



AMERICAN
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ESSENTIAL SCIENCE CONVERSATIONS:

GOOD FOR YOUR BODY AND MIND: THE PSYCHOLOGICAL SCIENCE CONNECTING PHYSICAL ACTIVITY AND OVERALL WELLBEING

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TRANSCRIPT

Shandol Hoover: Hello, everyone, and welcome. Thank you for joining us today. I'm Shandol Hoover, Director of APA Science Special Projects and Implementation. This program is part of an APA series called Essential Science Conversations, where panelists and audience members can engage in an open dialogue about emerging topics in psychological science.

Before we start with today's session, I want to share a few quick announcements. First, we hope you will visit apa.org/science to learn how APA helps psychological scientists in our Elevate document, as well as join over 50,000 other subscribers by subscribing to a free *Science Spotlight* newsletter, where you can get firsthand insight into funding, news, events, and resources.

We also hope you subscribe to our free editor's choice newsletter, where you'll get free articles right to your inbox. Second, thanks to those of you who submitted questions for today's program when you registered. You can also ask a question as the program is taking place in real-time. There's a Q&A feature on the dashboard. Please enter your questions there. We'll be monitoring those questions throughout the program.

Finally, this program is being recorded. Once it ends, everyone who registered will receive an email with a link to the recording, a transcript, and related resources in about two weeks. I'll now turn things over to Dr. Dennis Stolle, Senior Director of the Office of Applied Psychology for the American Psychological Association.

Dr. Dennis Stolle: Hello. I am delighted to be here today to chat with three experts about how movement influences psychological wellbeing, physical health, brain health, memory, cognitive functioning, and even productivity. This is a really important topic for obvious reasons, but it is also a hot topic. Just two days ago, for example, the *New York Times* ran a story with the headline Physical Fitness Linked to Better Mental Health in Young People.

What I want to do is just dive right in by introducing the panel of leading experts who are joining us today. We have Dr. Rebecca Hasson, who is an associate professor of Movement Science in the University of Michigan School of Kinesiology. As Director of the University of Michigan Childhood Disparities Research Laboratory, Rebecca uses her expertise in exercise physiology, implementation science and health equity research to improve the health and wellbeing of children and their families across the state.

We're also joined by Dr. Eli Puterman, who is an Associate Professor in the School of Kinesiology at the University of British Columbia in Vancouver, British Columbia. He is the Canada Research Chair in Physical Activity and Health since 2015, a fellow of the Academy of Behavior Medicine Research since 2020, and his interdisciplinary research develops physical activity programs among difficult-to-reach populations and highly stressed individuals.

We're also joined by Dr. Wendy Suzuki, who is an award-winning Professor of Neural Science and Psychology in the Center for Neural Science at New York University and Seryl Kushner Dean of the College of Arts and Science. She's a celebrated international authority on neuroplasticity, was recently named one of the top 10 women changing the way we see the world by *Good Housekeeping*, and regularly serves as a sought-after expert for publications, including the *Wall Street Journal*, *Shape*, and *Health*, and also does TED Talks. She is the author of *Good Anxiety* and *Healthy Brain, Happy Life*. Welcome.

I just want to dive right in by going first to you Dr. Hasson. I mentioned in my introduction that *New York Times* story. I'm wondering if you can say a few words about the connection between physical activity and improving cognition or mental health in kids. Also, is there any psychological science that might help give practical tips for actually developing programs in K-12 education? You're on mute.

Dr. Rebecca Hasson: Thank you. After four years, we still can't get it right.

Dr. Stolle: It's the truth, right?

Dr. Hasson: Thank you so much to everyone for being on this call and for having me. Yes, I'm excited to be here to talk with you all about kids and about how do we improve their social-emotional, as well as their mental health. I think to give us just a small understanding of where we are right now in mental health, is that we are in a mental health crisis, not only here in the United States, but across the world.

We know that the latest stats that was published in JAMA article show that one in four kids are exhibiting symptoms of anxiety and we have at least one in five kids that are exhibiting symptoms of depression. It was already heightened before the pandemic, but unfortunately, the pandemic exacerbated that, and we're seeing that manifest in different behaviors. Disruptive behaviors in classrooms, feelings of social isolation, even suicidal ideation in our kids.

There's many, many, many benefits of physical activity. We'll had a nice long discussion today about the dose, the intensity, the timing of physical activity, but just about all forms of physical activity or movement are beneficial for mental health. We know that it helps in terms of just feelings, how a child feels, that depending on the type or if it's an enjoyable form of physical activity, it can put them in a nice, pleasant zone, and it can also arouse them to a state to where you see increased focus and attention.

One of the best articles that we present to schools across the state of Michigan is Chuck Hillman's work where he actually showed 20 minutes of sitting versus 20 minutes of walking, you see that the brain is really nicely lit up. It's lit up in terms of in the regions that help us focus and attention. My PhD student, Penelope Friday, is also looking at how do we use physical activity for emotion regulation. We know that there are three main pathways by which that can happen.

