# Impact of Successful Diversion Completion on Juvenile Recidivism in Nebraska

Researcher: Navruz Shaw, PhD

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# Research Question & Objectives

**Primary Question:** Does successful completion of juvenile diversion programs reduce recidivism?

- What is the magnitude of this impact?
- What are the cost implications for the juvenile justice system?

**Study Period:** 2021 diversion cohort tracked through 2023

# Study Design and Period

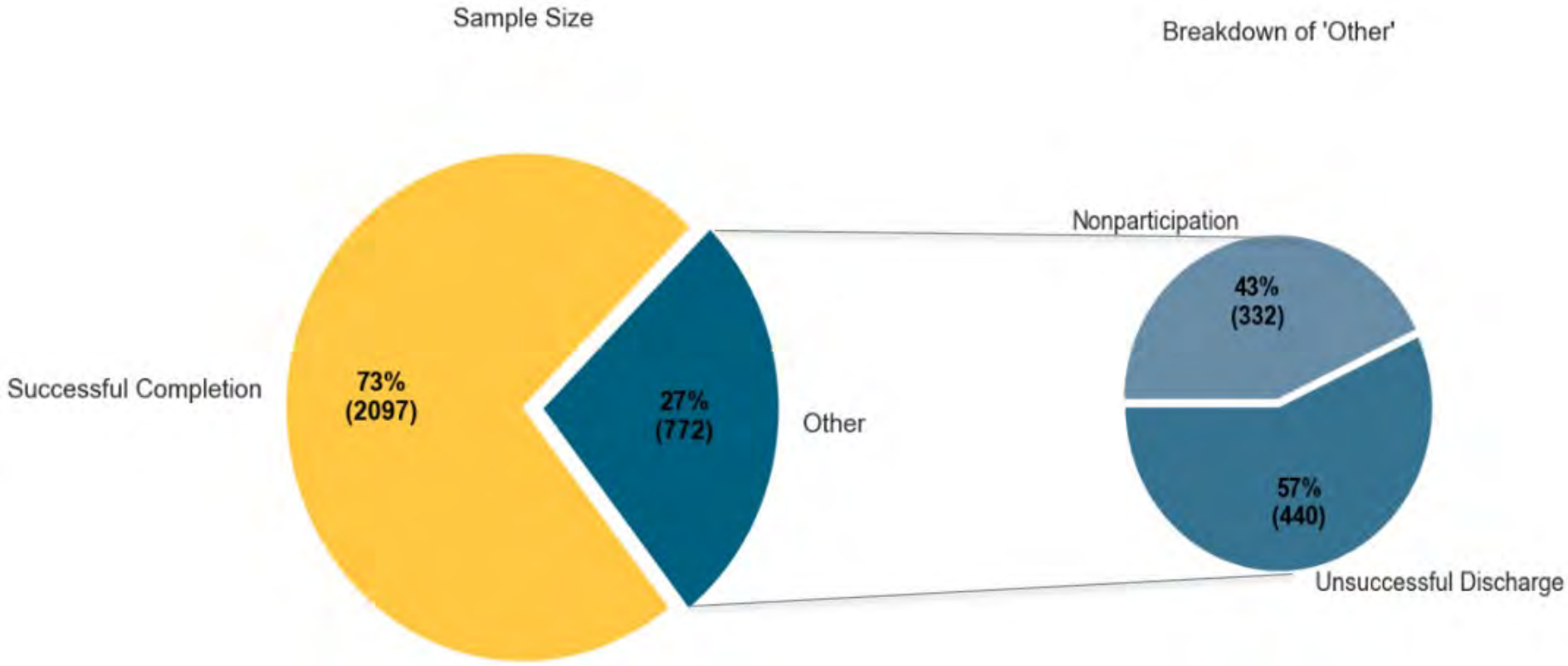
**Sample:** 2,869 youth from 2021 diversion cohort across 385 census tracts in Nebraska

**Clustering Structure:**

- Level 1: Individual youth (n=2,869)
- Level 2: Census tracts (n=385)
- Average 6.6 youth per tract (range: 2-48)

**Follow-up:** 3 years (through 2024)

# Distribution of Diversion Discharge Categories



# Data Sources

**Diversion program records/JDCM & JAC**-participant demographics, family structure, risk score, offense severity & diversion completion status

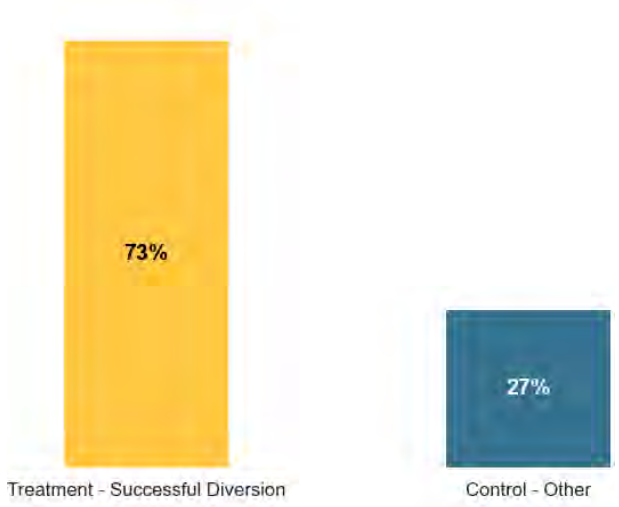
**Court records/JUSTICE** -arrest and disposition data for tracking offence & conviction recidivism

**Census**-census tract level educational attainment, poverty, unemployment & home ownership rates

# Successful Diversion Completion & Other Variables

**Treatment Variable:**

- Diversion completion success




- **Individual-Level Controls:**
- Demographics: Age, gender, race
- Case characteristics: Offense severity, risk score
- Family structure: Custody arrangement

**Geographic Controls:**

- Census tract random effects (significant clustering detected)

