



Testing effects of loss framing and checklists: evidence from a field experiment on wellness program participation in Philadelphia

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Abstract

Loss framing and checklist formatting are two oft-cited tools for encouraging behavior change, but there is little causal evidence on their impact in field settings. We partnered with the City of Philadelphia to test the effectiveness of these tools to increase completion of the City’s wellness program. In our experiment, 5235 City employees and retirees were randomly assigned to receive one of four postcard versions (using a 2×2 design), whereby we varied both framing (gain or loss) and how instructions were provided (information only or information in checklist format). Our results suggest that neither loss framing nor the checklist formatting significantly influenced the likelihood that individuals would complete the wellness tasks, or how quickly they completed the tasks. We conclude that this specific form of employee behavior may be difficult to influence through the “passive” behavioral interventions we tested, and suggest that a more “active” approach may be required in such instances.

Keywords Behavioral economics · Checklists · Loss framing · Experiment · Randomized control trial · Evidence-based policy

JEL Classification H75 · C93 · I12 · D90

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1 Introduction

In the last 50 years, there has been a steady increase in the development and testing of behavioral interventions that use insights from psychology and economics to influence behavior and wellbeing (i.e., Ashraf et al. 2006; Thaler and Benartzi 2004). There are many behavioral insights that seem promising based on lab experiments; however, few of these have been extensively or rigorously evaluated in field settings. In this paper, we describe a field experiment designed to test the ability of two behavioral science tools—loss framing and presenting information in checklist format—to increase participation in the City of Philadelphia’s wellness program for employees and retirees.

Workplace wellness programs are increasingly used to boost productivity, reduce absenteeism, and help employees make healthy choices (Baicker et al. 2010). A persistent challenge, however, is motivating employees to take part in these programs (Berry et al. 2010). The underutilization of wellness programs can have important financial and health consequences.¹ In Philadelphia, for example, the City government spends around \$88 million on health insurance for administrative employees. The City of Philadelphia, as a self-insured entity, could decrease costs by increasing participation in the City’s wellness program. As a result, the City of Philadelphia, like many other employers, provides a financial incentive (\$500) to encourage employees to complete the wellness program. Despite these incentives, over half of City employees still do not participate (with 56% non-completion in 2016).

Our intervention tested the effect of two different behavioral interventions on participation in the City’s wellness program, by randomly varying the content of a postcard sent to City employees and retirees. First, we tested the effect of “gain” versus “loss” framing on participation using a visual message and text. This builds on prior research suggesting that the framing of decisions can influence choices (Tversky and Kahneman 1981), and in particular that individuals may be “loss averse,” meaning they have a greater psychological reaction to losses relative to equivalent gains (Kahneman and Tversky 1979). Though gain and loss framing has been extensively studied, almost all the existing work is in lab settings, with student populations (Lindenmeier 2008; Choi et al. 2012; Block and Keller 1995). Furthermore, successful field studies that use loss framing have involved structural changes to the incentive schemes individuals face. For example, both Hossain and List (2012) and Fryer et al. (2012) successfully leverage loss aversion through a motivational incentive scheme that provides money up front and “takes it away” if a goal is not achieved (instead of a “gain” incentive that provides money when a goal is achieved). We provide some of the first field evidence on a simpler manipulation, in which only the messaging used to motivate behavior change incorporates loss language, while the underlying structure of the incentive scheme remains unchanged. This manipulation

¹ Note that recent work finds limited evidence supporting a causal effect of wellness programs on health outcomes (Jones et al. 2018). However, Jones et al. (2018) does suggest that wellness programs may still serve an important purpose as a screening mechanism for employers, from a human resources perspective.

is more “passive” than changing the structure of an incentive scheme, making it more practical and scalable if effective, as it is often not practically feasible to provide an upfront incentive that can be “taken away.”

Additionally, we tested the efficacy of presenting information about the steps needed to complete the wellness program in a checklist format (with check boxes next to each step) versus listing the same information in bullet point format. Checklist formatting is theorized to encourage action by providing a clear visual display of the steps needed to advance through a multi-stage action (Boorman 2001). However, most existing work on checklists compares checklist formatting to the provision of no information at all (Clark et al. 2007; Haynes et al. 2009), which makes it difficult to determine if the checklist format influences behavior or if the key element is the easily digestible information provided in the checklist itself. By holding information constant, our work is the first to estimate the causal impact of the checklist format specifically.