When you're doing more higher-intensity exercises, this helps activate the cognitive pathway that helps you think about a stressful event that occurs and helps you manage your response. Also, if you're doing exercises that you prefer, and that are enjoyable, that'll enhance your mood, as I mentioned before, and then if you're doing more motor skill type of activities, this helps with behavioral inhibition. We like to call it the think, feel, be pathways that then help with physical activity that lead to emotion regulation. That's more of those short-term benefits that teachers or parents are looking for right now.

We don't have to wait until improvements in fitness or wait two or three years to see these improvements. With physical activity, we like to say in the exercise world, that exercise is medicine. You can take a dose of exercise that can have a response that will improve a child's mood and improve their affect and wellbeing. How do we do this in schools? To give you the quick answer, I can go a little more in-depth later on, but I don't want to talk for too long, is that in most cases with schools, we've engineered a lot of physical activity out of the classroom, out of schools.

We no longer have daily PE like we used to. This is even worse in under-resourced schools. They do not have PE every day. They may not even have a certified physical education teacher. A lot of times recess is taken away as punishment. Classroom activity breaks are a great way to prime the brain for learning and increase that cognition in the classroom. Most elementary school teachers across the country are doing them but they're not doing them with fidelity, meaning they're only getting about 10 minutes when they could get 20 minutes.

I think one of the best strategies that we can talk about later is we need to re-engineer physical activity back into children's lives, both in the school, and the home, and the community to give everyone an equal chance to move more and feel better.

Dr. Stolle: That's great. I could imagine this objection. I'm curious how you respond to this. What about the people who say, "Well, look, I remember when I was a kid, and there was nothing I hated more than gym class because it made me feel terrible. I wasn't as strong as the other kids. I wasn't as fast. I had to do all these things I didn't want to do. I wasn't really coordinated, and so it made my mental health worse." What's your response to that?

Dr. Hasson: My response to that would be I fully acknowledge. I don't think the exercise world has fully acknowledged the physical activity trauma that many people have experienced. Meaning, there are places on the playground where you experienced bullying, or maybe where you felt your self-efficacy or your confidence and your ability to do an activity was lowered because you were held to a higher standard than you may have been physically or fit, capable of.

I think that that is a very important barrier that we're going to have to overcome as this is the only form of trauma where we just say, "Get over it. That happened in elementary school. Just get back to exercising." We don't actually address those feelings and those experiences. What we're trying to do in the state of Michigan is create positive physical activity experiences in terms of move however your body feels enjoyable to you.

There's many different ways of moving. How do we redefine physical activity? How do we redefine exercise? Exercise is a very scary word for folks, but how do we just help people to move more and make that the easier choice rather than sitting in front of the TV, rather than playing sedentary video games that our kids like to do and have a lot of access to?

Dr. Wendy Suzuki: I just have to jump in and say I so agree with you, Rebecca, and that my answer would be but play is exercise. All those kids wanted to get away from gym class, as I did, what do they want to do? They wanted to go play. That is a perfect example of what all of us are talking about today. I also wanted to add on to Rebecca's wonderful motto of exercise is medicine.

My motto that I want to add on to that is that every single time you move your body, you as a kid, you as a teenager, you as a 20-year-old, all the way up to 80 years old, every single time every one of us moves our body, we are releasing a whole bunch of beneficial neurochemicals in our brain. I call it a bubble bath of neurochemicals. Give your brain this bubble bath. That's what's causing that good mood that Rebecca was talking about. That's what's causing the brain plasticity, the growth of

certain brain areas. It's medicine. It is a bubble bath for your brain. It is helping your brain function better.

Dr. Stolle: Great. Thank you.

Dr. Hasson: I think that's excellent piece. Wendy, can you add a little bit more or Eli a little bit more for individuals who may not have full capacity of all of their entire bodies, so different ability levels, how might physical activity help with them?

Dr. Suzuki: Eli, I think that's your area.

Dr. Eli Puterman: Well, not physical disabilities in particular, but I do focus on how do we support people to really develop the types of strategies that they can do, that they want to do, that they're able to do, that meets their needs as best as possible. I think to resonate with what you were saying, Wendy, is this idea that it's play. We need to think about exercise without thinking about exercise. It's about movement.

I love that both of you keep saying the word movement and not exercise. I do similarly, all the work that I do and all the presentations is this idea that we are moving our bodies and our bodies crave to move. They have always craved to move, and whether they're craving to move with the extremities that we can use. If all we can use are the upper extremities, then that's what we use in order to play, in order to move our bodies, in order to dance.

There are so many amazing ways that our bodies can move that don't have to be thought about as exercise. I like to call it unthinking exercise. We need to stop thinking about it as exercise and thinking about it as how are we going to just get our bodies to move throughout the whole day, because that's how it used to be. That's how our bodies always were. As Wendy was saying, there's this flood of chemicals that really-- what do you call the bubble bath-

Dr. Suzuki: The bubble bath of neurochemicals.

Dr. Puterman: The bubble bath of neurochemicals. When we think about that, that's actually how our brain always was functioning, and then about 150 years ago, it stopped receiving these chemicals that it was craving for and needed. That's part of why we're in these crises, mental health crises, physical crises, where we are unable-- the chemicals that we need, actually, our brains got addicted to them and they really crave them, and they need them. We evolutionarily developed it that way. Now all of a sudden, we have completely stopped giving our brains what it needs.

