



A new, better you: Exercise for mental health

Science is now uncovering the myriad ways that exercise impacts the brain. For less stress, improved cognition and a “feel-better” effect, there’s nothing quite like movement to boost mental health.

Materials contained within this podcast are copyrighted property of The Ohio State University.

Robin Chenoweth: I inherited my dad’s bad knees, so running is out of the question. But to demonstrate the impact that exercise can have on mental health and cognition, let’s take a brisk walk around Ohio State University’s Columbus campus. Grab your headphones. Let’s go. It’s cold outside — about 38 degrees. And windy. It’s definitely more comfortable inside our studio. But as soon as we overcome inertia and stand up, says Carmen Swain, clinical associate professor of kinesiology in the College of Education and Human Ecology, our bodies change.

Carmen Swain: Just by getting up out of the chair and walking around, you're elevating your heart rate response. That is good for you.

Robin Chenoweth: We’re rounding the corner by the new Arts Complex on College Avenue. Picking up the pace, we skirt by some impressive landscaping. Dart through the crosswalk, coming beneath the oaks, walnuts, maples and sweet gums onto the Oval. The body is warming up as oxygen and nutrients are being delivered to the brain and other organs. I’m not cold anymore. Midway across the Oval, a student walks toward us. Her name is Megan Fahrenkamp.

Robin Chenoweth: Do you exercise and why?

Megan Fahrenkamp: So, sometimes, I definitely use it as a break from classwork and like, extracurricular activities. So just kind of like as a mental break. When you start breaking a sweat or like breathing heavier, like you could just feel in the moment of whatever exercise you're doing. And so, I think like I just feel happier and like more accomplished and definitely just leaves you feeling good.

Robin Chenoweth: That might be because about 20 minutes into exercise, the body bumps up production of stress-relieving endorphins. Which will happen to us if we keep walking. Close to the Thompson statue, we meet third-year student, Kyle Heppler.

Kyle Heppler: I'm actually just coming from the gym.

Robin Chenoweth: Why do you do it?

Kyle Heppler: To get my mind off things, for the most part. Like, school can be really like, stressful sometimes, and life can be stressful. But the gym is just like a coping mechanism for me. And just going to the gym makes me feel better and gets my day going and makes me more productive.

Robin Chenoweth: Kyle's not wrong. Research, even at Ohio State, has shown associations between exercise and synaptic plasticity, which affects cognition or brain functioning, as well as psychological well-being. Exercise is proven to have an energizing effect that combats feelings of fatigue. And studies show that exercise increases production of monoamine neurotransmitters in the brain, which can mimic the effects of certain antidepressant drugs. So, if you continue walking while I talk to experts in Ohio State's kinesiology program, you will likely feel the affect, too.

Carmen Swain: A lot of times people think about the power of movement, and they think about I want to do that because I want to lose weight, or it will improve my heart health. But I really think that the most powerful impact that exercise can have, is on the brain.

Robin Chenoweth: In this episode of the Ohio State University Inspire Podcast, we talk about another reason for you to stick to your goal to exercise more. Do it to get in shape, yes, but consider, too, the remarkable benefits exercise has for your mental well-being and cognitive health. And don't worry, our experts will give tips on how to make it happen. I'm Robin Chenoweth. Carol Delgrosso is our audio engineer. Inspire is a production of the College of Education and Human Ecology. Carmen Swain researches optimizing athletic performance and promoting physical activity to improve public health and prevent disease. Though she teaches graduate students, she recently created a general education course, Movement is Medicine, Your Prescription for Health.

Robin Chenoweth: It feels to me like the whole concept of like putting on exercise clothes and shoes and then concentrating for a certain amount of time on exercise is pretty new, evolutionary-wise, in human beings' experience.