We worked with the City of Philadelphia’s Office of Human Resources to send postcards to 5235 of the City’s active employees and retirees in August 2017, encouraging them to complete the wellness program for the 2017 calendar year. We utilized a 2×2 experimental design, varying the framing of the messaging (gain versus loss) and the format of the information provided (checklist versus bullet point). We then used the City’s administrative data on wellness program completion for the remainder of the calendar year to assess the impact of our interventions.

Our results provide no evidence that either condition, loss framing or checklist formatting, had a meaningful impact on wellness program participation. There is also very limited evidence of differential impacts for retirees versus employees. Note that because all participants in our study received a postcard, we cannot make causal claims regarding the impact of receiving a postcard (only about the content therein).

These findings suggest that more “passive” behavioral interventions that require minimal effort on the part of the implementer, like framing and checklist formatting on a postcard, may not be sufficient to encourage behavior change in the domain of wellness programs. More intensive approaches, like varying the level of the financial incentive or substantially decreasing the hassle costs involved in completing the program steps have been found to be effective (Cuellar et al. 2017), and may offer more promise in such instances.

2 Background literature

Previous field work on loss framing has focused on manipulations of real pay incentives as losses versus gains, rather than the changing messaging alone (Volpp et al. 2008; Giné et al. 2010; Hossain and List 2012). For example, the “loss framing” treatment in Fryer et al. (2012) provided teachers with a lump sum payment at the beginning of the school year that was later retracted if students did not reach a performance target. However, this approach is often not viable for organizations and governments. We test a more practical and simple approach for leveraging loss aversion—altering the language used to frame an incentive as a potential gain versus a lost opportunity.

Research on the efficacy of loss framing in messaging is mixed. In the context of risky health decisions, early studies suggested that loss-framed messages were more persuasive for “high-risk” health behaviors like cancer screening, where people may learn frightening information (Meyerowitz and Chaiken 1987), while gain-framed messages were more effective for “low-risk” preventative behaviors like using sunscreen (Detweiler et al. 1999). These conclusions, however, are not supported by recent meta-analyses (O’Keefe and Jakob 2009). In a different domain, Hallsworth et al. (2017) find no strong evidence of loss framing effects in letters encouraging tax compliance in the UK. However, Richburg-Hayes et al. (2017) find that loss framing in letters can increase engagement with welfare programs in Los Angeles. Our results add to this growing literature that field tests loss framing, providing evidence from the understudied context of organizations seeking to change employee health behaviors.

Our intervention also varied whether individuals were presented with the steps required to complete the wellness program in checklist or information only format. In the existing literature, there is evidence that safety checklists reduce errors in the medical and air transport industries (Byrnes et al. 2009; Boorman 2001; Haynes et al. 2009), while checklists have also been used to increase the number of parents completing subsidy renewal (Richburg-Hayes et al. 2017). However, much of the existing work on checklists compares the provision of a checklist to no information provision whatsoever; for example, the medical literature on checklists generally involves retrospective pre–post evaluations of introductions of mandatory checklists for doctors (see Haynes et al. 2009 and Byrnes et al. 2009), which implicitly test the impact of checklist formatting and information in the checklist simultaneously. This research design makes it impossible to disentangle the impact of the checklist format from the impact of the simple, easily digestible information provided in the checklist. Our study is unique in that we estimate the causal impact of the checklist format specifically, by holding information constant and only varying whether the information is presented using checklist formatting or not.

3 Experiment design

3.1 Implementing partners

This study was a collaborative effort between the City of Philadelphia’s Office of Human Resources (OHR), The Mayor’s Office in the City of Philadelphia, and the Philadelphia Behavioral Science Initiative, an academia–government research partnership connecting local academics to city officials.

3.2 Sample, context, and design

The study’s sample consisted of current and former city employees who: (1) were covered by the City-Administered Health Plan in 2017–2018; and (2) had not completed the wellness program by June 29th, 2017. We excluded those who had already

completed the wellness program and those who would not be eligible to receive health insurance through the City of Philadelphia in 2018. Our sample consisted of 5235 individuals, of whom 257 were retirees.

