolic hormone in both men and women very interesting because we had a guest on this podcast he actually is a he's a PhD scientist who runs the UFC performance training institute is named Duncan French and his graduate work at a you con stores was very interesting was an 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 were told about stress and testosterone levels right and this has also been looked at in females with estrogen although of course there's estrogen testosterone both males and females but that's how they designed the study so 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 epinephrine and epinephrine is derived biochemically derived from the molecule dopamine if you look at the pathway and even just Google it and go images you'll see that but adrenaline is is made from dopamine and dopamine and these anabolic hormones have a very close they're sort of close cousins they work together in the pituitary hypothalamus so it makes sense that one could leverage stress toward growth and towards animalism as opposed to cannibalism which is not saying cannibalism is an 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 these brain structures that control dopamine epinephrine testosterone and estrogen they're all thought to be in the subconscious meaning below our our ability to flip a switch and turn them on or off and yet minds that seemed impact them so I I all that to say that there's a clear mechanistic basis by which this could all work and and so on the one hand I'm surprised because they these are incredible results on the other hand I'm not surprised because there's a physiological substrate there that could readily explain them yeah and I think I think figuring out exactly how it works is really you know we should do that we should do that we've got common friends in both departments so we should we should do it but I but I didn't want to mention I you know the way the way I think about mindset and again I think we need to study this I'm not a neuroscientist I haven't looked at this but this is something we could do but the way I think about mindset is that it's a mindset that's kind of a portal between conscious and subconscious processes they operate as a default setting of the mind right so if you know if sort of programmed in there you have stress equals bad right that is going to you know couldn't that that's going to be something maybe conscious right but it doesn't have to be conscious right you don't people don't have to know their mindsets about stress until they're asked really it's 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 like you know 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 that communicates with more you know 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 and how do I think about stress is not going to be a good answer to that 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 it can 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 you know in a molecule or bones 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 there's a lot to unpack there but it clearly is the case that the mindsets they sort of act as he risks right and 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 mean trying to navigate the public health around anything the public health information around anything is kind of overwhelming as you mentioned for stress you see a lot in the stresses will crush you and then you can also find evidence that stress will grow you how should we the listeners think about stress and what 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 of ways that we can cope with stress better yeah or I may I should be careful with the word hope is there a way that we can leverage stress to our advantage great yeah and that's an important port new on senior language which is people of 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 vacation massage is yoga classes and yeah fight against an order check out right and yeah the real challenges how do we leverage it how do we work with it and I have a lot of thoughts on this the first and worst most important thing is to clarify our definition of stress so I think people often associate that the stress mind 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 so 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 are 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 you know overcomment through our massages when the stress is connected to the things we care about so then the question becomes OK 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 it's the first step is to just acknowledge that your stress 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 you care about not spend your time money effort energy trying to get rid of the stress does that make sense make sense and I love it as somebody who's laboratory studies the physiological effects of stress the effects that impress me the most are for instance the narrowing of visual attention that then drives a capacity to parse time more finally which then drives a capacity to process information faster it's almost like a superpower 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 is it what I like so much about that framework is that the response is very generic we unlike the relaxation response we don't actually have to train up the stress response so we all kind of get this as a as a freebie and then it sounds like it's a question of what we end up doing with that right in Han Selle father of stress set himself it's a non specific response right so it it occurs it's what you're doing with it it's how you're doing 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 in Hedonia because by checking out from stress you're also checking out from the things we care about and substance abuse exactly on a call on a Lemke who also we have the good fortune of having as a guest on this podcast talked a lot about this that you know so much of substance abuse it because she runs the addiction clinic over on the med side of campus it takes over people's lives because of this increased ability to to find a solution to the stress that then eventually becomes its own stress or in its own problem well I I love that 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 are 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 and there's a nutrition that 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 I'm constantly bombarded with health information and and influencers I turn might even know until you are one well one could argue one way or the other but what what is the deal with influencers are they doing something good for health information or they are they ruining the landscape and don't try and protect my feelings because I now know that stress is is actually an asset yes well I you know 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 you know things like when we're stressed or food or other things second is culture and media so movies you know podcasts now 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 you know we talked about that a little you do have we have as humans have the ability to be mindful of and to change our mindsets but you know the social media and influencer stuff has been in part and attempt to understand