Innovative decision support system for individualized exercise prescription

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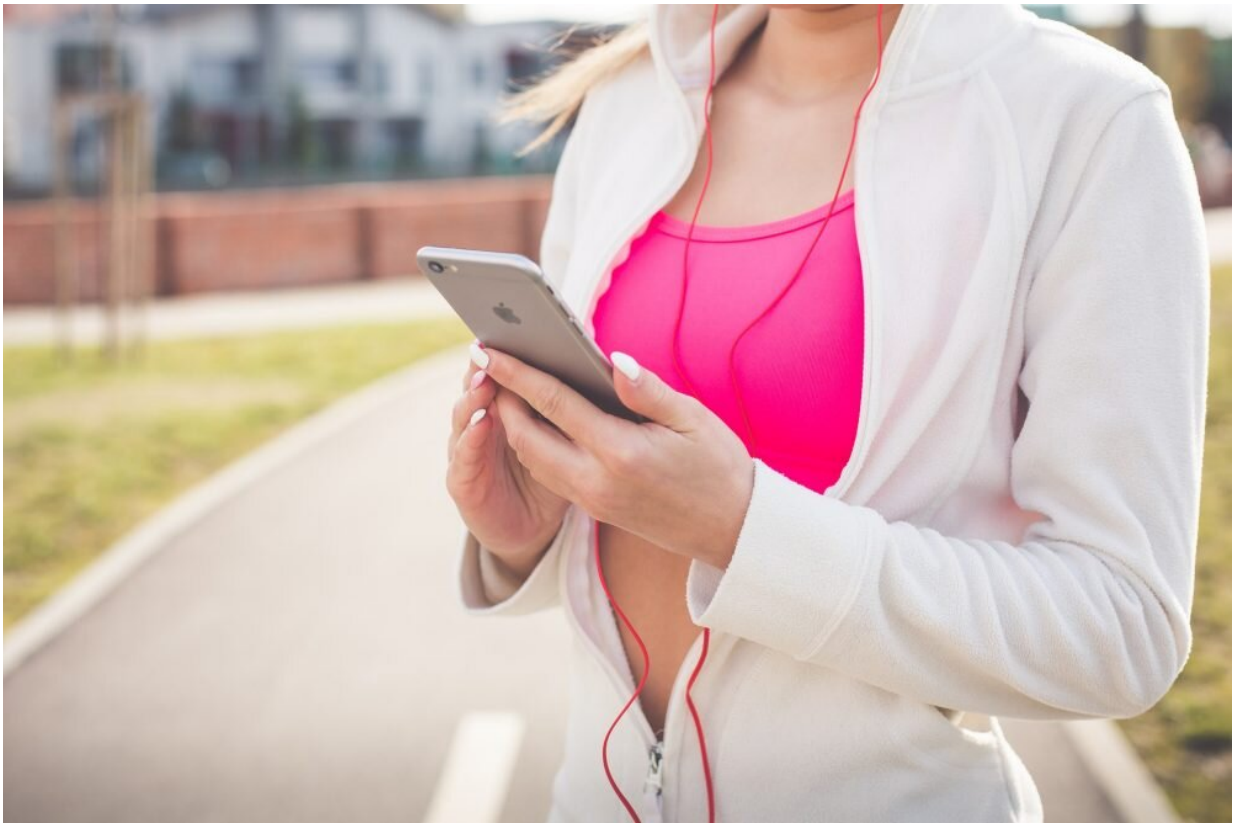

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Regular exercise is an important part of a healthy lifestyle, something scientists and health professionals have known for decades. There is also a growing trend toward prescribing exercise to target specific

cardiovascular disease risk factors to optimize health outcomes resulting from exercise.

Distinguished Professor of Kinesiology in the College of Agriculture, Health, and Natural Resources, Linda Pescatello, is commercializing a decision support system to help physicians, other health care providers, and exercise professionals prescribe personalized exercise plans to support patient heart health.

The interdisciplinary team includes Yin Wu, postdoctoral fellow in the Department of Kinesiology; kinesiology graduate students Rachel Berkowsky, Shiqi Chen, Erica Bushey, and Christina Day; Justin Kennedy, adjunct professor of computer science and engineering at UConn; Gregory Panza, a senior scientist at Hartford Hospital; and Margaux "Maggie" Guidry, field medical director at Servier Pharmaceuticals.

