

Getting heart disease patients to exercise: Study says wearables could help but only if money is on the line

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Combining financial incentives and personalized goal-setting with wearable devices may be an effective way of encouraging patients with heart disease to increase their physical activity. In patients with heart disease, regular physical activity has been shown to decrease the risk of a future heart attack, but getting these patients into a regular exercise program such as cardiac rehab has remained a challenge. Results of a clinical trial led by researchers at Penn Medicine, and published today in the *Journal of the American Heart Association (JAHA)*, show that a home based program offering payment upfront with money taken away if step goals were not met—a design that leverages the concept of loss aversion—increases activity levels and may help to form a more long-lasting habit.

"Regular exercise and [cardiac rehab](#) has shown to have significant benefit in those with [heart disease](#) but participation in such programs is extremely low for various reasons including patient motivation and access to exercise facilities. There is interest in developing creative remote strategies to engage [patients](#) in exercise programs but there is little research for guidance," said Neel Chokshi, MD, MBA, medical director of the Penn Sports Cardiology and Fitness Program and assistant professor of Clinical Medicine in Cardiology. "In this clinical trial, we tested a scalable approach combining wearables and principles from behavioral economics to show significantly increased [activity levels](#) even after incentives were stopped."

The study enrolled 105 patients into a home-based, remotely monitored program using the Misfit Shine wearable device for a 24-week period to determine the impact of personalized feedback with goals coupled to [financial incentives](#) for the first 16 weeks. Patients in the control arm received

the wearable but no other interventions. In the intervention group, patients were given personalized step goals and allocated \$14 at the beginning of each week for 16 weeks (\$224 in total). Each day the step goal was not met, \$2 was taken away. During the main intervention period (weeks 9 to 16), patients in the intervention had an increase in their [physical activity](#) by 1368 steps per day more than patients in control. After 16 weeks, financial incentives were stopped and patients were followed for another 8 weeks. During the 8-week follow-up period, patients in the intervention still had an increase of 1154 steps per day more than patients in control.

"While many are hopeful that [wearable devices](#) can motivate high-risk patients, we found that wearables alone did not increase physical activity levels," said Mitesh Patel, MD, MBA, MS, an assistant professor of Medicine and Health Care Management, and director of the Penn Medicine Nudge Unit. "However, framing rewards as a loss—a technique from behavioral economics—led to a meaningful difference in behavior. During the 6-month trial, the average patient in the intervention arm had step counts that totaled about 100 miles more than the average patient in control."

All participants were given a wearable device with a two week startup period to establish baseline step counts. The [intervention group](#) then received weekly increases in step goals with daily feedback via text message or email on their performance. Progress was divided in two phases; during the "ramp-up incentive" phase (weeks 1-8), daily step goals increased from baseline by 15 percent each week with a maximum goal of 10,000 steps per day. After 8 weeks, step goals remained fixed and participants moved into the "maintenance incentive" phase (weeks 9-16), followed by an 8-week follow-up phase without incentives (weeks 17-24). During

the 16-week intervention, participants in this arm were offered a loss-framed financial incentive. Each week, participants were informed that \$14 was allocated to a virtual account. Each day the patient achieved his or her step goal, the balance remained unchanged, but each day the step goal was not achieved, the participant was informed that \$2 had been deducted. The balance was refreshed with \$14 every week on Monday.

Chokshi and team suggest that additional studies should be conducted to evaluate the sustainability of incentive effects over longer-term periods, to compare incentive designs that vary in magnitude, duration, or frequency, and to evaluate financial incentives and personalized feedback independently to assess effects. This study was supported in part by Grant Number UL1TR000003 from the National Center for Advancing Translational Science. The study was also supported in part by the Institute for Translational Medicine and Therapeutics (ITMAT) and the University of Pennsylvania Health System through the Penn Medicine Nudge Unit.

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