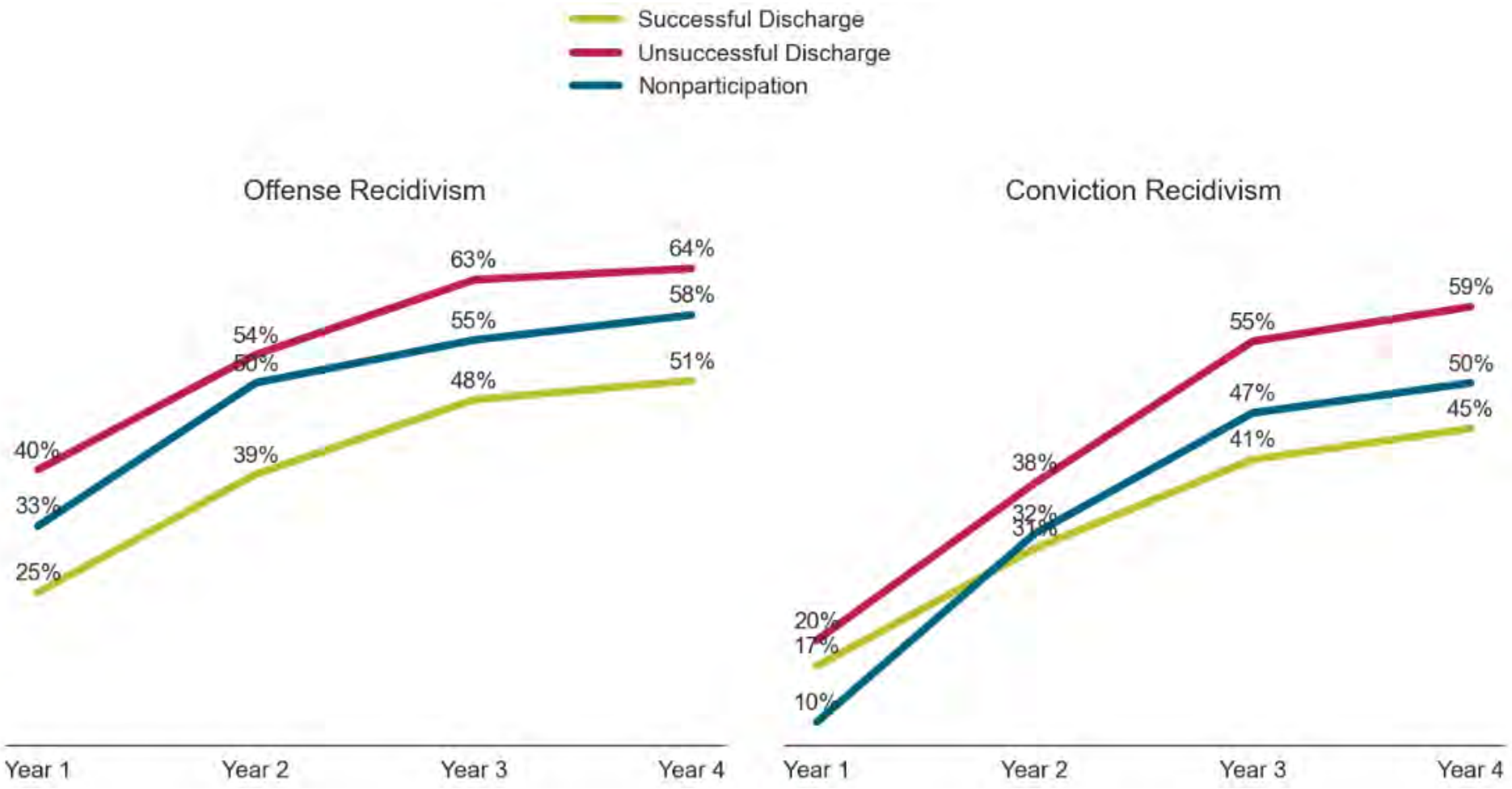
# Outcome Variable: Recidivism

**Two Binary Recidivism Measures (3-Year Cumulative):**

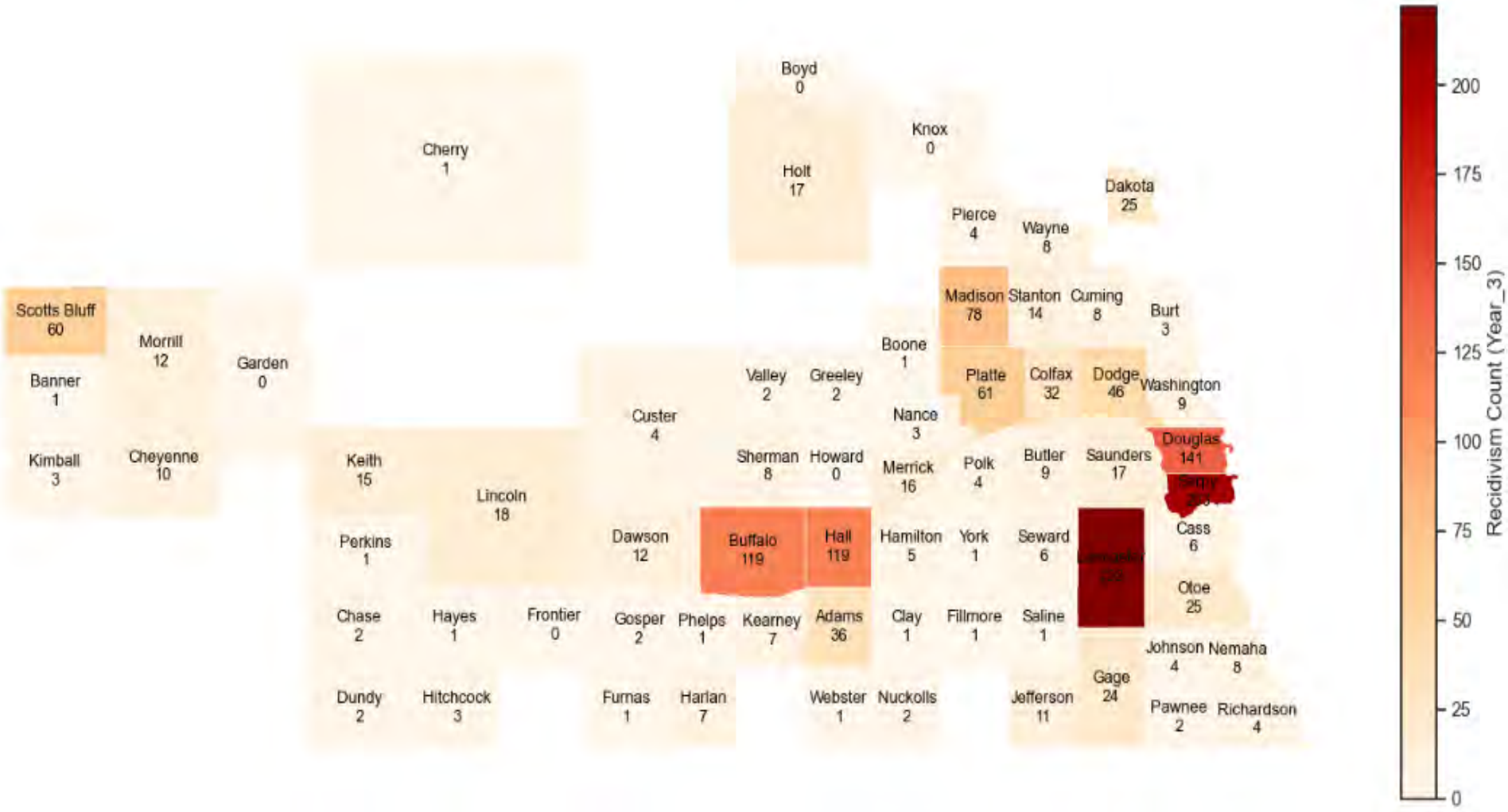
1. **Offense/Arrest**
   (excluding infractions/traffic violations)

2. **Conviction**
   (guilty disposition)

# Recidivism Trends



# Geography of Recidivism: Three-Year Cumulative Offense Recidivism by County, N=2869



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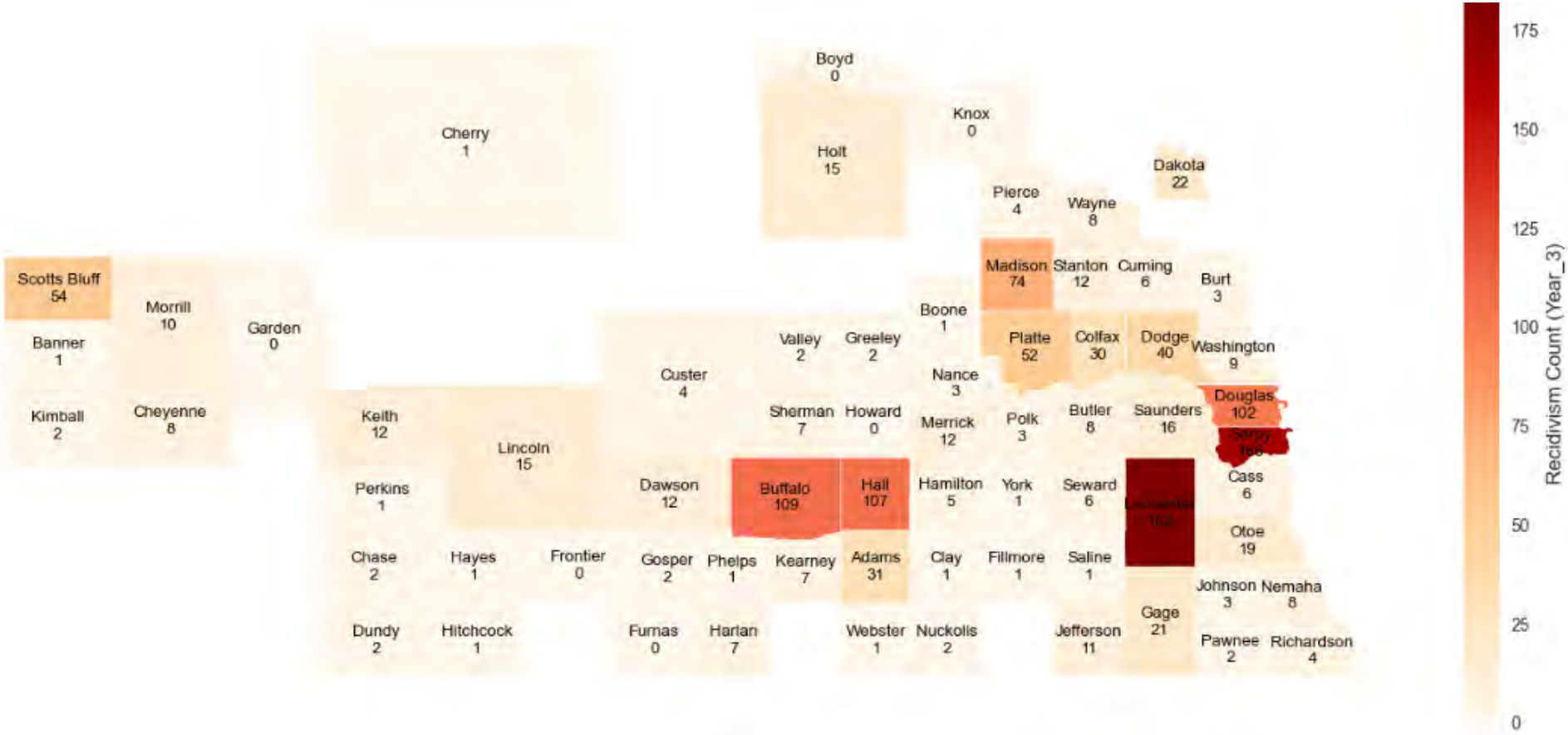
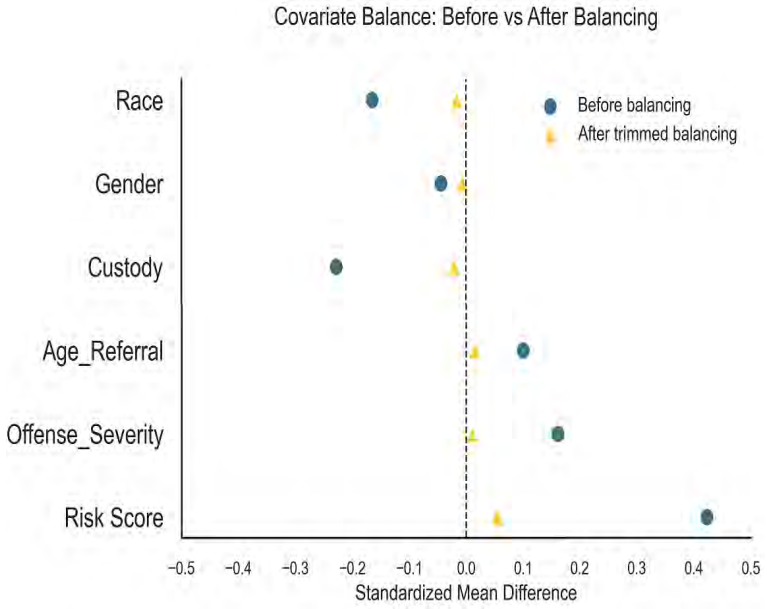


