# 4. Results

## Contents

A summary is shown in Table 1 and 2

Table 1: Summary of 1000 Simulated Mendelian Randomisation Studies With Null Causal Effect

| N | Proportion of Invalid IVs | F | $R^2$ | Weighted Median | | MR Hevo | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| | | | | Mean Estimate (Mean SE) | Positive Rate | Mean Estimate (Mean SE) | Positive Rate |
| Scenario 1: Balanced pleiotropy, InSIDE assumption satisfied | | | | | | | |
| 10,000 | 0.1 | 6.9 | 1.7% | -0.001 (0.101) | 0.015 | 0.000 (0.001) | 0.007 |
| 10,000 | 0.2 | 8.2 | 2% | 0.002 (0.105) | 0.013 | 0.002 (0.002) | 0.008 |
| 10,000 | 0.3 | 11.1 | 2.7% | -0.003 (0.112) | 0.029 | -0.002 (0.002) | 0.006 |
| Scenario 2: Directional pleiotropy, InSIDE assumption satisfied | | | | | | | |
| 10,000 | 0.1 | 6.9 | 1.7% | 0.014 (0.101) | 0.017 | 0.033 (0.001) | 0.016 |
| 10,000 | 0.2 | 8.2 | 2% | 0.033 (0.106) | 0.019 | 0.083 (0.002) | 0.032 |
| 10,000 | 0.3 | 11.1 | 2.7% | 0.064 (0.112) | 0.063 | 0.163 (0.003) | 0.114 |

IV: Instumental Variable, SE: Standard Error
Data from 1000 Simulated Mendelian Randomisation Studies
Null Causal Effect ($\beta = 0$)

Table 2: Summary of 1000 Simulated Mendelian Randomisation Studies With Positive Causal Effect

| N | Proportion of Invalid IVs | F | $R^2$ | Weighted Median | | MR Hevo | |
| | | | | Mean Estimate (Mean SE) | Positive Rate | Mean Estimate (Mean SE) | Positive Rate |
|---|---|---|---|---|---|---|---|
| Scenario 1: Balanced pleiotropy, InSIDE assumption satisfied | | | | | | | |
| 10,000 | 0.1 | 6.9 | 1.7% | 0.028 (0.102) | 0.024 | 0.041 (0.001) | 0.020 |
| 10,000 | 0.2 | 8.2 | 2% | 0.030 (0.106) | 0.029 | 0.043 (0.002) | 0.020 |
| 10,000 | 0.3 | 11.1 | 2.7% | 0.024 (0.112) | 0.032 | 0.040 (0.002) | 0.011 |
| 20,000 | 0.1 | 19.1 | 2.3% | 0.032 (0.075) | 0.032 | 0.042 (0.001) | 0.025 |
| 20,000 | 0.2 | 13.9 | 1.7% | 0.033 (0.077) | 0.039 | 0.046 (0.001) | 0.021 |
| 20,000 | 0.3 | 19.0 | 2.3% | 0.029 (0.081) | 0.038 | 0.043 (0.002) | 0.018 |
| Scenario 2: Directional pleiotropy, InSIDE assumption satisfied | | | | | | | |
| 10,000 | 0.1 | 6.9 | 1.7% | 0.043 (0.102) | 0.030 | 0.074 (0.001) | 0.052 |
| 10,000 | 0.2 | 8.2 | 2% | 0.062 (0.107) | 0.046 | 0.127 (0.002) | 0.105 |
| 10,000 | 0.3 | 11.1 | 2.7% | 0.091 (0.113) | 0.087 | 0.209 (0.003) | 0.234 |
| 20,000 | 0.1 | 19.1 | 2.3% | 0.044 (0.075) | 0.044 | 0.064 (0.001) | 0.062 |
| 20,000 | 0.2 | 13.9 | 1.7% | 0.060 (0.077) | 0.084 | 0.100 (0.001) | 0.122 |
| 20,000 | 0.3 | 19.0 | 2.3% | 0.080 (0.082) | 0.126 | 0.158 (0.002) | 0.220 |
| Scenario 3: Directional pleiotropy, InSIDE assumption not satisfied | | | | | | | |
| 10,000 | 0.1 | 8.5 | 2.1% | 0.096 (0.106) | 0.115 | 0.086 (0.001) | 0.072 |
| 10,000 | 0.2 | 22.0 | 5.2% | 0.192 (0.112) | 0.297 | 0.157 (0.003) | 0.186 |
| 10,000 | 0.3 | 10.3 | 2.5% | 0.321 (0.119) | 0.498 | 0.306 (0.004) | 0.403 |

IV: Instumental Variable, SE: Standard Error
Data from 1000 Simulated Mendelian Randomisation Studies
Positive Causal Effect (β = 0.1)

```
##
## CHECKING DATA AND PREPROCESSING FOR MODEL 'MRHevo.summarystats' NOW.
##
## COMPILING MODEL 'MRHevo.summarystats' NOW.
##
## STARTING SAMPLER FOR MODEL 'MRHevo.summarystats' NOW.


##
## CHECKING DATA AND PREPROCESSING FOR MODEL 'MRHevo.summarystats' NOW.
##
## COMPILING MODEL 'MRHevo.summarystats' NOW.
##
## STARTING SAMPLER FOR MODEL 'MRHevo.summarystats' NOW.
```

```
## # A tibble: 2 x 7
##       N WME_Av WME_SE Hevo_Av Hevo_SE Hevo_Causal citation
##   <int>  <dbl>  <dbl>   <dbl>   <dbl> <lgl>       <chr>
## 1     1  0.386  0.228   0.227   0.004 FALSE       [@bowden_consistent_2016]
## 2     2  0.386  0.228   0.227   0.004 FALSE       [@bowden_consistent_2016]
```

Table reference[1]

Word count: 20

1.  Bowden J, Smith GD, Haycock PC, Burgess S. Consistent Estimation in Mendelian Randomization with Some Invalid Instruments Using a Weighted Median Estimator. Genetic Epidemiology [Internet]. 2016 Apr [cited 2024 Oct 22];40(4):304. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC4849733/