Study 4 Pilot

2x2 Pool (Women vs Men) × Feedback (Control vs Treatment)

November 18, 2025

Items

Variable Names

Variable	Description
`treatment`	Binary indicator of whether a participant was randomly assigned to treatment condition (1 = treat, 0 = control).
`women_pool`	Binary indicator of pool condition (1 = women pool/75% women, 0 = men pool/25% women).
`female_pick`	Binary indicator of whether the 7th (final) selection is a woman (PRIMARY DV).
`base_gender`	Count of women selected in the initial 6 choices (0-6).
`tech_pick`	Binary indicator of whether the 7th selection is a technologist.
`choice-1 to choice-7`	The selected CEOs/Founders (choices 1-6 are initial, choice-7 is final DV)
`internal_motiv`	Aggregated Internal Motivation scale (mean of I1Z-I4Z).
`external_motiv`	Aggregated External Motivation scale (mean of E1Z-E3Z).
`fairness`	Aggregated Fairness scale (mean of fair1Z-fair3Z).
`gender`	Self-selected gender.
`race`	Self-selected race.
`age`	Self-entered age.

Demographics

```
## Excluded Participants: 55


## Total N: 395


##                             Percentage gender
## 1 Another gender not listed here:    0.51
## 2                             Man   37.97
## 3                       Non-binary    1.52
## 4                           Woman   60.00


##                             Percentage  Race
## 1 American Indian or Alaskan Native   0.51
## 2           Asian / Pacific Islander   5.82
## 3          Black or African American  11.14
## 4                  Hispanic / Latinx   6.58
## 5                  White / Caucasian  75.95


## # A tibble: 1 x 2
##   mean_age sd_age
##      <dbl>  <dbl>
## 1     42.5   13.7


##
##
## Cell Sizes by Condition:

## # A tibble: 4 x 3
##   pool  cond        n
##   <chr> <chr>   <int>
## 1 men   control    98
## 2 men   treat      98
## 3 women control    99
## 4 women treat     100


##
##
## Mean number of women in initial 6 selections:  2.34

## SD of women in initial 6 selections:  1.74

## # A tibble: 4 x 5
##   cond    pool  mean    sd     n
##   <chr>   <chr> <dbl> <dbl> <int>
## 1 control men    1.03  1.25    98
## 2 control women  3.64  1.26    99
## 3 treat   men    1.16  1.22    98
## 4 treat   women  3.5   1.19   100


##
##
## Proportion who selected a woman for final choice:  0.567
```

```
## SD:  0.496
```

```
## # A tibble: 4 x 5
##   cond    pool   mean    sd     n
##   <chr>   <chr> <dbl> <dbl> <int>
## 1 control men   0.245 0.432    98
## 2 control women 0.778 0.418    99
## 3 treat   men   0.510 0.502    98
## 4 treat   women 0.73  0.446   100
```

Cronbach's Alpha

```
## Cronbach's Alpha for Internal Motivation Scale:  0.9313717
```

```
## Cronbach's Alpha for External Motivation Scale:  0.8885261
```

```
## Cronbach's Alpha for Fairness Scale:  0.9065728
```

Primary Analysis: 2x2 Factorial ANOVA

```
## === 2x2 FACTORIAL ANOVA ===


## Model: female_pick ~ treatment * women_pool


##
## Call:
## lm(formula = female_pick ~ treatment * women_pool, data = d0)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.7778 -0.2449  0.2222  0.2700  0.7551
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)            0.24490    0.04389   5.580 4.50e-08 ***
## treatment              0.26531    0.06730   3.942 9.56e-05 ***
## women_pool             0.53288    0.06089   8.751  < 2e-16 ***
## treatment:women_pool  -0.31308    0.09122  -3.432 0.000663 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4507 on 391 degrees of freedom
## Multiple R-squared:  0.1809, Adjusted R-squared:  0.1746
## F-statistic: 28.78 on 3 and 391 DF,  p-value: < 2.2e-16


##                           2.5 %      97.5 %
## (Intercept)           0.1586138  0.3311821
## treatment             0.1329969  0.3976153
## women_pool            0.4131646  0.6525950
## treatment:women_pool -0.4924321 -0.1337357


##
##
## Cell Means:


## # A tibble: 4 x 5
##   cond    pool      n mean_female_pick    se
##   <chr>   <chr> <int>            <dbl> <dbl>
## 1 control men      98             24.5  4.37
## 2 control women    99             77.8  4.20
## 3 treat   men      98             51.0  5.08
## 4 treat   women   100             73    4.46
```