Carmen Swain: In evolutionary history, we had to move to survive. We had to go out and hunt for food. We had to find shelter. We had to find a way to escape a predator. We also had to remember the best way back, like there was no such thing as Google Maps. And, so, we had to use our brains to survive. And movement is a really powerful signal to the brain that something important is happening. And nowadays, we don't have to move for survival so much. And

oftentimes we find ourselves sitting on the couch. And when we sit on the couch, the signal that is sent to our brain is, it's time to relax. And so, this, this isn't really that great, because exercise is a stimulator in our brain for the reward system in the brain. And this is responsible for motivation, and for action. ... And a hormone that's a real key player in motivation and action in our brain is called dopamine. So, when we move, dopamine is released. And this is a hormone, and it's also a neurotransmitter, and it's what motivates us to action. And it is released when our brain expects some sort of reward from what we're doing. It motivates us and it reassures us that the thing that we're doing is worth doing.

Robin Chenoweth: Some studies suggest that the more you like the exercise you are doing, the more dopamine is released, and the more rewarding the exercise is. That's important to keep in mind when choosing the kind of exercise you do. But the thing is, if you don't get up, and don't stop watching the social media reels — which might give you a tiny dopamine hit but not on the level that exercise does — you can't realize the full effect.

Carmen Swain: So, if we're not moving, and our reward system isn't working so properly, it's not being stimulated, then, we're not getting as much of a dopamine release.

Robin Chenoweth: Another neurotransmitter released during exercise is serotonin, a natural chemical that plays a key role in setting your mood. I asked Brian Focht, a professor of kinesiology and director of Ohio State's Exercise and Behavioral Medicine Lab, about dopamine and serotonin, which are, in scientific parlance, monoamines.

Brian Focht: Monoamines are neurotransmitters that one of their primary functions in the brain is to transmit signals from one neuron to the other in the nervous system. ... Exercise has been shown to increase the synthesis of monoamines and the sensitivity of monoamine receptors or uptake in the brain, which actually mimics what several classes of very frequently used medications do. For example, the whole selective what are called the SSRIs — selective serotonin reuptake inhibitors, which have been used for treating depression, for treating anxiety — exercise appears to have an effect that mimics at least some of what that therapeutic effect of those medications is.

Robin Chenoweth: That's not to say that we know everything about how dopamine and serotonin work, Dr. Focht warns.

Brian Focht: Monoamines do a lot of things. We don't want to be too reductionistic with it.

Robin Chenoweth: But other research points to positive effects of exercise on depression. A study published in the *American Journal of Psychiatry*, which didn't measure for serotonin, determined that among almost 34,000 adults it studied, "12% of future cases of depression could have been prevented if all participants had engaged in at least one hour of physical activity each week." Other studies are beginning to unfold why. Not surprisingly, exercise has also been associated with reducing stress.

Carmen Swain: So even though we don't have to move to survive, something important to keep in mind is that, even though it's not so important for survival anymore, what we do have in our current lifestyle is stress. We have so much stress, right? And recent surveys have suggested that we have higher stress levels than ever. And what we know is that movement helps alleviate stress.

Robin Chenoweth: Do we know why?

Carmen Swain: It's complicated. It's not a one-shot answer. So yes, dopamine is related to the reward center. One of the things is this release in these neurochemical serotonin and dopamine that make us feel motivated and to take action. But another reason why we feel a reduction in stress is that when we move, we increase our blood flow to the heart and to the brain. And we get our heart pumping, and we increase our cardiorespiratory fitness. And what this does acutely is that this drives up what's known as our sympathetic response. And acutely while you're exercising, you can feel that — I'm a little bit short of breath maybe and my heart rate is beating faster.

Robin Chenoweth: If you're still walking as you listen, you probably are feeling this. But some of the really good brain benefits are yet to come.

Carmen Swain: Once we're done with the exercise, what happens then? Well, if you're doing hard exercise, as soon as you stop, you can feel your heart rate slowing down, right? And your breath, it goes back to normal really pretty quickly. And so what we call that is a release of the sympathetic response. It starts to go down because we're not exercising hard anymore. But what ramps up is called the parasympathetic response. And this is one of the things that helps us to feel more relaxed and less stress throughout the day. And your blood pressure, if you're a person that has like a higher blood pressure, it goes lower. ... It's rather complicated. Our physiology has changed. The person inside you — all of the hormones, the muscles, the things that keep you alive, our complex human body — is altered as a result of exercise. And it's a new and improved you as a result.

