Validate Power: d3.1

December 29, 2021

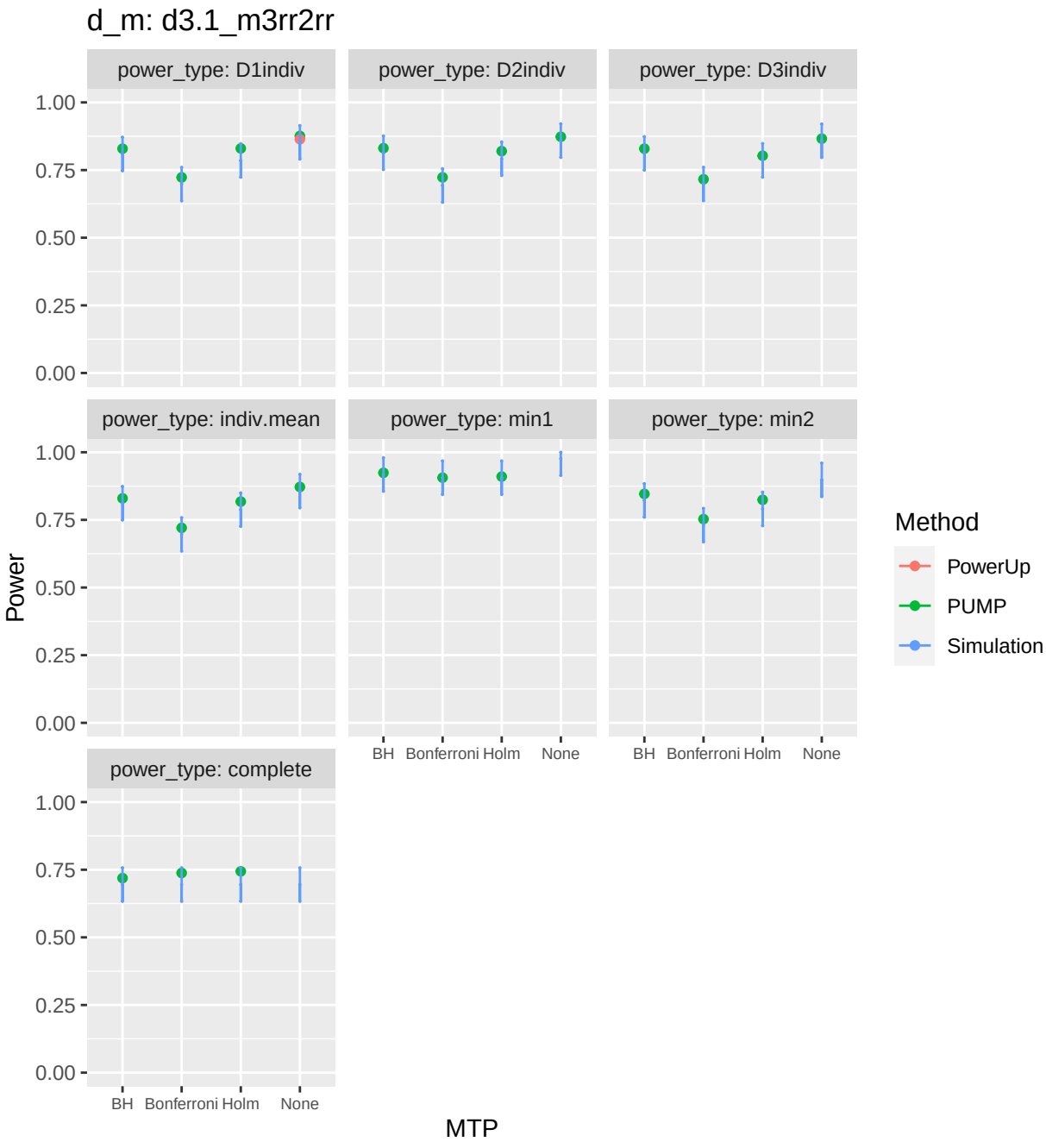
Design: Blocked RCT, with 3 levels, and randomization done at level 1 (individual level).

Models: random treatment effects.

- M = 3
- J = 30
- K = 15
- $\bar{n} = 100$ (unless otherwise noted)
- rho: $\rho = 0.5$
- MDES = 0.125, 0.125, 0.125
- R2: $R_1^2 = 0.1, 0.1, 0.1$
- ICC: $\text{ICC}_2 = 0.2, 0.2, 0.2$, $\text{ICC}_3 = 0.2, 0.2, 0.2$
- Omega: $\omega_2 = 0.1, 0.1, 0.1$, $\omega_3 = 0.1, 0.1, 0.1$

