Validate Power: d2.2

December 27, 2021

Design: Cluster RCT, with 2 levels, and randomization done at level 2 (school level).

Models: random treatment effects.

Default parameters:

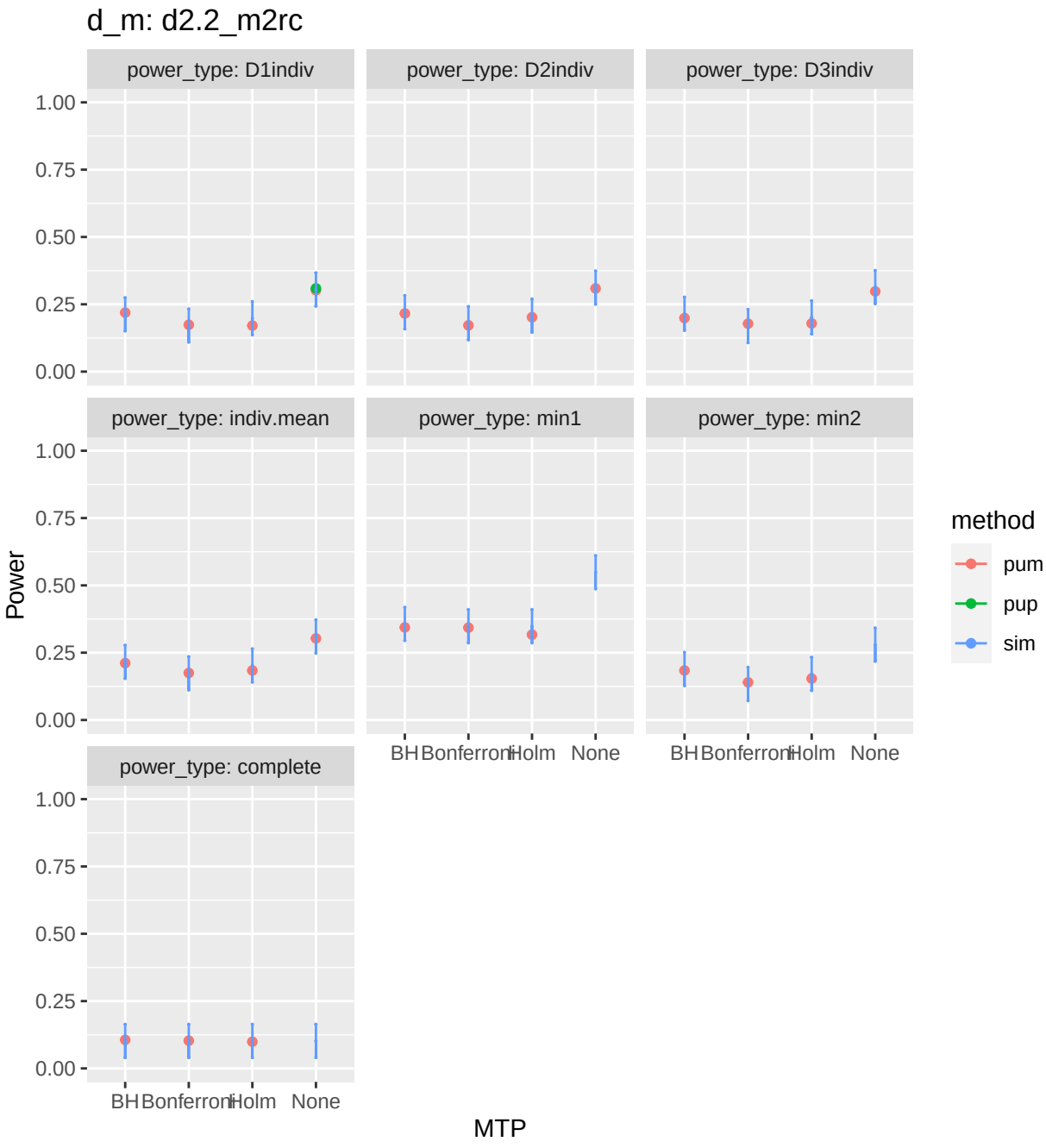
- M = 3
- J = 60
- rho: $\rho = 0.5$
- MDES = 0.125, 0.125, 0.125
- R2: $R_1^2 = 0.1, 0.1, 0.1$, $R_2^2 = 0.1, 0.1, 0.1$
- ICC: $\text{ICC}_2 = 0.1, 0.1, 0.1$

