OPEN

Outcome-based and Participation-based Wellness Incentives

Impacts on Program Participation and Achievement of Health Improvement Targets

Nathan A. Barleen, BS, Mary L. Marzec, PhD, Nicholas L. Boerger, MS, Daniel P. Moloney, PhD, Eric M. Zimmerman, MPH, MBA, and Jeff Dobro, MD

Objective: This study examined whether worksite wellness program participation or achievement of health improvement targets differed according to four incentive types (participation-based, hybrid, outcome-based, and no incentive). **Methods:** The study included individuals who completed biometric health screenings in both 2013 and 2014 and had elevated metrics in 2013 (baseline year). Multivariate logistic regression modeling tested for differences in odds of participation and achievement of health improvement targets between incentive groups; controlling for demographics, employer characteristics, incentive amounts, and other factors. **Results:** No statistically significant differences between incentive groups occurred for odds of participation or achievement of health improvement target related to body mass index, blood pressure, or nonhigh-density lipoprotein cholesterol. **Conclusions:** Given the null findings of this study, employers cannot assume that outcome-based incentives will result in either increased program participation or greater achievement of health improvement targets than participation-based incentives.

BACKGROUND

The majority of employers with 200 or more employees offer some form of employee wellness program.[1] Incentives are increasingly used within these programs[1–3] to promote participation and encourage individuals to take ownership of their health. Two types of incentives are commonly applied: participation-based incentives and outcome-based incentives. The latter make rewards contingent on achieving health metrics in a healthy range (or improved from a prior period).

There has been significant movement among employers toward outcome-based incentives,[2,4] though that trend may be subsiding. A 2014 survey found that 22% of employers had outcome-based incentives in 2014 and an additional 24% were considering implementing them in the future. A more recent survey showed 24% of employers using outcome-based incentives in 2016 that represented a reduction from 42% and 44% in 2014 and 2015, respectively.[5] Despite the adoption of outcome-based incentives, there is a paucity of published evidence from real-world settings regarding the impact of outcome-based incentives on either participation in employer-sponsored wellness programs or on achieving health improvement targets.

Several factors have prompted interest in outcome-based incentives. The Patient Protection and Affordable Care Act (PPACA)[6] as well as recently revised EEOC regulations[7] permit and provide guidance around the use of outcome-based wellness incentives. In addition, outcome-based incentives are conceptually similar to performance-based pay systems designed to align incentives with a desired outcome. Although the desired outcome in a pay-for-performance system is typically related to business goals such as increased sales or improved client retention, the desired outcome in an outcome-based wellness incentive is health status improvement. Similar to a performance-based pay, one may hypothesize that outcome-based incentives lead to greater personal accountability for health status measures and might therefore lead to more people meeting health improvement targets.

Existing literature includes evidence supporting the efficacy of behavioral economics derived outcome-based incentive designs using randomized experiments.[8–10] Most studies do not include evidence from real-world worksite implementation of outcome-based incentives. In experimental settings, outcome-based incentives have been shown to be associated with greater rates of tobacco cessation than no incentive[8,10] and have also been shown to be associated with greater short-term weight loss than no incentive.[9] Although these studies all relied on a type of outcome-based incentive, the incentive designs tested were notably different than those frequently used in worksite wellness settings, and the comparison groups received no incentive rather than an alternative (participation-based) incentive. In the studies cited above, incentives were awarded to individuals who successfully met change targets (quit smoking or lost weight). In contrast, outcome-based incentives in a typical employer setting are awarded to individuals who meet a healthy measure target [eg, healthy body mass index (BMI)] or a health improvement target (eg, 5% weight loss). Individuals who do not meet the target at baseline are able to pursue a reasonable alternative standard (RAS) to earn the incentive.

RAS are defined in the final rule regarding incentives for Nondiscriminatory Wellness Programs in Group Health Plans.[11] Employers in this study implemented a variety of RAS consisting of wellness program participation and allowing for exceptions to be granted where medically advisable. Some employers' RAS required completion of a specific number of telephonic coaching calls, but most allowed individuals to participate in a wellness program of their choosing. Individuals who missed established targets in a given year had the opportunity to improve their health status sufficiently to achieve established targets and earn incentives in future years.

In addition to the notable differences in outcome-based incentives as studied and as implemented in a typical worksite setting, there are limitations around how research-backed incentive designs may be applied in a worksite setting. Implementation in worksite settings requires accommodation of employee feedback, development of feasible and efficient processes to administer the incentive program, and application of programs across a range of individuals who may not be willing to participate in a research

From RedBrick Health, Minneapolis, MN (Mr Barleen, Dr Marzec, Mr Boerger, Dr Moloney, Mr Zimmerman, Dr Dobro).

No outside funding was solicited or received to support this work. The work was supported through the authors' employment at RedBrick Health.

All authors are employed by RedBrick Health, the wellness provider from which data were obtained for the analysis. RedBrick Health supports a variety of different incentive models and does not have an interest in supporting one type of incentive over others. The interest of this paper is in spurring research to further understanding of which types of incentives may be most effective.

Address correspondence to: Nathan A. Barleen, BS, 510 Marquette Avenue S, Suite 500, Minneapolis, MN 55402 (nbarleen@redbrickhealth.com).

DOI: 10.1097/JOM.0000000000000965

study.[12] In addition, participant trust in and attitudes toward their employer may impact the way that a program works within a worksite setting. Consequently, effectiveness of outcome-based incentive designs in practice may differ from the efficacy measured in experimental settings.