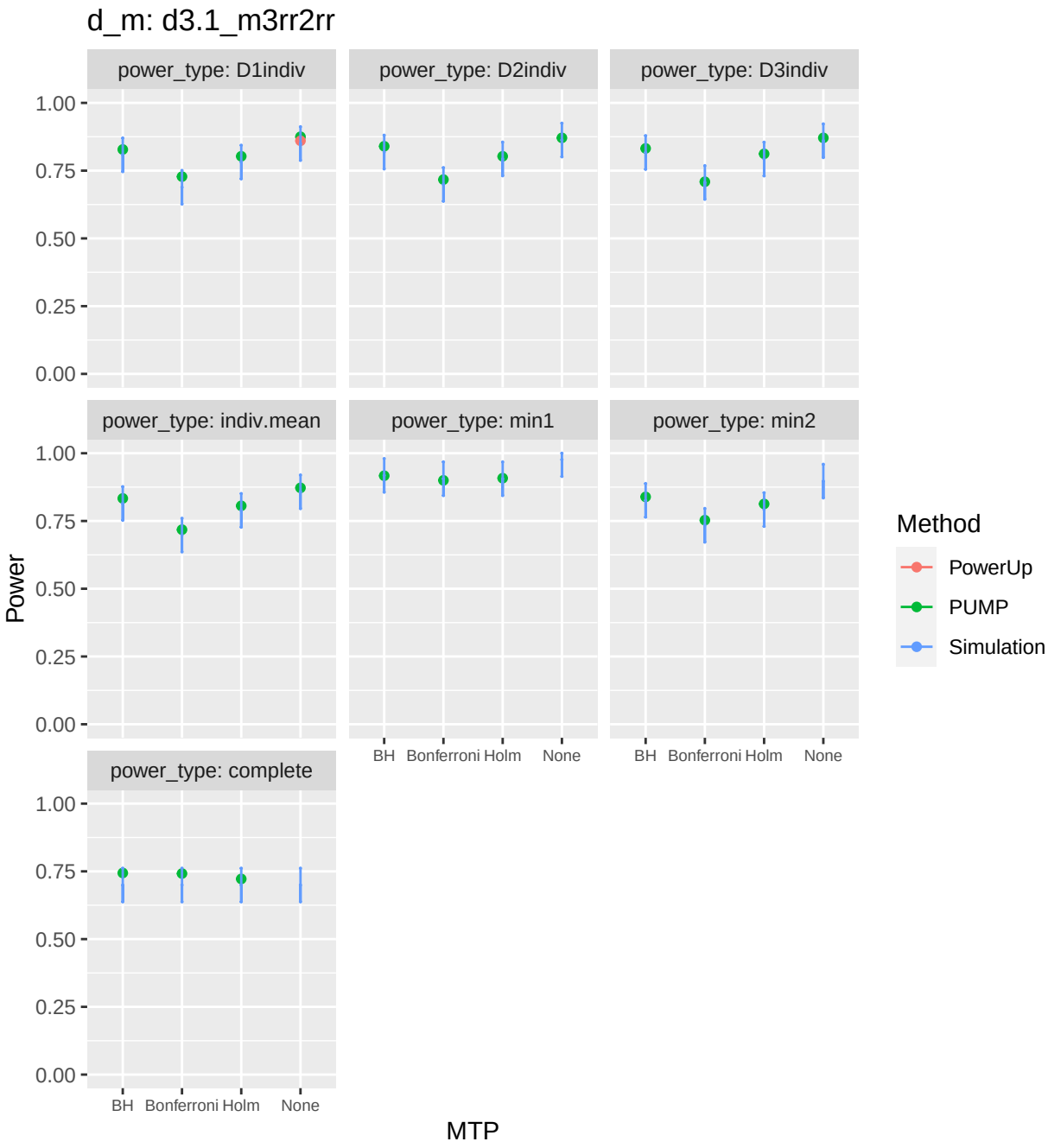
Power Validation

Base case

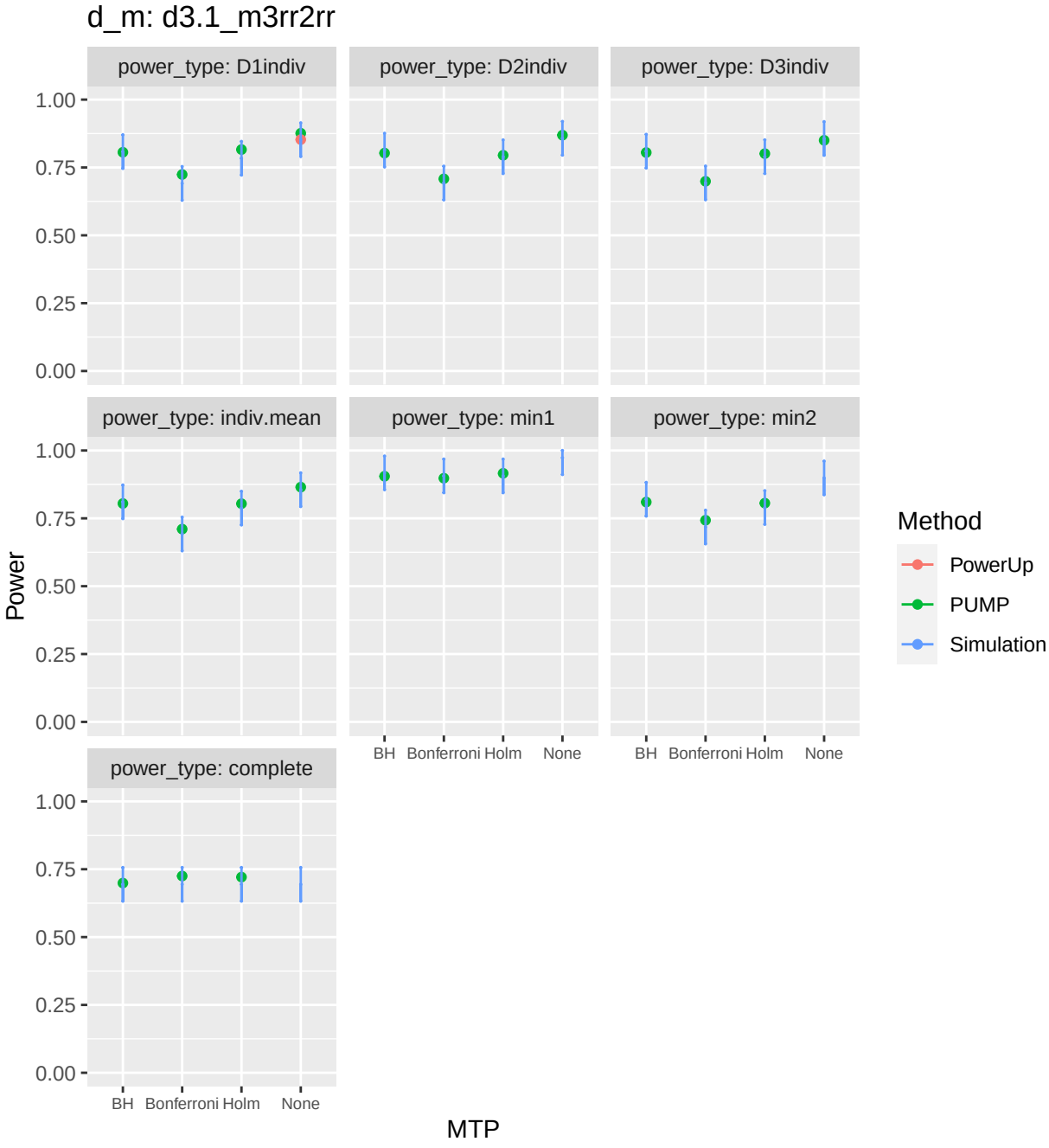


Varying school size

$\bar{n} = 75$

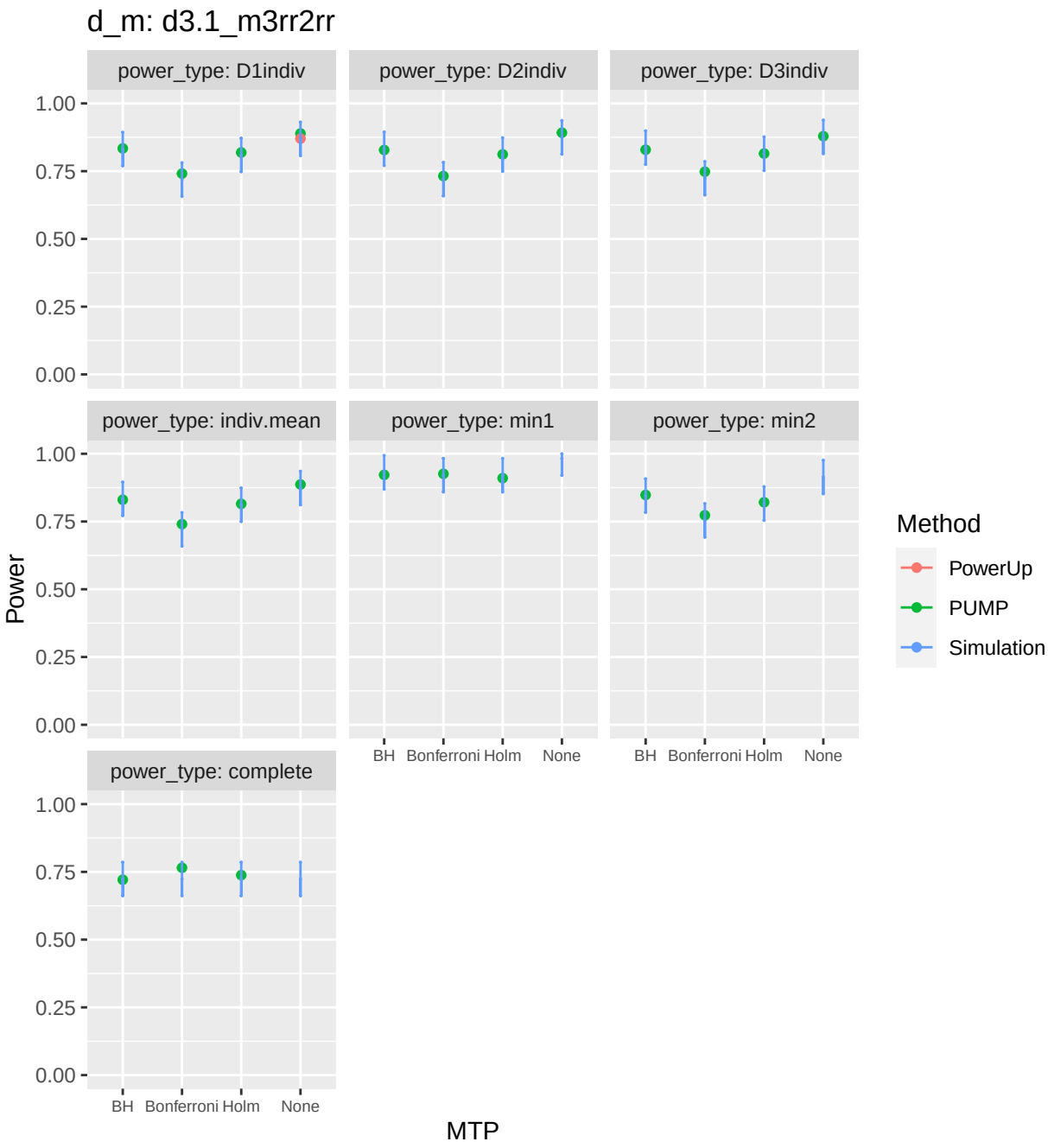


$\bar{n} = 50$

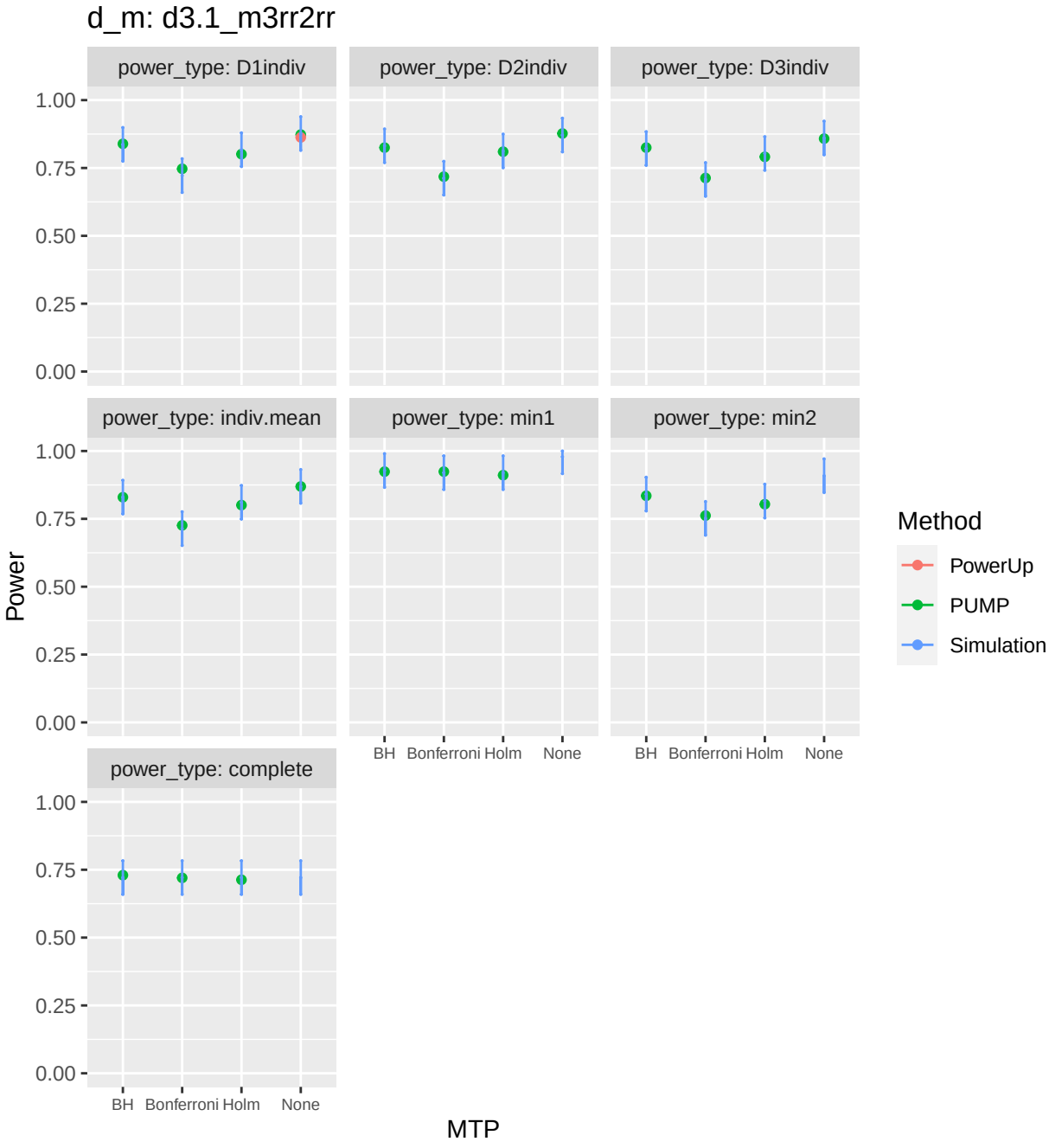

d_m: d3.1_m3rr2rr
power_type: D1indiv
power_type: D2indiv
power_type: D3indiv
power_type: indiv.mean
power_type: min1
power_type: min2
power_type: complete
1.00
0.75
0.50
0.25
0.00
Power
BH
Bonferroni
Holm
None
MTP
Method
PowerUp
PUMP
Simulation