City employees first receive notification about the wellness program during open enrollment and thereafter through monthly emails from OHR. Information about how to complete the wellness program is included in the City's open enrollment guide and at MyActive Health, an online portal for tracking wellness activities. Program completion involves multiple steps. After creating an online MyActive Health account, City employees and their spouses must contact a primary physician to complete a health assessment and biometric screening. In addition, City employees must complete two out of six designated "wellness activities." Each activity employees complete is automatically recorded online, except physical fitness tracking (which employees record themselves). All activities must be completed by October 31 in order for employees to earn the credit for that year. The earned credit is disbursed in the following calendar year, through reductions in the health insurance premium taken from the employee's biweekly paychecks.

To encourage participation, the City of Philadelphia sends eligible employees and retirees a motivational postcard each year, advertising the program and the \$500 credit associated with program completion. To test the impacts of framing and checklist formatting on behavior, we randomly assigned employees to one of four treatment groups, with each group receiving a postcard with a different layout. We used a 2×2 factorial design, where we varied the type of framing ("loss framing" vs. "gain framing") and the format of the content ("checklist + info" vs. "info only"). Postcards were mailed on August 3, 2017 and August 7, 2017.²

Individuals in the gain framing treatment received a postcard with messaging that emphasized the possibility of earning \$500 for successful completion of the wellness program. In the loss framing treatment, individuals received a postcard with messaging that emphasized the \$500 that would be foregone if one failed to complete the wellness program. The underlying incentives in the conditions were identical—a \$500 credit for wellness program completion. In other words, the loss framing treatment did not involve providing employees with money upfront that they would "lose" for failing to complete the program. The different treatments can be seen in Fig. 1.

For all participants, the back of the postcard included the same information on the actions required to complete the program, but the presentation of the information varied between treatment groups. Those in the checklist + info group had checkboxes next to each step that needed to be completed, while those in the information only group had the same information listed in bullet point format without checkboxes. Figure 2 shows the checklist + info and information only treatment conditions.

Randomization was conducted by the researchers in the summer of 2017, prior to postcard mailing. A simple randomization assigned each individual to one of the four treatment groups. Not all individuals who were employed at the time of

² Postcards were sent on multiple dates due to limitations on how many mailers could be physically prepared and delivered in a single day.

A Loss Framing Treatment



B Gain Framing Treatment



Fig. 1 Treatment conditions: loss framing and gain framing

A Checklist + Info Treatment

In order to AVOID LOSING THE \$500 HEALTH CARE CREDIT towards 2018 health insurance costs, all employees and covered spouses enrolled in City Administered Plan (CAP) benefits must complete the wellness program. Put this checklist on your fridge and get started!

Remember: covered spouses/life partners and employees need to complete steps 1-4 on or before Oct 31, 2017.

- ☒ **Step 1:** Review this card
- ☐ **Step 2:** Register an account or log on to the Wellness Action Zone at www.myactivehealth.com/city. **Note: your spouse/life partner must have a separate account.**
- ☐ **Step 3:** Complete your online 2017 Health Assessment
- ☐ **Step 4:** Enter your 2017 blood glucose, blood pressure, HDL, LDL and total cholesterol level
- ☐ **Step 5:** Only employees complete two additional activities below on or before Oct 31, 2017:
 - ☐ 1 dental exam or cleaning using your United Concordia benefits by Sept 30, 2017
 - ☐ Log 60 days of physical activity online
 - ☐ 3 phone sessions with a My Active Health Coach/Nurse
 - ☐ Earn 100 heartbeats in Online Digital Coaching
 - ☐ Earn 200 heartbeats in Online Digital Coaching
 - ☐ Complete the My Active Health Tobacco Cessation Program
 - ☐ Log 2 in-person visits to an in-network registered dietitian (RD)
 - ☐ Find an in-network RD at www.ibxweb.healthsparg.com
 - ☐ Complete NutriSavings by Sept 30, 2017. Go to order.nutrisavings.com
- ☐ **Step 6:** You are done!

Log on to the Wellness Action Zone at www.myactivehealth.com/city to get started.