Existing studies have looked at participation-based incentives associated with a single activity such as completion of a health assessment questionnaire[13,14] or participation in telephonic coaching programs.[15–18] Most of these studies use the employer as the unit of analysis and examine variation in incentive availability or incentive amounts offered against participation rates. Because these studies use the employer rather than person as the unit of analysis, they are unable to control for person-level differences. One study examined whether employer plan characteristics, including incentives, explained variation in estimated coefficients for age and gender derived from person-level analyses within each employer.[18] Their findings indicated that some employer-level characteristics were correlated with the estimated coefficients from person-level data. Another study conducted with a person-level unit of analysis found that coaching program participation was more likely when a participation-based incentive was offered than when no incentive was offered, but completion rates were no different among participants whether or not an incentive was offered.[17] This study sought to address a gap in current published literature by examining whether worksite wellness program participation or achievement of health improvement targets differed according to different incentive modalities.

This study compared the effects of participation-based and outcome-based incentives in an employer wellness setting controlling for age, gender, and other person-level and employer-level characteristics. Analyses were conducted on three analytic groups consisting of individuals with repeat health screening values approximately 12 months apart. The first group was composed of individuals with elevated baseline BMI, the second of individuals with elevated baseline blood pressure, and the third of individuals with elevated baseline nonhigh-density lipoprotein (HDL) cholesterol values. Logistic regression was performed to examine the effects of different incentive types on two outcomes: participation in worksite wellness programs and achievement of health improvement targets.

METHODS

Setting

The study was conducted among a group of employers who contracted with a specific wellness provider in calendar year 2014. Forty-eight employers from various industries, including manufacturing, finance and insurance, health care, and retail, were represented in the study population. The wellness provider contracted primarily with large self-insured employers in the United States. The wellness provider offered individualized guidance and choice of personalized wellness programs, including phone-based health coaching, onsite in-person health coaching, online or mobile digital coaching programs, and self-monitoring programs (trackers) that synchronized self-entered data with data from approved apps and wearable devices. The wellness provider supported a range of different types of incentives including both participation-based and outcome-based incentives.

Final incentive and program design decisions were made by employers in collaboration with third-party benefit consultants and wellness provider staff. Employers decided which health promotion activities should be incented as well as how incentives would function. Employers frequently split their populations into different incentive groups on the basis of various characteristics. For example, an employer may have offered one set of incentives to employees and a different set of incentives to eligible dependents.

Analytic Samples

A cohort of individuals who completed a biometric health screening in both 2013 and 2014 ($N = 121{,}908$) was identified and examined to understand the differential impact of participation-based and outcome-based incentives. Screenings were performed by clinical staff at onsite events, in community-based walk-in clinics, or by individuals' primary care providers. Analysis was conducted on three groups of individuals with elevated baseline (2013 measure) BMI ($\geq 30\ kg/m^2$ [19]) ($n = 36{,}611$), blood pressure (systolic ≥ 140 mm Hg or diastolic ≥ 90 mm Hg[20]) ($n = 15{,}962$), or non-HDL cholesterol ($\geq 160\ mg/dL$[21]) ($n = 26{,}729$) for two reasons. First, given a similar improvement, long-term health impacts were more likely to accrue to individuals with elevated baseline measures than to individuals with healthy baseline values. Second, in outcome-based incentive models, elevated baseline groups were targeted for compliance with RAS participation requirements. Individuals with elevated baseline metrics did not earn the outcome-based incentive based on their biometric values and were required to participate in relevant wellness programs in order to earn the incentive. Individuals who met the outcome-based incentive target earn the incentive and may have had limited or no further incentive to participate in programs. Tables 1 to 3 summarize available sample sizes in each analytic sample as well as the distribution of model covariates by each incentive type within each analytic sample.

Measures

Two dependent variables were used in analyses: participation and achievement of a health improvement target. Both variables were binary indicators. Program participation was defined as having completed at least one program interaction beyond enrolling in a program (eg, completed a phone coaching call, completed a step in an online coaching program, or tracked physical activity on 1 day) between health screening observations for all groups. Participation requirements to earn incentives varied by employer, but earning all available incentives in a participation-based incentive typically involved multiple program interactions through one or more program types. Meeting participation-based RAS in an outcome-based incentive sometimes required participation in a specific program type. The operational definition of participation was selected to avoid favoring particular types of interactions or incentive types and to be consistent with an intent-to-treat approach.

The operational definition of health status improvement varied according to baseline risk group. Achievement of a health improvement target was defined as a reduction of at least 5% of baseline body weight in the BMI group; as reducing blood pressure to less than 140/90 mm Hg for blood pressure group; and as a reduction of at least 10% from baseline non-HDL cholesterol for the non-HDL cholesterol group. In practice, health improvement targets varied by employer and did not exist for employers using participation-based incentives. Common definitions were selected to be representative of outcome-based incentive improvement targets used by employers in the study.

As described earlier, the primary independent variable of interest was incentive type. Incentives were classified into one of four incentive types on the basis of inclusion of health contingent elements in the incentive design. An element was a specific activity or achievement that was associated with an incentive award. Participation-based incentives had no health contingent elements, but included incentives for participation in wellness programs. Hybrid (partial outcome-based) incentives included health contingent elements that were worth less than the total available outcome and participation incentive amount. Outcome-based incentives contained health contingent elements equal to the total available outcome and participation incentive amount. No incentive indicated that there were no incentives available for either health contingent elements or for participation in wellness programs.