# Research Design Challenges and Methodological Strategies

**Challenge:** Selection bias in diversion program assignment

**Solution Comparison:**

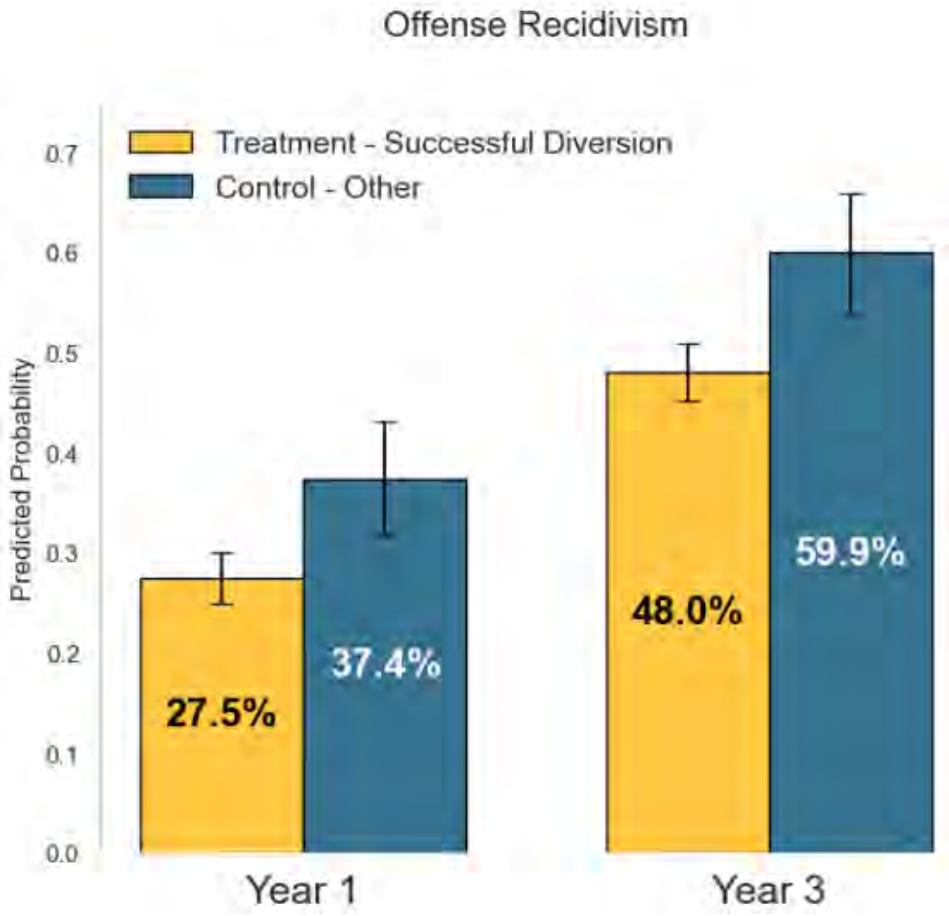
- **Propensity Score Matching:** Failed to adequately balance some covariates
- **Entropy Balancing:** Successfully achieved balance across all covariates
- Significant tract level clustering detected:
  - Null Model ICC: 17-20 %
- **Final Approach:** Mixed-effects logistic regression with entropy-balanced data



# Empirical Results: Successful Diversion Completion and Offense Recidivism

## Successful diversion completion

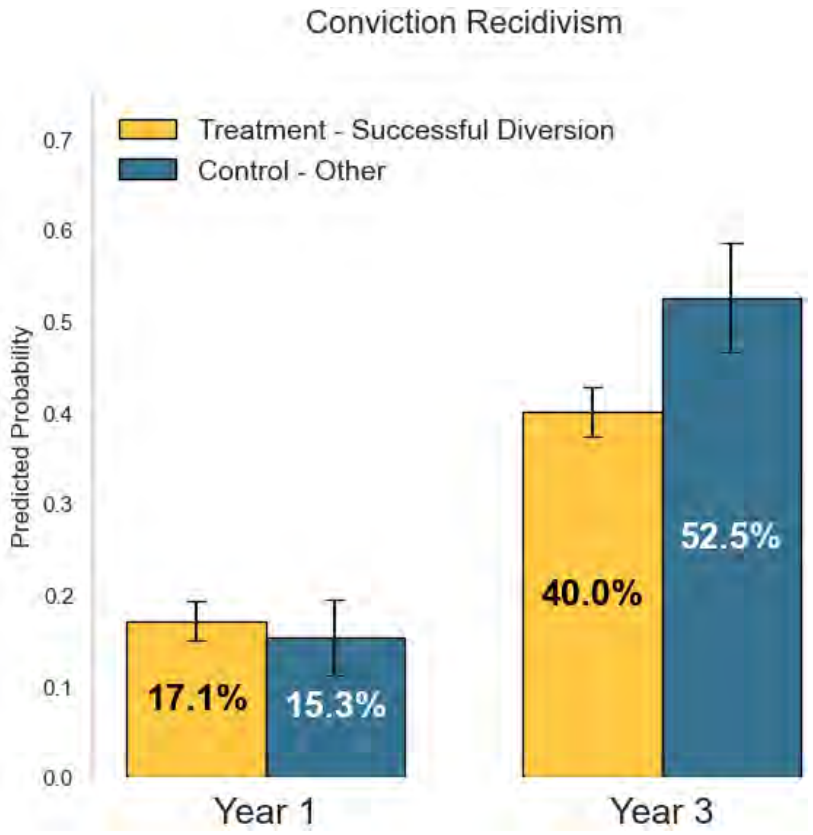
- reduces the probability of recidivism by **10 percentage points** in **Year 1** and **11 percentage points in Year 3**
- prevented an additional ~ **116-187** youth from reoffending
- reduces the relative risk of recidivism by **27%** & **20%** at Years 1 and 3
- has **sustained** protective effects; i.e. no evidence of "catch-up" recidivism



# Empirical Results: Successful Diversion Completion and Conviction Recidivism

**Successful diversion completion exhibits**

- no immediate effect on recidivism in Year 1
- strong delayed protective effect by Year 3, reducing recidivism by about **12 percentage points**
- prevented an additional ~ **199 youth** from further court involvement
- **24% relative risk reduction** for convictions at Year 3
- **delayed effect** pattern (unlike offense recidivism, conviction benefits emerge over time rather than immediately



# Model Results: Covariate Effects and Cross Level Interactions

**Level-1 Effects:** Race, gender and age increase the probability of immediate and longer- term **offense** recidivism

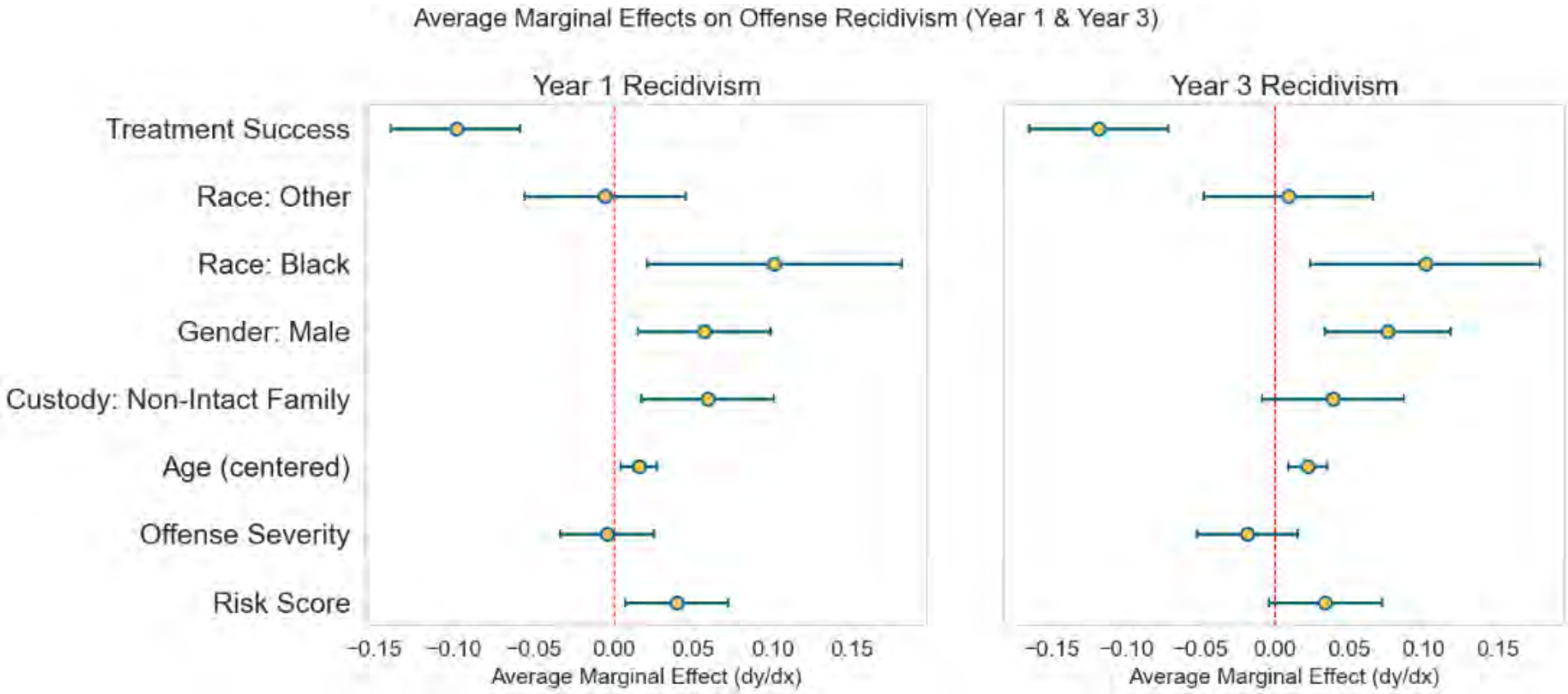
**Level-2 Effects:** No census-tract variables independently affect recidivism in statistically significant terms