We're seeing the repercussions of not having those serotonin levels, the dopamine levels, the endocannabinoid levels, all the different chemicals that really float around that help our brain think, feel, manage stress, be resilient are now missing.

Dr. Stolle: Dr. Puterman, we've talked a little bit about kids. We've been using the word play, which sometimes is associated with kids. Can you shift gears for us a little bit and talk to us about what might be some of the benefits for adults, particularly adults who are maybe under chronic stress? People who are in jobs, for example, that are chronically stressful, how do they get onto a physical activity program, and would it really help them?

Dr. Puterman: When I think about a physical activity program, it becomes so daunting. It's this massive event that has to occur five times per week that we have to get in our car and take us to a place, that's a whole experience, get to that place, do that hour long class, then get home from that.

This is a three-hour event on top of a job. That's why I really like to think about it as reducing the extent to which that we're feeling that burden of time, that crunch of time.

We've completed some studies here in our lab where we used commercially available apps in particular from this one company called Down Dog. We provided these for free to healthcare workers. I was told this is a societal problem. This is a structural problem. Healthcare workers don't have time. They have too much stress. They won't want to work out. They won't want to do it at home. We need to restructure the entire institution, which is completely true.

We do need to provide more access or more nurses, more healthcare workers within divisions so that there's less of a patient to nurse ratio. There's a lot of structural issues that need to be managed, both within the United States, here in Canada, and globally, but I know our two countries are doing some of the worst ratios with nurse to patients and even patient to beds ratios. There's a lot of structural issues, but we provided for free access to these apps 300 participants.

They were all healthcare workers. The majority were nurses. We said, "Hey, just do some stuff at home. Get a mat. You don't need any equipment. You don't need a gym membership." Over the 12-week period, we showed reductions in depressive symptoms, reductions in burnout, and also reductions in absenteeism, how many days they were calling in sick. We were able to improve mental health and even potential some physical health or absenteeism, is both mental health and physical health.

We were able to shift a lot of different psychological parameters by becoming physically active at home. I just think that we need to shift the way that we're conceptualizing what an exercise program means. What does it mean to move our bodies? Whether it's with an app at home, whether it's a walk in the neighborhood, if it's safe, whether it's going to a park and just doing some walks in the park, if it's safe, are all ways that we can move our bodies without it needing to be a three-hour endeavor.

Dr. Hasson: Yes. Agreed. We're doing the same thing in children here in the state of Michigan. We've actually partnered with Detroit Public Television because many of our kids, a third of our kids during the pandemic did not have Wi-Fi at home. We broadcasted exercise videos on TV to make them fully accessible. It's similar to Eli, we've seen that kids will do it. With parent support, kids will exercise at home.

That reduces the barrier of not having a safe neighborhood to exercise in, or if you don't live close to a park, or if you're not getting sufficient exercise at school, you can move more in the comforts of your own home. It's a safer space for kids to move at home too, because again, at adolescence, you're getting into that social anxiety, and especially for girls, we've seen higher enjoyment and exercising at home among the girls versus the boys.

Dr. Puterman: Sorry. Go ahead, Wendy, please.

Dr. Suzuki: I was going to say, Rebecca, you asked about disability, and it made me wonder whether you've heard of this program out of Scotland called the *Daily Mile*.

Dr. Hasson: Oh, yes.

Dr. Suzuki: I had the pleasure of speaking with the originator of this program. She is a former elementary school principal who noticed that all of her students, they were not looking so healthy, and she didn't know why. She did something so simple. She said, "I don't care when you do this,"

to her teachers, "Go out and walk around the outdoor track for 15 minutes a day, whenever it fits in, and take everybody with you."

You're in a wheelchair, they go out in the wheelchair. You're on crutches, you go out on crutches, but everybody walks for 15 minutes. They were walking very slow at first, but over the course of the semester, they all got into it. We have to do this. We're doing it together. It's fun. It's not competitive. It is being outside in all times of weather, all times of the year. This is now working its way up the Parliament of Scotland to make it mandatory for all kids.

It's such a simple idea, but they had huge benefits. This is something if you think of it as play/movement, the question of disabilities or not disabilities becomes much, much less challenging. It will always have some challenge. I'm not saying that it disappears, but I always think of that, and what a beautiful, simple idea that takes advantage of practical things but also the neuroscience and the psychology of how important movement is for our brains.

Dr. Hasson: Absolutely. Another thing that we've looked at- [crosstalk] Real quickly. Another thing that we've looked at too is for our children with cognitive disabilities, how do we break down those exercises into small digestible pieces? What we learn from PE teachers and adaptive PE teachers is that you need simple instructions and cue words. We've again, started to create more videos that make them more accessible not only for children with physical disabilities, but also cognitive disabilities that may need a little more support in just starting an exercise program to learn those motor skills to then be able to move more at home. Sorry, Dennis, go for it.