Varying R2

$R_1^2 = 0.6,\ 0.6,\ 0.6$

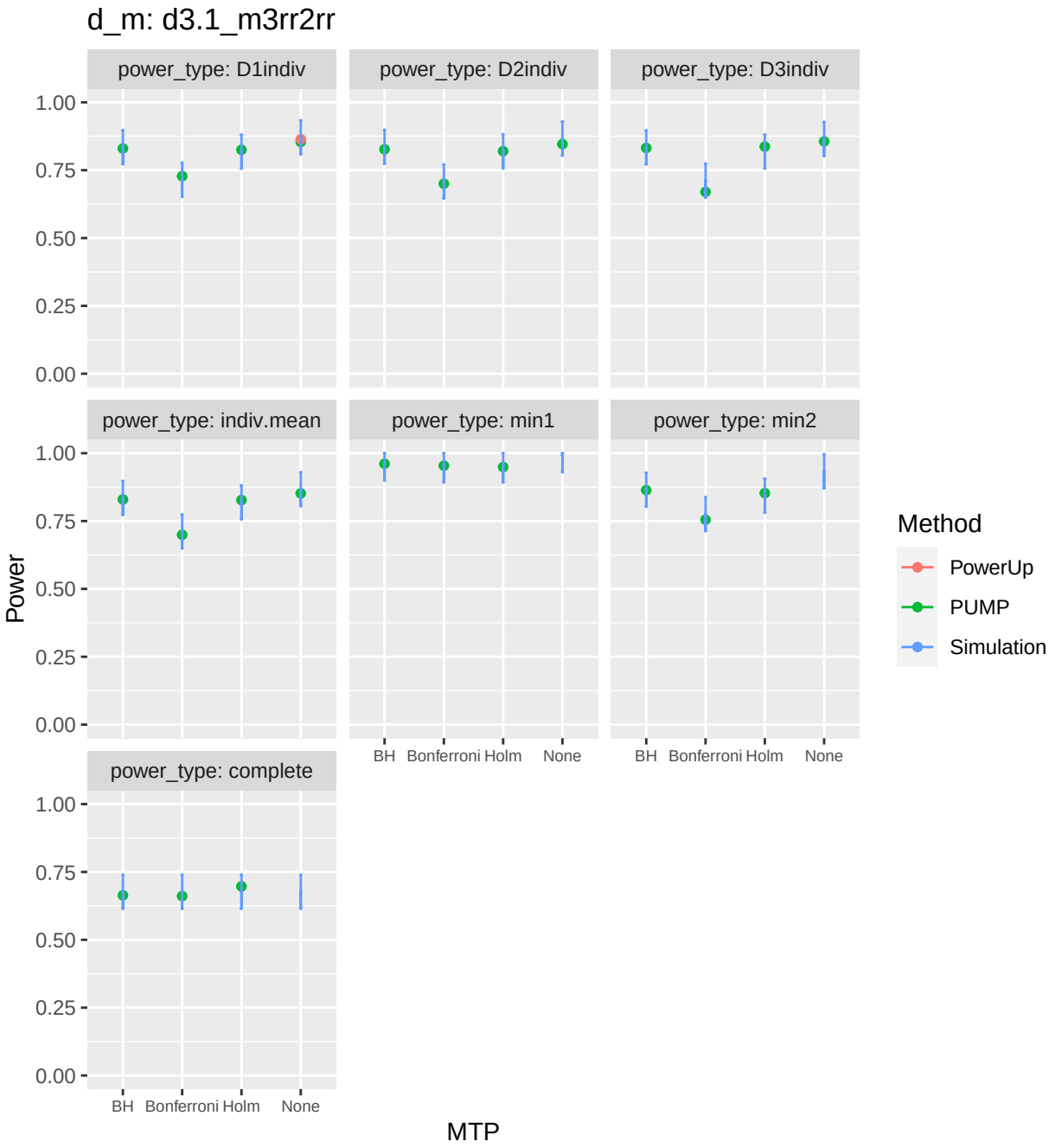


$R_1^2 = 0, 0, 0$

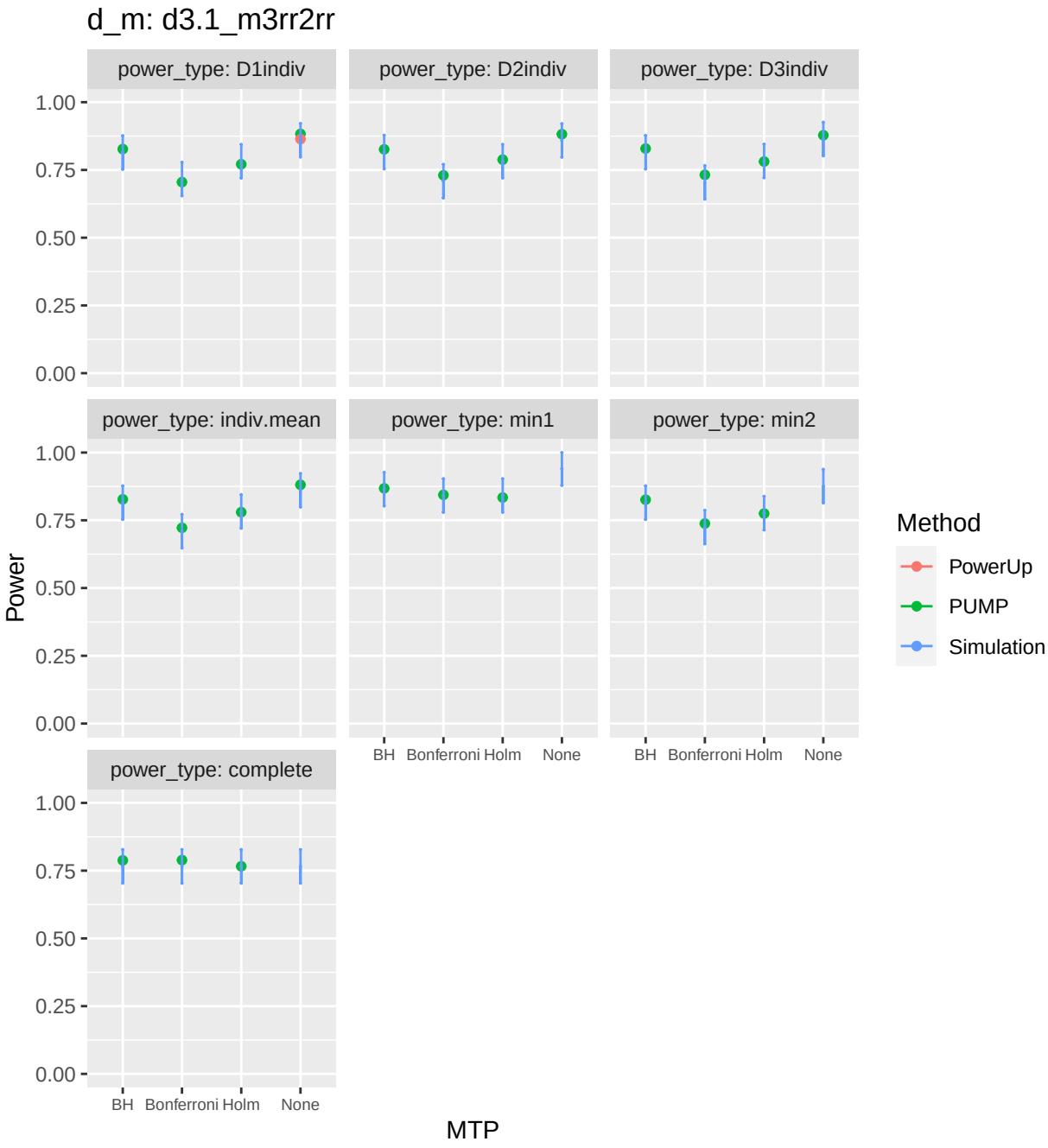

d_m: d3.1_m3rr2rr
power_type: D1indiv
power_type: D2indiv
power_type: D3indiv
power_type: indiv.mean
power_type: min1
power_type: min2
power_type: complete
1.00
0.75
0.50
0.25
0.00
Power
BH
Bonferroni
Holm
None
MTP
Method
PowerUp
PUMP
Simulation

