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ABDUL LATIF JAMEEL POVERTY ACTION LAB

STEPPING UP TO COMBAT URBAN DIABETES

Providing financial incentives to walk at least 10,000 steps per day led to increased exercise and moderate physical and mental health improvements among diabetics and prediabetics in India, with 'threshold' contracts being especially effective for diabetics who are more impatient.

Featuring an evaluation by Shilpa Aggarwal, Rebecca Dizon-Ross, and Ariel Zucker

PHOTO: NAMRATA RAHA | TCD

The number of people worldwide with diabetes has nearly quadrupled since 1980. Prevalence has particularly increased in low- and middle-income countries, where the disease often poses additional health and economic burdens on people experiencing poverty. In addition to an approximate economic cost amounting to 0.9 percent of global GDP, the diabetes epidemic has had a steep human cost, directly causing an estimated 1.6 million deaths in 2016.

Lifestyle changes such as increasing physical activity and eating a healthier diet can both prevent the disease and help the diagnosed avert serious long-term complications such as heart disease and strokes. Yet many diabetics and prediabetics do not adopt these habits. Behaviors such as these come with immediate time and effort costs, though health benefits are only visible in the long run. Therefore, impatient individuals may procrastinate modifying their lifestyles. One potential way to address this challenge is to offer incentives that can encourage impatient individuals to adopt healthy behaviors now and not later. However, it is unclear what size, frequency of payment, or other features of incentives are most effective.

To test the impact of different reward structures on the exercise habits and health of diabetics, Shilpa Aggarwal (Indian School of Business), Rebecca Dizon-Ross (University of Chicago; J-PAL affiliated professor), and Ariel Zucker (University of California, Santa Cruz) partnered with the Government of Tamil Nadu, India, to randomly provide diabetic and prediabetic adults with financial incentives to walk at least 10,000 steps per day.

KEY RESULTS:

Incentives for walking were highly effective at inducing exercise. Providing INR20 (US$0.33) per day of meeting the 10,000 daily step target increased compliance by 20 percentage points (a 67 percent increase), raising the average number of steps per day even during the three months after the intervention ended.

Incentives led to moderate physical and mental health improvements. The incentives program improved health outcomes by 0.05 standard deviations, as measured through a health risk index comprising measures such as body mass index (BMI) and random blood sugar. Mental health improved by 0.1 standard deviations.

Incentives designed with minimum thresholds of days walked for receiving rewards increased walking more among impatient individuals. Because impatient individuals discount the effort of future walking, thresholds that effectively 'bundle' rewards for walking now with walking in the future were particularly effective for them. For patient individuals, threshold payments decreased compliance, highlighting the importance of tailoring incentive contracts to the patience of the individual.

Increasing payment frequency had no impact on the number of steps walked. Daily, weekly, and monthly incentive payments were equally effective at increasing walking, indicating limited impatience over financial payments.

Threshold contracts were the most cost-effective variant of the incentive program.

EVALUATION

India had an estimated 77 million people diagnosed with diabetes in 2019 and is predicted to reach 101 million cases by 2030. Diabetes poses immense costs in treating the disease and in lives lost; in 2019, the Indian health care system spent an estimated US$7 billion on treating the disease and approximately one million individuals died. While lifestyle changes like exercise and healthy diets can help stave off or mitigate the impact of diabetes, a large portion of people with diabetes in India are not adopting healthier habits.

Researchers partnered with the Government of Tamil Nadu to evaluate the impact of incentivizing and monitoring lifestyle modifications on patients' ability to prevent and manage diabetes in the city of Coimbatore. Researchers recruited 3,192 individuals with a diabetes diagnosis or elevated blood sugar, a risk factor for developing diabetes, from public screening camps at government hospitals, markets, religious institutions, and parks.

On average, participants were 49 years old. A majority (67 percent) had been diagnosed with diabetes by a doctor, and 82 percent had elevated blood sugar (HbA1c) levels, a biometric indicator of diabetes. Many participants faced additional health conditions commonly associated with diabetes, such as hypertension (49 percent) or obesity (61 percent).

Participants were randomly assigned to one of eight different intervention groups: six groups received pedometers and small incentives to walk at least 10,000 steps each day, one comparison group received pedometers to monitor their steps, and one group received neither pedometers nor incentives (see Box 1 and Figure 1).

Participants in the incentives and monitoring groups reported steps taken through an automated calling system every evening. Researchers visited participants three times during the twelve-week program to sync the pedometers and verify self-reported steps. In addition, researchers conducted a baseline health survey, collected baseline walking data, and assessed participants' impatience through a series of questions on preferences. Health measures included HbA1c levels, BMI, blood pressure, and mental health.

