# Case Executive Summary

## I. Overview and Objectives

Objective

1. Estimate the causal effect of workplace wellness programs
2. Use a randomization to overcome selection bias

Background

Historically high health care spending is the US is related to smoking and chronic diseases. Workplace Wellness programs were developed with the intention that increasing preventive care could potentially prevent these diseases, consequently lowering the health care costs. These wellness programs have grown in popularity in recent years, backed by claims that each dollar spend on wellness programs reduces medical spending by $3.27 and absenteeism costs by $2.73. The credibly of these claims are often questioned due to study issues such as selection bias. The Illinois Workplace Wellness Study aims to evaluate effects of a wellness program by implementing a randomized evaluation at the University of Illinois at Urbana-Champaign.

Overview: The Illinois Workplace Wellness Study

- Conducted at the University of Illinois at Urbana-Champaign
- Sample: 4,834 employees
    - Treatment group: 3,300 employees invited to participate in the iThrive wellness program
    - Control group: 1,534 employees not invited
- Program features:
    - 2-year duration
    - Annual health screening and risk assessment
    - Weekly wellness activities with financial rewards of up to $650

## II. Analysis and Findings

**Question 1:**

For the comparison to describe the causal effect of workplace wellness on health care spending the assignment of wellness program participation to firms must be random or there must be no systematic differences, aka cofounding factors, between firms in the control and treatment groups that also affects health care spending. For the causal relationship to be determined, there were had to be no systematic differences in potential outcomes between the two types of firms, we would need to explore the differences in the adoption of the wellness programs, not other factors like workforce compensation and benefits design that affect healthcare spending. These conditions are likely not to be satisfied. Independent firms would not likely participate or reframe from participating in wellness programs for the purposes of a study and there is almost no chance that firms participating vs. those not participating have no cofounding factors and are comparable in the scope of an observational study. These conditions are unlikely to hold true in reality because employers that adopt wellness programs may already be more health-oriented, have different employee demographics etc., so overall these cross-firm comparisons are likely to have selection bias.

**Question 2:**

For this comparison to describe causal effect of workplace wellness on employee outcomes, employee eligibility must be randomly assigned. In the case of the Illinois Workplace Wellness Study this condition is satisfied since employees are randomly selected to be either in the control or treatment groups. Because of this randomization, it is likely on average that the post-randomization outcomes of the employees in the treatment and control groups can be interpreted as the causal effects of the program.

**Question 3:**

In this study, "treatment" refers to employees randomly assigned to be eligible for the wellness program, while "control" refers to those that are ineligible for the program. This isn't to be confused with those labeled as participants, which are those in the treatment group who have completed the program. There are also those labeled as non-participants, which are also in the treatment group, but they did not complete the program. We see here that participation is based on program completion while being apart of the treatment or control group is based on if they were or weren't part of the program for the study. participation is a subset of the treatment group and reflects individual take-up decisions, not random assignment. There were 3,300 employees in the treatment group

and 1,534 employees in the control group. Of those in the control group 1,900 employees participated in the initial segment of the Illinois Workplace Wellness Study.

**Question 4: Pre-Randomization Check**

To verify that the randomization worked properly, we checked the health care spending before the program began for both the treatment and control groups. We examined this using linear regression:

$Y\_pre = \beta_0 + \beta_1 \times Treatment + \varepsilon$, where $\beta_0$ represents the control group mean and $\beta_1$ represents the difference between groups.

Results:

| Variable | Control Mean | Treatment Mean | Difference | P-Value |
|---|---|---|---|---|
| Total Spending | $505.58 | $464.81 | -$40.77 | 0.306 |
| Office Visit Spending | $66.71 | $57.98 | -$8.74 | 0.377 |
| Prescription Drug Spending | $103.37 | $101.27 | -$2.10 | 0.909 |
| Hospital Spending | $283.36 | $259.33 | -$24.03 | 0.387 |

Interpretation: The p-values indicate no differences between the treatment and the control groups prior to the randomization. This is true because the p-values are above 0.05 meaning we find no statistically significant pre-treatment differences in spending between treatment and control. This means that the treatment assignment was random and that any differences in randomization are due to the wellness program.