Pescatello's system, P3-EX, helps clinicians "prioritize, personalize, and prescribe exercise" for adults at risk for cardiovascular disease.

Oftentimes, individuals have multiple risk factors for cardiovascular disease, or multiple chronic conditions, which may each dictate different exercise prescriptions. P3-EX uses an algorithm to help practitioners determine which risk factor to target, so as to provide the greatest health benefit to the patient.

"They're not black and white recommendations," Pescatello says.

Organizations like the Center for Disease Control issue general guidelines for physical activity, which are beneficial from a public health perspective. But when it comes to treating specific conditions or risk factors, there is a growing body of research showing that not all exercise is equal.

For example, if a practitioner wants to focus on increasing a patient's level of HDL or "good" cholesterol, they should prescribe more aerobic activity. Whereas if they want to focus on lowering their LDL or "bad" cholesterol level, incorporating resistance or strength training activities will be more beneficial.

P3-EX uses the FITT (Frequency, Intensity, Time, and Type) principle to frame the exercise prescription. Pescatello created the FITT principle more than a decade ago to help her students understand how to prescribe physical activity. FITT has since become the standard to frame the exercise prescription recommendations of the American College of Sports Medicine.

P3-EX has a user-friendly interface that asks clinicians to enter information about the patient's or client's medical history, symptoms, and risk factors. The tool then provides an individualized prescription in less-than five minutes with evidenced-based FITT recommendations for the patient.

"With this tool we do believe doctors, nurses, and other health care professionals can more quickly and effectively prescribe exercise to people," Wu says.

Despite the proven health benefits of exercise, only 30% of physicians recommend exercise as part of treatment. P3-EX aids this process by providing specific, time-effective, evidence-based recommendations for patients who could benefit from a tailored exercise program.

Pescatello and Wu published a paper that showed combining exercise with blood pressure medication has a greater impact on hypertension than either alone. They also found certain types of exercise alone led to greater reductions in blood pressure than medication alone.

To move the tool from idea to product, the researchers sought support from the START Pre-Proof of Concept Fund, which leverages UConn's expertise in technology commercialization for applicants from several public universities in Connecticut. START funding, provided by CTNext and administered by the Office of the Vice President for Research, supports the preliminary validation of innovative early-stage technologies with commercial potential.

Pescatello took advantage of START to develop a prototype of P3-EX and conducted market research. Through this study, they determined there was no app like P3-EX on the market.

"We're taking exercise prescription to another level," Pescatello says.

Pescatello's team also participated in other entrepreneurship programs like Accelerate UConn and the Connecticut Center for Entrepreneurship and Innovation Summer Fellowship Program.

Guidry, who worked with Pescatello while she was a graduate student at UConn, contributes her business expertise gained from years of working in the pharmaceutical industry. Guidry serves as a liaison between the research team and doctors and other potential users.

"I'm bringing not only my scientific background and passion, but my understanding of the business model," Guidry says. "A lot of the business know-how is knowing who else to talk to."

Their upcoming evaluation study, funded by a UConn SPARK Technology Commercialization Fund grant, will engage potential users of P3-EX including physicians and allied health professionals and professionals in marketing, innovation, patient experience, patient advocacy, human resources, and/or administration at pharmaceutical companies, life insurance companies, corporate wellness programs,

concierge medicine practices, or clinical research organizations to obtain their feedback on the usefulness of P3-EX for the work they do.

The study will ask participants about their experience prescribing or recommending exercise, the functionality of the tool, and how effective they feel the tool would be in their line of work.

Kennedy is working to scale the tool up so that it can be used by many people at once. One of the challenges of this task will be running the tool on a sever that operates 24/7 and can handle the traffic of more users.

"I could easily see it being used by hundreds of thousands of people," Kennedy says. "Things come and go in waves, and if you're there at the right time, you catch them. This seems like it's one of those waves."

The eventual goal for P3-EX is to develop a widely accessible mobile app that practitioners can use on-site.

Pescatello hopes to continue commercializing P3-EX so that patients may use it themselves. She would also like to see the eventual app integrated with personal trainers who can help patients take the prescription into practice and the digital healthcare system.

"That's where we see it going," Pescatello says. "But it's a step-by-step process."

More information: Linda S Pescatello et al, Do the combined blood pressure effects of exercise and antihypertensive medications add up to the sum of their parts? A systematic meta-review, *BMJ Open Sport & Exercise Medicine* (2021). DOI: 10.1136/bmjsem-2020-000895

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