

## 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

<i>N</i>	Proportion of Invalid IVs	<i>F</i>	<i>R</i> <sup>2</sup>	Weighted		MR	
				Median		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
20,000	0.1	19.1	2.3%	0.000 (0.074)	0.015	-0.001 (0.001)	0.003
20,000	0.2	13.9	1.7%	0.002 (0.076)	0.018	0.002 (0.001)	0.005
20,000	0.3	19.0	2.3%	-0.003 (0.08)	0.020	-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
Scenario 3: Directional pleiotropy, InSIDE assumption not satisfied							
10,000	0.1	8.5	2.1%	0.068 (0.105)	0.089	0.044 (0.001)	0.016
10,000	0.2	22.0	5.2%	0.165 (0.112)	0.245	0.114 (0.003)	0.089
10,000	0.3	10.3	2.5%	0.299 (0.119)	0.457	0.266 (0.005)	0.305

IV: Instrumental 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 <sup>2</sup>	Weighted		MR	
				Median		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)	2.4	0.041 (0.001)	2.0
10,000	0.2	8.2	2%	0.030 (0.106)	2.9	0.043 (0.002)	2.0
10,000	0.3	11.1	2.7%	0.024 (0.112)	3.2	0.040 (0.002)	1.1
20,000	0.1	19.1	2.3%	0.032 (0.075)	3.2	0.042 (0.001)	2.5
20,000	0.2	13.9	1.7%	0.033 (0.077)	3.9	0.046 (0.001)	2.1
20,000	0.3	19.0	2.3%	0.029 (0.081)	3.8	0.043 (0.002)	1.8
Scenario 2: Directional pleiotropy, InSIDE assumption satisfied							
10,000	0.1	6.9	1.7%	0.043 (0.102)	3.0	0.074 (0.001)	5.2
10,000	0.2	8.2	2%	0.062 (0.107)	4.6	0.127 (0.002)	10.5
10,000	0.3	11.1	2.7%	0.091 (0.113)	8.7	0.209 (0.003)	23.4
20,000	0.1	19.1	2.3%	0.044 (0.075)	4.4	0.064 (0.001)	6.2
20,000	0.2	13.9	1.7%	0.060 (0.077)	8.4	0.100 (0.001)	12.2
20,000	0.3	19.0	2.3%	0.080 (0.082)	12.6	0.158 (0.002)	22.0
Scenario 3: Directional pleiotropy, InSIDE assumption not satisfied							
10,000	0.1	8.5	2.1%	0.096 (0.106)	11.5	0.086 (0.001)	7.2
10,000	0.2	22.0	5.2%	0.192 (0.112)	29.7	0.157 (0.003)	18.6
10,000	0.3	10.3	2.5%	0.321 (0.119)	49.8	0.306 (0.004)	40.3
20,000	0.1	18.8	2.3%	0.094 (0.078)	19.3	0.064 (0.001)	8.0
20,000	0.2	27.2	3.3%	0.186 (0.086)	37.0	0.113 (0.002)	14.3
20,000	0.3	32.0	3.8%	0.307 (0.092)	56.6	0.228 (0.004)	29.7

IV: Instrumental Variable, SE: Standard Error

Data from 1000 Simulated Mendelian Randomisation Studies

Positive Causal Effect ( $\beta = 0.1$ )

```
##
## 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.
```

Table 3:

N	WME_Av	WME_SE	Hevo_Av	Hevo_SE	Hevo_Causal	citation
1	0.386	0.229	0.216	0.004	FALSE	[@bowden_consistent_2016]
2	0.386	0.229	0.216	0.004	FALSE	[@bowden_consistent_2016]

##

## COMPILING MODEL 'MRHevo.summarystats' NOW.

##

## STARTING SAMPLER FOR MODEL 'MRHevo.summarystats' NOW.

Table reference<sup>1</sup>

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/>