TABLE 1. Demographic Characteristics of Elevated BMI Analysis Group

Covariate	Participation-Based Incentives ($n = 15,397$)	Partial Outcome-Based Incentive (n = 9,500)	Full Outcome-Based Incentive ($n = 8,483$)	No Program Incentive ($n = 3,231$)	*P*
Mean baseline BMI	35.9	35.3	35.8	34.9	<0.001
% Female	54.8%	46.5%	43.7%	40.7%	<0.001
Mean age	48.2	45.6	47.7	46.5	<0.001
% dependents	10.1%	15.0%	17.2%	13.9%	<0.001
% able to email	90.9%	88.6%	81.7%	87.0%	<0.001
Income decile					
Bottom decile	3.1%	2.0%	2.7%	2.1%	<0.001
2nd decile	5.4%	4.7%	4.8%	4.2%	
3rd decile	4.5%	4.8%	6.9%	4.6%	
4th decile	5.6%	5.8%	14.6%	4.8%	
5th decile	10.0%	9.7%	12.9%	6.5%	
6th decile	8.3%	6.4%	15.4%	7.3%	
7th decile	11.2%	9.0%	10.0%	6.8%	
8th decile	12.8%	10.8%	9.3%	10.7%	
9th decile	18.9%	19.3%	13.7%	14.7%	
Top decile	20.3%	27.4%	9.9%	38.3%	
Population density					
Bottom decile	0.0%	0.1%	0.8%	0.0%	<0.001
2nd decile	0.2%	1.3%	3.0%	0.2%	
3rd decile	0.7%	1.6%	4.8%	1.3%	
4th decile	1.8%	1.8%	6.0%	2.2%	
5th decile	4.6%	2.4%	9.6%	3.5%	
6th decile	6.5%	7.7%	10.9%	3.4%	
7th decile	14.6%	11.4%	16.4%	8.2%	
8th decile	19.0%	17.8%	16.3%	19.3%	
9th decile	27.5%	29.6%	18.5%	26.7%	
Top decile	25.1%	26.4%	13.8%	35.3%	
Industry group					
Manufacturing	39.0%	36.8%	78.9%	26.2%	<0.001
Professional services	25.6%	57.6%	0.6%	73.5%	
Services	35.3%	5.7%	20.5%	0.3%	
Mean messages per eligible	15.3	9.6	13.0	10.2	<0.001
Mean culture index	63.3	65.0	63.8	68.9	<0.001
Program incentive amount					
Non-monetized/no incentive	33.8%	4.6%	0.0%	100.0%	<0.001
$1–$99	21.6%	1.4%	1.2%	0.0%	
$100–$199	8.6%	7.8%	0.0%	0.0%	
$200–$299	20.4%	41.9%	2.3%	0.0%	
$300–$399	12.7%	34.8%	44.4%	0.0%	
$400–$499	0.1%	1.9%	0.6%	0.0%	
$500–$599	1.2%	7.7%	0.0%	0.0%	
$600–$699	0.0%	0.0%	51.5%	0.0%	
$700 or more	1.7%	0.0%	0.0%	0.0%	
% with incentive rollover	42.2%	87.8%	47.8%	0.0%	<0.001
% with partial incentive payout	72.7%	88.9%	0.0%	0.0%	<0.001

BMI, body mass index.

Other independent variables were included in analyses to control for potential confounding effects. These variables included person-level demographics such as age, gender, and relation type (employee or dependent), which were derived from eligibility files. Median income and population density in an individual's residential zip code were matched from U.S. census data.[22] Zip codes were divided into deciles on the basis of both median income and population density and individuals were assigned to the decile into which their zip code fell. An indicator was included to show whether an email address, by which communications could be sent to each individual, was available. Employer-level variables included an industry categorization, the number of health promotion program communications that the employer sent per eligible employee, and a continuous culture of health index. The culture of health index was constructed as the proportion of employees who reported in the health assessment that their employer ''actively promotes the health of employees.'' Incentive attributes included as control variables included the total incentive dollars available in a year for health outcomes or program participation, as well as indicators for two other incentive characteristics: rollover and ''get what you earn.'' The rollover flag indicated that individuals who earned above their maximum in one period could roll excess incentive points over into a subsequent period. The ''get what you earn'' flag indicated that an individual could earn partial incentive dollars, whereas absence of the flag indicated that an individual earned all of the incentives or none at all.

Statistical Analysis

Bivariate relationships between incentive type and each covariate were examined. Chi-squared tests were used to test for correlations between the distributions of categorical covariates and incentive type. Analysis of variance (ANOVA) was used to test for

