

Applied Research Brief: Financial Analysis/Behavior Change

The Impact of Alternative Incentive Schemes on Completion of Health Risk Assessments

Emily Haisley, PhD; Kevin G. Volpp, MD, PhD; Thomas Pellathy; George Loewenstein, PhD

Abstract

Purpose. The biggest challenge for corporate wellness initiatives is low rates of employee participation. We test whether a behavioral economic approach to incentive design (i.e., a lottery) is more effective than a direct economic payment of equivalent monetary value (i.e., a grocery gift certificate) in encouraging employees to complete health risk assessments (HRAs).

Design. Employees were assigned to one of three arms. Assignment to a treatment arm versus the nontreatment arm was determined by management. Assignment to an arm among those eligible for treatment was randomized by office.

Setting. A large health care management and information technology consulting company.

Patients. A total of 1299 employees across 14 offices participated.

Intervention. All employees were eligible to receive \$25 for completing the HRA. Those in the lottery condition were assigned to teams of four to eight people and, conditional on HRA completion, were entered into a lottery with a prize of \$100 (expected value, \$25) and a bonus value of an additional \$25 if 80% of team members participated. Those in the grocery gift certificate condition who completed an HRA received a \$25 grocery gift certificate. Those in the comparison condition received no additional incentive.

Measures. HRA completion rates.

Analysis. Logistic regression analysis.

Results. HRA completion rates were significantly higher among participations in the lottery incentive condition (64%) than in both the grocery gift certificate condition (44%) and the comparison condition (40%). Effects were larger for lower-income employees, as indicated by a significant interaction between income and the lottery incentive.

Conclusion. Lottery incentives that incorporate regret aversion and social pressure can provide higher impact for the same amount of money as simple economic incentives. (*Am J Health Promot* 2012;26[3]:184-188.)

Key Words: Behavioral Economics, Corporate Wellness Programs, Health Incentives, Health Risk Assessments, Preventive Health Care, Prevention Research. Manuscript format: research; Research purpose: intervention testing/program evaluation; Study design: randomized trial; Outcome measure: behavioral; Setting: workplace; Health focus: medical self-care; Strategy: incentives; Target population age: adults, seniors; Target population circumstances: education/income level

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INTRODUCTION

Concerns about rapidly rising health care costs have driven the adoption of corporate wellness programs, which have been shown to reduce absenteeism¹ and medical claims costs.² However, achieving high rates of employee participation has proven challenging. To encourage participation, approximately 50% of wellness programs incorporate financial incentives, including cash payments, health account contributions, gift cards, and reductions in medical premiums, with many offering rewards valued at more than \$100.³ Although the research finds that incentives are helpful in motivating program participation, the behavioral economics literature suggests that, holding cost constant, different types of incentives can have dramatically different efficacy.⁴

We compare the effectiveness in promoting HRA completion of a direct economic incentive (i.e., a grocery gift certificate) to that of a novel incentive scheme that applies insights from behavioral economics. HRAs query employees about chronic conditions, health status, and health behaviors. Increasing HRA completion rates is a priority for many companies and is a critical first step in the design and deployment of wellness programs.

The novel incentive scheme utilizes a lottery incentive to maximize motivation. Lotteries have been found to be effective as incentives in a variety of domains, including areas of preventive health care, such as medication adherence,⁵ weight loss,⁶ cholesterol reduction,⁷ and vaccination.⁸ Research on substance dependence treatment has also compared lotteries with fixed payments and has found that they can

be more cost effective in motivating abstinence than fixed-value vouchers.⁹

The lottery we used incorporates a feature inspired by the Dutch postal code lottery, which motivates people to play through the desire to avoid experiencing regret. In the Dutch postal code lottery, a postal code is randomly selected, and residents of that postal code who purchased tickets win a prize, which means that those in the postal code who failed to purchase a ticket know that they would have received a prize if they had purchased a ticket.¹⁰ We sought to additionally amplify motivation through peer pressure by making the size of the lottery prize conditional on coworker completion of HRAs. In sum, we compared the effectiveness in promoting HRA completion of a lottery incentive intervention that incorporates ideas from behavioral economics with a more traditional intervention involving a fixed reward.