If you need technical assistance call Active Health at :
1-866-795-2970
M-F 8AM to 8PM
Saturday 8AM to 2PM



B Info Only Treatment

In order to AVOID LOSING THE \$500 HEALTH CARE CREDIT towards 2018 health insurance costs, all employees and covered spouses enrolled in City Administered Plan (CAP) benefits must complete the wellness program. Follow the instructions below to complete the wellness program.

Remember: both covered spouses/life partners and employees need to complete their online 2017 Health Assessment and Biometrics on or before Oct 31, 2017.

- Register an account or log on to the Wellness Action Zone at www.myactivehealth.com/city.
- Note: your spouse/life partner must have a separate account.**
- Complete your online 2017 Health Assessment
- Enter your 2017 blood glucose, blood pressure, HDL, LDL and total cholesterol level

Only employees complete two additional activities below on or before Oct 31, 2017:

- 1 dental exam or cleaning using your United Concordia benefits by Sept 30, 2017
- Log 60 days of physical activity online
- 3 phone sessions with a My Active Health Coach/Nurse
- Earn 100 heartbeats in Online Digital Coaching
- Earn 200 heartbeats in Online Digital Coaching
- Complete the My Active Health Tobacco Cessation Program
- Log 2 in-person visits to an in-network registered dietitian (RD)
 - Find an in-network RD at www.ibxweb.healthsparg.com
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You are done after you complete the steps above.

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Fig. 2 Treatment conditions: checklist+info and info only

Table 1 Summary statistics

	All subjects	Gain + Info only	Loss + Info only	Gain + Check-list + Info	Loss + Check-list + Info
Age (years)	47.73	47.08	47.41	48.11	48.32
Female (%)	51.58	51.52	54.09	51.30	49.39
Eligible and completed in 2015 (%)	37.03 (<i>n</i> = 3881)	37.02 (<i>n</i> = 986)	38.66 (<i>n</i> = 952)	34.79 (<i>n</i> = 963)	37.65 (<i>n</i> = 980)
Eligible and completed in 2016 (%)	32.39 (<i>n</i> = 3656)	32.93 (<i>n</i> = 905)	35.42 (<i>n</i> = 926)	29.23 (<i>n</i> = 910)	31.91 (<i>n</i> = 915)
Number of participants	5235	1314	1307	1310	1304
Number of retirees	257	51	66	61	79

“Eligible and Completed” variables for 2015 and 2016 are based only on those individuals who were in our 2017 sample and were also eligible to participate in the program in 2015 and 2016, respectively (sample sizes for these variables are as listed in the table)

randomization were still employed at the end of the study, so there are small differences in the sample sizes of the four treatment groups.

We present demographics for our sample by condition in Table 1. We find small differences between some of our treatment groups, so we control for covariates in our main specifications.

Our primary outcome variable is a binary variable for completion of the wellness program in 2017, observed at the individual level. As a secondary outcome measure, we observed and recorded the date that the individual completed the wellness program for 2017 (to assess impacts on time to complete the program, as a continuous measure). All data were collected through the MyActive Health online portal.

Because the sample size and estimated mean for the outcome were both roughly known *ex ante*, we estimated minimum detectable effects to assess the statistical power of our design. Specifically, using power of 0.8, a type I error rate (α) of 0.05, a sample size of 5000, and a control mean of 0.44 (44%), we estimated a minimum detectable effect size of 3.95 percentage points. When adjusting the α to 0.025 (using the Bonferroni correction for multiple comparisons in this 2 × 2 design), we estimated a minimum detectable effect size of 4.35 percentage points.

3.3 Hypotheses

Our two hypotheses are drawn from the behavioral science literature. First, we hypothesized that individuals who received a loss-framed postcard would complete the wellness program at a higher rate than those who received the gain-framed postcard. This is consistent with the idea that loss framing is more motivating than gain framing because of loss aversion (Kahneman and Tversky 1979). Second, we hypothesized that individuals who received the wellness steps in checklist format would be more likely to complete the wellness program than those who received the information only condition, because the checklist format would better encourage action completion (Haynes et al. 2009).