Simple Effects by Pool

Men Pool (25% Women)

```
## === MEN POOL (25% WOMEN) ===
```

```
## Model: female_pick ~ treatment
```

```
##
## Call:
## lm(formula = female_pick ~ treatment, data = d0 %>% filter(women_pool ==
##     0))
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.5102 -0.2449 -0.2449  0.4898  0.7551
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.24490    0.04389   5.580    8e-08 ***
## treatment    0.26531    0.06730   3.942 0.000113 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4687 on 194 degrees of freedom
## Multiple R-squared:  0.07488,    Adjusted R-squared:  0.07011
## F-statistic:  15.7 on 1 and 194 DF,  p-value: 0.0001041
```

```
##                  2.5 %    97.5 %
## (Intercept) 0.1583409 0.3314550
## treatment   0.1325785 0.3980337
```

```
##
##
## Cell Means - Men Pool:
```

```
## # A tibble: 2 x 4
##   cond        n mean_female_pick    se
##   <chr>   <int>            <dbl> <dbl>
## 1 control    98             24.5  4.37
## 2 treat      98             51.0  5.08
```

Women Pool (75% Women)

```
## === WOMEN POOL (75% WOMEN) ===


## Model: female_pick ~ treatment


##
## Call:
## lm(formula = female_pick ~ treatment, data = d0 %>% filter(women_pool ==
##     1))
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.7778  0.2222  0.2222  0.2700  0.2700
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  0.77778    0.04221  18.426   <2e-16 ***
## treatment   -0.04778    0.06158  -0.776    0.439
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4323 on 197 degrees of freedom
## Multiple R-squared:  0.003075,   Adjusted R-squared:  -0.001986
## F-statistic: 0.6076 on 1 and 197 DF,  p-value: 0.4366


##                  2.5 %     97.5 %
## (Intercept)  0.6945368 0.86101879
## treatment   -0.1692278 0.07367226


##
##
## Cell Means - Women Pool:


## # A tibble: 2 x 4
##   cond          n mean_female_pick     se
##   <chr>     <int>            <dbl>  <dbl>
## 1 control      99             77.8   4.20
## 2 treat       100             73     4.46
```

Wald Test: Comparing Treatment Effects Across Pools

```
## === WALD TEST: DIFFERENCE IN TREATMENT EFFECTS BETWEEN POOLS ===

## Treatment Effect (Men Pool 25%):   0.2653 (SE = 0.0673)

## Treatment Effect (Women Pool 75%): -0.0478 (SE = 0.0616)

## Difference in Treatment Effects: 0.3131

## Standard Error of Difference:    0.0912

## Wald Statistic (z):              3.4321

## P-value (two-tailed):            0.0006

## 95% CI for Difference:           [0.1343, 0.4919]

## INTERPRETATION: The treatment effect is SIGNIFICANTLY different between pools (p < 0.001).
## This supports the reversal hypothesis: gender feedback has opposite effects
## depending on whether women are under- or over-represented.

##
## Note: This Wald test formally tests whether the treatment effect at men pool

## is significantly different from the treatment effect at women pool.

## The test uses robust (HC3) standard errors.
```