METHODS

Design

The study was a two-arm, randomized, controlled trial with a convenience comparison sample. The study was approved by the Carnegie Mellon University and University of Pennsylvania institutional review boards.

Sample

The study was conducted in a health care management company in all 14 of its U.S. offices distributed across the country with 15 or more employees, resulting in 1299 eligible employees. Management was willing to implement interventions at eight offices, which were randomly assigned to either the grocery gift certificate or the lottery arm. For reasons of statistical power, because the lottery arm was expected to have greater within-work-group correlations, five offices were assigned to the lottery arm, and three were assigned to the grocery gift certificate arm. The remaining six offices served as a convenience comparison sample.

Measures

The main dependent measure in the study was HRA completion rate. In 2007, the company HRA completion rate was 27%. In the following year,

2008, a \$25 cash incentive was introduced, which increased the rate to 49%. Our study was conducted in 2009, during which the \$25 incentive was still in effect for all employees. The company provided us with demographic information on age, income, work tenure, and zip code of employees.

Intervention

The comparison arm received an e-mail explaining the HRA and the \$25 incentive. One reminder e-mail was sent each week for 4 weeks. In the grocery gift certificate arm, the e-mail explained that, in addition to the \$25 incentive, they would receive a \$25 grocery gift certificate upon completion of the HRA. Reminder emails were sent each week over the next 4 weeks. In the lottery arm, the e-mail explained that, in addition to the \$25 incentive, they would be able to participate in a lottery. In the lottery condition only, employees were divided into teams of four to eight employees, informed of other team members' identities, and told that one team would be selected randomly each week. Each member of the winning team who had completed the HRA prior to the time of the drawing would win \$100. If at least 80% of the members of the team completed the HRA, the prize would increase to \$125. The cumulative cost of the lottery incentive, per employee who completed the HRA, was designed to be actuarially equivalent to the \$25 value of the grocery gift certificate.

To receive a team assignment in the lottery arm, employees had to have established an account on the company's health insurance provider Web site. Employees who had not previously signed up for the wellness program or elected the company insurance were given a 2-day window to submit an enrollment form in person. In the other two arms, employees were allowed to enroll at any point. This created an additional obstacle to HRA completion in the lottery arm. As a result, 20% of the employees assigned to the lottery condition were never even assigned to a lottery team and, therefore, were not eligible for the lottery incentive. The primary analysis includes all employees at work sites who were randomly assigned to this

condition in the denominator by using an intent-to-treat approach (i.e., including those assigned to the lottery incentive who were not eligible because of a lack of login), resulting in a conservative test of the efficacy of the lottery.

Analysis

Results were analyzed with analysis of variance to detect differences in demographics between study arms and logistic regression to determine the impact of the experimental treatments on completion of the HRA controlling for demographic characteristics.

RESULTS

The sample was predominantly female (85%), with a mean age of 41 years and an average work tenure of 2.86 years. Mean household income, estimated on the basis of the median income for the employee zip code, was \$43,084. One-way analysis of variance found significant differences between study arms in these demographic variables, so we report analyses that include demographic controls.

The HRA completion rates were 64% in the lottery arm ($n = 489$), 44% in the grocery gift certificate arm ($n = 184$), and 40% in the comparison condition ($n = 626$). Completion rates in the lottery arm were significantly greater than the \$50 grocery gift certificate arm ($t_{(671)} = 4.76$; $p < .001$; 95% confidence interval [CI] of the difference in means, 12%–28%) and the \$25 comparison arm ($t_{(1113)} = 8.15$; $p < .001$; 95% CI of the difference in means, 18%–29%). Completion rates in the grocery gift certificate arm were not significantly higher than in the \$25 comparison arm ($t_{(808)} = .95$; $p = .34$; 95% CI of the difference in means, -4%–12%). As previously discussed, the analyses include the 22% of employees in the lottery arm who were ineligible to receive the lottery incentive. If we exclude these participants, the HRA completion rate in the lottery arm was 76%.