Assumptions

- Two-level design: $\text{ICC}_3 = 0$, $\omega_3 = 0$, $K = 1$
- Constant treatment effects: $\omega_2 = 0$

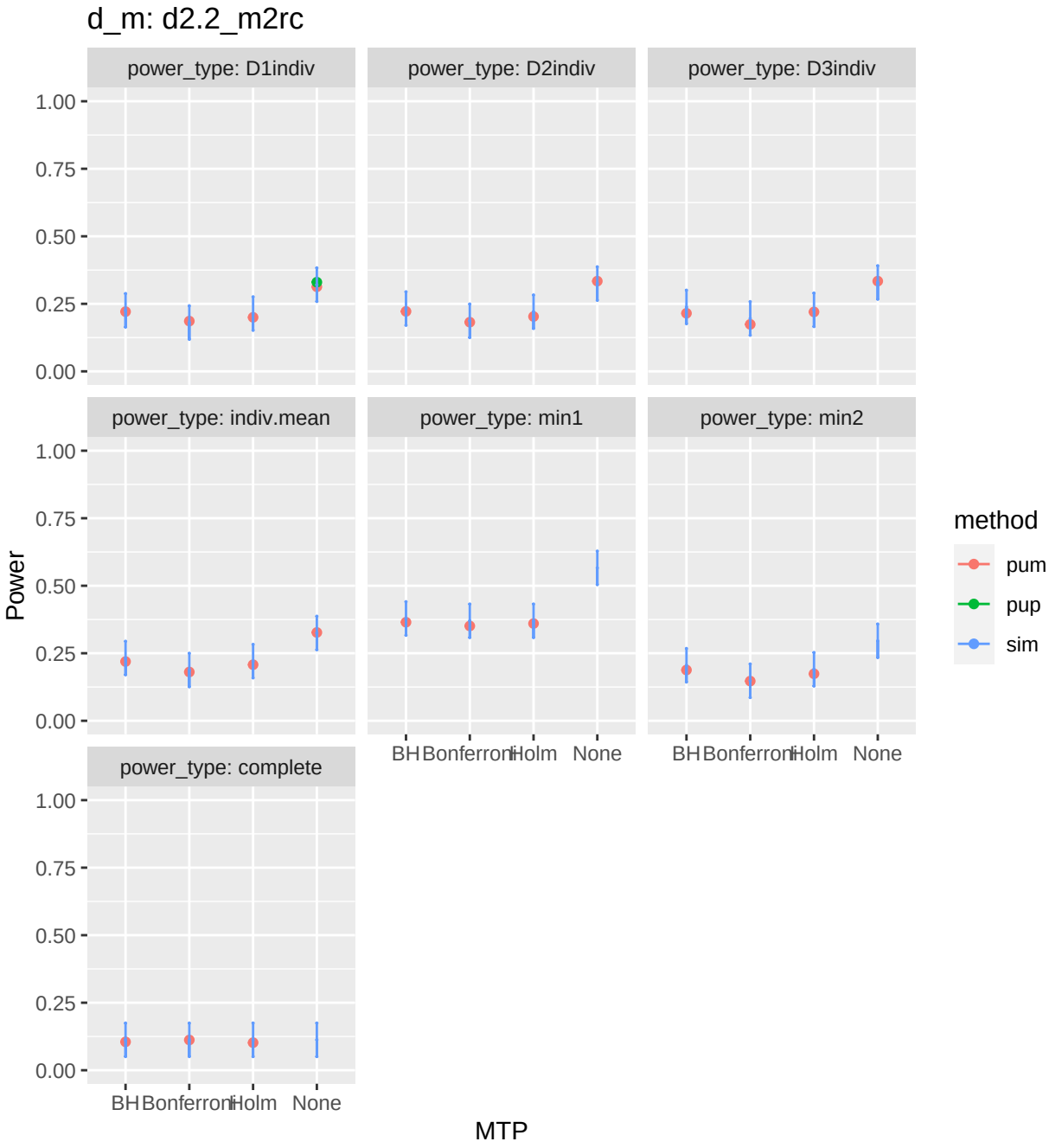
Power Validation

Base case

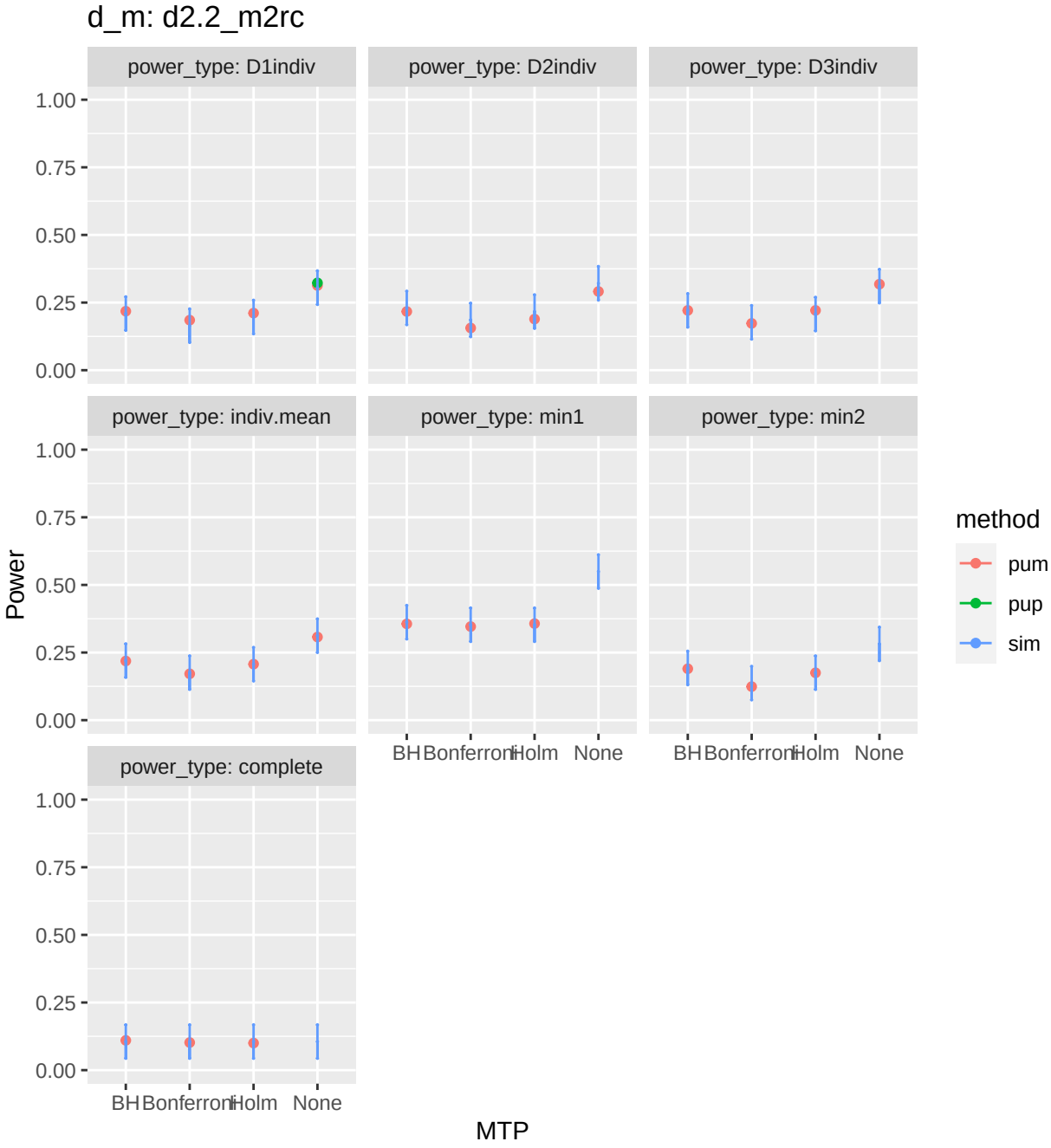