Visualization
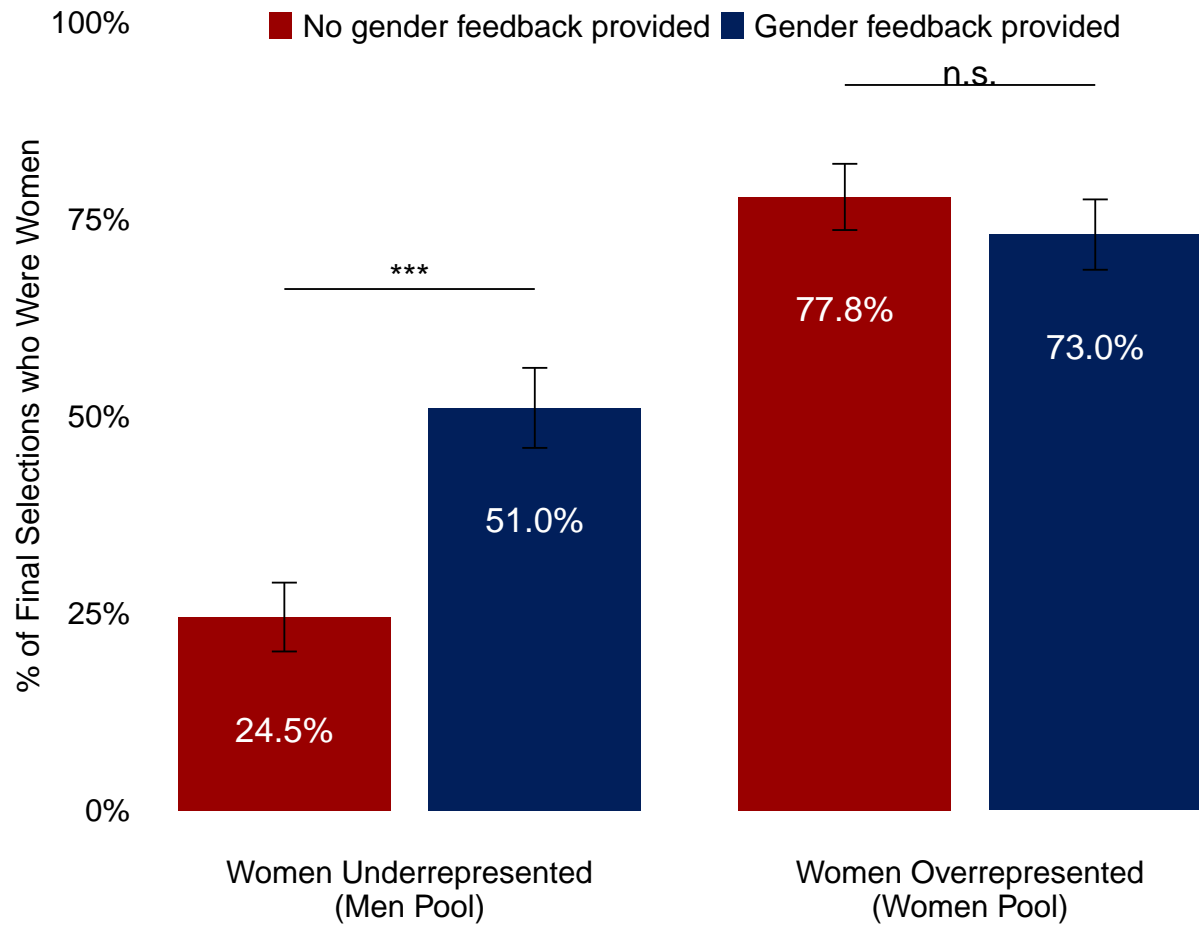
Interaction Plot: Treatment × Pool