The difference between experimental arms was also analyzed by using a logistic regression model (Table 1). Unadjusted analyses (specification 1, Table 1) revealed an odds ratio for the lottery arm of 2.66 (95% CI,

Table 1
Logistic Regression Analysis of Health Risk Assessment Completion

Specifications	Treatment Only	Demographic Controls	Impact of Income	All Variables
Lottery condition	2.66** (2.08–3.39)	2.44** (1.88–3.16)	8.86** (4.00–19.59)	6.55** (2.88–14.87)
Direct payment condition	1.17 (0.84–1.74)	1.14 (0.80–1.61)	1.07 (0.75–1.50)	1.08 (0.76–1.53)
Years of employment		1.11** (1.05–1.17)		1.11** (1.05–1.16)
Age		1.01* (1.00–1.02)		1.01* (1.00–1.02)
Female		0.36** (0.25–0.51)		0.38** (0.26–0.53)
Income		1.07 (0.99–1.17)	1.18** (1.06–1.31)	1.17** (1.04–1.31)
Income X lottery condition			0.76** (0.65–0.90)	0.80* (0.68–0.95)
Observations	1299	1299	1299	1299
F ²	0.04	0.07	0.04	0.08

Note: Odds ratios displayed, income expressed in ten thousands, 95% confidence interval in parentheses.

* $p < 0.05$.

** $p < 0.01$.

2.08–3.39), indicating that these employees had a significantly higher likelihood of completing an HRA compared with those in the comparison arm. The grocery gift certificate arm had an odds ratio of 1.17 (95% CI, .84–1.64), indicating that they were not more likely to complete the HRA compared with those in the comparison arm. Adjusting for demographic characteristics that differed significantly across the treatment and comparison groups despite random assignment, the odds ratios are largely unchanged (specification 2, Table 1). Older employees, those with longer tenure, and men were significantly more likely to complete the HRA. Visual analysis of cumulative completion rates over time indicated that, although completion rates differed across conditions, the time course of how the ultimate completion rates were achieved was relatively similar across conditions.

Although lower-income participants completed HRAs at lower rates in both the comparison and grocery gift certificate groups, they completed HRAs at higher rates in the lottery group, as indicated by a significant interaction between income and the lottery condition indicator variable (odds ratio = .76; 95% CI, .65–.90; specification 3). The observed interaction between

income and HRA completion is robust to the inclusion of control variables (specification 4) and is represented graphically in Figure 1.

DISCUSSION

Summary

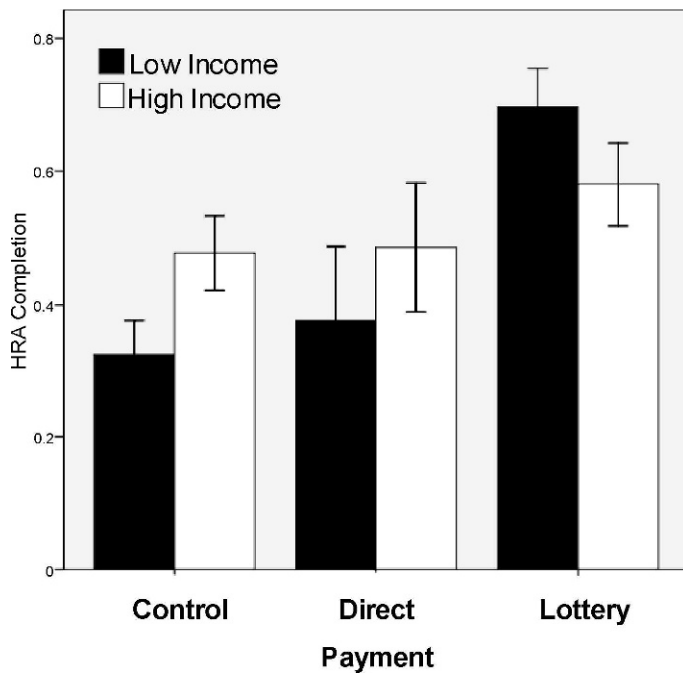
In this study, a lottery incentive scheme that was designed to accentuate regret, as well as social pressure, was more effective in increasing HRA completion rates than an alternative approach that gave HRA completers a fixed prize of actuarially equivalent value. The success of the intervention in this context suggests that a lottery-based approach, or variations on it, could be applied productively to a range of other desired health behaviors, particularly one-shot behaviors (e.g., getting flu shots or recommended medical tests).