**Interaction Effects:**

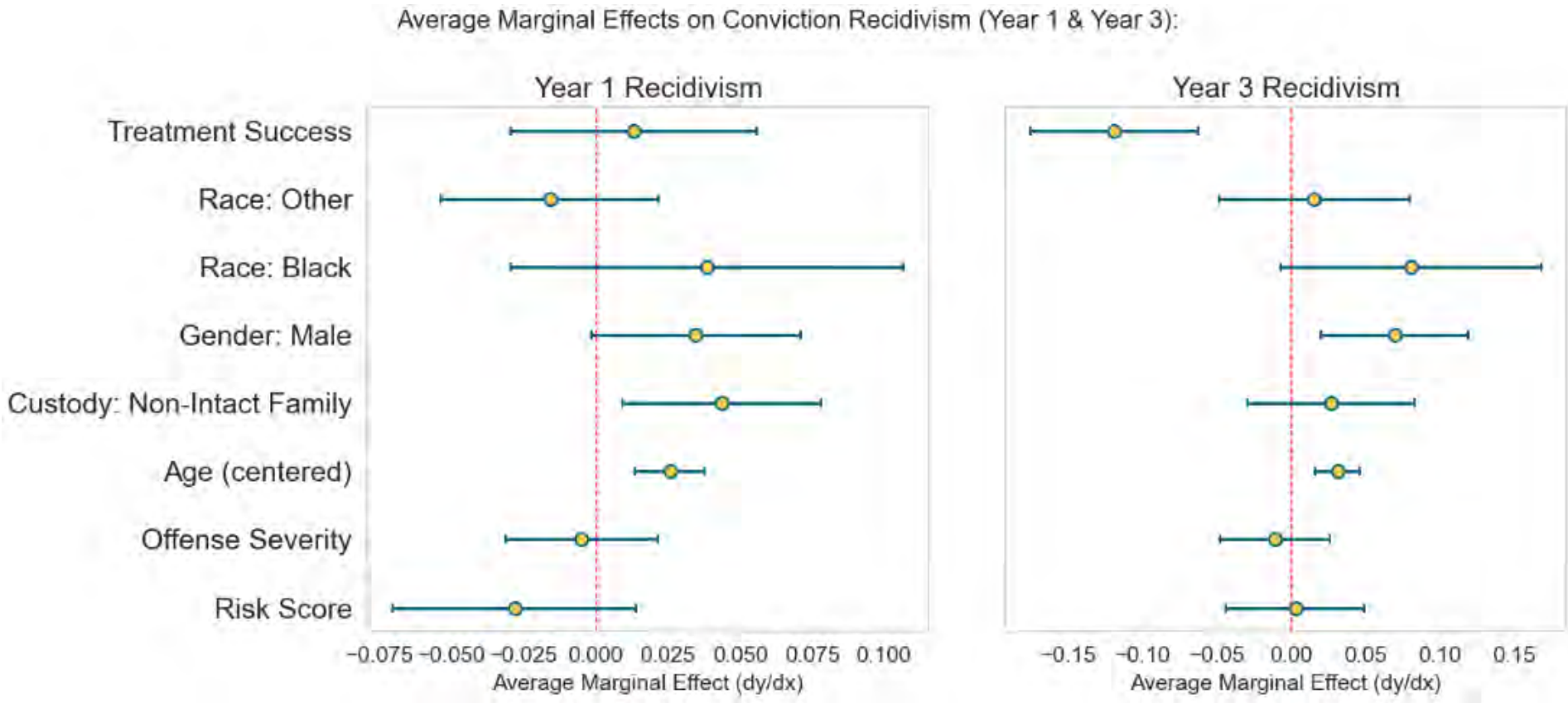
- Cross-level interactions are not statistically significant
- Adding interactions made some Level-1 effects non-significant
- Evidence of complex, context-dependent relationships

**Robust Finding:** Treatment effect is consistently significant across models, except for Year 1 conviction recidivism.

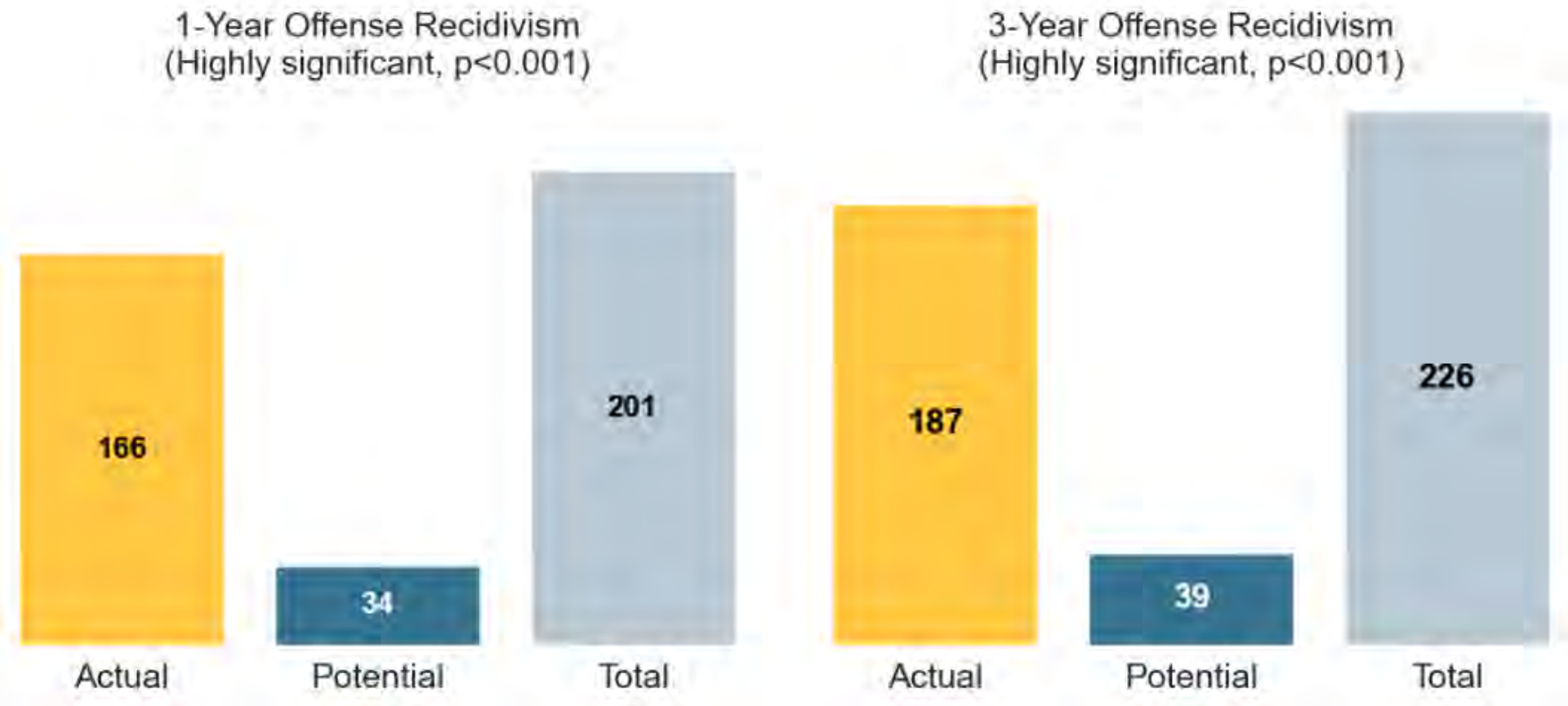
# Offense Recidivism (Year 1 and Year 3)
# 1092 youth clustered in 443 census tracts