Table 2 Average treatment effects

	(1) 2017 Comp.	(2) 2017 Comp.	(3) 2017 Comp.	(4) 2017 Comp.
Checklist + Info	-0.0252* (0.0137)	-0.00256 (0.0106)		
Loss Framing			0.0140 (0.0137)	0.00232 (0.0106)
Female		0.0940*** (0.0109)		0.0941*** (0.0109)
Age		-0.00143*** (0.000445)		-0.00144*** (0.000445)
Completed in 2016		0.753*** (0.0114)		0.753*** (0.0114)
Ineligible in 2016		0.390*** (0.0144)		0.390*** (0.0144)
Constant	0.441*** (0.00970)	0.162*** (0.0243)	0.421*** (0.00964)	0.159*** (0.0243)
Observations	5235	5235	5235	5235
R ²	0.001	0.404	0.000	0.404

This table shows the results from regressions estimating average treatment effects of the interventions on wellness completion in 2017 using linear probability models. Results without and with controls are shown, for each of the main manipulations. The control variables are gender, age, and whether the employee completed wellness in 2016. Standard errors in parentheses

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

4 Results

We use linear probability models to analyze the effectiveness of the two treatments.³ Since our experiment did not include a “neutral” or “control” framing condition, we evaluate the efficacy of loss framing relative to gain framing. The regression specifications we use to assess the effects of framing and checklists are shown below:

$$\text{Completion2017}_i = \beta_0 + \beta_1 * \text{Checklist}_i + \gamma_i + \epsilon_i, \quad (1)$$

$$\text{Completion2017}_i = \beta_0 + \beta_1 * \text{LossFraming}_i + \gamma_i + \epsilon_i. \quad (2)$$

Our outcome variable of interest, Completion2017_i , is an indicator variable for whether individual i completed the wellness program in 2017. We use various control variables in these specifications, with γ_i representing a vector of demographic variables for individual i , including age, gender, and whether or not the individual completed the wellness program in 2016. Table 2 shows the results of this analysis.

We find no evidence that either treatment substantially changed completion rates. In column 1, which represents a simple comparison of means, we find that the checklist format reduced the likelihood that an individual completed the wellness program

³ For robustness, we also use logistic regression to estimate Eqs. (1) and (2). These marginal treatment effects are presented in Online Appendix Table A.4. These results are qualitatively similar to those presented in Table 2.

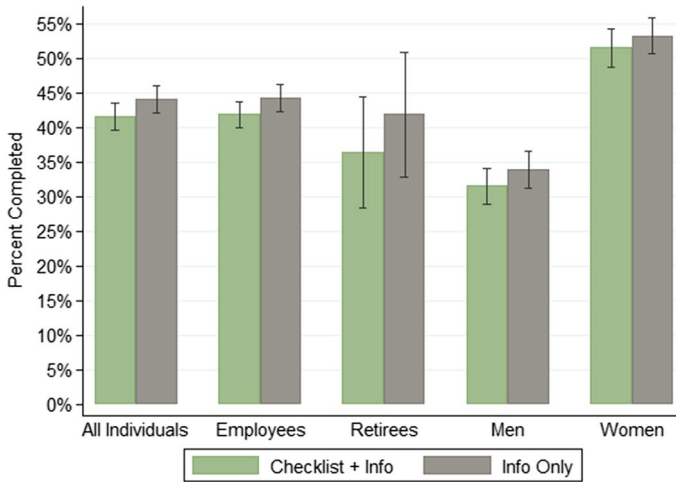


Fig. 3 Wellness completion rates by checklist condition. This figure presents the proportion of employees who completed the wellness program for the Checklist+Info and Info Only treatments, with 95% confidence intervals, and also disaggregated by employment status and gender