Figure 1: Effect of Gender Feedback by Pool Condition

Conditional Mediation Analyses

Mediation in Men Pool (Women Underrepresented)

```
## ============================================================

## CONDITIONAL MEDIATION: MEN POOL (WOMEN UNDERREPRESENTED)

## ============================================================

## --- INTERNAL MOTIVATION - MEN POOL ---


##
## Call:
## lm(formula = internal_motiv ~ treatment, data = d_men)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.5560 -0.6967 -0.0433  0.7146  1.8184
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.16452    0.09318  -1.766  0.07902 .
## treatment    0.35619    0.13177   2.703  0.00748 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.9224 on 194 degrees of freedom
## Multiple R-squared:  0.0363, Adjusted R-squared:  0.03133
## F-statistic: 7.307 on 1 and 194 DF,  p-value: 0.007479


## Sobel test for Internal Motivation (Men Pool):


## $statistic
## internal_motiv
##       3.376167
##
## $p_value
## internal_motiv
##   0.0007350321
##
## $se
## internal_motiv
##     0.03612815


##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Method
##
##               Estimate 95% CI Lower 95% CI Upper p-value
## ACME          0.0434460    0.0097232    0.0855218  0.0102 *
```

```
## ADE             0.2218601    0.0928882    0.3533042  0.0016 **
## Total Effect   0.2653061    0.1326531    0.3969837  0.0002 ***
## Prop. Mediated 0.1637580    0.0380272    0.3800145  0.0104 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Sample Size Used: 196
##
##
## Simulations: 10000


## --- EXTERNAL MOTIVATION - MEN POOL ---


##
## Call:
## lm(formula = external_motiv ~ treatment, data = d_men)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.2455 -0.6957 -0.2898  0.6463  2.2958
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.10297    0.09343  -1.102   0.2718
## treatment    0.24229    0.13214   1.834   0.0682 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.925 on 194 degrees of freedom
## Multiple R-squared:  0.01704,    Adjusted R-squared:  0.01197
## F-statistic: 3.362 on 1 and 194 DF,  p-value: 0.06824


## Sobel test for External Motivation (Men Pool):


## $statistic
## external_motiv
##     -0.1787987
##
## $p_value
## external_motiv
##      0.8580957
##
## $se
## external_motiv
##     0.03923299


##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Method
##
##                 Estimate 95% CI Lower 95% CI Upper p-value
## ACME            -0.0016996   -0.0273160    0.0178529   0.845
```

```
## ADE             0.2670057     0.1329727     0.3980536  <2e-16 ***
## Total Effect     0.2653061     0.1324888     0.3938578  <2e-16 ***
## Prop. Mediated  -0.0064063    -0.1217091     0.0758937   0.845
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Sample Size Used: 196
##
##
## Simulations: 10000


## --- FAIRNESS SCALE - MEN POOL ---


##
## Call:
## lm(formula = fairness ~ treatment, data = d_men)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.54653 -0.80737 -0.04352  0.58619  2.15906
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  -0.2410     0.0906  -2.660  0.00846 **
## treatment     0.5598     0.1281   4.369 2.03e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8969 on 194 degrees of freedom
## Multiple R-squared:  0.08959,    Adjusted R-squared:  0.08489
## F-statistic: 19.09 on 1 and 194 DF,  p-value: 2.029e-05


## Sobel test for Fairness (Men Pool):


## $statistic
## fairness
##  5.24862
##
## $p_value
##     fairness
## 1.532428e-07
##
## $se
##   fairness
## 0.03563367


##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Method
##
##               Estimate 95% CI Lower 95% CI Upper p-value
## ACME          0.104705     0.051240     0.163588  <2e-16 ***
```

```
## ADE             0.160601      0.032515      0.288199  0.0142 *
## Total Effect     0.265306      0.130575      0.394818  <2e-16 ***
## Prop. Mediated   0.394658      0.195570      0.780327  <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Sample Size Used: 196
##
##
## Simulations: 10000
```