## Conviction Recidivism (Year 1 and Year 3)
## 2010 youth clustered in 471 census tracts



# Offense Recidivism: Actual, Potential & Total Potential Benefit



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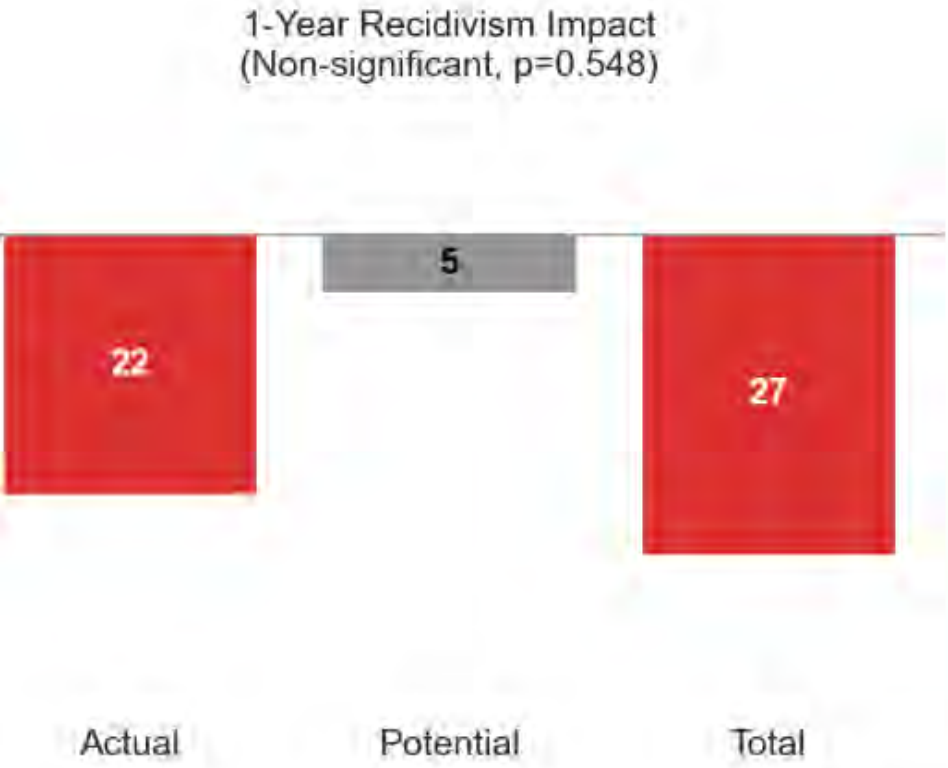
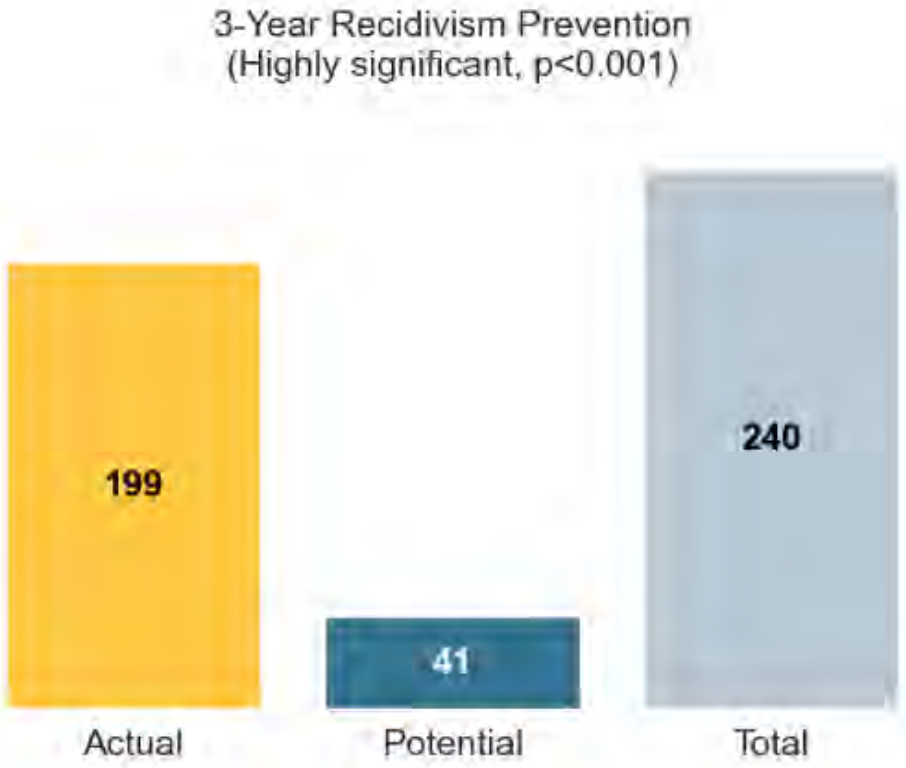
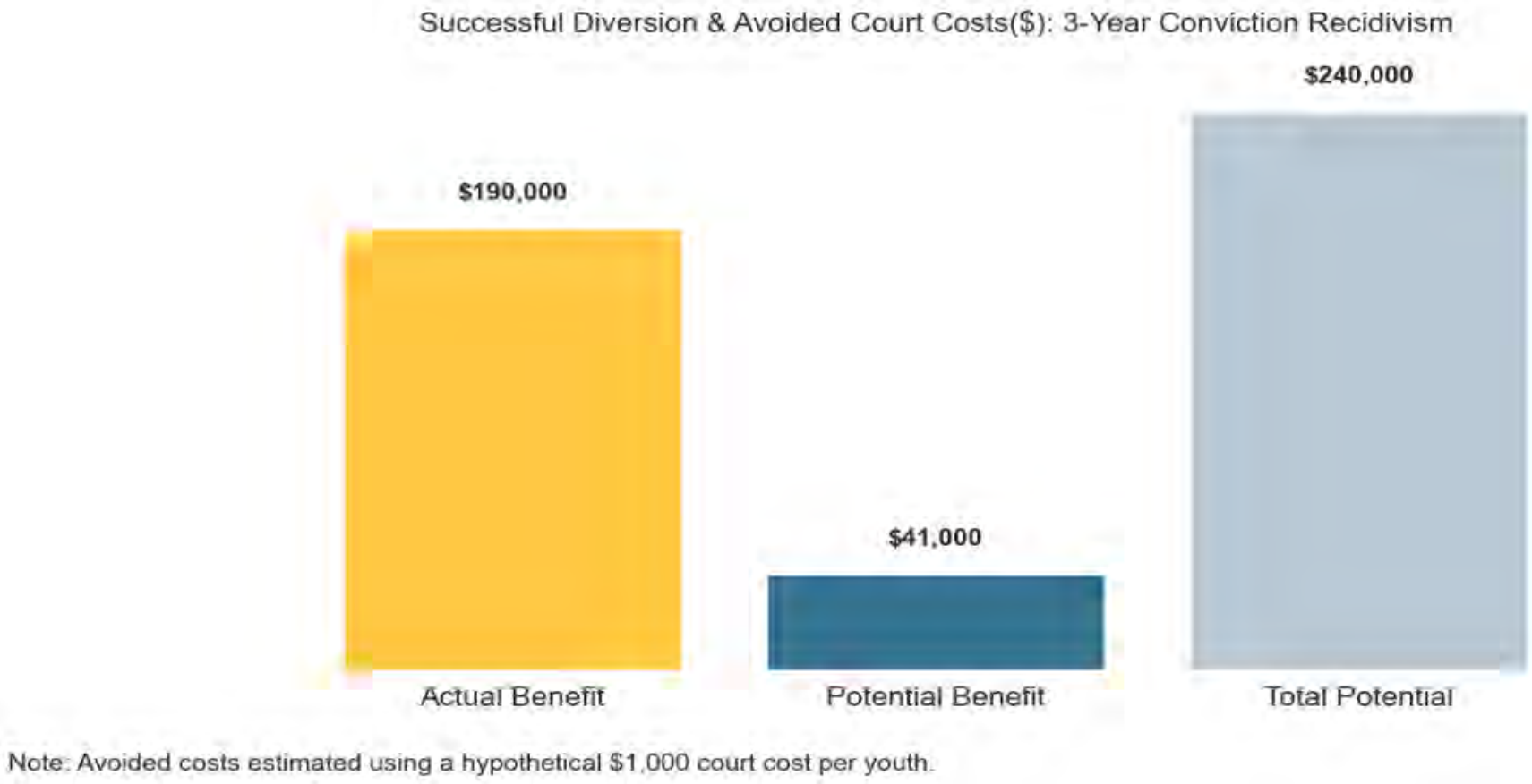


# Cost Implications: Three -Year Conviction Recidivism




Note: Avoided costs estimated using a hypothetical $1,000 court cost per youth.

# Conclusions

Successful completion of diversion

- significantly reduces offense and conviction recidivism
- has longer-term protective effect
- as it applies to reducing conviction recidivism, takes time to show full impact

Programs need to invest in improving completion rates

Neighborhood context matters - some tracts have very high recidivism rates, others are much more protective

# Limitations of the Study

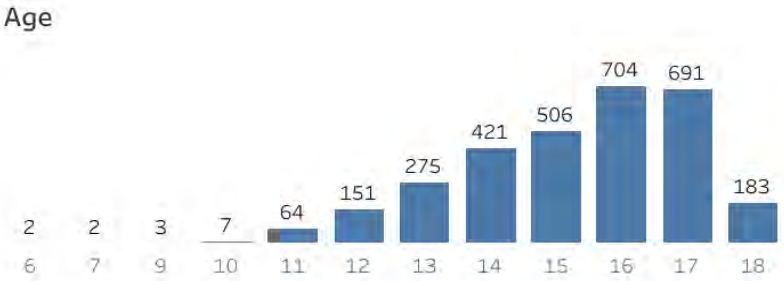
- Observational study
  - Potential for unmeasured individual and contextual confounders
- Missing case level data(risk score, custody, family income)
- 3-year follow-up period

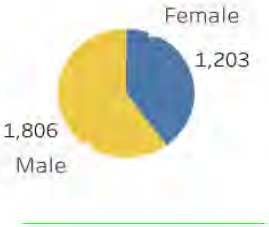
# Future Research

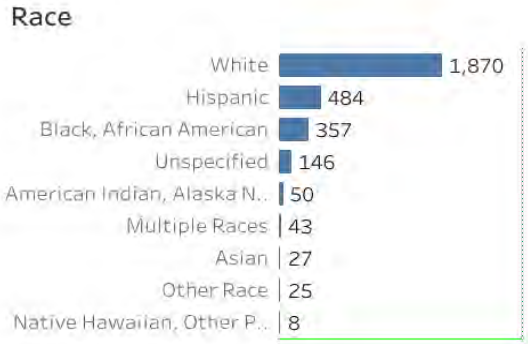
- Longer-term follow-up
- Further explore the effect of contextual factors
- Compare effectiveness of diversion vs. probation
- Cost-benefit analysis refinement

# Appendix

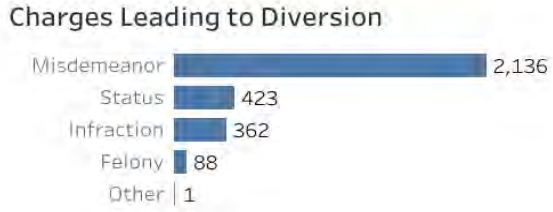
# Original 2021 Diversion Discharge Data:

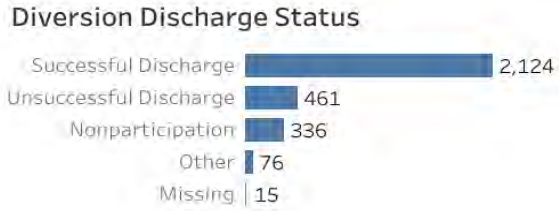






# Not All Tracts Are Equal: Average offense & conviction recidivism by census tract and year

## Model Diagnostics: Multicollinearity Assessment

```
 vif

    Variable |       VIF        1/VIF
-------------+----------------------
treat_succ~s |      1.00     0.999351
Race1_reco~d |
           2 |      1.06     0.944191
           3 |      1.14     0.874624
2.Gender_e~d |      1.00     0.996013
2.custody_~d |      1.02     0.976338
       Age_c |      1.02     0.978536
offense_se~c |      1.02     0.980982
risk_score_c |      1.09     0.914845
-------------+----------------------
    Mean VIF |      1.05
```

# Bivariate Model: 3 Year Conviction Recidivism

```
Mixed-effects logistic regression               Number of obs     =      2,010
Group variable: GEOID20Censu~t                  Number of groups  =        471

                                                Obs per group:
                                                              min =          1
                                                              avg =        4.3
                                                              max =         31

Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(1)      =      14.47
Log pseudolikelihood = -2058.6772               Prob > chi2       =     0.0001
                          (Std. err. adjusted for 471 clusters in GEOID20CensusTract)
------------------------------------------------------------------------------
                     |               Robust
      Year_3_dummy | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-------------------+----------------------------------------------------------------
     treat_success |  -.6626427   .1741703    -3.80   0.000     -1.00401   -.3212753
             _cons |   .1468897    .162275     0.91   0.365    -.1711635    .4649429
-------------------+----------------------------------------------------------------
GEOID20CensusTract |
         var(_cons)|   1.836452    .274224                      1.37049    2.460839
------------------------------------------------------------------------------
```