where do our mindsets about things like healthy foods come from and Brad turnwalled who is a former grad student my lab has done a series of really interesting studies on this showing that you know if you rate the nutritional quality of the you know top grossing movies in the last 20 years or you look at the Instagram accounts of all the most influential people on Instagram what you and you analyze the nutrition content of what they're eating what he's shown is that you know depending on the study 70 to 90 percent of those movies or influencers would fail the legal standards for advertising in the UK so they're nutrition contents that are you know maybe not surprisingly but undeniably unhealthy and you know to me that's interesting and important it shows that where are we getting this mindset that you know 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 to so generally what we found is that when people talk about unhealthy foods they use language that connotes a sense of excitement fun sexiness danger indulgence basically anything good and desirable this would be like cookies cakes high sugar. Sorry. Yeah. Really unhealthy. Yeah foods or yeah that's actually the objective what health means is challenging but yeah high fat I think there's pretty good agreement now that excessive sugar yeah isn't going and highly processed yeah highly processed excessive I think there's general consensus I'm sure someone if you're going to come after anyone come after me I'll stand behind. 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 you know it's nutritious but it's it's sort of boring it's bland recovery from the holidays sort of the post holiday exactly right and this is really important because you know you're doing all this work trying you know and others are doing all this work trying to inform people about what actually is good for them and meanwhile there's this you know hurricane of other full you know a force that's telling people that's seeping into our minds that 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 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 you know 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 and could you know if your 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 you know what people do but what they think about the foods they're eating it's really interesting I hadn't thought about until now but it makes sense that any food that's packaging can be sold is can be woven into a film or promoted by a celebrity influencer not a health influencer per say but a celebrity influencer because they'll get paid right it's part of the the ecosystem that allows them an income and it feeds back on sales to the company and whereas things that can't be commoditized it's it's more difficult right it's hard to do 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 there's no identifiable source of 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's some of that certainly in 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 you know 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 that people respond more positively they're more likes on posts about unhealthy foods so it's a it's a yeah 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 for and I realize that there are people out there who derive the same sort of 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 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 to 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 sounds they're really interesting study when it's published we let me know and I think it was actually released this week oh great I will be sure to jam and turn on medicine jam and turn or okay great journal I will definitely talk about it on social media and and elsewhere sounds very interesting what else are you up to lately that's I look my favorite question to ask any scientist or colleague by the way is what are you most excited about lately what what what what do you up late thinking about and getting up early thinking yeah so hands down the thing I most accept 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 carry NATO who's the head of the Stanford allergy center here she is 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 you know less reactive to peanuts and the problem with that treatment is it's really difficult because they're having all sorts of negative symptoms inside 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 addition of byproduct of this treatment and you have to sort of endure them to get through it but what we found in our conversation with carry 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 allergy 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 a sign of the allergic tolerance those who had this mindset throughout had better outcomes to the treatment so that's just one example I think you know my goal is really to move us beyond the placebo versus drug you know 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 incredible I can't wait to read that study is that one out or on the way okay well then I will also read and communicate with you and then about that study 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 you know it's incredible it just goes on and on and on and I realize some of that is legal protections I it's hard for me to believe that they're actually expecting anyone to read those because you need a you know a high powered microscope to read this print is truly fine print but I did realize that in reading over the side effects that you prime one prime is themselves to experience the side effects and so now I just rip up the side effects thing and 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 not it's strictly a placebo it's not no C-bo 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 placebo were expectancy based so you expect to get a benefit and that benefit occurs there 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 if you just expect that your blood pressure will go down that you know 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 is not this illness is not going to kill you right that you're being treated well then you can start to unpack you know the mechanisms through which blood pressure could be relieved maybe it's anxiety reduction maybe it's changing the you know the sort of anticipation of what the prioritization of what the body needs to focus on and so I really think that you know 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 to answer your question I think that that could be true but it depends on what actually is the mindset you're okay 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 would 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 our lab meta mindset 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 here as you know so well they're all 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 against it you know we can fight about it till we're you know exhausted the question is is it helpful or harmful and then you know you can go about seeking out ways to adopt more useful mindsets so you know 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 they didn't have any other mindsets about symptoms so we just got the luxury of setting it right when it