TABLE 2. Demographic Characteristics of Elevated Cholesterol Group

Covariate	Participation-Based Incentives ($n = 11,359$)	Partial Outcome-Based Incentive ($n = 7,753$)	Full Outcome-Based Incentive ($n = 5,345$)	No Program Incentive ($n = 2,272$)	*P*
Mean baseline non-HDL cholesterol	183.9	183.7	185.6	184.7	<0.001
% Female	41.3%	35.8%	36.6%	36.5%	<0.001
Mean age	47.6	44.6	48.1	46.7	<0.001
% dependents	8.6%	15.7%	17.3%	21.8%	<0.001
% able to email	92.2%	89.0%	81.6%	88.7%	<0.001
Income decile					
Bottom decile	1.6%	1.7%	2.2%	1.3%	<0.001
2nd decile	3.2%	2.9%	4.2%	3.0%	
3rd decile	3.2%	3.9%	6.6%	3.8%	
4th decile	4.1%	4.4%	13.4%	5.0%	
5th decile	7.7%	7.4%	11.6%	5.9%	
6th decile	7.0%	5.7%	13.6%	5.3%	
7th decile	9.4%	7.7%	10.1%	5.8%	
8th decile	12.1%	10.0%	10.1%	9.2%	
9th decile	19.3%	19.9%	14.2%	17.0%	
Top decile	32.3%	36.5%	14.1%	43.8%	
Population density					
Bottom decile	0.0%	0.1%	0.8%	0.0%	<0.001
2nd decile	0.2%	0.7%	2.6%	0.1%	
3rd decile	0.7%	1.0%	4.3%	1.1%	
4th decile	1.4%	1.2%	5.2%	2.2%	
5th decile	3.8%	1.6%	8.3%	2.6%	
6th decile	4.8%	5.2%	10.1%	3.5%	
7th decile	12.6%	9.4%	16.0%	7.8%	
8th decile	19.4%	17.7%	17.0%	21.7%	
9th decile	30.9%	31.9%	21.0%	31.4%	
Top decile	26.3%	31.4%	15.0%	29.5%	
Industry group					
Manufacturing	44.7%	26.9%	79.8%	22.8%	<0.001
Professional services	26.2%	65.4%	0.6%	77.0%	
Services	29.1%	7.7%	19.5%	0.3%	
Mean messages per eligible	13.5	10.2	13.1	11.4	<0.001
Mean culture index	61.9	65.4	63.9	66.3	<0.001
Program incentive amount					
Non-monetized/no incentive	37.1%	3.9%	0.0%	100.0%	<0.001
$1–$99	14.6%	1.2%	1.2%	0.0%	
$100–$199	7.3%	5.1%	0.0%	0.0%	
$200–$299	21.3%	50.6%	2.2%	0.0%	
$300–$399	13.0%	31.9%	44.9%	0.0%	
$400–$499	0.1%	1.5%	0.6%	0.0%	
$500–$599	0.9%	5.9%	0.0%	0.0%	
$600–$699	0.0%	0.0%	51.1%	0.0%	
$700 or more	5.8%	0.0%	0.0%	0.0%	
% with incentive rollover	41.5%	87.4%	47.7%	0.0%	<0.001
% with partial incentive payout	69.2%	89.1%	0.0%	0.0%	<0.001

HDL-high-density lipoprotein.

differences in the means of continuous covariates between incentive types.

Multivariate logistic regression models were used to estimate the association between incentive type and both wellness program participation and achievement of health improvement targets in each analytic group in order to control for observed differences in other covariates that may influence program participation or health status improvement. The explanatory variable of interest was incentive type. Participation-based incentives were used as the reference group because this was the largest group and was considered current practice. Control variables included in each model were age, gender, relation type, median income in zip code of residence, population density in zip code of residence, availability of email communication, an employer-level count of the number of promotional messages sent per employee, employer industry, an employer-level culture index, dollar value of incentives, and other incentive characteristics. Regression models of achievement of health improvement targets included program participation as a covariate. Each regression model included a random effect for the incentive group. Standard errors were estimated using bootstrapping with 400 repetitions to account for clustering of individuals within incentive groups. Incentive groups were used as the clustering variable because of differences in how employers treat individuals in each incentive group. A separate logistic regression model was estimated for both program participation and achievement of health improvement targets within each of the three elevated baseline measures groups yielding a total of six regression results. Commonalities across regression results for participation or health target achievement were highlighted as findings. All statistical analyses were conducted using Stata 12.1[23] (StataCorp LP, College Station, TX) and tested for significance at the $\alpha = 0.05$ level.

TABLE 3. Demographic Characteristics of Elevated Blood Pressure Group

Covariate	Participation-Based Incentives ($n = 7,005$)	Partial Outcome-Based Incentive ($n = 3,791$)	Full Outcome-Based Incentive ($n = 3,723$)	No Program Incentive ($n = 1,443$)	*P*
Mean baseline systolic BP	140.5	142.0	144.4	139.9	<0.001
Mean baseline diastolic BP	91.7	90.4	90.9	90.4	<0.001
% female	45.4%	35.7%	35.7%	28.1%	<0.001
Mean age	49.5	47.6	50.7	48.0	<0.001
% dependents	8.0%	13.1%	17.0%	15.3%	<0.001
% able to email	89.4%	85.7%	77.6%	87.4%	<0.001
Income decile					
Bottom decile	2.9%	1.7%	2.8%	1.0%	<0.001
2nd decile	5.4%	5.2%	4.9%	3.4%	
3rd decile	4.5%	5.8%	7.6%	3.9%	
4th decile	5.1%	6.1%	14.2%	4.8%	
5th decile	9.3%	10.9%	12.1%	6.0%	
6th decile	6.6%	6.2%	15.5%	6.7%	
7th decile	10.4%	8.8%	11.7%	4.9%	
8th decile	12.7%	10.3%	9.6%	8.2%	
9th decile	17.6%	16.8%	12.7%	12.4%	
Top decile	25.6%	28.2%	8.8%	48.9%	
Population density					
bottom decile	0.0%	0.1%	0.8%	0.0%	<0.001
2nd decile	0.3%	1.2%	2.1%	0.4%	
3rd decile	0.6%	1.6%	4.3%	1.3%	
4th decile	1.6%	2.1%	4.9%	2.7%	
5th decile	4.2%	2.5%	9.3%	3.9%	
6th decile	5.0%	7.9%	9.6%	3.3%	
7th decile	12.8%	12.7%	16.2%	6.9%	
8th decile	18.4%	16.8%	17.2%	18.4%	
9th decile	28.4%	27.5%	19.9%	28.8%	
Top decile	28.7%	27.8%	15.8%	34.5%	
Industry group					
Manufacturing	36.1%	44.6%	70.0%	24.1%	<0.001
Professional services	25.4%	47.3%	0.6%	75.7%	
Services	38.6%	8.1%	29.4%	0.2%	
Mean messages per eligible	13.6	9.8	11.8	9.8	<0.001
Mean culture index	62.3	63.4	62.9	72.3	<0.001
Program incentive amount					
Non-monetized/no incentive	36.9%	4.0%	0.0%	100.0%	<0.001
$1–$99	22.2%	2.5%	1.0%	0.0%	
$100–$199	5.3%	9.6%	0.0%	0.0%	
$200–$299	19.1%	44.8%	1.2%	0.0%	
$300–$399	13.0%	26.6%	49.0%	0.0%	
$400–$499	0.1%	1.8%	0.6%	0.0%	
$500–$599	1.2%	10.8%	0.0%	0.0%	
$600–$699	0.0%	0.0%	48.3%	0.0%	
$700 or more	2.2%	0.0%	0.0%	0.0%	
% with incentive rollover	37.1%	87.7%	44.5%	0.0%	<0.001
% with partial incentive payout	66.3%	85.5%	0.0%	0.0%	<0.001