Robin Chenoweth: Some call this the “feel-better” phenomenon. It's been widely studied. Not everybody feels it during exercise, Dr. Focht points out, because running, high intensity workouts and that yoga dancer pose can be difficult, and even painful. The effect most often kicks in post exercise. And it can be powerful.

Brian Focht: We have some correlational data that would suggest that individuals who are feeling better, are more likely to adhere to activity. So this could be actually a very powerful intervention tool to use, is if we're able to help individuals choose the types of activity the demand of the activity, the intensity, those kinds of things that that they find tolerable, but also leads them to have a pleasant experience and positive, that could actually be a particularly valuable part of promoting more activity or longer or better adherence patterns.

Robin Chenoweth: So, key point here. When talking about gaining psychological benefits from exercise, especially over time, the type you choose really counts because you have to like what you are doing, and feel as though you can accomplish it, enough to continue doing the exercise. The actual type of exercise might matter less than the fact that you are just doing it.

Brian Focht: The first decade or so of my career, I was very much focused on what we would call acute exercise, so single bouts of exercise, and how did that affect various kinds of psychological states? ... I had a very strong interest in strength training and resistance exercise. ... What's really kind of emerged across the last 20 years is, there's a wide variety of modes of activity that can lead to the quote-unquote, "feeling better phenomenon," whether it's resistance exercise, whether it's what we might consider alternative forms of activity, like yoga, or tai chi. There's, you know, potentially a wide array of forms of exercise that can help individuals manage stress-related emotions, or manage stress, that there seems to be a wide array of types of activity that can confer some benefit.

Robin Chenoweth: Carmen Swain.

Carmen Swain: One of the most underrated exercises, is walking. Walking is fantastic. It has so many benefits. We talked about evolutionary history. What did our ancestors do? They walked.

Robin Chenoweth: They walked, everywhere.

Carmen Swain: Yeah. And even if we think about 50 years ago, when I think about my parents and my grandparents, they walked so much more than us. And if you look back at the pictures of the people that lived before you, like your parents, your great grandparents, you're like, if you look at them, they look so healthy. And a large part of that is because they walked a lot. Walking is powerful. And it's amazing. And there are so many health benefits from benefits from it. That's a great place to start.

Robin Chenoweth: But wait. There are more mind-body benefits, says Dr. Focht.

Brian Focht: People's feelings of energy and fatigue, are very, very powerfully impacted by exercise.

Robin Chenoweth: In what ways?

Brian Focht: It's to some degree maybe even a bit counterintuitive, because exercise can be demanding and quote, unquote, fatiguing. But at the same time, one of the most robust findings we see is that people feel energized by activity. So even if it is demanding or intense, you can actually see reductions in fatigue, increases in perceptions of energy, and that that alone can be a pretty, pretty pleasant or powerful psychological benefit of activity.

Robin Chenoweth: People with health challenges can benefit, too. Dr. Focht participated in a study by the College of Medicine's Steve Clinton, using diet and exercise to help prostate cancer

patients whose treatment had created side-effects of fatigue, muscle loss and diminished quality of life.

Brian Focht: We did a very short-term intervention, it was only eight to 12 weeks in length total but saw profound changes in patients' physical functioning. ... So, their ability to walk, their ability to climb stairs, muscular strength improved, and then an array of more of these kind of quality of life or psychological well-being measures also improved, as well as social cognitive measures. Across the 20-some odd years that I've been doing that work, that was actually some of the greatest magnitude of change in that short of a period of time than I'd ever observed.

Robin Chenoweth: So, are you keeping a tally? In addition to all the other benefits we often hear about, exercise releases endorphins, feel-good hormones, into the body. It also releases chemicals like dopamine, which gives you purpose, and serotonin, which improves your mood and sleep. Research suggests that these mimic the effect that certain antidepressant drugs have on receptors in the brain. There is robust evidence that exercise reduces feelings of fatigue. And, post-exercise, a parasympathetic response kicks in that can help you feel less stressed. Remember Kyle, on the Oval? He said that he carries the mental health effects of his exercise throughout his day. That kind of benefit is acute, or short term. But there are longer term benefits as well.