Dr. Stolle: No, that's fantastic. A theme that I'm hearing here is this idea that exercise doesn't have to be a big deal and you can break it down. It causes me to have this question that I'd like to direct to you first, Dr. Suzuki, which is this idea of physical activity, you think of treadmill, sports, weightlifting, whatever, and I'm hearing that it doesn't have to be all that. For me, I enjoy doing yoga and I want to ask you, does that count? I think your answer is going to be yes, but here's the more difficult question, does it count as much? Am I getting as much benefit if I'm not doing intense activity?

Dr. Suzuki: You get different benefits from different kinds of activity, as one would imagine. The point that I know that Rebecca and Eli would want me to emphasize, and we'll all emphasize, is first walking counts. It's not like, "Oh, it's a lowly-- if I don't have anything else." It counts. Where does it count most? For mental mood. 10 minutes of walking has been shown to decrease anxiety and depression levels significantly.

You don't even have to change your clothes to get 10 minutes of walking in. Yoga similarly might not have that aerobic capacity as a meditative capacity that we know is so important for mood and for brain plasticity. People with lots of meditation experience have enhanced area 10 of your brain, which is right in your prefrontal cortex. What you get with the aerobic part is the release of neuro-growth factors that give you the brain plasticity, that change in the anatomy, physiology and function of the brain. Particularly in my favorite brain area, the hippocampus, that will grow brand new brain cells in your hippocampus critical for long-term memory.

Will you get that with only gentle walking? Maybe not, but guess what? There's power walking, and that gets your heart rate up. It's actually not that hard. You don't have to become a marathon runner to get aerobic activity. You can do power walking to get aerobic activity. Yes, there are differences that we know about, but everything gives you a brain benefit.

Dr. Puterman: I'll add that there was a-- I think it was Singh or someone else who just published a systematic review of meta-analysis over the past year that compared all these different types of forms of movement, dance, yoga, walking, aerobic, resistance training on depressive symptoms, on anxiety disorders, on psychological stress, and everything was effective. Every single one.

Our study in healthcare workers, some of them were given access-- they all had access to either a high-intensity interval training app, which is really just bodyweight training using your own body for moving your body at the intensity that you choose, that you like. The other app was yoga. There was another app that was barre. There was another app that was running.

People had access to all of them. A lot of people just used the yoga app, and there were changes in depressive symptoms, burnout, and absenteeism. At the end of the day, it's choosing the types of activities that you like because you'll only have benefits from physical activity if you do it, and you'll only do it if it's pleasurable, if you enjoy it. If it's not enjoyable, that's when we fall off our "programs". We fall off our desires to move our bodies more.

I think it's really important that people are just choosing activities that they enjoy because all activities of moving our bodies stimulate the neurochemicals, other chemicals that have similar types of impacts in the brain. One might release some type of neurochemical, another one might release another type of neurochemical, but at the end of the day they're still improving mood, still improving cognition, and they're still impacting each other within different lobes of the brain and different areas of the brain.

Dr. Hasson: Eli, what would you say for the people who do not feel better before, during or after exercise? One of the comments in the chat is an individual says, "I never feel good with exercise. I only feel good when I get to cross off that checkmark to say mission accomplished." What would you say to them?

Dr. Puterman: I would say that they are actually getting some benefit from it. If they're saying that there's a mission accomplishment, there's a moment after that they enjoy. It could also be-- there's a really great research highlighting that the pleasure that we experience from exercise is both a result of what the physiological states that are occurring, so the interoceptive cues or the physiological cues that are sending signals to the brain, "This is not right or this is right. This is the right intensity, or this is not the right intensity."

There's also all the cognitive factors that are layered onto it as well. Those cognitive factors are, "I can do this. I have a long history in this. I know this is something I enjoy." It's based on motivation, it's based on habit, it's based on your cardiorespiratory fitness as well. How much you end up enjoying it. These two systems, the cognitive system, the interoceptive physiological systems, they interact with each other to really designate the type of intensity that you enjoy.

I would recommend that it could be that the type of exercise that is being done, the intensity that's being done at is not enjoyable because physiologically or cognitively you're letting yourself think or physiologically feel that this is not the right type of movement that you're doing.

I would say maybe change the intensity, change the type of exercise, because if you're enjoying it and you're still doing it, it means that there's something that you're getting beneficially in your mind from it, and then you just have to tweak the type and the intensity, and then there might actually be in those moments where you're like, "Oh, this is the Zen moment people talk about when they're running." Not everyone gets that runner's high, but if we can release those endocannabinoids and give us that runner high and give that calm state, that is golden.

Dr. Hasson: Awesome. Thank you.

Dr. Stolle: Here's a question I'd like to just toss out to the group. Let's say that I want to maximize the beneficial impact on my brain from exercise. That's my goal. Two questions. Should I do my exercise inside or outside? Second, should I do it alone or with other people?

Dr. Hasson: I'll let Wendy take the first stab at that one.

Dr. Suzuki: Oh, thank you. I would love to answer that. I would say what you should be doing is what is most enjoyable to you. If you like outside, you love the wind in your hair, go outside. If you like inside in a studio with other people, do that. It's really same answer to when should I exercise? A very common question that I get asked. The answer is exercise when you can exercise. Whenever you can fit it in our busy lives is the best time to exercise.