BP, blood pressure.

RESULTS

There were demographic differences between the four incentive type groups. The most notable differences were observed among the full outcome-based incentive group. This group was significantly older, lived in lower income and more rural zip codes, and was more likely to work in manufacturing than other groups. The full outcome-based incentive group had more incentive dollars available but was less likely to be able to roll over incentives or earn partial incentives. Tables 1 to 3 summarize the full set of demographic comparisons by incentive type. Individuals with participatory incentives were more likely to be female than other groups.

Overall wellness program participation rates were 53.4% among the elevated baseline BMI group, 54.5% among the elevated baseline non-HDL cholesterol group, and 51.8% among the elevated baseline blood pressure group. About 18.4% of program participants in the elevated baseline BMI group lost at least 5% of body weight. Among program participants in the elevated baseline non-HDL cholesterol group, 38.2% reduced their non-HDL cholesterol by at least 10%. Among program participants in the elevated baseline blood pressure group, 62.9% reduced their blood pressure to less than 140/90 mm Hg.

Odds of Participating in Worksite Wellness Programs

Table 4 summarizes estimated program participation odds ratios for different incentive types controlling for other factors using logistic regression. No significant differences were observed between any of the incentive type categories. Larger incentive

TABLE 4. Odds Ratios for Participating in Any Program Activity Between Measurements

	BMI ≥30 kg/m² Estimation Sample ($n = 36,611$)	Non-HDL ≥160 mg/dL Estimation Sample ($n = 26,729$)	Blood Pressure ≥140/90 mm Hg Estimation Sample ($n = 15,962$)
Baseline BMI	1.00		
Baseline non-HDL cholesterol		1.00	
Baseline systolic blood pressure			1.00
Baseline diastolic blood pressure			1.00
Female (reference – male)	1.75[c]	1.61[c]	1.73[c]
Age	1.04[a]	1.00	1.03
Age squared	1.00[b]	1.00	1.00
Able to email (reference – unable to email)	2.57[c]	2.59[c]	2.71[c]
Dependent (reference – employee)	0.53[b]	0.51[c]	0.65[a]
Zip derived median income decile			
Bottom decile	0.73[a]	0.82	0.84
2nd decile	0.67[b]	0.71[b]	0.81
3rd decile	0.78[a]	0.89	0.78[*]
4th decile	0.91	0.98	1.06
5th decile	0.91	0.99	0.96
6th decile	0.89	0.92	0.93
7th decile	0.94	0.96	1.04
8th decile	1.06	1.15	1.10
9th decile	0.98	1.06	1.12
Top decile (reference)	—	—	—
Zip derived population density decile			
Bottom decile	0.67	0.92	1.48
2nd decile	0.86	0.77	0.82
3rd decile	0.93	0.90	1.08
4th decile	1.07	1.10	1.11
5th decile	0.83	0.80	0.96
6th decile	1.11	1.08	1.24
7th decile	1.01	0.97	1.05
8th decile	1.04	1.03	1.12
9th decile (reference)	—	—	—
Top decile	0.94	0.91[a]	0.97
Industry group			
Manufacturing (reference)	—	—	—
Service	1.41	1.19	1.34
Professional service	2.12	2.47[a]	2.15
Employer-level messages sent per consumer	1.02	1.02	1.01
Employer-level culture index	0.99	0.98	0.98
Incentive type category			
Participation-based incentives (reference)	—	—	—
Hybrid (partial outcome-based) incentives	1.19	1.06	1.05
Full outcome-based incentives	0.96	1.07	1.10
No program incentives	1.46	2.01	2.07
Incentive amount			
$0 or non-monetized (reference)	—	—	—
$1–$99	1.32	1.21	1.47
$100–$199	3.95[a]	6.52[a]	5.01[a]
$200–$299	4.14[c]	5.96[c]	5.45[c]
$300–$399	2.82[a]	4.48[b]	4.09[b]
$400–$499	4.73[b]	10.21	9.04
$500–$599	4.98	9.99[a]	6.72
$600–$699	12.63[b]	16.69[b]	11.38[a]
$700 or more	8.07	12.67	12.26
Rollover indicator (reference – no rollover)	0.89	0.89	1.04
Partial payout indicator (reference – no partial payout available)	1.23	1.56	1.31
Intercept	0.14[a]	0.43	0.34
Random effect variance	1.23	1.31	1.30

BMI, body mass index; HDL-high-density lipoprotein.
[a] $P < 0.05$.
[b] $P < 0.01$.
[c] $P < 0.001$.

amounts were associated with greater odds of participation as were female gender and the ability to receive email communications. Eligible dependents exhibited lower odds of participating in programs than employees. Participation was not associated with baseline biometric values and only in the BMI sample was it significantly associated with age. Participation was also not associated with the employer-level measure of the number of messages sent or the employer-level culture index measure.