Kyle Heppler: At the end of the first semester, I broke my finger, so I couldn't go to the gym. So with finals were a little rough, because I couldn't go to the gym as often and I couldn't exercise. So that really took a toll on me. But now that I got cleared, it's been a lot better and my mental health has been a lot better and I've been able to be more productive.

Robin Chenoweth: Do you think it affects your ability, cognitively, to think better and to perform better at your academics after you have exercised?

Kyle Heppler: I didn't really work out my freshman year. I'm a junior now. And my grades weren't as good freshman year as they are now. And like, I just think it's because I exercise more. I keep my body better, keep my mind better. So, definitely, working out and exercising has helped out a lot with my cognitive ability and being able to perform better in school.

Robin Chenoweth: Research on Brain Derived Neurotrophic Factor, BDNF for short, might point to at least some reasons why. Some of these studies have been done at Ohio State. High levels of this molecule have been found in the hippocampus, amygdala, cerebellum and cerebral cortex. Studies indicate that [exercise might improve memory](#) by increasing BDNF, helping form new synapses in the brain that mediate learning and memory. That, in turn, makes it easier to absorb information and form long-term memories, which can help students like Kyle to perform better academically. Brian Focht.

Brian Focht: There's a fairly robust literature showing that exercise in aging individuals, older adults, is associated with better cognitive function. There's some very positive results there. But another area where I think you're seeing a lot of emerging research is also in children and

adolescents. Same kinds of things in that we're seeing, some plasticity occurring and also some, actually, interestingly, changes in improvements in academic performance and outcomes with exercise and physical activity.

Robin Chenoweth: Carmen Swain.

Carmen Swain: There was an interesting case study done in Naperville...

Robin Chenoweth: Naperville, Illinois, outside of Chicago. Twenty years ago, the district was struggling with test scores — especially in reading. Inspired by a Harvard professor of psychiatry who promoted the positive effects of exercise on brain functioning, they made (pause) a change.

Carmen Swain: That implemented PE classes prior to the school day. ... And it wasn't that much. It was run a mile before school. ... And what they found was that test scores in these children in the schools skyrocketed, standardized test scores, were so improved that this became a new way for the school system. And there's been other school systems that have mimicked this, that they implement this. ... And when they did this consistently, they had so many positive effects, not only in improved test scores, but one school reported that they hadn't had a fight in their middle school for multiple years, after a result of implementing this program.

Robin Chenoweth: Improves behavior, too.

Carmen Swain: Yeah, it makes you feel better. ... And we know that, when we exercise, even for just like a period of 20 to 40 minutes, that we can find an increase in this BDNF in our bloodstream by about 32%. And so, what this BDNF does is that it helps preserve the neurons that are in our brain. And it also helps create those new pathways to help us rewire the brain. It helps neurogenesis, to have new neurons in our brains.

Robin Chenoweth: Speaking of rewiring the brain, you might feel that you need to rewire yours in order to stick to an exercise routine. That's exactly what you need to do, current science says. But it can be easier than you think. We asked students what keeps them from exercising.

Connor Wayrick: I think just laziness mostly. And just a weird schedule sometimes. Like, just like, The lack of consistency makes it hard, like to find, like a good schedule to go work out.

Suma Narra: I'm quite a bit lazy, first thing. So yeah. And the others as well, my schedules are quite tight. I got to attend my university every day, all the five days in a week. And I'm also working as a part time. So, all the things, it's just like a messy day. So, I don't really get to exercise.

Robin Chenoweth: Brian Focht.

Brian Focht: Lack of time, whether it's a real or imagined barrier, is something that the large majority of individuals who struggle with being regularly physically active or exercising regularly tend to cite as their number one. ... We focus a lot on this idea of self-regulation. You really do have to be very intentional and planning out exercise and setting goals and planning to overcome the barriers that you experience. ... Small changes add up and truly making more modest, gradual changes, and doing them in a systematic structured way, where you're focusing your goals on the process of what you're doing, less on the outcome of what you're doing. By meeting short-term, process-related goals, ultimately stringing those together leads to the long-term outcome goals.

Robin Chenoweth: Carmen Swain.