Varying rho

$\rho = 0.2$

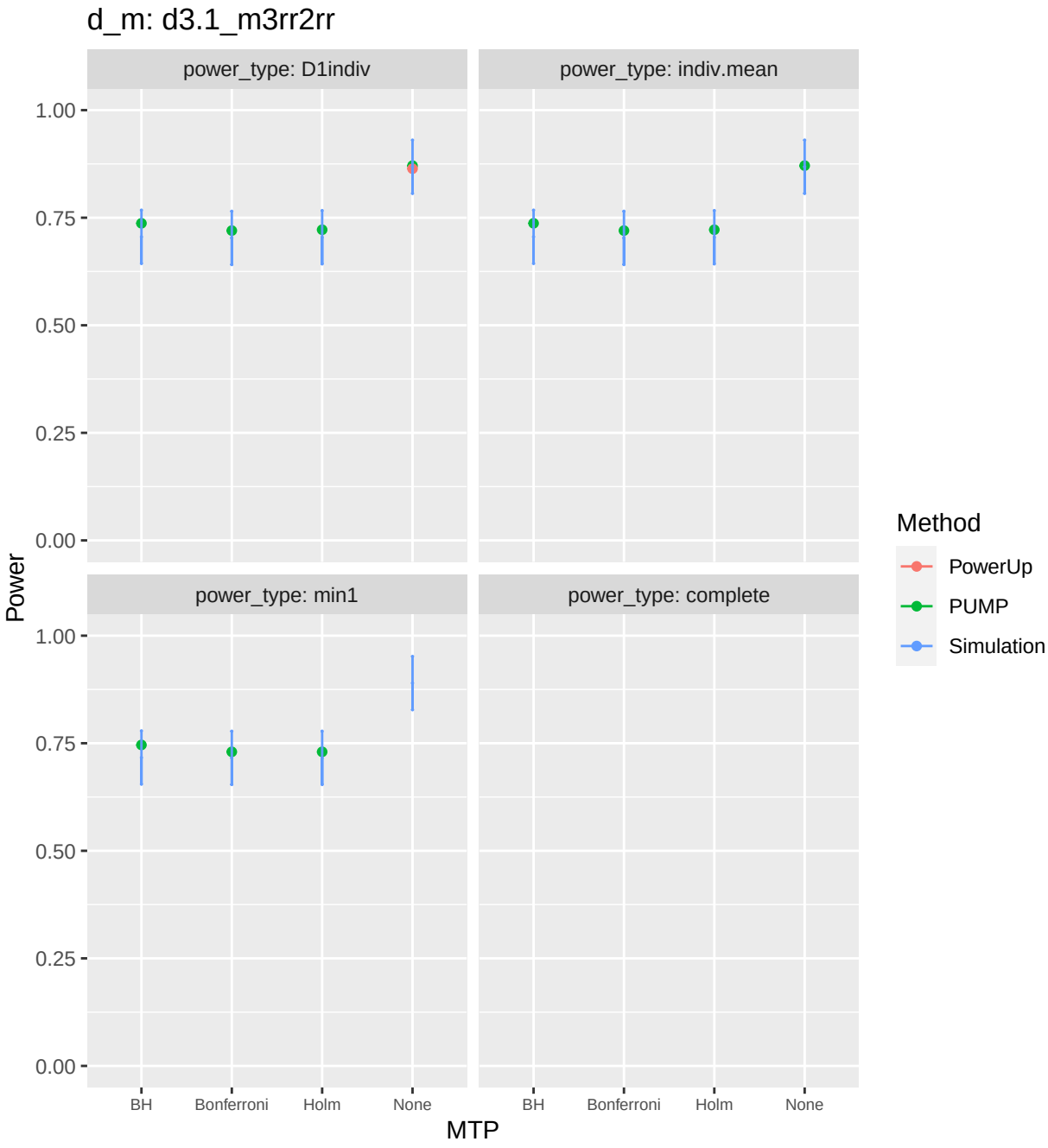


$\rho = 0.8$


d_m: d3.1_m3rr2rr
power_type: D1indiv
power_type: D2indiv
power_type: D3indiv
power_type: indiv.mean
power_type: min1
power_type: min2
power_type: complete
1.00
0.75
0.50
0.25
0.00
Power
BH
Bonferroni
Holm
None
MTP
Method
PowerUp
PUMP
Simulation