In terms of when can I get the most benefit? One of the studies that I did that I think is so powerful is we looked at mid-fit people. They're already exercising two or three times a week, aerobic exercise two or three times a week. We gave them a choice of exercise as much as you want. Free exercise at this cool club that they were already going to. You can go as much as seven times a week or just stay at two or three times a week. What happened? What cognitive benefits happened?

What we found was essentially every drop of sweat counts for your brain. You exercise a little bit more, you get a little bit more benefits. You exercise a lot more, you got more benefits. That does not say that everybody needs to exercise seven times a week. The takeaway is that every time you are moving your body, you are getting these benefits. Look at your life. Where can you fit it in that it is enjoyable? Including walks with your family, walks with your dog, dancing with your partner, all of these things count. Every drop of sweat counts for your brain.

Dr. Hasson: To piggyback on what Wendy said, the person who asked that question, I wonder if they live in California because in Michigan, we have snow about six months of the year. I would hate to say, yes, we have to get outside to get the benefits of exercise for your brain, because there may be some cusswords flowing out from your mouth as you are walking or running outside in Michigan during those winter months.

There are those diehard individuals that'll get outside, but I think Wendy's is 100% correct, do what you will love to do now. In May, it's wonderful outside. Yes, I could definitely see anecdotally, and the literature shows that walking in nature, nature walks can have an added benefit as opposed to exercising indoors, but moving more is the bottom line. If you take anything from this talk, move more and pick the movements that you like and will do for the rest of your life.

I think exercising with a partner, moving with a partner, it depends. We found in children, they don't like exercising with their siblings. They go too slow. They go too fast. If you ever ran with somebody that runs just a little faster than you. Sometimes that social support is great for accountability, and sometimes it may lower our confidence in our ability because we're exercising with somebody that's maybe a little bit more fit.

Again, to echo what Wendy said and what Eli has said, finding the activities that you love to do, the people you love to do them with, if you like to do them with folks, and then in the spaces that is comfortable and safe for you to do them.

Dr. Puterman: Yes, I think this is amazing because I love where this has gone to where we have really talking about do what you love, and I think that it really speaks to, or can tolerate for now,

more than something that you might not be able to tolerate. I think it's really important because I know when we look at Instagram, we look at Twitter, we're all on the X, we look at all the Facebook, we look at all the social media that we're all on and we're all absorbing, the information that we're seeing with other people is that exercise is required to be CrossFit, exercise is required to be very intense. Exercise is required to be in massive groups. Exercise is in a gym.

We are getting this information that exercise can only happen in particular spaces for the maximal type of benefits physically and psychologically, and if we don't look like the people who are posting all these videos, we are failing at physical activity and moving our bodies. I really want us to step back from that and really block all those types of people on our Instagram feeds and on our social media feeds so that we can start exploring for ourselves what we like.

I know that when I lived in San Francisco, nature was really the best thing that could ever happen for me. I would go for my long runs in the forest. When I'd get on the treadmill somehow running beside other people created this competitive part of me that I hate and I love in myself, and I would like go really intensely and then I'd be too exhausted to continue doing it.

It didn't create the types of sustainability that I needed. Going to the group classes of spin at that gym that I was going to. I went once and I'm like, "I hate group stuff." I know some people love group stuff. Wendy, I know that you have led group classes. I'll come to yours one day, I promise. I might hate it the whole time but not because of you, but I just don't like group activities. I moved into a building now and there's a gym downstairs and very few people are in it, I made sure to start using that. Now I can go very often and I just love it. I'm passionate about it because I have found the right ingredients for me.

Dr. Stolle: I'm super curious to know from any of you, what's your response to this phrase. No pain, no gain. You hear that with exercise all the time.

Dr. Hasson: As a part of the exercise industry, I will take full responsibility for that and apologize on behalf of all people who want to move more and have that-- because that phrase has-- I think the fitness industry, back in the '70s when we were really about fitness and we'd get out there and just burn, that has had some unintended consequences on our perceptions of moving more to where we do have the perceptions that if I am not in pain, then this is not going to benefit me in any health way.

The literature says that that is just simply not true. We know all the way back from 1995 when we first put out the physical activity recommendations, that it's a nice sigmoidal curve in terms of overall health. That the most benefits you get from moving more is from getting off the couch to engaging in brisk walking, and that brisk walking means you can hold a conversation, you might start to perspire a little bit while you're out walking, but that most of that-- If you get up to running, great, there's a little more benefit, but it's not a linear increase.

This is slightly different than the mental health outcomes that we talked about that where you keep doing more, you keep getting better. When we talk about overall health, if we can just get folks to move more, approximately 30 minutes a day, and it doesn't even have to be in a meal, like an exercise meal. You hear the *New York Times* put out many articles around exercise snacks to where we just had these snacks throughout the day, 2 or 3 minutes here, 5 minutes here, 10 minutes here, and you're slowly accumulating these exercise snack throughout the day. We know that that is just as beneficial as if you do it in one chunk.