Mediation in Women Pool (Women Overrepresented)

```
## ==========================================================

## CONDITIONAL MEDIATION: WOMEN POOL (WOMEN OVERREPRESENTED)

## ==========================================================

## --- INTERNAL MOTIVATION - WOMEN POOL ---

##
## Call:
## lm(formula = internal_motiv ~ treatment, data = d_women)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.52241 -0.67467 -0.03176  0.68932  1.84044
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.18659    0.08755  -2.131  0.03430 *
## treatment    0.34471    0.12350   2.791  0.00577 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8711 on 197 degrees of freedom
## Multiple R-squared:  0.03804,    Adjusted R-squared:  0.03316
## F-statistic: 7.791 on 1 and 197 DF,  p-value: 0.005767

## Sobel test for Internal Motivation (Women Pool):

## $statistic
## internal_motiv
##      0.7826981
##
## $p_value
## internal_motiv
##      0.4338044
##
## $se
## internal_motiv
##      0.0349704

##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Method
##
##                 Estimate 95% CI Lower 95% CI Upper p-value
## ACME           0.0094352   -0.0130723    0.0418857  0.4124
## ADE           -0.0572129   -0.1823549    0.0680289  0.3672
## Total Effect  -0.0477778   -0.1683899    0.0744996  0.4496
```

```
## Prop. Mediated -0.1974803    -2.4638996     2.4875626  0.6588
##
## Sample Size Used: 199
##
##
## Simulations: 10000


## --- EXTERNAL MOTIVATION - WOMEN POOL ---


##
## Call:
## lm(formula = external_motiv ~ treatment, data = d_women)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.1660 -0.6161 -0.2690  0.6558  2.2892
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept) -0.09638    0.08828  -1.092    0.276
## treatment    0.15616    0.12453   1.254    0.211
##
## Residual standard error: 0.8783 on 197 degrees of freedom
## Multiple R-squared:  0.007919,   Adjusted R-squared:  0.002883
## F-statistic: 1.573 on 1 and 197 DF,  p-value: 0.2113


## Sobel test for External Motivation (Women Pool):


## $statistic
## external_motiv
##      0.2737553
##
## $p_value
## external_motiv
##      0.7842727
##
## $se
## external_motiv
##     0.03627252


##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Method
##
##                 Estimate 95% CI Lower 95% CI Upper p-value
## ACME            0.0015506   -0.0114835    0.0194384  0.7872
## ADE            -0.0493284   -0.1729330    0.0739472  0.4154
## Total Effect   -0.0477778   -0.1689008    0.0738434  0.4312
## Prop. Mediated -0.0324548   -1.0084007    0.8350062  0.8552
##
## Sample Size Used: 199
##
```

```
##
## Simulations: 10000


## --- FAIRNESS SCALE - WOMEN POOL ---


##
## Call:
## lm(formula = fairness ~ treatment, data = d_women)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.3378 -0.8135 -0.1541  0.6138  2.1062
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  -0.1882     0.0893  -2.107   0.0364 *
## treatment     0.2983     0.1260   2.368   0.0189 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8885 on 197 degrees of freedom
## Multiple R-squared:  0.02767,    Adjusted R-squared:  0.02273
## F-statistic: 5.606 on 1 and 197 DF,  p-value: 0.01887


## Sobel test for Fairness (Women Pool):

## $statistic
##   fairness
## -0.7137758
##
## $p_value
##  fairness
## 0.4753658
##
## $se
##   fairness
## 0.03689519


##
## Causal Mediation Analysis
##
## Nonparametric Bootstrap Confidence Intervals with the Percentile Method
##
##                  Estimate 95% CI Lower 95% CI Upper p-value
## ACME           -0.0078549   -0.0343238    0.0145899  0.4764
## ADE            -0.0399229   -0.1647434    0.0806054  0.5080
## Total Effect   -0.0477778   -0.1712311    0.0733335  0.4256
## Prop. Mediated  0.1644051   -1.7908315    2.0967247  0.6932
##
## Sample Size Used: 199
##
##
## Simulations: 10000
```

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