# Null Model: Clustering Detected

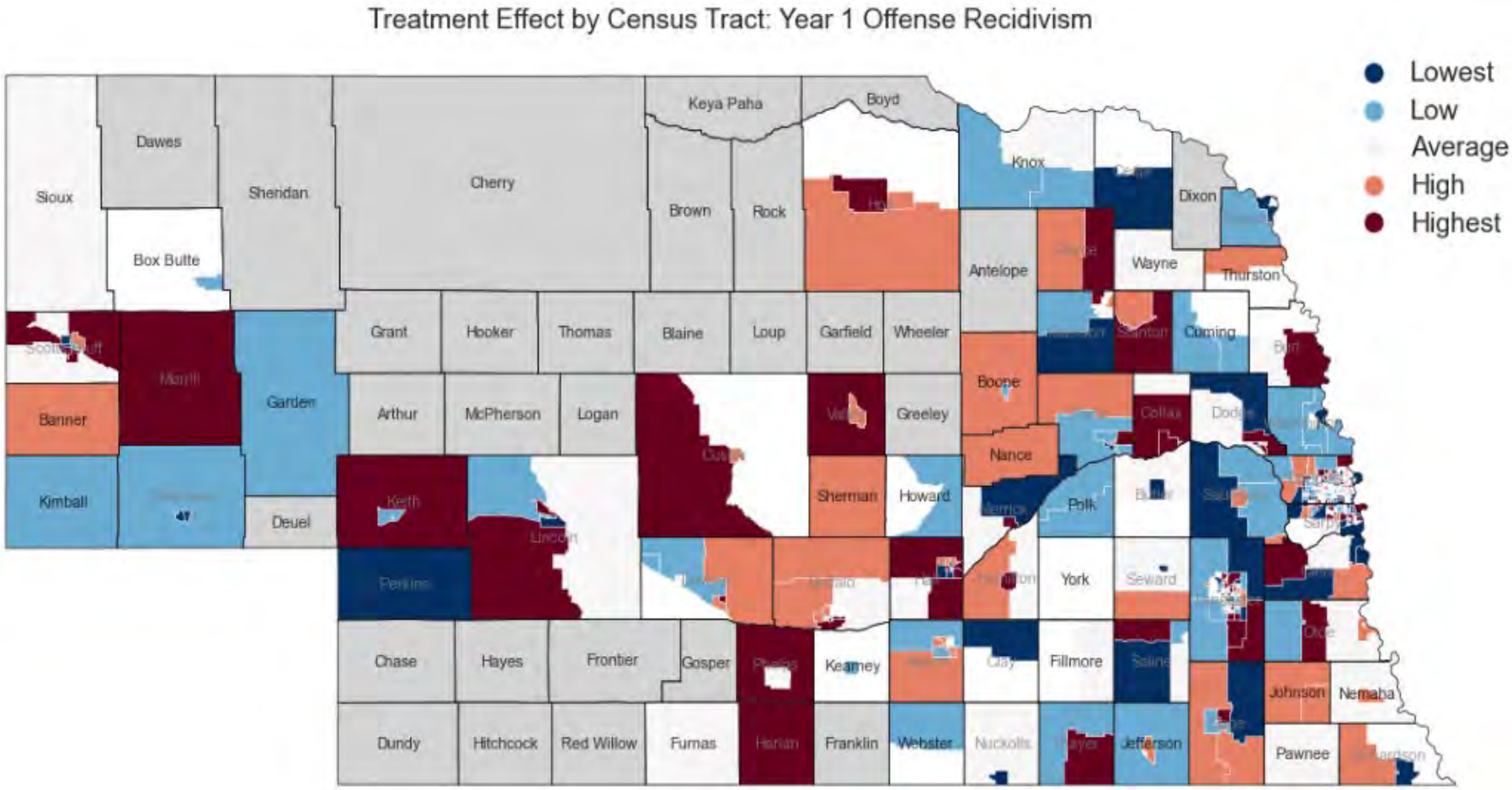
```
Mixed-effects logistic regression               Number of obs     =      2,636
Group variable: GEOID20Censu~t                  Number of groups  =        466

                                                Obs per group:
                                                              min =          1
                                                              avg =        5.7
                                                              max =         48

Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(0)      =          .
Log pseudolikelihood = -2285.4947               Prob > chi2       =          .
                         (Std. err. adjusted for 466 clusters in GEOID20CensusTract)
------------------------------------------------------------------------------
                     |               Robust
      Year_1_dummy | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-------------------+----------------------------------------------------------------
             _cons |  -1.030139   .0697193   -14.78   0.000    -1.166786   -.8934915
-------------------+----------------------------------------------------------------
GEOID20CensusTract |
         var(_cons)|   .8680801    .134995                      .6400141    1.177416
------------------------------------------------------------------------------
------------------------------------------------------------------------------
                       Level |        ICC   Std. err.     [95% conf. interval]
-----------------------------+------------------------------------------------
          GEOID20CensusTract |   .2087761   .0256885      .1628584    .2635642
------------------------------------------------------------------------------
```

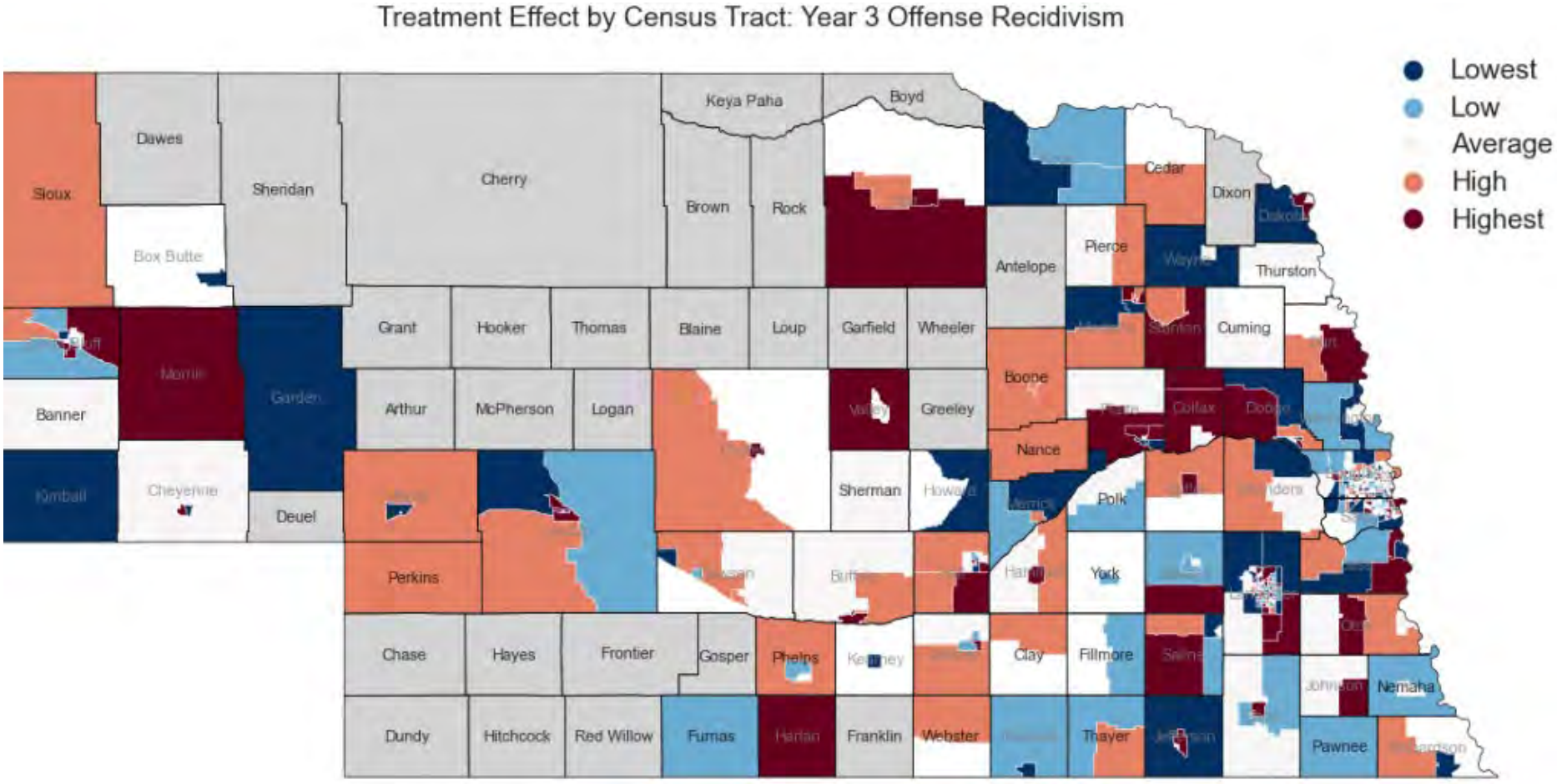
# Census Tract Level Variables, 3 Year Conviction Recidivism: Non -Significant Effect