**Question 5: Causal Estimates**

We estimated that the casual effect of the wellness program eligibility on the year 1 post-randomization outcomes using the following regression models:

Model 1 (No controls): $Y\_post = \beta_0 + \beta_1 \times Treatment + \varepsilon$

Model 2 (With controls): $Y\_post = \beta_0 + \beta_1 \times Treatment + \beta_2 \times Male + \beta_3 \times White + \beta_4 \times Age37\text{-}49 + \beta_5 \times Age50+ \varepsilon$

Results:

| Variable | No Controls | With Controls |
|---|---|---|
| Total Spending | -31.18 (54.26) | -24.29 (53.77) |
| Office Visit Spending | -7.84 (8.83) | -7.61 (8.80) |
| Prescription Drug Spending | -10.42 (24.63) | -9.09 (24.63) |
| Hospital Spending | -10.30 (40.26) | -5.73 (39.96) |

Interpretation: These values are the Intent to Treat estimates that show the casual impact of a participant being offered the program. The negative values show that the treatment groups spent less money across all the categories, but like in Question 4, this is statistically insignificant due to the smaller coefficients. Because they are not statistically significant, we see there is no clear evidence that offering the wellness program reduced healthcare spending in the first year.

**Question 6:**

We compared the results from both the program participants and non-participants that were in the treatment group using the following models:

Model 1 (No controls): $Y\_post = \beta_0 + \beta_1 \times Participated + \varepsilon$

Model 2 (With controls): $Y\_post = \beta_0 + \beta_1 \times Participated + \beta_2 \times Male + \beta_3 \times White + \beta_4 \times Age37\text{-}49 + \beta_5 \times Age50+ + \varepsilon$

Results:

| Variable | No Controls | With Controls |
|---|---|---|
| Total Spending | -130.03 (59.56) | -147.08 (58.94) |
| Office Visit Spending | 12.66 (7.43) | 9.46 (7.39) |
| Prescription Drug Spending | -32.98 (27.03) | -32.46 (27.12) |
| Hospital Spending | -106.06 (46.21) | -116.75 (45.95) |

Interpretation: These estimates are not casual, because the participation was voluntary. These estimates show us that participants had substantially lower total and hospital spending than non-participants even when controlling for demographics. These findings are not causal effects of participating in the wellness program though because participation was voluntary and are likely correlated with unobserved traits and reflect selection bias. We see through the small ITT effects and large participant vs. Non-participant differences show how the observational comparisons can overstate the benefits of the wellness program.

## III. Conclusion and Recommendation for Employers

Key Lessons:

1. **Randomized trials are essential:** This study demonstrates the importance of RCTs for evaluating wellness programs. Prior studies resulted in greater program effects, but that was most likely due to selection bias. Randomization is essential for separating true causal effects from selection bias.
2. **Eligibility ≠ Participation:** Being offered the wellness program (treatment) is not the same as choosing to participate in it. Our Intent-to-Treat (ITT) estimates compare all employees randomly assigned to the treatment group with those in the control group and therefore captures the causal effect of eligibility, not participation
3. **Modest effects on spending:** There was no significantly significant effect on any spending category in year 1. After the first year after randomization, we find no statistically significant reductions in total, office, prescription, or hospital spending from being offered the wellness program. This is because the programs didn't generate any substantial savings that were claimed by the industry, so the savings had to be less than $3.27. This implies that, at least in the short run, that employers shouldn't expect large direct medical cost savings
4. **The effect of selection bias:** The difference between the ITT effects and the participants effects show us how misleading data can be. Program participants appear to have much lower-spending than non-participants but this is most-likley due to selection bias, as healthier and more-health conscious employees are likely to opt in and create the illusion of program effectiveness.
5. **Consider Implementation:**
    a. Don't rely on industry claims alone.
    b. Consider external non-financial benefits that could influence participants
    c. Explore alternative health strategies such promoting healthy work-life balance practices.

The Illinois study provides strong evidence that workplace wellness programs do not have a significant impact on health care spending and that credible research design is crucial to make accurate informed decisions about such investments.