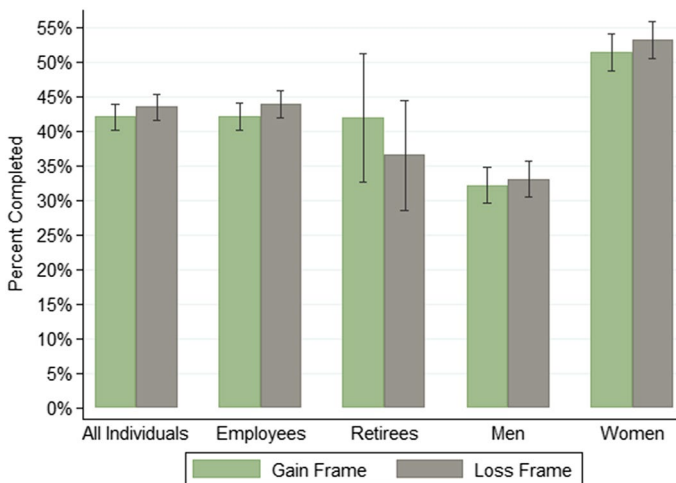


Fig. 4 Wellness completion rates by framing condition. This figure presents the proportion of employees who completed the wellness program for the Gain Frame and Loss Frame treatments, with 95% confidence intervals, and also disaggregated by employment status and gender

in 2017 by 2.52 percentage points on average ($p=0.067$). This is also shown visually in Fig. 3. This estimate, however, may be biased due to the omission of covariates. Once we include covariates (column 2), we find no effect of the provision of checklists. We present similar analysis for the effects of the loss framing treatment in columns 3 and 4, again with and without controlling for covariates. The effect of loss framing is positive, but small in magnitude and statistically insignificant in both specifications. This can be seen visually in Fig. 4.

In addition to our primary analysis, we also conduct exploratory analysis to investigate heterogeneous treatment effects by employment status and gender, using the same regression specification shown in Eqs. (1) and (2). The results are in Online Appendix Tables A.1 and A.2 (and can be seen visually in Figs. 3 and 4). For employment status, we find that neither treatment had an impact on the likelihood of current employees to complete the wellness program. We find similar null results from checklist formatting for retirees, but see some evidence that loss framing decreases the probability that a retiree completed the program by 6.6 percentage points ($p=0.048$). This finding runs counter to our ex-ante hypotheses, though future research is needed to examine whether this finding is robust or simply a statistical anomaly. Our gender analysis, which is motivated by previous experimental work that finds evidence of both gender differences in behavioral preferences and heterogeneous responses by gender to behavioral interventions (Ellingsen et al. 2013; Macapagal et al. 2017), is generally consistent with our overall results. That is, we find no evidence that either treatment influenced either gender, though it is worth noting that the point estimates are positive for women and negative for men for both checklist formatting and loss framing.

An alternative possibility is that there may be no treatment effects on whether or not someone completes the wellness program, but there may be effects on how long it takes them to complete it. In other words, the treatments may have encouraged people to complete the program faster. We present the results of this analysis in Table A.3 of the Online Appendix. Again, the results suggest that neither treatment had any effect on the time that it took individuals to complete their wellness steps.

5 Discussion

In this paper, we present the results of a large-scale field experiment testing the effects of both message framing and checklist formatting on employee behavior in the domain of wellness program participation. We find no evidence that either framing or formatting has an impact on behavior.

Our findings on loss framing are consistent with a range of studies focused on message language rather than real pay incentive schemes, which find little to no difference between loss and gain-framed messages when it comes to motivating specific health behaviors. For example, O’Keefe and Jensen (2009) find in a meta-analysis that loss-framed messages are only slightly more effective than gain-framed messages in the domain of health behaviors. Our null result is also consistent with work in other domains, including the framing of letters to tax delinquents (Halls-worth et al. 2017).

Our null result on the effect of using a checklist format when presenting information suggests that such checklists might be effective simply because they provide information in a clear and concise way, not necessarily because they use a checklist format per se. There are, however, important differences in the context in which we studied these checklists relative to previous work. In our case, we focused on employee health behavior specifically, using checklists that were passively mailed to people and not actively monitored. It is possible that one or more of these contextual

factors may help explain our findings, but further empirical work is needed to investigate this.

More broadly, our experiment provides insights on deploying behavioral concepts to change real-world behavior. Recent years have seen the expansion of behavioral science tools into many domains, but the academic literature is still catching up to real-world implementation of these concepts in the field. Clearly, more work is needed to generate the body of evidence required to draw broad conclusions about the efficacy of specific behavioral interventions. The present work seeks to add evidence in this domain to help practitioners identify well-tested behavior change tools rather than relying on insights that may not be well supported in certain contexts by empirical evidence.

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