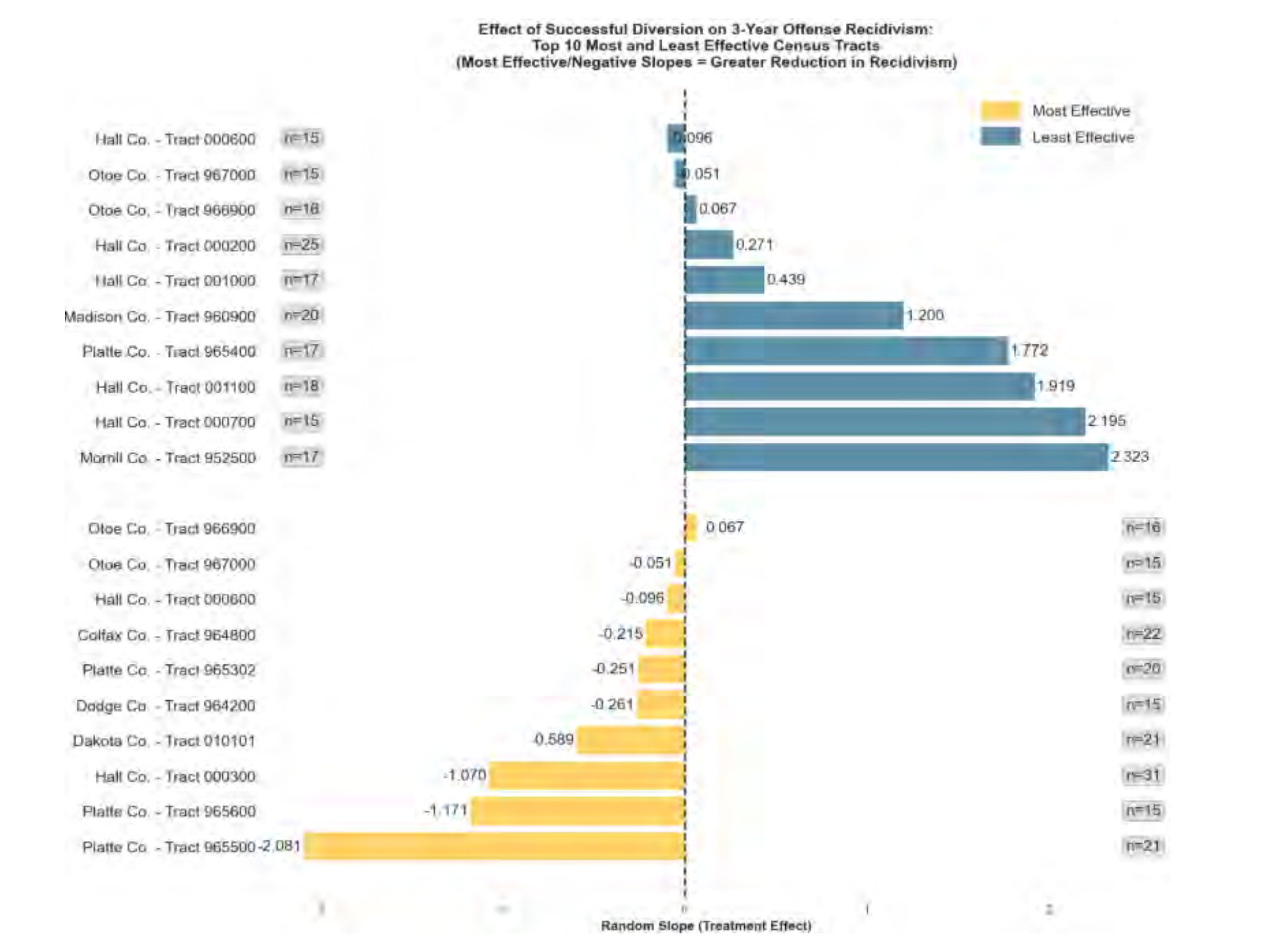
```
Mixed-effects logistic regression               Number of obs     =      1,980
Group variable: GEOID20Censu~t                  Number of groups  =        443

                                                Obs per group:
                                                              min =          1
                                                              avg =        4.5
                                                              max =         31

Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(11)     =      43.31
Log pseudolikelihood = -1969.94                 Prob > chi2       =     0.0000
                          (Std. err. adjusted for 443 clusters in GEOID20CensusTract)
------------------------------------------------------------------------------
                             |               Robust
               Year_3_dummy  | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-----------------------------+------------------------------------------------------------------
            treat_success    |  -.8373853    .199709    -4.19   0.000    -1.228808   -.4459628
                             |
            Race1_recoded    |
                    Other    |   .1188954   .2236357     0.53   0.595    -.3194226    .5572133
                    Black    |   .5625695   .3114914     1.81   0.071    -.0479425    1.173081
                             |
          Gender_encoded     |
                     Male    |   .4447832   .1702381     2.61   0.009     .1111226    .7784437
                             |
         custody_recoded     |
      Non-Intact Family      |   .1901804   .1940663     0.98   0.327    -.1901826    .5705433
                   Age_c     |   .2087183   .0525412     3.97   0.000     .1057395    .3116971
      offense_severity_c     |  -.0850019   .1260832    -0.67   0.500    -.3321203    .1621166
            risk_score_c     |   .0130057   .1581947     0.08   0.934    -.2970502    .3230615
       Unemployment_Rate     |  -7.050217   4.000828    -1.76   0.078     -14.8917    .7912618
    Renter_Occupied_Rate     |    .319842   .6788551     0.47   0.638     -1.01069    1.650374
LessThanHighSchool_Rate      |    .486444   1.259303     0.39   0.699    -1.981744    2.954632
                     _cons   |  -.1311597   .3345045    -0.39   0.695    -.7867765     .524457
-----------------------------+------------------------------------------------------------------
GEOID20CensusTract           |
      var(treat_success)     |   1.492583   .5046572                      .769376    2.895598
             var(_cons)      |   2.914153   .5621835                     1.996655    4.253259
------------------------------------------------------------------------------
```

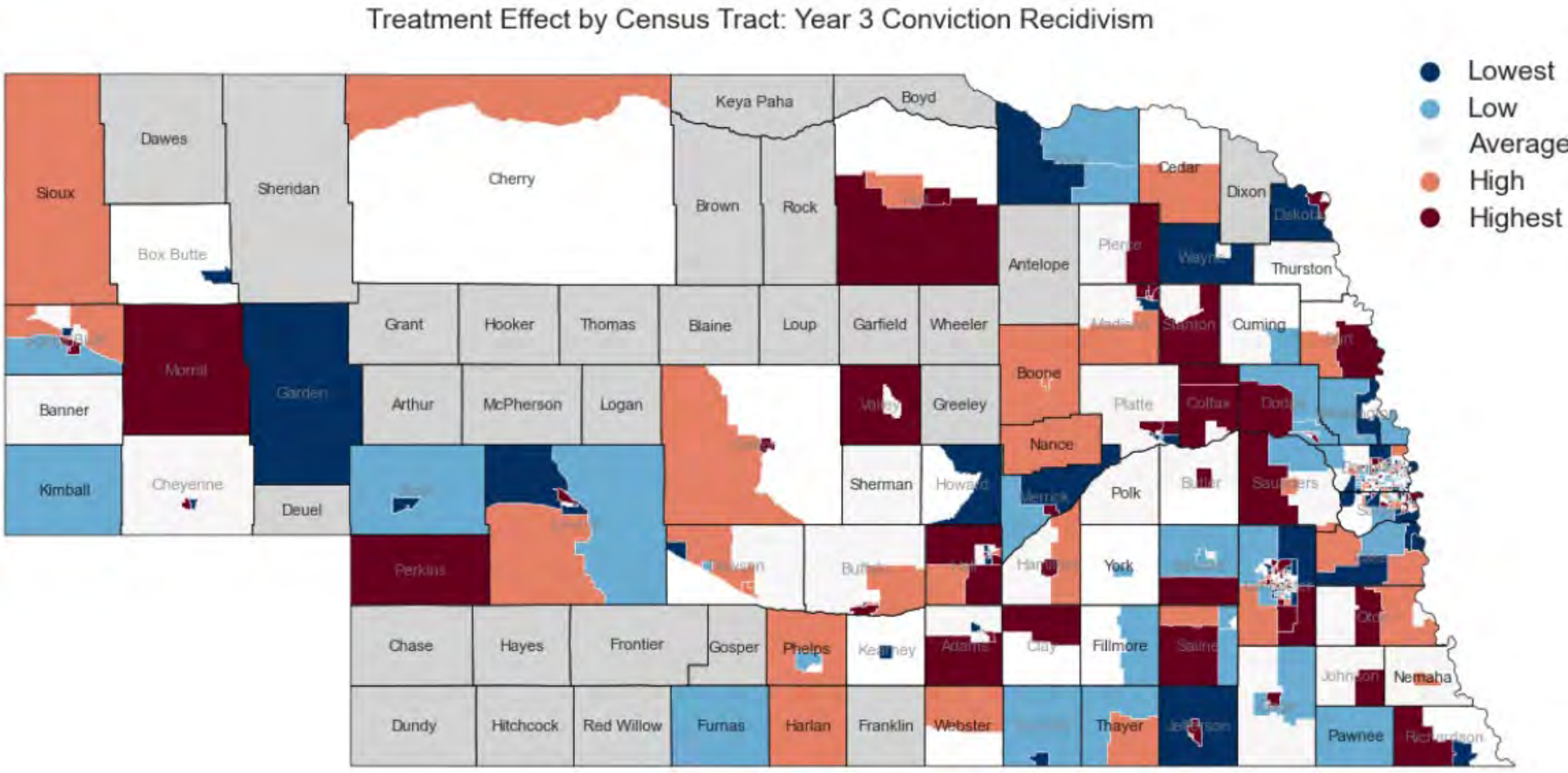
## Interacting Contextual and Individual Variables(3-Year Conviction Recidivism): Non-Significant Effect