Depending on what outcome you're looking at, so for individuals trying to manage their glucose levels, so individuals with diabetes, we actually know those intermittent activities throughout the day can help with glucose management to a better extent than doing it in a continuous one block. I don't remember the question, but I do remember that the answer. [crosstalk]

Dr. Suzuki: No pain, no gain.

Dr. Hasson: Yes, no pain, no gain. Release yourself, free yourself from the philosophy that you have to hurt in order to gain benefits. That we know that you do not have to hurt and actually what Eli and Wendy have said, you actually want to feel good. If you feel good, that's where the benefits are coming from. If you don't feel good, then keep searching for that wonderful exercise or that movement, or that physical activity that does make you feel good and clinging to it.

Dr. Suzuki: Can I jump onto the walking part? We keep coming back to walking, and I want to use that to answer one of the questions in the Q&A about what about older people. How can we address movement in older people? This is one of my favorite studies done in people that are over 65. They looked at their frequency of walking, how many walks did they take? They were more meal walks and not snack walks, but how many walks did you take during the week?

They looked at the relationship between that and how many years from the start of the study after which did they develop dementia. If these people over 65 move their body, took the walks three times a week or more, they were 30% less likely to develop dementia in that next six years. 30% less likely with just walking three times a week. Can most of us do that? Yes, we can.

For this reason, I like to call movement, walking in particular, a supercharged 401(k) for your brain. Every single time you do it, you are giving yourself that protection. You are not necessarily rolling the clock back or curing Alzheimer's disease, if you might have that in your genetic background as I do, but what you're doing is you are building up the parts of the brain that are very susceptible to aging and dementia.

Those two parts, I mentioned one before the hippocampus, critical for our ability to learn and retain new long-term memories for facts and events, and the prefrontal cortex. Did you know with regular exercise, particularly the aerobic kind, you get what I like to call a big fat fluffy hippocampus and prefrontal cortex? Imagine doing that your whole lifetime. You have these ginormous, okay, I'm exaggerating a little bit, ginormous hippocampus prefrontal cortex. It takes so much longer for the disease or for aging to damage these areas enough, so you start seeing those cognitive impairments.

Exercise is-- can I say it's even more important for us as we age? It's important for us at every single age, I know all of us would agree with that, but so important for the aging population.

Dr. Hasson: Yes. If I can add too, now that we're on the topic of aging populations, I work with colleagues here, also focus on hand function and fine motor skills. Did you know that in the United States, 30% of our older populations have impairments in their hand? Thinking about how do we continue to exercise our hands is also very important because as everybody knows, hand function is really important for activities of daily living and independence. It can be task as simple as gardening, knitting, sewing and even playing Connect 4. Doing these fine motor skills so whole body is great, but don't forget about the hands. Hands is important for cooking. Somebody in the chat said that they do a lot of movement and cooking in their kitchen and so they're getting their movement that way, but you need your hands to be able to cut. Let us also think about whole body movements, but also tailored movements for our hands to enhance those fine motor skills.

Dr. Stolle: I'm sold. Exercise is great. Maybe it's just the people I know, but I think most of the people I know if I said to them, "Exercise is great," they'd shake their head and say, "Yes, exercise is great. We agree with that." We seem to have though this issue where people say that but then they don't do it. It seems to be this intractable problem that has existed for a very long time.

No matter how much the benefits of exercise are touted, no matter how much people agree that it's a good idea and even claim that they want to do it, they don't actually do it. Does the psychological science, the behavioral science have anything to say about that? Why is that happening, and is there any solution?

Dr. Puterman: If people don't mind me jumping in, this is a societal issue as well. This is an issue where we have layers from the individual responsibility all the way to how society structures our days. With a structured day of 9:00 to 5:00 and children drop off at school and then the activities for your children at the end of the day, or just even having to prepare food at the end of the day, and some people have to have two jobs, it becomes really a burden or a question of time.

I think what we can dispel here, and I think what we are trying to dispel here is this question of time should be something where we're not thinking about it that we need to move our bodies for three hours per day. It's something that we could do for five minutes here, five minutes there, five minutes another time during the day and then five minutes again. Somehow, we have 20 minutes, right?

If you look at the literature, 75 minutes a day reduces depressive symptoms in the future by 18%. That's huge. That's a 20% reduction just with 75 minutes in a week, sorry not in a day. 75 minutes in a week will reduce. That's 10 minutes a day. 10 minutes a day of moving our bodies with a little bit of sweat. I really think that society needs to be restructured. Again, I'm not here to restructure society. None of us have those solutions just yet, but we can help people restructure their conceptualization of moving their bodies within their particular days.

I think that's the key here. The individuals who say, "I have no time." The individuals who say what does time mean to them in terms of their-- what does exercise mean to them, and how can they make it fit their concept of time? I think that is just a major key that we need to be addressing. I'm sure I have some other ideas. We've talked about finding something that you like that will be something that is more motivating.

I personally think as much as we put into our calendar meetings, we need to put into our calendar movement experience. That doesn't mean that it has to be a 30-minute movement experience. Just make sure that meeting one ends at 1:00 and meeting two starts at 1:10, 1:15 so you can leave the house, leave your office for even a 5, 10-minute walk. I think those are some key little switches that people can do to start just getting those 5, 10 minutes into their schedule on a daily basis. Anyone want to add to that?