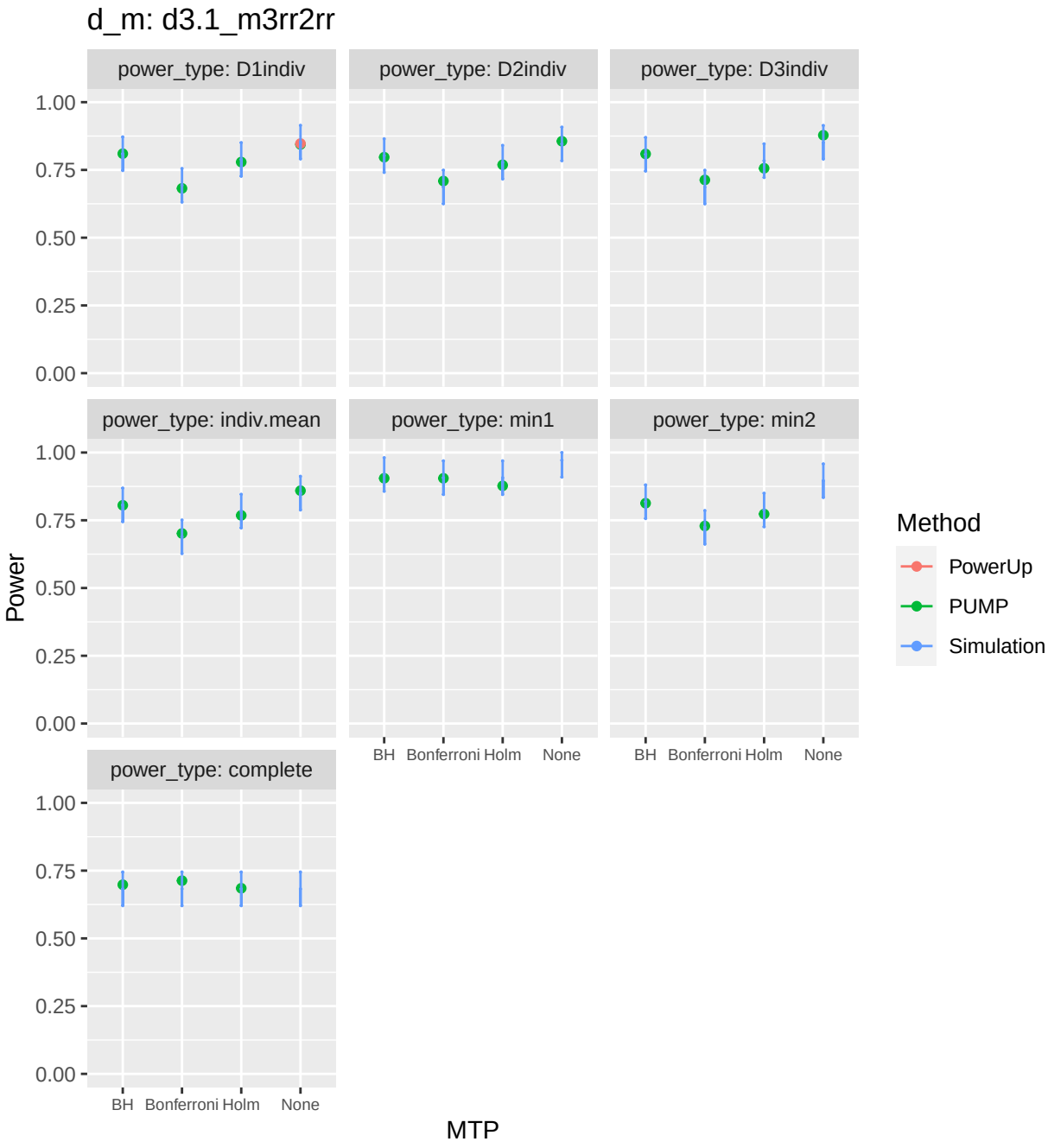
Varying true positives

MDES = 0.125, 0, 0

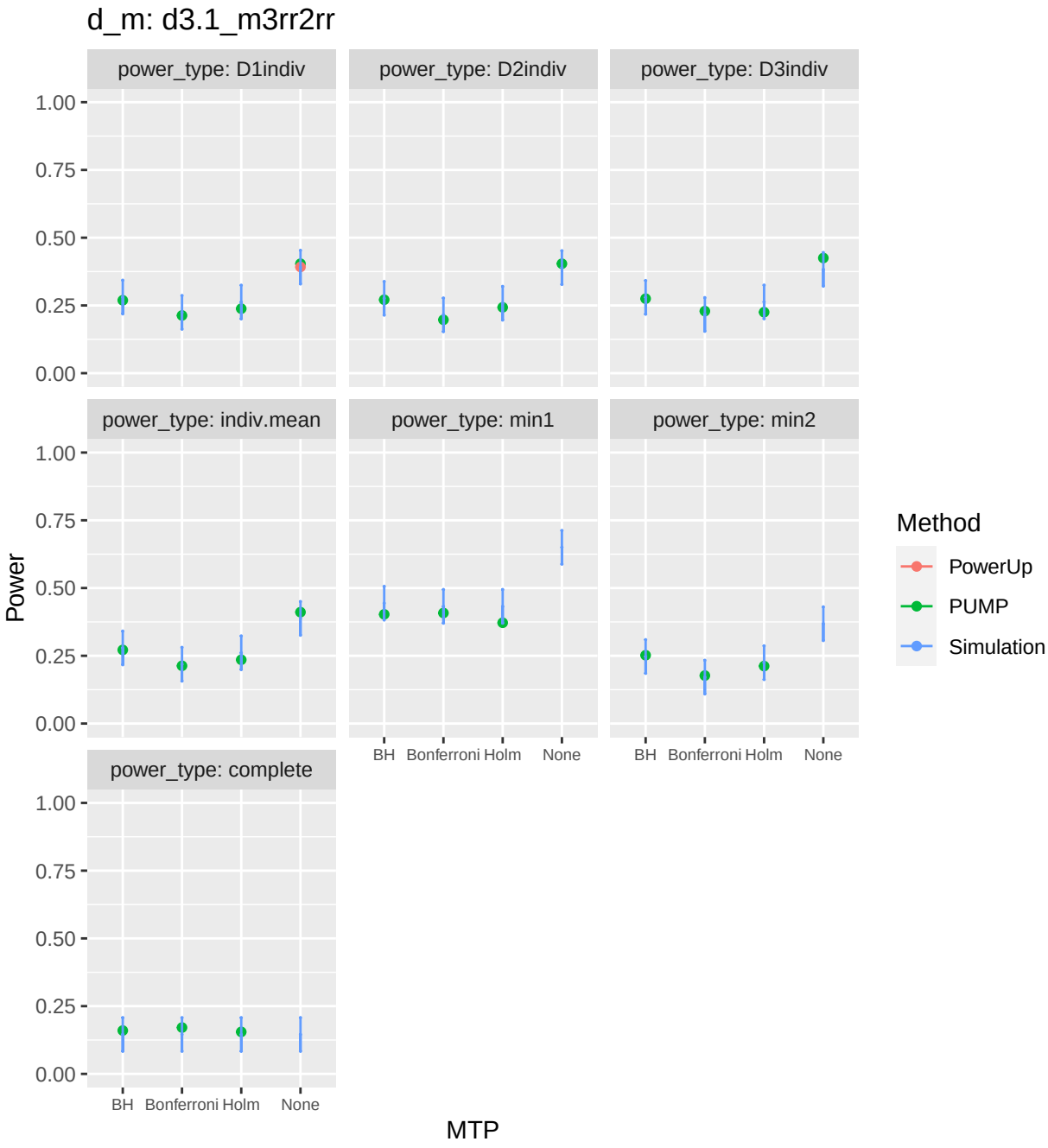


Varying ICC

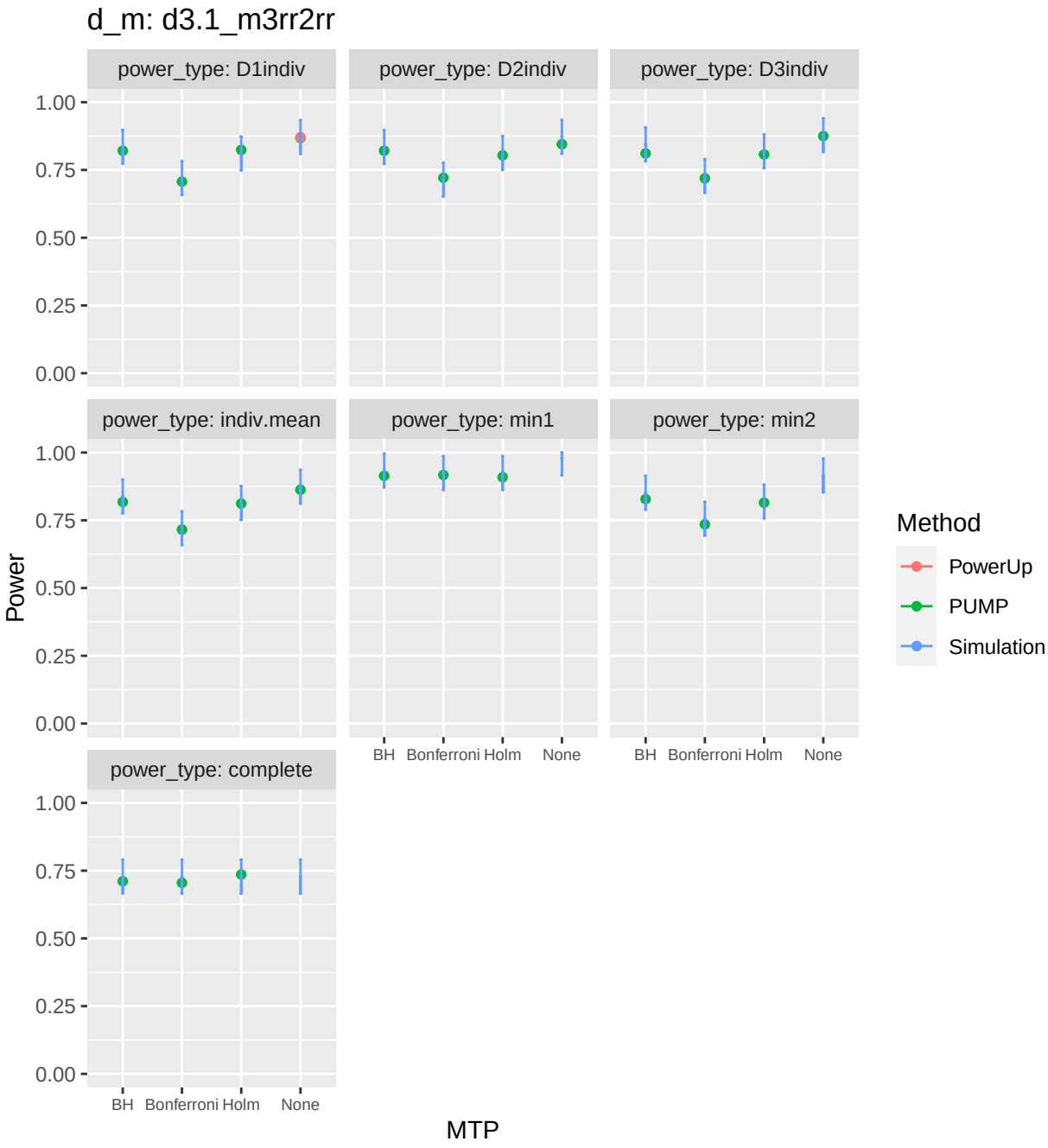
$\text{ICC}_2 = 0.7, 0.7, 0.7$



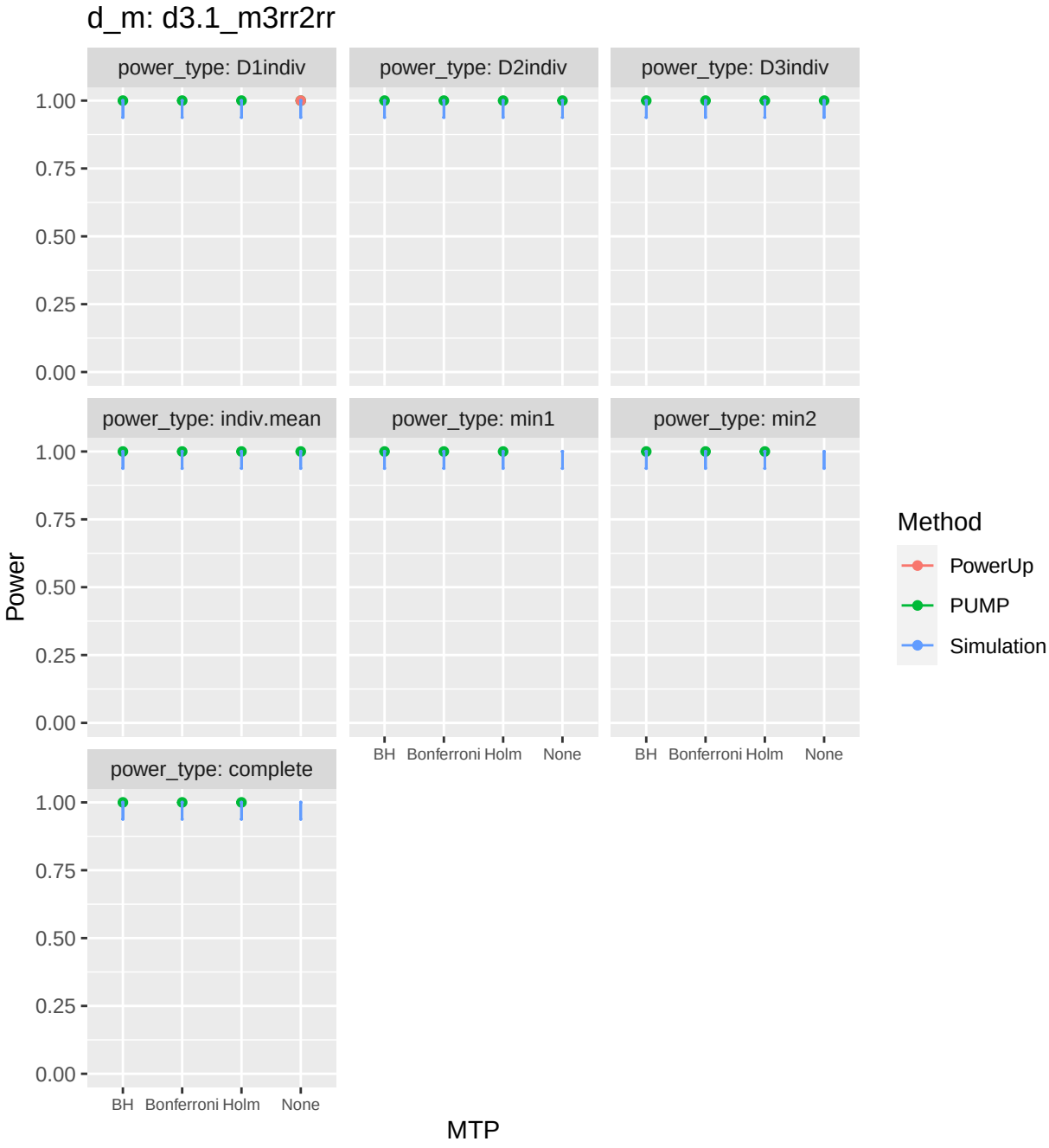
