

Researchers explore how personality affects gamified diabetes self-management

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Mobile health (mHealth) apps using gamified elements, like Empower by Ayogo and Fitocracy, for improving behaviors important to self-managing chronic illness are growing in popularity. But evidence of effectiveness of mHealth apps has been mixed. Meanwhile, rates of Type 2 diabetes in older adults are higher than other populations, as about 20 percent of Americans over the age of 65 suffer from the disease.

In response to these trends, researchers at the University of Maryland designed and tested an app for self-managing diabetes for insight into how personality differences might explain why mHealth apps help some patients more than others. They tested a homegrown "DiaSocial" app, via tablet devices, on a group of older military veterans - a demographic experiencing a heavy diabetes burden and underrepresented in mHealth intervention studies.

In addition to testing the overall efficacy of the solution, the 13-week pilot clinical trial focused on the roles of psychological traits called locomotion (think of "just do it") and assessment ("do it right"). "Locomoters, more than assessors, benefited from the app, as the relationship between locomotion and performance over time was a bit stronger," says one of the researchers, Michelle Dugas, a social psychologist and post-doctoral researcher at UMD's Center for Health Information & Decision Systems (CHIDS).

The findings, published by PLOS ONE, also showed DiaSocial users

high in locomotion performed more self-management behaviors related to physical activity, diet, medication adherence, and glucose measures, and earned more points in the app than their counterparts low in locomotion. The participants who earned more points in the app subsequently experienced greater declines in average blood glucose—a key clinical outcome for diabetes.

However, the locomotors' expectedly high performance trended downward after the midpoint of the trial - "suggesting a propensity to get bored more easily," Dugas says. Kenyon Crowley, CHIDS deputy director, iSchool doctoral candidate and DiaSocial lead designer, adds: "This decreasing usage pattern might be mitigated by tailoring an app to periodically integrate new goals and challenges consistent with engagement levels and a user's individual characteristics." Corresponding future studies are planned to investigate these precision tailored strategies.

In addition to laying groundwork for accounting for personality traits in gamifying chronic illness management, the study "also shows the strength in multidisciplinary research that brings together clinicians, health IT researchers and psychologists," Dugas says.

Comprising the research team, in addition to Dugas and Crowley: Arie W. Kruglanski, UMD Distinguished University Professor of Psychology; Guodong "Gordon" Gao, associate professor in the Decision, Operations and Information Technologies Department at the Robert H. Smith School of Business; Ritu Agarwal, the Smith School's senior associate dean for research, Professor and the Robert H. Smith Dean's Chair of Information Systems and CHIDS founder and director; Timothy Xu, Emory University's Department of Biology; and Nanette Steinle, endocrinologist and nutritionist for the Maryland Veterans Administration Health Care Center and associate professor at the University of Maryland School of Medicine. The DiaSocial application

was developed in partnership with the Fraunhofer Center for Experimental Software Engineering.

Dugas says incorporating mHealth in diabetes self-management—and accounting for personality traits—"is increasingly critical, given time constraints experienced by health care providers and growing prevalence of U.S. diabetes cases," which have quadrupled since 1980 and associated costs have exceeded \$200 billion annually. Current data, she adds, shows that in "resident-staffed general medicine clinics, residents spent an average of 5 out of 25 minutes on diabetes, and evaluation of glycated hemoglobin levels are addressed just 40 percent of the time."

Dugas says her team's findings also give insight into crafting interventions that would benefit low locomotors and assessors. "We plan to build on these initial findings and continue to research to better understand who benefits from different types of mHealth treatments and why," she says. "We anticipate the results will give additional insight into how to craft tailored mHealth tools that will be more effective for more people."

More information: For more on the study, read "Individual differences in regulatory mode moderate the effectiveness of a pilot mHealth trial for diabetes management among older veterans" at *PLOS One*.

Provided by University of Maryland

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