Dr. Hasson: Yes, in addition to individual changes, I'd also like to argue that our environment has changed significantly in the last 50 to 70 years. Nike put out a wonderful report back in 2012 showing that the shifts in physical activity are mainly what-- while we're mostly talking about leisure time physical activity, most of the shift in movement has come from taking out physical activity in our household activities, taking out physical activity in our transportation. Most people used to use public transportation or would walk to school or walk to work, and taking out physical activity out of our occupation to where we moved more on the job.

Our solution has been not to re-engineer physical activity back into those spaces, it's to tell individuals you're now responsible for your physical activity, at least in the United States. I do think that we need more policy change and environmental change to support and make that choice to move, as Eli was talking about, an easier choice. For instance, in the children's world, there's many bills being passed around the United States that focuses on mandating recess.

In California, they have mandated physical education, and providing those-- we're trying to integrate making physical activity in the classroom an easier choice. As Eli talked about with workplace wellness, can they mandate breaks and computer shuts up? I know there might be some CEOs on this call, but the data shows that the cost of exercising, that investment in time and the rewards that you're going to get in productivity, absenteeism, presenteeism, all of those things that employers are looking for it is well worth the investment. I think it's in addition to providing supports and enjoyable activities for people to do, we also need systems change to make that possible for everyone.

Dr. Suzuki: I'll just add one more idea. I think everything that Rebecca and Eli has said are spot on. I have one additional interpretation of the question you posed to us Dennis, which is, "I have no time to exercise. What would happen?" So many people have come up to me sheepishly as like, "Oh, you're an exercise expert. I don't exercise enough, I only walk." Again, "You walk? That is part of exercise."

I agree that physical activity we know from all the stats have gone down. There's still walking necessary. I happen to live in New York City, so we're lucky that you must walk in New York City. There's also ways to add into that normal-- We are not stationary every day. I always use example of going to Costco. Can you take two more laps around all of Costco? Okay, don't eat all the samples, but take two more laps. That's a huge benefit for your physical activity. Are you doing that?

Can you park farther away from the front of the store? You're adding a little bit just in that little act as well. Even without thinking about, "Oh, where can I add in my 10 or 15 minutes?" There are smart ways to add in more movement to your lives so that maybe you are moving more than you realize you are.

Dr. Stolle: If I'm going to exercise to get physically healthy, there are metrics I know about that I can look at. I can weigh myself on the scale. Am I making progress? I can look at myself in the mirror. I can measure my biceps. There's all kinds of things I could do. If I'm going to exercise to get mentally healthy, I have no idea what my hippocampus looks like. Is there is there any way for me to know whether it is working, or these things that can only be measured with scientific equipment in a laboratory somewhere?

Dr. Puterman: Go ahead, Wendy. No, please.

Dr. Hasson: That's all you, Wendy.

Dr. Suzuki: I just have to jump in and say yes. I'm sorry, I cannot measure my own hippocampus or yours in a way. What I can do and every single person on this call can do, I can ask myself, "Do I feel good? Is this feeling good?" Including after the workout that you didn't like very much, because that's when the benefit comes. We all have this internal monitor.

How are we feeling?

We know as neuroscientists and psychologists that dopamine and serotonin and noradrenaline are going up when you are moving your body, when you are walking, can you feel that? By the way, dopamine, serotonin, noradrenaline, that's what's in the antidepressants that they give people with depression. Get attuned to that. That is how you know whether that spin class that Eli hates-- I love spin. Eli hates it. I love it but I know I love it and he knows he hates it. That is my simple answer that goes for everybody.

Dr. Puterman: I was going to say the exact same answer but not as well spoken in terms of does it feel good? Let's say if you're a cognitive behavioral therapist and prior to someone entering an anxious state or entering something that they are in fear of, they have to rate how scary is this? At the end of it, they were like how scary was it? Was it as bad as you assumed it would be? I think that is similar with physical activity. It's like how stressed are you right now? How unhappy are you right now or how happy are you? How calm are you right now?

At the end of the event, people can record on their own scale of 1 to 10 and start tracking to see that they are actually seeing some benefit from it. I think if you have a lot of experience with tracking your own mind and understanding yourself, then you can just be like, "Oh, I feel good right now," or at the end of the day, you say, "Oh, that was a really good day probably because I exercised."

Sometimes we need that evidence and if people need that evidence, they should start recording it. If they went for a walk, do they feel calmer coming back into their office so that they can start seeing the accumulation of the evidence that even 10 minutes or 5 minutes really helped them? I think that might be a good way of starting to realize. At the end of it, I liked that you called it the, what was it, the exercise snack? Was it the exercise snack you called it, Rebecca?

Dr. Hasson: Yes.

Dr. Puterman: I love that because I also call it savoring. The same way you have a snack, you also have to savor that snack. You have to really think like, "Wow." At the end of the bout, think, "Wow, that was really good. I feel much calmer," and savor that experience because it's that savoring, that emotional recall that helps a future engagement saying "Oh, I don't want to do this right now. Wait, but last time I really enjoyed it." The reason you remember really enjoying it is because you did savor it. You did make effort to think, "Did I feel good from this?"