Limitations

Perhaps the most important limitation of the study was that the lottery condition combined a variety of design features: (1) the possibility of winning \$100 in the lottery, (2) the assignment to teams, and (3) the bonus of \$25 if 80% of the team participated. Because these design features were only run in combination, we are unable to disentangle the specific contributions of the

features (or interactions between them) to the success of the intervention. A second limitation was being unable to randomize the six sites that served as comparisons as a result of management's unwillingness to include them in the pool on the basis of concerns about their ability to implement the lottery. This introduces concerns that these sites could have lower rates of HRA completion as a result of poor organization. However, the similarity in rates of completion between the \$25 comparison and grocery gift certificate sites suggests this was not the case. A third limitation, which worked against the success of the lottery intervention and made our results more conservative, was the short 2-day time window in which lottery participants were able to register on the Web to be eligible for the lottery condition and the additional effort required to register on the Web. Removal of these two features would have likely resulted in higher rates of HRA completion in the lottery arm. A fourth limitation was that lottery winners were paid through increases in their paychecks, whereas employees in the grocery gift certificate condition were compensated with grocery gift certificates. This design choice was made by the company and introduces a possible confounding factor. Rewards paid as part of paychecks are taxable

Figure 1
Health Risk Assessment (HRA) Completion Rates by Condition and a Median Split of Household Income



and, because they are bundled together with larger sums of money, are likely to be less noticeable to employees than grocery gift certificates. Again, it is likely that this difference between treatments biased the results toward lower effectiveness in the lottery condition.

Implications

This study is the first to demonstrate that a lottery-based incentive approach that incorporates ideas from behavioral economics is more effective than an actuarially equivalent direct incentive. This is important for two reasons.

First, many employers use incentives to encourage healthy behaviors by employees, and using these dollars as efficiently as possible is essential to maximizing their collective impact on health. For example, a national survey found that more than 67% of responding organizations used HRAs to assess health risk factors in their populations and that 62% provided cash incentives for completion ranging between \$25 and \$100, 22% offered incentives between \$101 and \$200, and 9% offered cash incentives greater than \$200.¹¹ One evaluation of the impact of HRA payments nationally

concluded that achievement of a completion rate of 64% with economic incentives requires a payment of approximately \$115 compared with the \$50 expended in this study to achieve the same rate.¹²

Second, many employers have struggled to drive broad participation in critical health and wellness programs in a cost-effective fashion. As employers strive to achieve higher rates of engagement in wellness programs to control health costs, incentive designs that amplify the motivation to participate may be essential to achieving clinically significant effects.

The lottery incentive was designed to take advantage of several findings from the behavioral economics literature. Lotteries in general may be more effective than fixed payments, as people tend to overweight small probabilities in making decisions. Consistent with research demonstrating that demand for lotteries decreases with income, the lottery incentive was especially motivating to lower-income employees. This suggests that such an approach may be a particularly useful way to drive higher rates of engagement in health and

wellness programs in lower-income groups. In addition, behavioral research has found that the desire to avoid regret is a potent force in decision making under uncertainty. By giving employees feedback about what they would have won had they completed HRAs, the incentive scheme was designed to maximize the threat of regret if people failed to adhere. Finally, the success of the lottery condition can likely be attributed in part to the social pressure to qualify one's group for the bonus lottery prize. The majority of the groups (63%) qualified for the bonus lottery prize by achieving an 80% completion rate.

