

Using a wearable device to exercise more? Add competition to improve results

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While using a wearable device alone may not always be enough to motivate more exercise, adding fun and competition can be the catalyst needed to drive real results, according to a new study from researchers at

Penn Medicine and Deloitte Consulting LLP. The two teams combined behavioral insights, gaming elements such as points and levels, and social elements like support, collaboration, or competition to generate significantly positive results in a workplace physical activity program. But when the study, called STEP UP, turned off the gaming elements, participants in the competition arm were the only ones who sustained higher levels of physical activity. Results were published today in *JAMA Internal Medicine*.

"Gamification and wearable devices are used commonly in workplace wellness programs and by digital health applications, but there is an opportunity to improve their impact on health behaviors by better incorporating behavioral insights and social incentives," said Mitesh Patel, MD, MBA, the director of Penn Medicine's Nudge Unit and an assistant professor of Medicine and Health Care Management. "We found that a behaviorally designed gamification program led to significant increases in physical activity compared to a [control group](#) that used wearable devices alone. During the nine-month trial, the average person in the competition arm walked about 100 miles more than the [average person](#) in control."

For six months, roughly 600 Deloitte employees from 40 U.S. states took part in a [physical activity program](#). Each participant who was classified as obese or overweight, had daily, personalized step goals, with steps recorded via wearable devices that provided feedback to the participants. Four groups were formed: One in which participants only had their goals and the device, and three others with games tied to their goals.

The "gamified" groups could achieve points and different tiers, or "levels." Importantly, the games were designed to use principles from behavioral economics. This included having all participants sign a commitment contract, before beginning, pledging to strive for their daily

goal, agreeing to have points allocated upfront lost—instead of gained—if goals were not met, and having a "fresh start" each week with a new set of points. Additionally, there were five levels to the game. Each participant started at the middle, which allowed for progression or regression based on goal achievement. All of these elements were adapted from a previous clinical trial that tested a similar approach among families.

Each gamified group was built around a social element. The support group participants chose a "sponsor" who received a weekly notification of whether the step goals were reached and could provide encouragement or motivation.

The collaboration group was split into teams of three. Each day, a member was randomly selected to represent the team and, if they reached their [goal](#) on the prior day, the whole team kept its points.

The competition group was also split into clusters of three who received a weekly leaderboard email showing their individual rankings compared to each other.

During the six-month intervention, the gamification with competition group increased their physical activity by 920 steps per day more than control, a significant difference. Support and collaboration also lead to significant increases of 689 and 637 steps more per day than control, respectively. The real difference between the arms of the study was seen in the three months after the gamification was turned off. The competition arm was the only one of the three gamification arms that had a lasting impact on its members, with a 569 daily step increase compared to control. Both former collaboration and support employees averaged more steps than the control group, but neither were significant.

"Many wellness solutions and patient engagement applications are

implemented without proper testing of whether or not they actually work," said Greg Schwartz, managing director and leader for the advanced analytics and predictive modeling group in life science with Deloitte Consulting LLP. "We partnered with the Penn Medicine Nudge Unit to conduct a rigorous clinical trial that would provide evidence on the most effective approach overall and how to tailor future interventions for each individual."

Key to the next steps of this research will be the data that they collected from each participant on a wide range of characteristics including demographics, personality type, and social networks.

"Most interventions are designed as one-size-fits-all, in which a single intervention is deployed to a large population," said Patel. "Even if the program works on average, many participants may not benefit. Our next step will be to use data from this trial to develop behavioral profiles that could be used in the future to match the right intervention to the right person."

More information: *JAMA Internal Medicine* (2019). [DOI: 10.1001/jamainternmed.2019.3505](https://doi.org/10.1001/jamainternmed.2019.3505)

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