BOX 1. INTERVENTION DETAILS

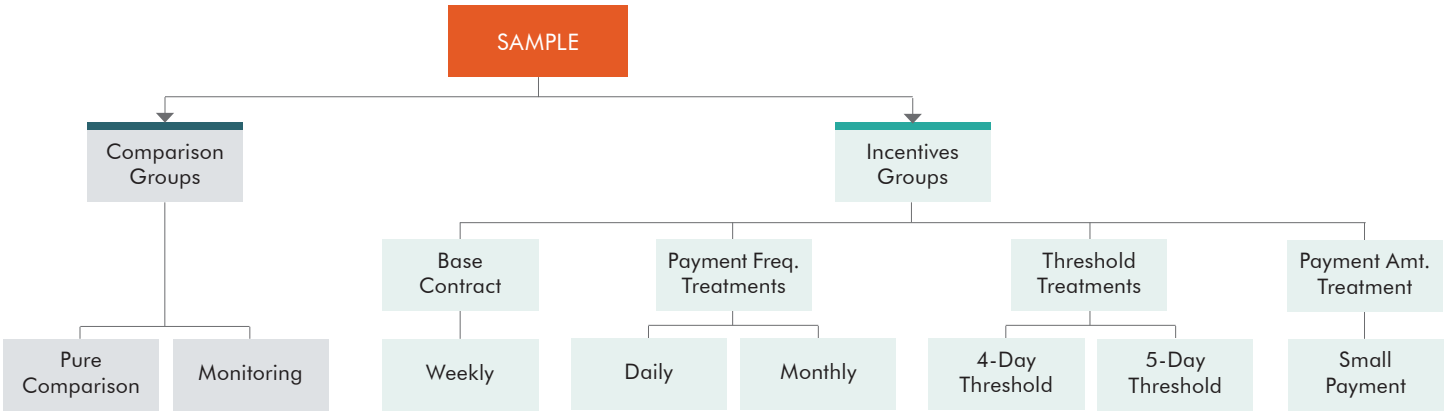
Incentives groups: Individuals received a pedometer to monitor their daily steps and mobile recharges as incentives to walk at least 10,000 steps a day. Researchers offered six different types of incentive contracts within this group that varied in amount, the frequency of payments, and the minimum number of days per week that the target must be met to receive rewards:

- **Weekly base incentive contract:** Individuals received INR20 (US$0.33) for each day they walked 10,000 steps or more. Payments were made weekly.
- **Weekly small payment contract:** Individuals received INR10 (US$0.17) for each day they met the step target. Payments were made weekly.
- **Daily payment contract:** Individuals received INR20 (US$0.33) the same night on which they reported and met the step target.
- **Monthly payment contract:** Every month, individuals received INR20 (US$0.33) per day for all days they met the step target over the past month.
- **Weekly four-day threshold:** If individuals met the target on at least four days of a given week, they received INR20 (US$0.33) for each day they met the step target.
- **Weekly five-day threshold:** If individuals met the target on at least five days of a given week, they received INR20 (US$0.33) for each day they met the step target.

Monitoring group: Individuals received a pedometer but no incentives. They were encouraged to wear the pedometer and report their steps every day.

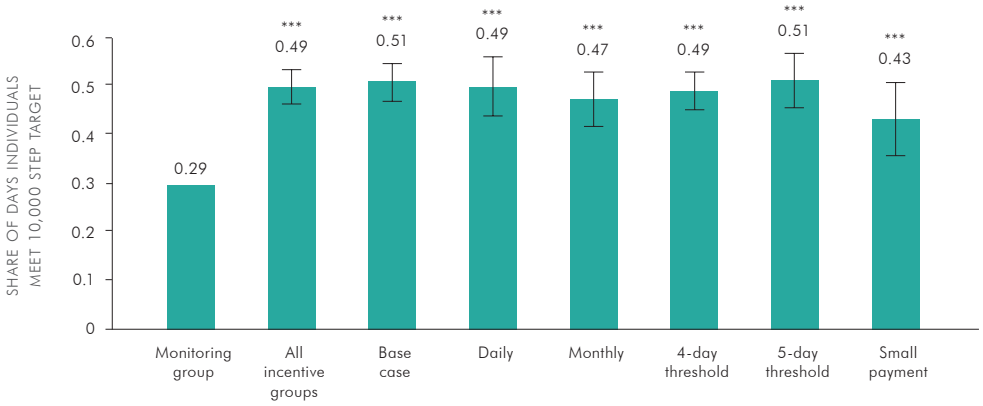
Pure comparison group: Individuals did not receive pedometers to monitor their steps nor incentives for their behavior.

FIGURE 1. EVALUATION DESIGN



RESULTS

FIGURE 2. INCENTIVES INCREASED DAILY COMPLIANCE WITH THE 10,000 STEP TARGET



Note: Error bars represent 95% confidence intervals for a test of a difference in means from the Monitoring group. Statistically significant difference relative to the monitoring group is noted at the 1% (***), 5% (**), or 10% (*) level.