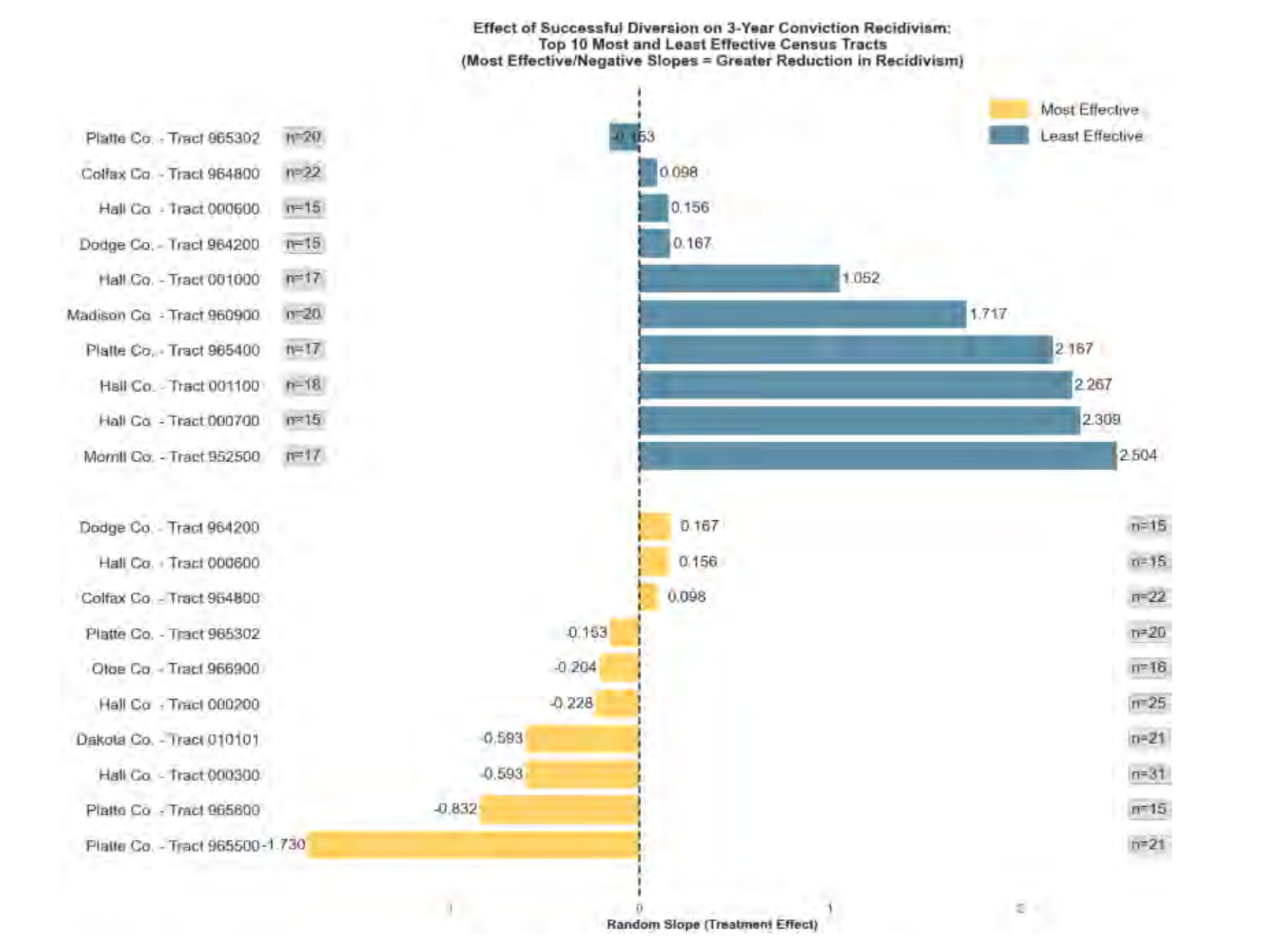
```
Mixed-effects logistic regression               Number of obs      =      1,980
Group variable: GEOID20Censu~t                  Number of groups   =        443

                                                Obs per group:
                                                              min =          1
                                                              avg =        4.5
                                                              max =         31

Integration method: mvaghermite                 Integration pts.   =          7

                                                Wald chi2(17)      =      58.34
Log pseudolikelihood = -1960.7789               Prob > chi2        =     0.0000
                          (Std. err. adjusted for 443 clusters in GEOID20CensusTract)
------------------------------------------------------------------------------
                             |               Robust
               Year_3_dummy | Coefficient  std. err.      z    P>|z|     [95% conf. interval]
-----------------------------+------------------------------------------------------------------
             treat_success |  -.8840165   .2044259    -4.32   0.000    -1.284684   -.4833491
                           |
             Race1_recoded |
                     Other |   .5593767    .596017     0.94   0.348    -.6087951    1.727549
                     Black |   .3555725   .6936831     0.51   0.608    -1.004021    1.715166
                           |
           Gender_encoded |
                      Male |   .4338859   .1757482     2.47   0.014     .0894257     .778346
                           |
          custody_recoded |
       Non-Intact Family   |   .1810304   .1938368     0.93   0.350    -.1988828    .5609435
                   Age_c   |   .2172595   .0524785     4.14   0.000     .1144036    .3201155
       offense_severity_c  |  -.0941695   .1277423    -0.74   0.461    -.3445399    .1562009
             risk_score_c  |   .0151197   .1642962     0.09   0.927     -.306895    .3371344
        Unemployment_Rate  |  -14.91059   6.393981    -2.33   0.020    -27.44257   -2.378622
    Renter_Occupied_Rate   |   1.249439   .9467948     1.32   0.187    -.6062447    3.105123
LessThanHighSchool_Rate    |   .2765258   1.765011     0.16   0.876    -3.182832    3.735884
             race2_x_unemp |   10.11396   8.945057     1.13   0.258     -7.41803    27.64595
             race3_x_unemp |   15.61945   10.08837     1.55   0.122    -4.153397    35.39229
            race2_x_renter |  -3.055333   1.527975    -2.00   0.046     -6.05011   -.0605573
            race3_x_renter |  -.2603316   2.070344    -0.13   0.900    -4.318132    3.797468
              race2_x_lths |   1.621734    1.95776     0.83   0.407    -2.215404    5.458872
              race3_x_lths |  -2.718321   4.053278    -0.67   0.502     -10.6626    5.225957
                     _cons |  -.1024928   .3939435    -0.26   0.795    -.8746079    .6696223
-----------------------------+------------------------------------------------------------------
GEOID20CensusTract           |
      var(treat_success)|    1.638581   .5505677                      .848129    3.165731
             var(_cons)|     3.228508   .6287732                     2.204067    4.729105
------------------------------------------------------------------------------
```


Treatment Effect by Census Tract: Year 1 Offense Recidivism
Lowest
Low
Average
High
Highest
Sioux
Dawes
Sheridan
Cherry
Keya Paha
Boyd
Brown
Rock
Knox
Dixon
Box Butte
Antelope
Wayne
Thurston
Grant
Hooker
Thomas
Blaine
Loup
Garfield
Wheeler
Boone
Cuming
Banner
Morrill
Garden
Arthur
McPherson
Logan
Greeley
Nance
Kimball
Deuel
Keith
Sherman
Howard
Polk
Perkins
Lincoln
York
Seward
Chase
Hayes
Frontier
Gosper
Kearney
Fillmore
Johnson
Nemaha
Dundy
Hitchcock
Red Willow
Furnas
Franklin
Webster
Jefferson
Pawnee


Treatment Effect by Census Tract: Year 3 Offense Recidivism
Lowest
Low
Average
High
Highest
Sioux
Dawes
Sheridan
Cherry
Keya Paha
Boyd
Brown
Rock
Box Butte
Antelope
Pierce
Cedar
Dixon
Thurston
Cuming
Grant
Hooker
Thomas
Blaine
Loup
Garfield
Wheeler
Boone
Nance
Banner
Garden
Arthur
McPherson
Logan
Greeley
Sherman
Howard
Polk
Kimball
Cheyenne
Deuel
Perkins
York
Chase
Hayes
Frontier
Gosper
Phelps
Clay
Fillmore
Dundy
Hitchcock
Red Willow
Furnas
Franklin
Webster
Thayer
Nemaha
Pawnee


Effect of Successful Diversion on 3-Year Offense Recidivism:
Top 10 Most and Least Effective Census Tracts
(Most Effective/Negative Slopes = Greater Reduction in Recidivism)
Most Effective
Least Effective
Hall Co. - Tract 000600 n=15
Otoe Co. - Tract 967000 n=15
Otoe Co. - Tract 966900 n=16
Hall Co. - Tract 000200 n=25
Hall Co. - Tract 001000 n=17
Madison Co. - Tract 960900 n=20
Platte Co. - Tract 965400 n=17
Hall Co. - Tract 001100 n=18
Hall Co. - Tract 000700 n=15
Morrill Co. - Tract 952500 n=17
0.096
0.051
0.067
0.271
0.439
1.200
1.772
1.919
2.195
2.323
Otoe Co. - Tract 966900 n=16
Otoe Co. - Tract 967000 n=15
Hall Co. - Tract 000600 n=15
Colfax Co. - Tract 964800 n=22
Platte Co. - Tract 965302 n=20
Dodge Co. - Tract 964200 n=15
Dakota Co. - Tract 010101 n=21
Hall Co. - Tract 000300 n=31
Platte Co. - Tract 965600 n=15
Platte Co. - Tract 965500 n=21
0.067
-0.051
-0.096
-0.215
-0.251
-0.261
-0.589
-1.070
-1.171
-2.081
Random Slope (Treatment Effect)


Treatment Effect by Census Tract: Year 3 Conviction Recidivism
Lowest
Low
Average
High
Highest
Sioux
Dawes
Sheridan
Cherry
Keya Paha
Boyd
Brown
Rock
Box Butte
Antelope
Cedar
Dixon
Thurston
Grant
Hooker
Thomas
Blaine
Loup
Garfield
Wheeler
Morrill
Garden
Banner
Arthur
McPherson
Logan
Greeley
Boone
Platte
Nance
Kimball
Cheyenne
Deuel
Sherman
Howard
Polk
Perkins
York
Chase
Hayes
Frontier
Gosper
Phelps
Fillmore
Dundy
Hitchcock
Red Willow
Furnas
Harlan
Franklin
Webster
Thayer
Johnson
Nemaha
Pawnee
Richardson
Cuming
Wayne
Dakota


Effect of Successful Diversion on 3-Year Conviction Recidivism:
Top 10 Most and Least Effective Census Tracts
(Most Effective/Negative Slopes = Greater Reduction in Recidivism)
Most Effective
Least Effective
Platte Co. - Tract 965302 n=20
Colfax Co. - Tract 964800 n=22
Hall Co. - Tract 000600 n=15
Dodge Co. - Tract 964200 n=15
Hall Co. - Tract 001000 n=17
Madison Co. - Tract 960900 n=20
Platte Co. - Tract 965400 n=17
Hall Co. - Tract 001100 n=18
Hall Co. - Tract 000700 n=15
Morrill Co. - Tract 952500 n=17
-0.153
0.098
0.156
0.167
1.052
1.717
2.167
2.267
2.309
2.504
Dodge Co. - Tract 964200 n=15
Hall Co. - Tract 000600 n=15
Colfax Co. - Tract 964800 n=22
Platte Co. - Tract 965302 n=20
Otoe Co. - Tract 966900 n=16
Hall Co. - Tract 000200 n=25
Dakota Co. - Tract 010101 n=21
Hall Co. - Tract 000300 n=31
Platte Co. - Tract 965600 n=15
Platte Co. - Tract 965500 n=21
0.167
0.156
0.098
-0.153
-0.204
-0.228
-0.593
-0.593
-0.832
-1.730
0
Random Slope (Treatment Effect)