$\text{ICC}_3 = 0.7, 0.7, 0.7$



$\text{ICC}_2 = 0, 0, 0$

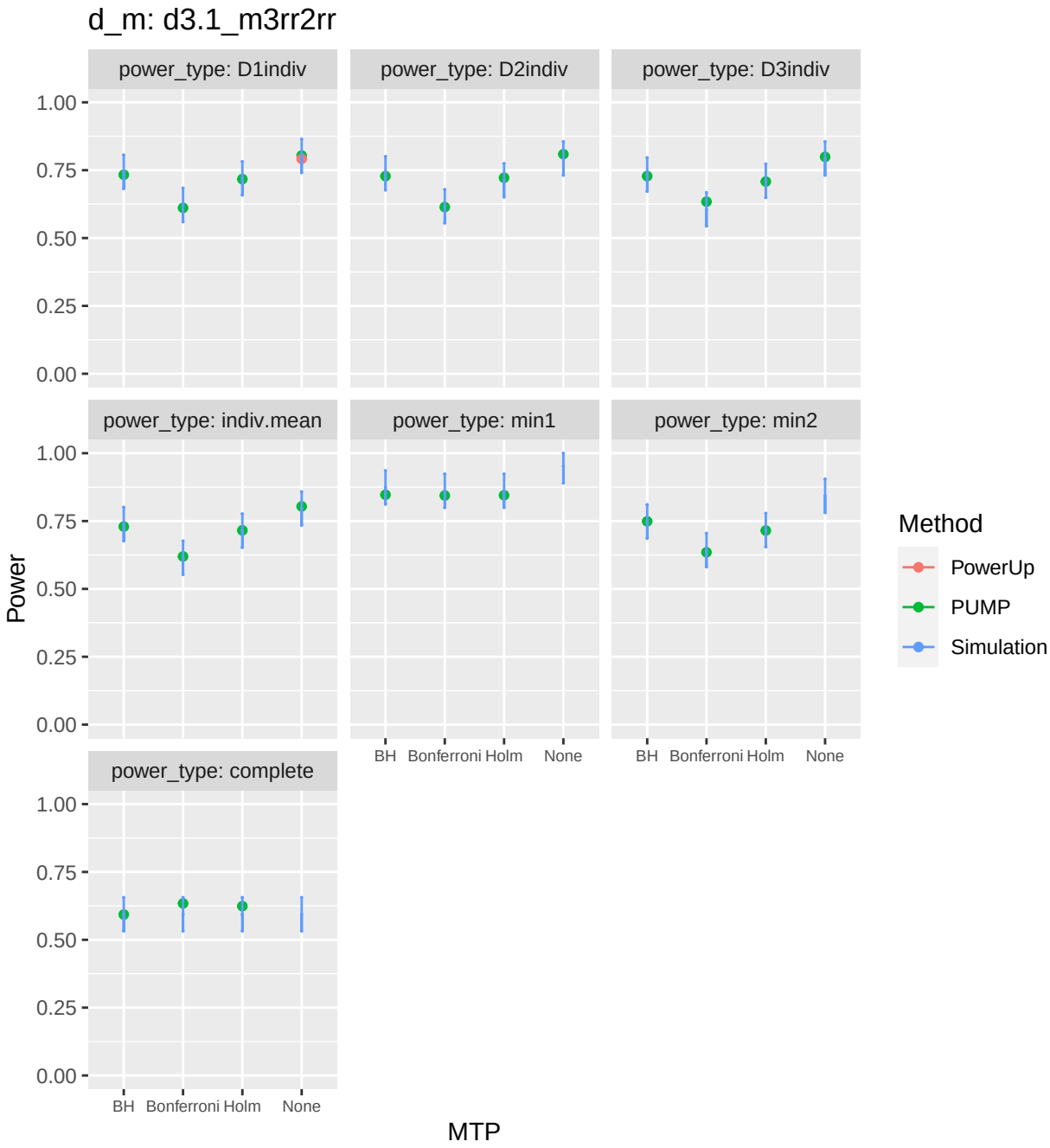


$\text{ICC}_2 = 0.2, 0.2, 0.2$

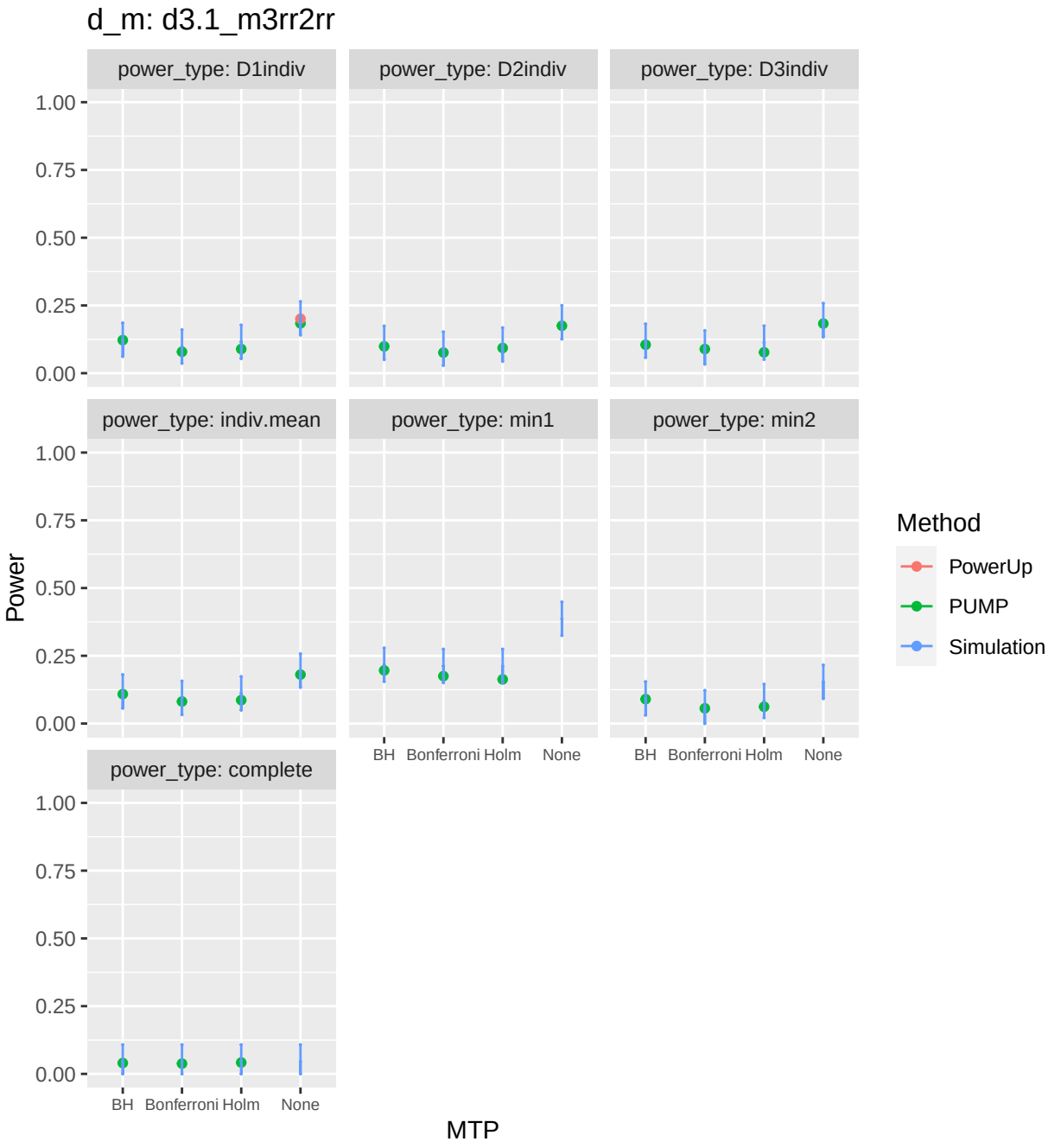


Varying Omega

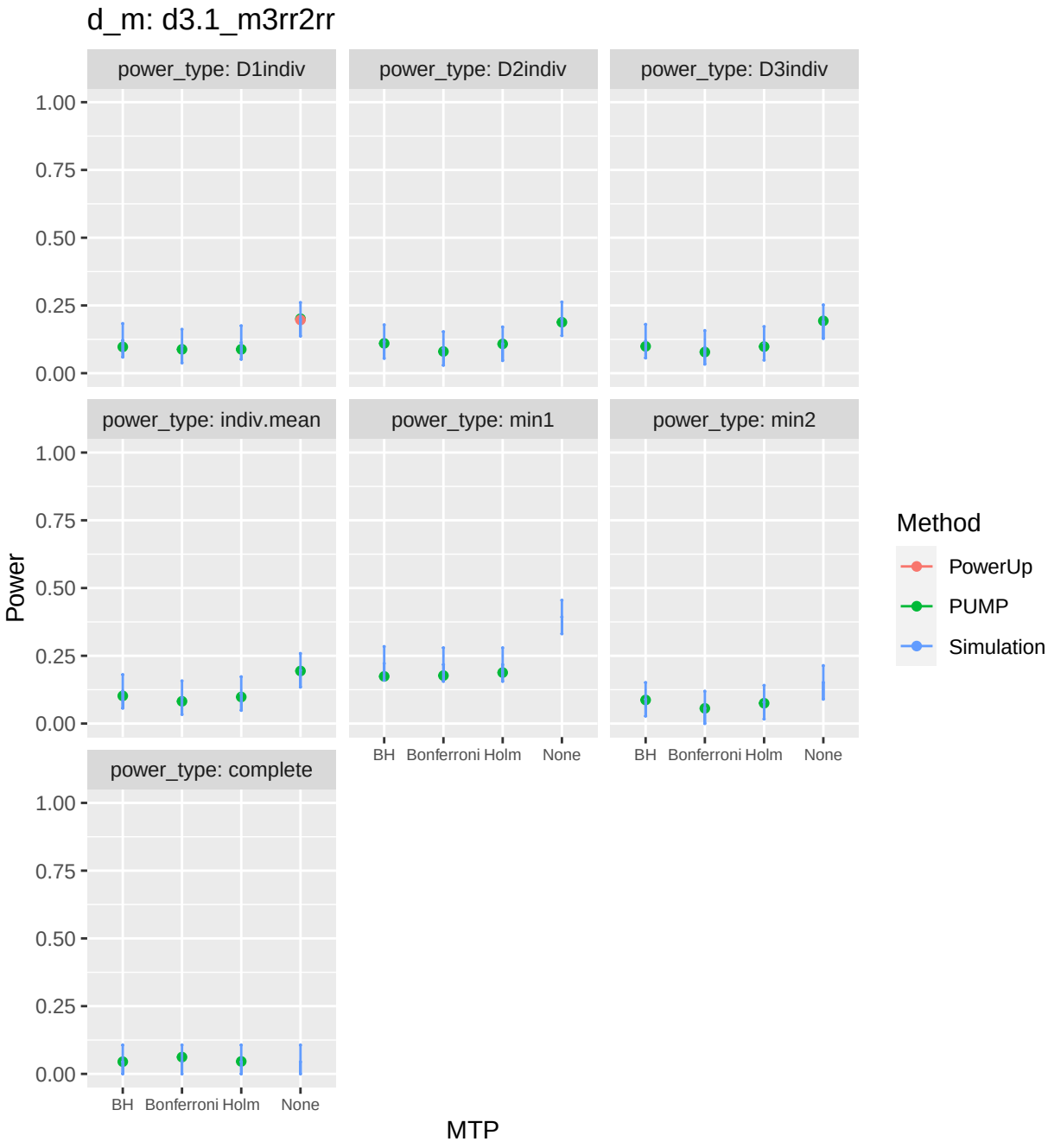
$\omega_2 = 0.8, 0.8, 0.8, \omega_3 = 0.1, 0.1, 0.1$