Incentives for walking were highly effective at inducing exercise. Providing INR20 (US$0.33) per day of meeting with the daily step target increased compliance by 20 percentage points (a 67 percent increase) relative to the monitoring group (Figure 2). Incentives increased walking by 1,266 steps per day (a 20 percent increase), or roughly thirteen minutes of brisk walking. Steps increased even among those who did not meet their daily step targets. The impact of incentives on walking remains stable throughout the duration of the program.

Participants walked more even after incentives ended. Groups that received incentives continued to walk more than the monitoring group even after incentives were no longer offered, albeit 60 percent as much as during the program. This impact persisted through the end of measurement, twelve weeks after the intervention ended, suggesting that the short-term incentive program may have thus induced habit formation.

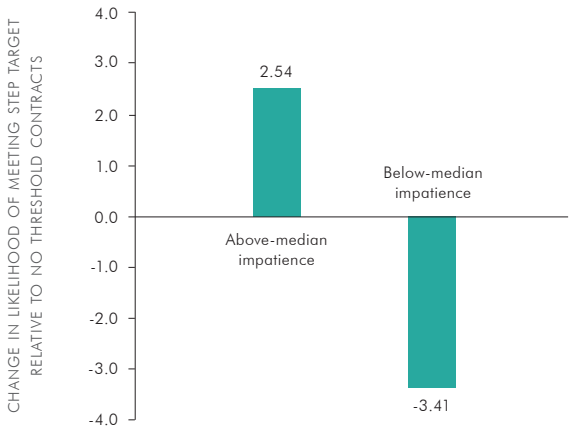
Incentives led to moderate physical and mental health improvements. The incentives program improved health outcomes by 0.05 standard deviations relative to the comparison group, as measured through a health risk index comprising measures such as BMI and random blood sugar. Incentives also improved performance on a mental health index by 0.1 standard deviations, with participants reporting feeling happier and less worn, but had no impact on physical fitness. The positive effect on mental health may be from increased exercise, the financial benefit of the reward, or a combination of both.

Threshold contracts increased walking more among impatient individuals. While threshold payments did not, on average, increase walking relative to those receiving rewards without a threshold, for impatient individuals who tend to put off exercise the threshold payments increased step target completion by 6 percentage points relative to patient individuals (Figure 3). By comparison, threshold payments decreased patient individuals' compliance by 3.4 percentage points relative to individuals who received incentives without a threshold, highlighting the importance of tailoring incentive contracts to the patience of the individual.

Increasing payment frequency had no impact on the number of steps walked. While intuition might suggest that increasing payment frequency can better incentivize impatient individuals, daily incentive payments were no more effective at increasing walking in this context than a weekly or monthly schedule. This suggests that while impatience in the effort domain is important for incentive design, impatience in the reward domain may be less so.

Threshold contracts were the most cost-effective variant of the incentive program. Participants did not always meet their step targets the requisite number of times per week and were thus paid an average of 10 to 15 percent less than the amount paid through other contracts options. These cost savings were achieved while generating the same amount of walking among participants. In the lower payment group, the incentive was also smaller than the base rate of INR20 but came at the cost of fewer steps walked.

FIGURE 3. THE EFFECTIVENESS OF THRESHOLD CONTRACTS VARIED BY INDIVIDUALS' PATIENCE LEVELS



POLICY LESSONS

PHOTO: NAMRATA RAHA | TCD

Providing incentives can be an effective way to increase exercise among diabetic populations. Although scalable, low-intensity programs—and pedometer-based incentives in particular—have successfully generated exercise among nondiabetic populations, this study is the first to suggest that such approaches can also be effective among diabetics. The persistent impact on walking throughout the program suggests that the intervention could be extended further with similar effects, making it suitable for policymakers seeking a longer-term or even permanent incentive program.

Tailoring incentive contracts to individuals' patience levels may dramatically improve the program's success. While threshold contracts were highly effective at motivating impatient individuals to walk, they decreased walking among patient individuals. Efforts by policymakers to individualize who receives a threshold contract based on impatience could substantially increase program effectiveness and cost-effectiveness.

SCALE-UP AND ONGOING RESEARCH

Researchers are exploring how the incentive program may be effectively scaled up in partnership with the Government of Tamil Nadu. Researchers are also conducting a follow-up study looking into how incentive contracts can be customized to the individual at scale, focusing on two variations that tailor contracts to individuals based on observable characteristics or incentivize individuals to choose their preferred contract type.

Featured Evaluation: Aggarwal, Shilpa, Rebecca Dizon-Ross, Ariel Zucker. "Incentivizing Behavioral Change: The Role of Time Preferences." Working Paper, May 2021

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The Abdul Latif Jameel Poverty Action Lab (J-PAL) is a network of affiliated researchers around the world who are united by their use of randomized evaluations to answer questions critical to poverty alleviation. J-PAL's mission is to reduce poverty by ensuring that policy is informed by scientific evidence.

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