

UC SANTA BARBARA

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## Change by the Bundle

Let's say you've decided to make some changes in your life. You're out of shape, your mind wanders, your self-esteem is wavering, and you have no idea what you just read. So you decide to focus on one thing — losing weight, maybe — and tackle the other issues later. You don't want to take on too much at once, right?

A new paper by researchers at UC Santa Barbara, however, suggests you're selling yourself short. [“Pushing the Limits: Cognitive, Affective & Neural Plasticity Revealed by an Intensive Multifaceted Intervention,”](#) published this week in *Frontiers in Human Neuroscience*, strongly suggests that we have seriously underestimated our ability to change our lives for the better.

[Michael Mrazek](#), director of research at UCSB's Center for Mindfulness & Human Potential and lead author of the paper, said the six-week study from which the paper is drawn demonstrates that simultaneous, significant improvement across a broad range of mental and physical functions is possible. Participants in the intervention all showed dramatic improvements in more than a dozen different outcomes, including strength, endurance, flexibility, working memory, standardized test performance, focus, mood, self-esteem, mindfulness and life satisfaction.

“Part of what distinguishes this work is finding such broad improvements across so many different domains, particularly given that the effect sizes were so large,” Mrazek explained. Large effect sizes signify that the results were not only statistically significant but also indicative of substantial changes. “Many of these effects were very large — larger than you tend to find in studies that focus on

changing only one thing.”

In the study, 31 college students were recruited for an intensive lifestyle change program; 15 participated in the intervention and 16 were in the waitlist control group. Those in the intervention put in five hours a day each weekday for six weeks. They did 2.5 hours of physical exercise (including yoga and Pilates), one hour of mindfulness practice and 1.5 hours of lecture or discussion on topics such as sleep, nutrition, exercise, mindfulness, compassion, relationships or well being. They were advised to limit alcohol consumption to one drink a day, eat a diet of mostly whole foods and sleep 8-10 hours a day.

Throughout the study, the participants were tested on a variety of factors, including physical fitness, cholesterol and triglyceride levels, working memory capacity, reading comprehension and more. They also underwent magnetic resonance imaging (MRI) of their brains to examine areas known to be associated with a range of cognitive functions.

“The neuroimaging findings help us understand and contextualize the other significant results,” Mrazek explained. “For instance, participants made dramatic improvements in their mindfulness, their reading comprehension, their working memory capacity. So we look to the neuroimaging data to understand what’s happening in the communication between brain networks that’s allowing for these changes.”

Overall, the results were clear and striking, Mrazek said. Even six weeks after the intervention, participants continued to show improvement in all areas. “We predicted that the intervention would lead to substantial improvements in health, cognitive abilities and well-being, but we didn’t know how long they would last. It seemed possible that some of the benefits wouldn’t extend beyond the training. So I was surprised that even without any contact and support, participants maintained significant improvements at the six-week follow up.”

Determining exactly why all these changes were possible will require future study, Mrazek noted, but he suspects that a comprehensive approach allows each area of improvement to reinforce the others. “Recent research suggests it’s often more effective to make two or more changes simultaneously, especially when those changes reinforce one another. It’s easier to drink less coffee if at the same time you get more sleep. Our intervention extended this logic by helping people make

progress in many ways, which can create an upward spiral where one success supports the next," he said.

Mrazek said conventional thinking about changing one's behavior focuses on working on one thing at a time. This is also the way most science is done — manipulating just one thing and observing the effect. He and his team, however, decided to try a fresh approach. "It occurred to us that real changes in people's lives don't occur in a vacuum. We wanted to see how much change is possible if you help someone improve all these dimensions of their life simultaneously."

The study could have wide applications beyond the college campus, Mrazek noted. Although the subjects were college students, they weren't extraordinary in any way. "People showed up with all sort of different challenges, including in some cases mental illness and physical limitations. These were just college students, some of whom were doing great and others who were really struggling," he said. "More research is necessary to know if these

results generalize to other populations, but there may eventually be opportunities for similarly modeled programs to be integrated into education, medicine, or social services."

Students in K-12 schools might particularly benefit from programs similar to the study's intervention, Mrazek said. "Many students spend nearly all day in school for 10 or more years of their lives," he observed. "Our intervention was fairly intensive in spending six weeks with these participants, but that's nothing in comparison to how much time kids spend in school. If future research can show similar benefits among middle school or high school students, then multifaceted programs like ours could help schools advance their priorities of improving both academic achievement and student well-being."

At the other end of the age spectrum, new retirees might also benefit from a program to kick-start the next phase of their lives, Mrazek said. "My intuition is that these things can be very helpful at any age," he said. "I think there's a big opportunity for people who are finishing up their careers and hopefully have decades of life still to enjoy. They have time, wisdom and in some cases resources to contribute to the world. Could something like this help them avoid cognitive decline and find an exciting new way forward as they transition into a later stage in their lives? I think it might, and that's something we would like to assess in future

research.”

[Jonathan Schooler](#), senior author on the paper and a professor in the Department of Psychological & Brain Sciences and director of the Center for Mindfulness & Human Potential, also observed that the research has both scientific and societal relevance. “This work advances society in demonstrating a straightforward route toward realizing people’s full potential, and science in elucidating the brain mechanisms that may underpin such gains,” he said.

Ultimately, Mrazek said, he’d like the study to be a source of optimism. “I hope this research raises a sense of possibility, and maybe even sense of expectation, about what is possible for someone who wants to improve his or her life,” he said. But he also doesn’t think we have all the answers yet. “As encouraging as these results are, I think this is only a preview of what will ultimately be achieved through future interventions that draw on continual advances in science and technology,” he said. “The true limits of how much a person can change is a mostly unexplored frontier of scientific understanding.”

Other authors in the study were Benjamin W. Mooneyham, a former UCSB graduate student and now a lecturer in the Department of Psychology at the University of Texas Austin and Kaita L. Mrazek, a visiting researcher at UCSB.

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## **About UC Santa Barbara**

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