Dr. Hasson: Yes. We've actually incorporated that into our exercise videos on our website that you do at home. After the video plays, it asks the children how do they feel of it so then they can start to monitor and just bringing their feelings, how they're feeling after exercise, making it salient, so again, they'll be more likely to do it again or if they didn't feel well, they choose another video.

Dr. Puterman: I noticed that there's just one question that I want to say that-- someone said that they haven't seen recommendations for exercise for psychological outcomes, only for physical outcomes like the ACSM guidelines and so on. There is actually one by the Canadian Network for Mood and Anxiety Treatments that actually has specifically for depressive symptoms that was published in 2016 of how many minutes per week is recommended for reducing depressive symptoms, depending on is it mild, moderate, or severe depressive symptoms.

Really, this report highlights that at mild to moderate depressive symptoms exercise is a frontline first go-to. It's not an adjunct therapy to pharmaceuticals or CBT. It could be a standalone treatment for mental health at the mild to moderate levels. I will make sure that I add that to the references that are provided for people.

Dr. Suzuki: I'll add one more reference that I saw in the Q&A. Somebody asked me for the reference for area 10 getting bigger with meditation. I highly recommend a wonderful scientific American article written by Richard Davidson and Matthieu Ricard about-- I think it's called *The Science of Meditation*. Beautiful explanation of what happens in the brain with long-term meditation. I'll put that in the references along with Eli's as well.

Dr. Stolle: Great. Thank you. These comments are a perfect segue to a question that I want to pose to all of you to wrap us up. We have the benefit here of having an audience that includes maybe just some people who want to get healthy and also a lot of people who are themselves behavioral scientists, or who are aspiring behavioral scientists. The question I want to pose and I'm curious to hear from each of you to wrap us up is, what in your judgment is the single most important problem that behavioral science needs to tackle and solve within the next five years or so with regard to exercise and mental wellbeing? What's that unanswered question that we really need to get answered?

Dr. Hasson: From a research standpoint?

Dr. Stolle: From a research standpoint.

Dr. Hasson: Wendy, I saw your hand up.

Dr. Suzuki: Yes. Well, I'm going to give the answer of the question that I want to most answer, which is what is that really detailed exercise prescription? How many times a week for your heart? How many times a week for your cardiovascular system? Well, that's part of the heart. How many times a week for good mental health? We have so many kids and adults suffering from anxiety and depression. How much, how long, what kind do I need to address that specifically?

I know, I'm going to speak for all of us, we can't say that-- I can tell you that 10 minutes will help not clinically depressed people, but general people, that will decrease their anxiety and depression. What about mild cognitive impairment? What do I need to do if I have a level of mild cognitive impairment? What if I am in my 40s, I want to be maximizing my work, how do I maximize all that big fat fluffy brain stuff that I was talking about so it works for me? We can all say exercise more, I cannot say how much or specifically what kind for you. That's what I would like to be able to tell.

Dr. Hasson: One phrase, I'll make it one minute so Eli can have the last two, is that the phrase that I do love is just do it. We don't know all of the details about exercise, but we do know if you move more, you will feel better. I may work in the health equity implementation science world, particularly with kids, and so the research questions I'm interested in is how do we provide equitable opportunities for everyone to be able to move more so they can feel better?

A recent report came out in JAMA, that cost effectiveness analysis that at least in the United States, \$15.6 billion dollars could be saved if we close the gap in physical activity disparities. While this is an individual health problem dilemma that not everybody is moving more, it's also a societal problem and it's costing us money. I'd like to call myself the father from *My Big Fat Greek Wedding* who goes spraying Windex on everything. I like to spray physical activity on everything because I think it will help to be a part of the solution to many societal problems that we have.

Dr. Puterman: I'll just build on what Rebecca is saying because I do think that it will solve some problems, some economics, some social and psychological problems. I also think that what we need to do is start targeting the groups and working with the groups that are having a harder time

being physically active. Whether it's environmental, social, psychological reasons, and really, we need to start target and work with communities in order to properly develop the types of programs.

I think Rebecca is doing this so beautifully within the school system. We need to really target what are people wanting within their groups and within their own lives so that they can enjoy it more and do it more. The more we can layer in enjoyment, the more we can layer in what people actually want and discover some of these kind of scientific components to it, then we're able to really make advances the way that we're hoping that our fields can advance.

Dr. Stolle: Great. Thank you. I could do this for another hour or two, but we're at time. I first want to thank our expert panelists so much for participating today, and even more I want to thank all of the folks who are in the audience. We got so many great questions in the chat. I hope that you enjoyed today's discussion. You're going to receive a one-minute survey to complete after this broadcast, and we'd love to get your feedback, so please do that.

We'd also like to hear from you on other topics that you would like us to cover in the future. You can email us at science@apa.org with recommendations. We invite you to subscribe to *Science Spotlight*, which can be your source for the most relevant news and information about new psychological science that is coming out. We hope to see you at future events. Thanks again for sharing your feedback on our survey and for being here, and listening, and providing questions today. Thank you.