Odds of Achieving Health Improvement Targets

Table 5 summarizes estimated health improvement target odds ratios for each incentive type controlling for other factors using logistic regression. Again, no significant difference in the odds of achieving health improvement targets was observed by incentive type categories. Several factors that were associated with participation such as incentive amount and the ability to receive email communications were not associated with achievement of improvement targets. The program participation indicator was only significantly associated with achieving improvement targets in the BMI sample. Age and gender were consistently associated with achievement of health improvement targets. Females were more likely to achieve health improvement targets. Age was consistently nonlinear with reduced odds associated with age and slightly higher odds associated with the age-squared term. Higher baseline measure levels were associated with greater odds of health status improvement in the BMI and non-HDL cholesterol samples but not in the blood pressure sample.

DISCUSSION

This study offered a direct comparison of the effectiveness of participation-based and outcome-based incentives in worksite wellness program settings. This study found that, among groups with elevated baseline health status measures, there were no significant differences in the odds of program participation among different incentive types when controlling for communications, individual demographics, and other incentive characteristics such as incentive amounts. There was also no statistically significant difference in the odds of health improvement between the various incentive types when controlling for potential confounders.

As mentioned in the Introduction, outcome-based incentives are conceptually similar to performance-based pay systems designed to align incentives with a desired outcome. Although the desired outcome in a pay-for-performance system is typically related to business goals such as increased client retention, the desired outcome in an outcome-based incentive model is health status improvement. Several factors are required for effective pay-for-performance systems[24]: 1) clearly defined performance objectives; 2) well-communicated performance objectives; 3) individuals possess the knowledge, skills, abilities, and self-efficacy to meet performance objectives; and 4) aligning incentives with individuals' value systems.

Applying these principles to outcome-based incentives illustrates several potential reasons that outcome-based incentives may not be associated with greater participation or health improvement. Employers using outcome-based incentives appear to have clearly defined and communicated health targets, but individuals may or may not agree with these targets or may not understand what to do to reach them. In addition, employees may feel that the targets are arbitrary and irrelevant to work performance (not aligned with individual or organizational values). Employees may not possess the knowledge, skills, abilities, and self-efficacy required to meet established health status targets. There may be opportunities for employers or wellness providers to better apply learning from the pay-for-performance world to wellness incentives.

In addition, the presence of RAS may have dampened effects of outcome-based incentives. RAS in the study population consisted largely of participation in a wellness program. Given the RAS, outcome-based incentives are effectively participation-based for those who do not meet established targets at baseline (the population of interest in this study). In this light, it may be unsurprising that no difference was observed. This differs from the expectations of many employers who view outcome-based incentives as analogous to performance-based pay and expect greater accountability and therefore better outcomes.

Several of the estimated odds ratios appear to be counter-intuitive. Holding all other factors constant, no significant association was observed between the client-level culture index and worksite wellness program participation. The directionality of estimated odds ratios suggested that higher culture scores were associated with slightly lower odds of wellness program participation, whereas other studies have found positive associations between culture and wellness program participation.[13,14,17] This discrepancy may be, at least in part, to the conceptualization of culture as a shared perception of employer support. It may also be the case that the employer-level shared perception captured in the variable was not representative of the study population, those who had repeat biometric health screenings and elevated baseline metrics.

Another example of a seemingly nonintuitive finding is the lack of correlation between the number of messages sent per eligible participant and wellness program participation. The ability to communicate to an individual via email was associated with a greater likelihood of wellness program participation, but the employer-level number of communications sent per eligible participant was not. This may be due to the way communications were targeted. Lack of prior participation was a common criterion used to determine who should receive additional communications. Individuals who participated early in the program year likely would have received fewer messages than otherwise similar individuals who did not participate or who postponed participation.

The no-incentive group showed higher odds of program participation than other incentive types, though not significantly so. This may be due to the focus of the analytic sample on individuals who had completed health screenings in 2 consecutive years and had an elevated baseline metric. Individuals who were motivated enough to complete screenings in both years without having incentives in place may have been more self-motivated than other groups that had incentives in place. It should also be noted that nonincented groups in the study population typically consisted of spouses or non-benefit enrolled individuals who may not the primary target of the program, but may be aware of available offerings. This suggests caution in generalizing these findings beyond a repeat screening population and indicates a need for future work explicitly modeling selection into the repeat screening cohort.

Although this study was not designed to evaluate whether worksite wellness programs lead to behavior change or health improvement outcomes, the estimated odds ratio on the participation covariate hints that they may. For all three samples, the odds ratio was greater than one, though it was only significantly greater than one in the elevated BMI estimation sample. The very broad definition of participation, at least one interaction regardless of program focus or intended outcome, is likely insufficient to estimate program effects. Future work should examine a range of participation definitions.