In future work, it would be very interesting to see whether the lottery is as effective in motivating compliance in other types of wellness programs, such as those encouraging physical exercise or adherence to recommended tests, such as colonoscopy. It would also be useful to test the efficacy of lotteries differing in payoffs, probabilities, and expected values to determine how to achieve the greatest participation rate at lowest cost.

On the basis of the success of the lottery incentive and positive feedback from the employees, the company implemented this approach for all employees in 2010, which resulted in a completion rate of 60% across the entire organization. This is a substantial improvement from the 49% completion rate in 2008, when the company offered a simple \$25 cash incentive, and is only a few percentage points lower than the 64% rate achieved for the lottery arm in this study in 2009. This translation of research into practice suggests that such approaches could be scalable and used in employer settings to significantly increase HRA completion rates more efficiently than standard approaches that use simple economic incentives. More generally, this research suggests that ideas from behavioral economics could be applied more broadly in increasing utilization of wellness programs.

Acknowledgment

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References

1. Heaney CA, Goetzel RZ. A review of health-related outcomes of multi-component worksite health promotion programs. *Am J Health Promot.* 1997;11:290-307.

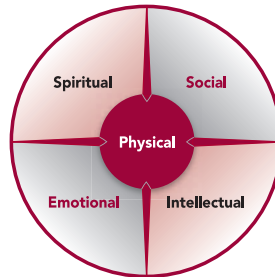
2. Bly JL, Jones RC, Richardson JE. Impact of worksite health promotion on health care costs and utilization. *JAMA*. 1986;256:3235–3240.
3. Working Well: A Global Survey of Health Promotion and Workplace Wellness Strategies. Norwalk, Conn: Buck Consultants; 2009.
4. Volpp KG, Pauly MV, Loewenstein G, Bangsberg D. P4P4P: an agenda for research on pay-for-performance for patients. *Health Aff (Millwood)*. 2009;28:206–214.
5. Volpp KG, Loewenstein G, Troxel A, et al. A test of financial incentives to improve warfarin adherence. *BMC Health Serv Res*. 2008;8:272.
6. Volpp KG, John LK, Troxel A, et al. Financial incentive-based approaches for weight loss: a randomized trial. *J Am Med Assoc*. 2008;300:2631–2637.
7. Francisco VT, Paine AL, Fawcett SB, et al. An experimental evaluation of an incentive program to reduce serum cholesterol levels among health fair participants. *Arch Fam Med*. 1994;3:246–251.
8. Yokley JM, Glenwick DS. Increasing the immunization of preschool children: an evaluation of applied community interventions. *J Appl Behav Anal*. 1984;17:313–325.
9. Petry NM, Alessi SM, Hanson T, Sierra S. Randomized trial of contingent prizes versus vouchers in cocaine-using methadone patients. *J Consult Clin Psychol*. 2007;75:983–991.
10. Zeelenberg M, Pieters R. Consequences of regret aversion in real life: the case of the Dutch postcode lottery. *Org Behav Hum Dec*. 2004;93:155–168.
11. 2010 Performance Benchmarks in Health Risk Assessment Use Wall Township, NJ: Healthcare Intelligence Network; 2010.
12. Taitel M S, Haufle V, Heck D, Loeppeke R, Fetterolf D. Incentives and other factors associated with employee participation in health risk assessments. *Journal of Occup and Environ Med*. 2008;50(8):863–872.

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DIMENSIONS OF OPTIMAL HEALTH

(O'Donnell, *American Journal of Health Promotion*, 2009, 24,1,iv)

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