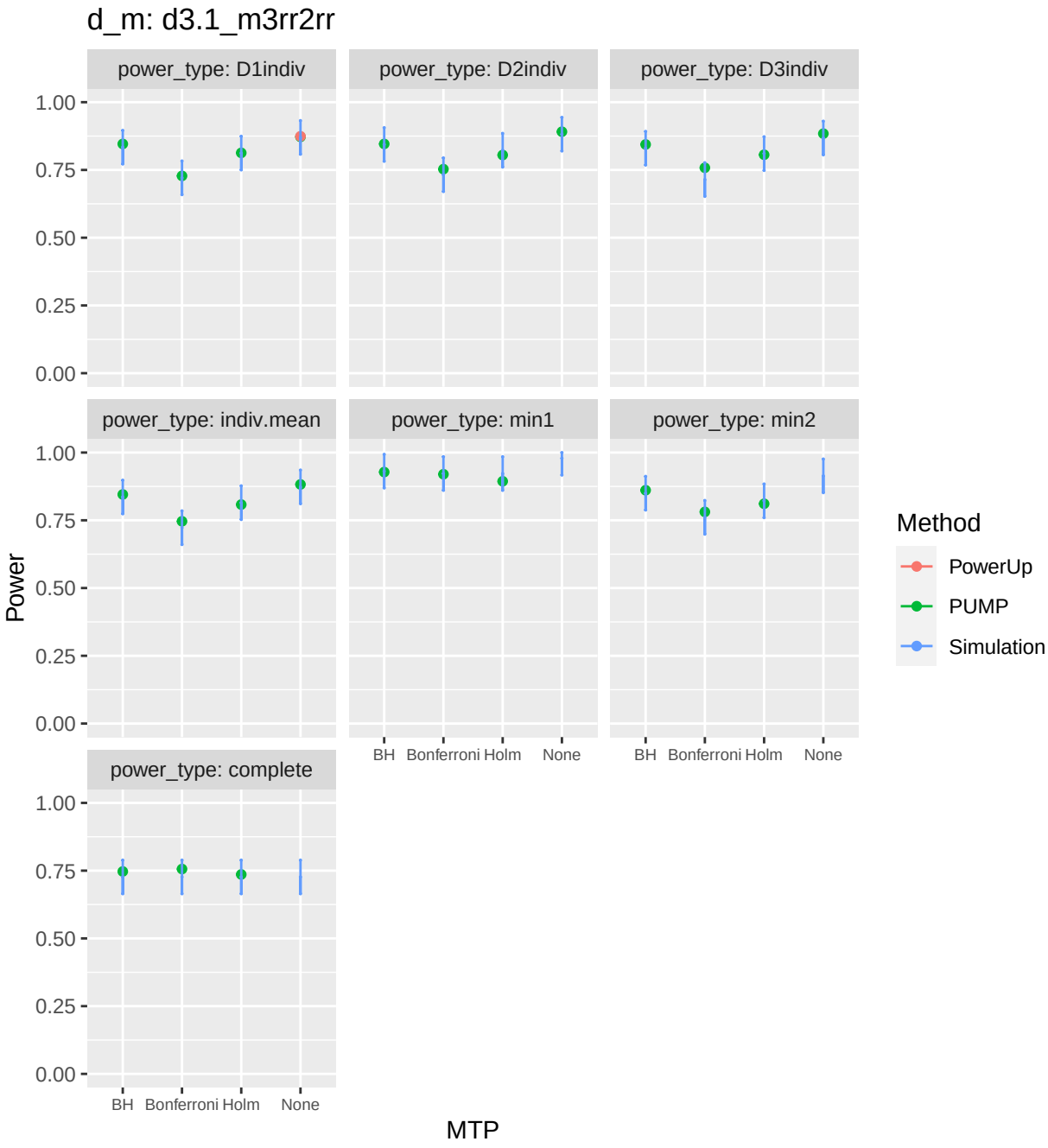
$\omega_2 = 0.1, 0.1, 0.1, \omega_3 = 0.8, 0.8, 0.8$



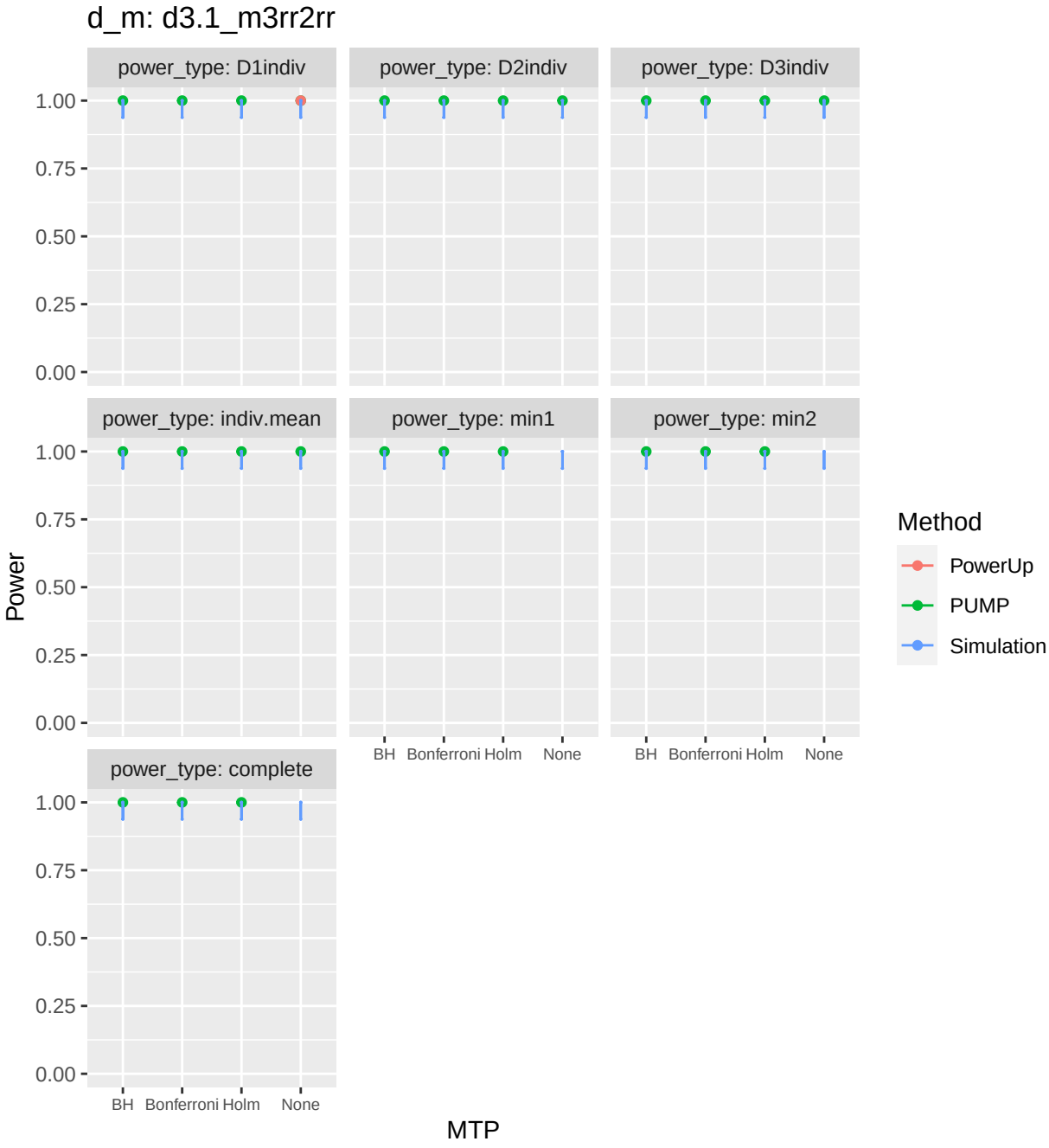
$\omega_2 = 0.8, 0.8, 0.8, \omega_3 = 0.8, 0.8, 0.8$