comes to healthy food I think we will 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 you know I'm by no means an expert at this but I'm testing it with my own child it's how do I you know 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 is no need to do that because that when you start thinking about it in terms of mindsets 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 you know my parents 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 it's natural and that it can help going through stressful experience can help her learn grow and become more connected and happier individual and you know with exercise and physical activity we haven't really gotten to that yet but we will the time yeah it'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 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 you think that would be a useful exercise definitely and you know and your works speaks to the stem and the mindful it's not I would yeah really urge against people getting dogmatic about their mindset also right like oh I need to have the right mindset or if I don't have the right mind you know 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 your 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 work colleagues across campus so you run your laboratory where you do research you were also an athlete in the university a serious athlete and then you're also a clinical psychologist is that right so I was trained as a clinical psychologist so my PhD is in clinical psychology and I did you know all my pre and post internships with stress and trauma do you see patients or did you see patients I did yes I don't anymore okay that's a very unique constellation of practitioner and researcher so what what are the mindsets that you try and adopt on a regular basis in as a consequence or in relation to those things or athlete researcher clinician you know for yourself as you move through life do you have an overarching mindset that all challenge is good or do you have any kind of central mindsets that help you navigate through you know it has 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 that you have the inside knowledge of how this stuff works and you 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 summer raising kids or some people are just you know are doing any number of things so this is where I think it would be useful for people to hear what what do you do this is what I'm asking you know 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 when I was you know really intensely exercising and training those were the questions I asked when I was dealing with eating and you know 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 you know now I think we're in the midst of a global pandemic it's you know what how can our mindsets be useful here you know so I you know 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 you know I know many of your 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 that you have no chance when you get up there on the balance beam right and I 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 how can we do better with this right how can we you know we're all talking about a I taking over the world and technology this and all personalized medicine that and it's like we have done so little relatively so little with the human resource our human brains that the you know the potential for which is so great and we've done almost nothing you know 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 my 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 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 no it's really it's been such an honor getting to chat with you on just you you have such an impact on the world and I look for it I hope we can do some science together also yeah with all our papers and materials and interventions are housed on our website mbl.stanford.edu we also have a link there to 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 and I think stress approach of acknowledging welcoming and utilizing your stress and then I guess I'm on Twitter Aliacron I don't do much there but maybe I will start too those are all great resources we will provide links to all of those for our listeners and viewers and 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 just 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 your you your listeners and all you know anybody who's inspired by this work if they want to share stories or want a partner on a collaboration to please reach out great well and the comment section on YouTube is a great place to do that as well you will hear from them great thank you so much Ali thank you thank you for joining me for my conversation with Dr. Aliyah Krum 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. Krum's work and perhaps even be a research subject in one of their upcoming studies on mindsets you can go to mbl.stamford.edu there you will also see a tab for support where if you like you can make a tax deductible donation to support the incredible research that Dr. Krum and her colleagues are doing if you're learning from and or enjoying the Huberman lab podcast please subscribe to our YouTube channel that's a terrific zero cost way to support us in addition please subscribe to us on apple and Spotify and on apple you have the opportunity to leave us up to a five star review on YouTube you also have the opportunity to leave us questions and comments in the comment section below any of the episodes you can also make suggestions about future guests that you'd like us to host on the Huberman lab podcast please also check out our sponsors mentioned at the beginning of this episode that's the best way to support this podcast we also have a patreon it's patreon.com slash Andrew Huberman and there you can support the podcast at any level that you like if you're not already following us on Instagram and on Twitter we are Huberman lab at both Instagram and Twitter and there I teach neuroscience in short form sometimes videos sometimes text slides some of that information overlaps with what you find on the podcast some of it is distinct from what you find on the podcast on previous episodes of the Huberman lab podcast often discuss supplements while supplements aren't necessary or used by everybody many people derived tremendous benefit from them an important consideration when using supplements is that they be sourced from the highest quality sources for that reason we partner with Thor and THOR and E because Thorne supplements use the highest quality ingredients and the greatest degree of precision in terms of what's listed on the bottles actually what you will find in their products that is not true for all supplement companies if you'd like to see the supplements that I take you can go to Thorne that THORne that you slash Huberman and you can get 20% off any of those supplements in addition if you navigate into the Thorne site through that portal Thorne.com slash you slash Huberman you can also get 20% off any of the other supplements that Thorne makes in closing I like to thank you once again for joining me for my discussion about mindsets with Dr. Alia Crom and as always thank you for your interest in science.