Limitations

There are limitations to the current study that should be noted. This analysis was not intended to evaluate the effectiveness of health improvement programs, but rather to examine whether there was any differential impact in the presence of outcome-based incentives or participation-based incentives. This analysis relies on a 1-year observation period. It is possible that differential impacts of various types of incentives may become apparent over a longer time

TABLE 5. Odds Ratios for Achieving Health Improvement Targets

	BMI $\geq$ 30 kg/m^2 Estimation Sample (n = 36,611)	Non-HDL $\geq$ 160 mg/dL Estimation Sample (n = 26,729)	Blood Pressure $\geq$140/90 mm Hg Estimation Sample (n = 15,962)
Baseline BMI	1.03[c]		
Baseline non-HDL cholesterol		1.01[a]	
Baseline systolic blood pressure			0.99[c]
Baseline diastolic blood pressure			1.00
Program participation	1.12[b]	1.06	1.06
Female (reference—male)	1.11[b]	1.19[b]	1.26[c]
Age	0.96[c]	0.95[c]	0.93[c]
Age squared	1.00[c]	1.00[c]	1.00[c]
Able to email (reference—unable to email)	0.94[a]	0.96	1.08
Dependent (reference—employee)	1.08	1.12[a]	0.99
Zip derived median income decile			
Bottom decile	0.88	1.07	0.74[b]
2nd decile	0.81[a]	0.95	0.84
3rd decile	0.79[b]	0.91	0.85
4th decile	0.88	1.00	0.88
5th decile	0.88	0.96	1.00
6th decile	0.98	1.01	1.05
7th decile	0.90	0.93	0.97
8th decile	0.99	0.98	1.04
9th decile	0.91	0.98	0.95
Top decile (reference)			
Zip derived population density decile			
Bottom decile	0.88	1.29	1.16
2nd decile	0.80	0.96	1.06
3rd decile	0.85	1.15	1.18
4th decile	0.91	1.03	1.02
5th decile	0.87	1.04	1.08
6th decile	0.90	0.98	1.07
7th decile	0.95	1.01	1.00
8th decile	0.90[a]	1.06	1.01
9th decile (reference)			
Top decile	0.97	1.07	0.97
Industry group			
Manufacturing (reference)			
Service	1.01	0.91	0.97
Professional service	0.91	0.91	0.71[a]
Employer-level messages sent per consumer	1.00	1.00	1.00
Employer-level culture index	0.99	0.99	1.00
Incentive type category			
Participation-based incentives (reference)			
Hybrid (partial outcome-based) incentives	1.05	0.99	1.05
Full outcome-based incentives	0.93	0.87	0.95
No program incentives	0.96	0.76	1.16
Incentive amount			
$0 or non-monetized (reference)			
$1–$99	0.86	1.14	0.89
$100–$199	0.98	0.97	1.11
$200–$299	1.04	0.97	1.05
$300–$399	1.04	1.02	1.08
$400–$499	1.08	0.87	0.83
$500–$599	0.88	1.10	0.69
$600–$699	1.30	1.28	1.16
$700 or more	1.09	0.70	0.75
Rollover indicator (reference—no rollover)	1.02	0.94	0.89
Partial payout indicator (reference—no partial payout available)	0.98	0.90	1.23
Intercept	0.37[a]	0.23[c]	14.67[c]
Random effect variance	0.09	0.16	0.20

BMI, body mass index; HDL-high-density lipoprotein.
[a]$P < 0.05$.
[b]$P < 0.01$.
[c]$P < 0.001$.

horizon. Future work looking at longer time periods is needed to determine whether differences emerge over time.

This analysis relied on data from a narrow set of individuals who chose to complete two biometric health screenings and who had baseline values above a particular level. Reliance on a self-selected set of repeat screening participants limits the generalizability of findings. Additional modeling to explicitly account for this selection effect would be valuable. Another factor that may limit generalizability is that all data were drawn from a single wellness provider. Reliance on data from a single wellness provider may not only result in more consistent incentive and participation data but may also limit generalizability. Future work should examine whether outcome-based incentives are more effective among specific populations, in specific settings, or when particular conditions are present. For example, individuals who have healthy metrics at baseline may respond more positively to outcome-based incentives than individuals who are outside of recommended ranges at program onset.

There are also several limitations to the measures that were available for this study. The measure of culture used for this study captures the degree to which employees share a perception that their employer ''actively promotes the health of employees.'' This is conceptually different than most other culture measures, but is the only measure that was available for the timeframe of this study. Future work should examine how well this correlates with other culture measures. Another limitation relates to the inability to control for differences in motivation or stages of change. These measures were not available for the study period. Future work should consider whether motivation or stages of change are impacted by outcome-based incentives and whether controlling for differences in motivation could yield different estimates of the impact of outcome-based incentives.

Definitions of health improvement targets and participation used in the study represent another potential limitation. The health improvement target definitions were selected to be representative of those used by study employers, but they do not match exactly what was in place for each employer. Future work should consider whether the health improvement targets selected might impact the effectiveness of outcome-based incentives. Likewise, the definition of participation was intentionally chosen to be broadly consistent with an intent-to-treat approach. Future work should examine whether outcome-based incentives might have a differential impact on the quantity or quality of participation achieved.

CONCLUSION

When person-level demographics, communications, culture, incentive amounts, and other incentive characteristics were controlled for, no difference in program participation or the achievement of health improvement targets was observed between participation-based and outcome-based incentives. Current policy and employer interest in outcome-based incentives is based on assumptions that linking incentives directly to outcomes of interest will be more effective than linking incentives to participation that may lead to that same outcome. This study does not definitively support nor disprove that hypothesis. Future work is needed to understand more completely the impacts of outcome-based wellness incentives and the conditions and settings in which outcome-based incentives may be most effective.