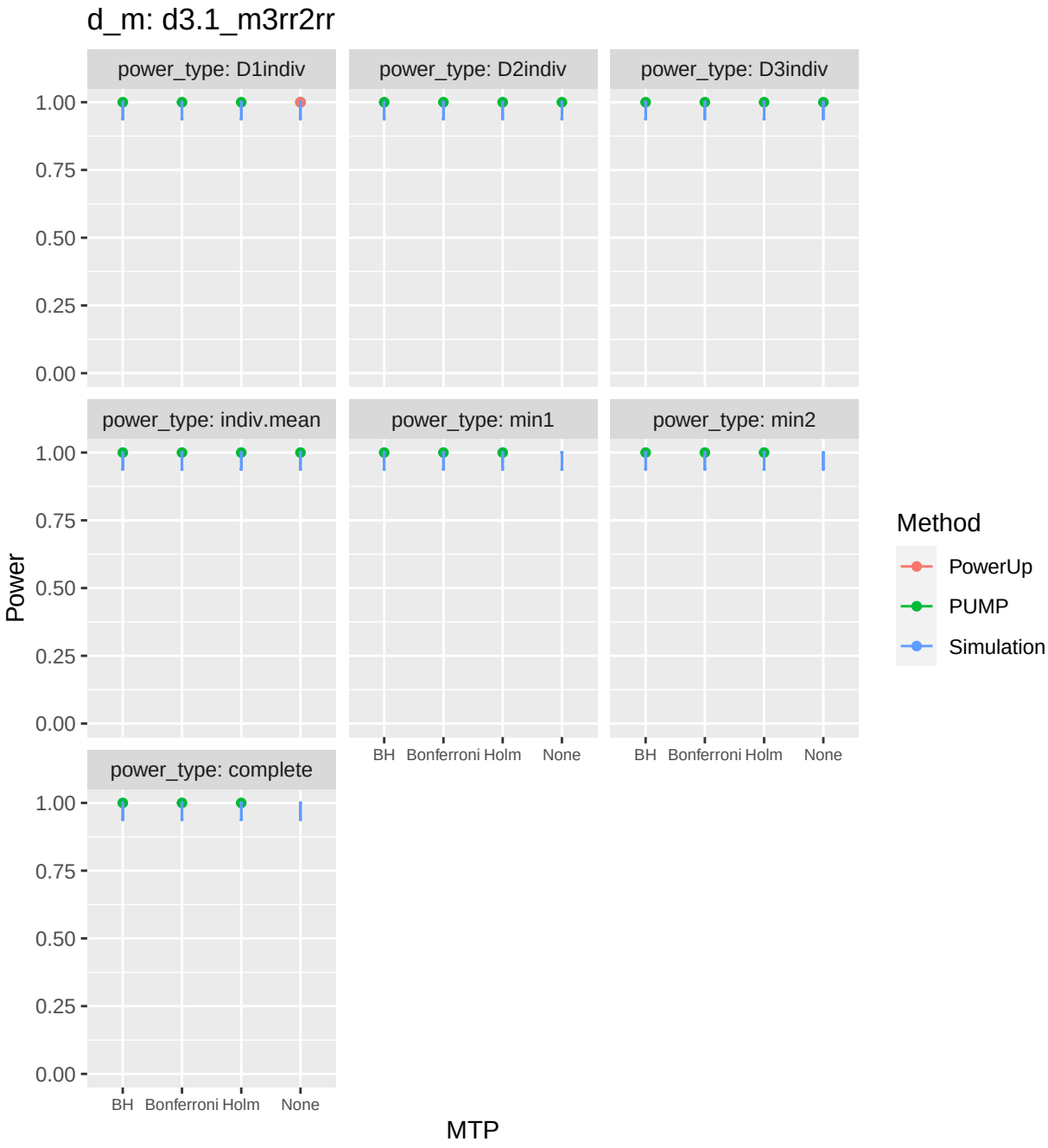
$\omega_2 = 0, 0, 0, \omega_3 = 0.1, 0.1, 0.1$



$\omega_2 = 0.1, 0.1, 0.1, \omega_3 = 0, 0, 0$



$\omega_2 = 0, 0, 0, \omega_3 = 0, 0, 0$



MDES validation

Target value: 0.125

```
##
##
## +------------+---------------+---------------+-------------+
## |    MTP     | Adjusted MDES | D1indiv Power | Target MDES |
## +============+===============+===============+=============+
## | Bonferroni |     0.126     |     0.723     |    0.125    |
## +------------+---------------+---------------+-------------+
## |     BH     |     0.126     |     0.837     |    0.125    |
## +------------+---------------+---------------+-------------+
## |    Holm    |     0.127     |     0.826     |    0.125    |
## +------------+---------------+---------------+-------------+
##
## Table: d3.1_m3rr2rr
```

Sample size validation

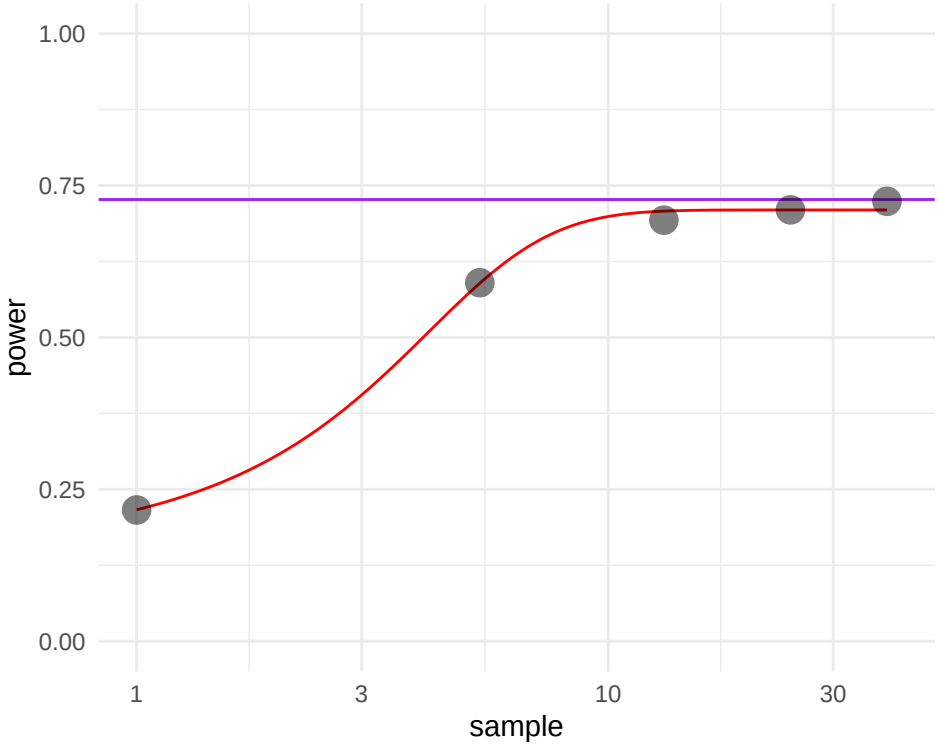
Target value: 15

```
##
##
## +------------+-------------+-------------+----------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+================+
## | Bonferroni |      K      |     15      |     0.723      |
## +------------+-------------+-------------+----------------+
## |     BH     |      K      |     15      |     0.824      |
## +------------+-------------+-------------+----------------+
## |    Holm    |      K      |     16      |     0.833      |
## +------------+-------------+-------------+----------------+
##
## Table: d3.1_m3rr2rr
```

Target value: 30

```
##
##
## +------------+-------------+-------------+----------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+================+
## | Bonferroni |      J      |     34      |     0.723      |
## +------------+-------------+-------------+----------------+
## |     BH     |      J      |     34      |     0.833      |
## +------------+-------------+-------------+----------------+
## |    Holm    |      J      |     112     |     0.831      |
## +------------+-------------+-------------+----------------+
##
## Table: d3.1_m3rr2rr
```

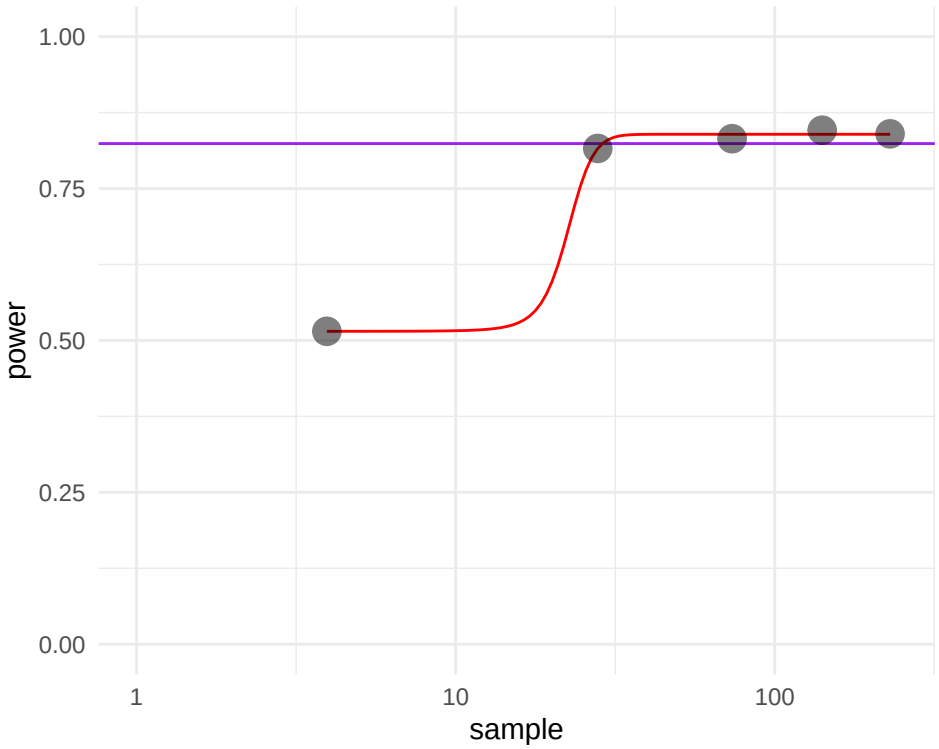
Note: particularly flat power curves results in discrepancy for J.



Target value: 100

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |    nbar     |    132.2    |     0.723     |
## +------------+-------------+-------------+---------------+
## |     BH     |    nbar     |     128     |     0.831     |
## +------------+-------------+-------------+---------------+
## |    Holm    |    nbar     |    15176    |     0.824     |
## +------------+-------------+-------------+---------------+
##
## Table: d3.1_m3rr2rr
```

Note: particularly flat power curves results in discrepancy for `nbar`.


1.00
0.75
0.50
0.25
0.00
power
1
10
100
sample