Carmen Swain: The number one New Year's resolution is, I want to exercise more. But most often this fails. And the reason being is that people often will think back to a time in their life where they were active. ... They think about previous them. And they said, "I want to do that," and they try to do too much, too soon. Or they get really motivated because they see somebody on an app or somebody on a YouTube video and they want to keep track with that. They think they should be able to. But that's not the ideal way to do it.

Robin Chenoweth: Research has consistently shown a better way.

Carmen Swain: The very best way is to start very small. You can't start too small. Because what our brain really likes, is when we have achievement, when we make successes. ... And so, if you do something really small on the first day, like, "I'm going to get up from my chair at lunchtime, instead of just sitting at my desk all day, I'm going to take a five-minute walk." And then the next day, you say, "Okay, I'm going to do a six-minute walk."

Robin Chenoweth: (Laughs)

Carmen Swain: It might sound really small to you, but those minutes add up really fast. And that is what is most effective in creating sustained change. Extremely small baby steps.

Robin Chenoweth: Okay. So, you don't overwhelm yourself and then fail. Because I think the failure is probably...that's what sends people right back to the couch, right?

Carmen Swain: Well, it is. And it's this, this feeling of defeat. And it's...what's happening is that, you're not getting better at exercise by going from a five minute walk to a six minute walk. What you're doing is, that you're creating a neural pathway in your brain. This neural pathway is a connection that says, "Okay, it's time to exercise. I did that yesterday. I was successful at five minutes." And then, "I was successful at six minutes." And this neural pathway becomes more of, instead of tiny little road in your brain, it becomes a, a major pathway. It becomes more of like a highway. The more you do it, the more you train your brain to like that you've made a success. And your brain likes success. And so, you're training your brain to become an exerciser more so than your body.

Robin Chenoweth: It's fitting that you can train your brain to make exercise routine, at the very same time you exercise to help your brain function better and feel better, in concert with a healthier body.

Robin Chenoweth: You've recently created a class a GE class, right, that addresses a lot of the things we're talking about here.

Carmen Swain: Movement is medicine, your prescription for health. ... I love to teach exercise physiology to exercise physiology students. But throughout my life exercise has been so important to me personally, that it's really important to share this information with people other than just exercise physiology students. And it became kind of a dream of mine that I would create this course that would be available to all the students at Ohio State. And I want people to know about the power of movement and how impactful it can be in their life. ... And so I teach this class, to not only talk about the physical impacts that exercise can have on us, but also how it can help our mental well-being. ... I love this stuff. I could talk about all day. I do it professionally and I love it. But I think the thing that makes us really passionate and really love something so much is when something affects us personally, right? When it impacts our own life. ... I don't know if this is really appropriate time to tell a little story but...

Robin Chenoweth: It's always an appropriate time.

Carmen Swain: I have a son, uh, multiple sons. But one of them, one of ... my oldest son, ~~was~~ when he was young, even very little. He was kind of sad and not super happy. And I didn't understand why because he was so loved. ... I had him tested for different things. And all these tests came back that my son had severe depression. And I was shocked. How could this be this small child of mine, like my firstborn son, like, we love him so much, how can he be depressed? I took him to cognitive behavioral therapy. So I'll try it. And we did everything. My husband was a professional cyclist, he's a professional athlete, and I'm an exercise physiologist. So, exercise is really important to both of us.

Robin Chenoweth: When she read about the Naperville School case, she knew what she had to do.

Carmen Swain: And I thought, I'm gonna, I'm gonna run Gavin. ... So, I said, I'm going to have my son run. And so, he started running in the morning. And he loved it so much that he wouldn't complain. He's in third grade. He didn't...would not complain about getting up and running at 6:30 in the morning, before school, and he, like, requested to do it. And it made him feel so much better. And my son was severely depressed. He is not depressed. And he loves running.

Robin Chenoweth: Does he run every day?

Carmen Swain: He runs every day.

Robin Chenoweth: If you continued to walk, run or otherwise exercise with us, congratulations. You have earned yourself a boost of dopamine and serotonin, not to mention brain derived neurotrophic factor. Enjoy your exercise-induced euphoria. To learn more tips on how you can successfully exercise to improve your physical health and mental well-being, see the link in our episode notes.

©2024 The Ohio State University