REFERENCES

1. Claxton G, Rae M, Panchal N, et al. Health benefits in 2015: stable trends in the employer market. *Health Aff (Millwood)*. 2015;34:1779–1788.
2. Towers Watson. The New Health Care Imperative: Driving Performance, Connecting to Value. 19th Annual Towers Watson/National Business Group on Health Employer Survey on Purchasing Value in Health Care: Towers Watson; 2014. Available at: http://www.towerswatson.com/en-US/Insights/IC-Types/Survey-Research-Results/2014/05/full-report-towers-watson-nbgh-2013-2014-employer-survey-on-purchasing-value-in-health-care. Accessed January 3,2017.
3. Mattke S, Liu H, Caloyeras JP, Huang CY, Van Busum KR, Rand Corporation. *Workplace Wellness Programs Study: Final Report.* Santa Monica, CA: Rand; 2013.
4. Abbott RK. Eight Macro-Trends Influencing Employer-Sponsored Health Care Strategies. NA-2014-40105. Towers Watson; 2014. Available at: https://www.towerswatson.com/en-US/Insights/IC-Types/Ad-hoc-Point-of-View/Perspectives/2014/eight-macro-trends-influencing-us-health-care-strategies. Accessed January 3, 2017.
5. Fidelity Benefits Consulting & National Business Group on Health. Moving from Wellness to Wellbeing: Seventh Annual Employer-Sponsored Health and Wellbeing Survey. National Business Group on Health. 2016. Available at: http://www.businessgrouphealth.org/pub/a0d30d2b-782b-cb6e-2763-7380d7691b8a. Accessed January 3, 2017.
6. Patient Protection and Affordable Care Act, Pub L. 111-148 §2705 (2010). Available at: https://www.gpo.gov/fdsys/pkg/PLAW-111publ148/html/PLAW-111publ148.htm. Accessed December 2, 2016.
7. Regulations to Implement the Equal Employment Portions of the Americans with Disabilities Act. 29 C.F.R. §1630. 14 (2016). Available at: http://www.ecfr.gov/cgi-bin/text-idx?SID=e7799af9c033548cf18406c7fadf7bf6&mc=true&node=pt29.4.1630&rgn=div5. Accessed December 2, 2016.
8. Halpern SD, French B, Small DS, et al. Randomized trial of four financial-incentive programs for smoking cessation. *N Engl J Med*. 2015;372:2108–2117.
9. Volpp KG, John LK, Troxel AB, Norton L, Fassbender J, Loewenstein G. Financial incentive-based approaches for weight loss: a randomized trial. *JAMA*. 2008;300:2631–2637.
10. Volpp KG, Troxel AB, Pauly MV, et al. A randomized, controlled trial of financial incentives for smoking cessation. *N Engl J Med*. 2009;360:699–709.
11. Incentives for Nondiscriminatory Wellness Programs in Group Health Plans; Final Rule. 45 C.F.R. §146-147. (2013). Available at: http://www.ecfr.gov/cgi-bin/text-idx?SID=c1b8b95a8472ee176ff966c11b9ad041&mc=true&node=pt45.1.146. Accessed January 3, 2017.
12. Volpp KG, Asch DA, Galvin R, Loewenstein G. Redesigning employee health incentives: lessons from behavioral economics. *N Engl J Med*. 2011;365:388–390.
13. Seaverson EL, Grossmeier J, Miller TM, Anderson DR. The role of incentive design, incentive value, communications strategy, and worksite culture on health risk assessment participation. *Am J Health Promot*. 2009;23:343–352.
14. Taitel MS, Haufle V, Heck D, Loeppke R, Fetterolf D. Incentives and other factors associated with employee participation in health risk assessments. *J Occup Environ Med*. 2008;50:863–872.
15. Wilhide C, Hayes JR, Farah JR. The use and influence of employee incentives on participation and throughput in a telephonic disease management program. *Popul Health Manag*. 2008;11:197–202.
16. Gingerich SB, Anderson DR, Koland H. Impact of financial incentives on behavior change program participation and risk reduction in worksite health promotion. *Am J Health Promot*. 2012;27:119–122.
17. Grossmeier J. The influence of worksite and employee variables on employee engagement in telephonic health coaching programs: a retrospective multivariate analysis. *Am J Health Promot*. 2013;27:e69–e80.
18. Terry PE, Grossmeier J, Mangen DJ, Gingerich SB. Analyzing best practices in employee health management: how age, sex, and program components relate to employee engagement and health outcomes. *J Occup Environ Med*. 2013;55:378–392.
19. Centers for Disease Control and Prevention. Assessing Your Weight. Available at: http://www.cdc.gov/healthyweight/assessing/index.html. Accessed August 7, 2015.
20. James PA, Oparil S, Carter BL, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). *JAMA*. 2014;311:507–520.
21. National Cholesterol Education Program, (U.S.). Expert Panel on Detection Evaluation, Treatment of High Blood Cholesterol in Adults. *Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (adult treatment panel III): Final Report.* Washington, DC: The Program; 2002
22. Missouri Census Data Center. zcta_master dataset [dataset]. Available at: Missouri Census Data Center website: www.http://mcdc2.missouri.edu/. Accessed August 24, 2016.
23. StataCorp. *Stata Statistical Software: Release 12*. College Station, TX: StataCorp LP; 2011.
24. Durham CCB, KM. Pay for performance. In: Locke AE, editor. *Handbook of Principles of Organizational Behavior*. 2nd ed., Malden, MA: Blackwell; 2009. p. 217–238.