Varying school size

$\bar{n} = 100$

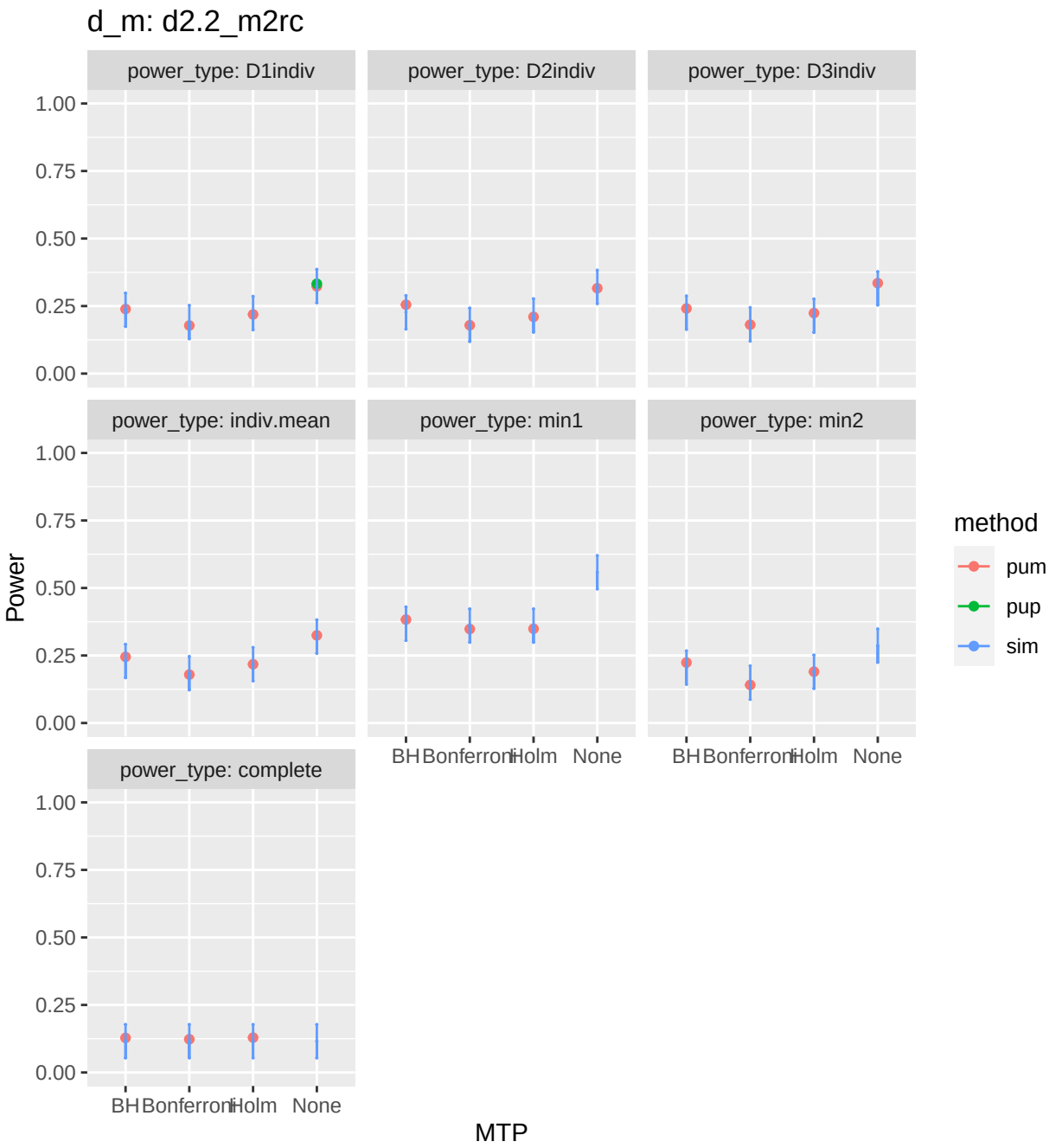


$\bar{n} = 75$

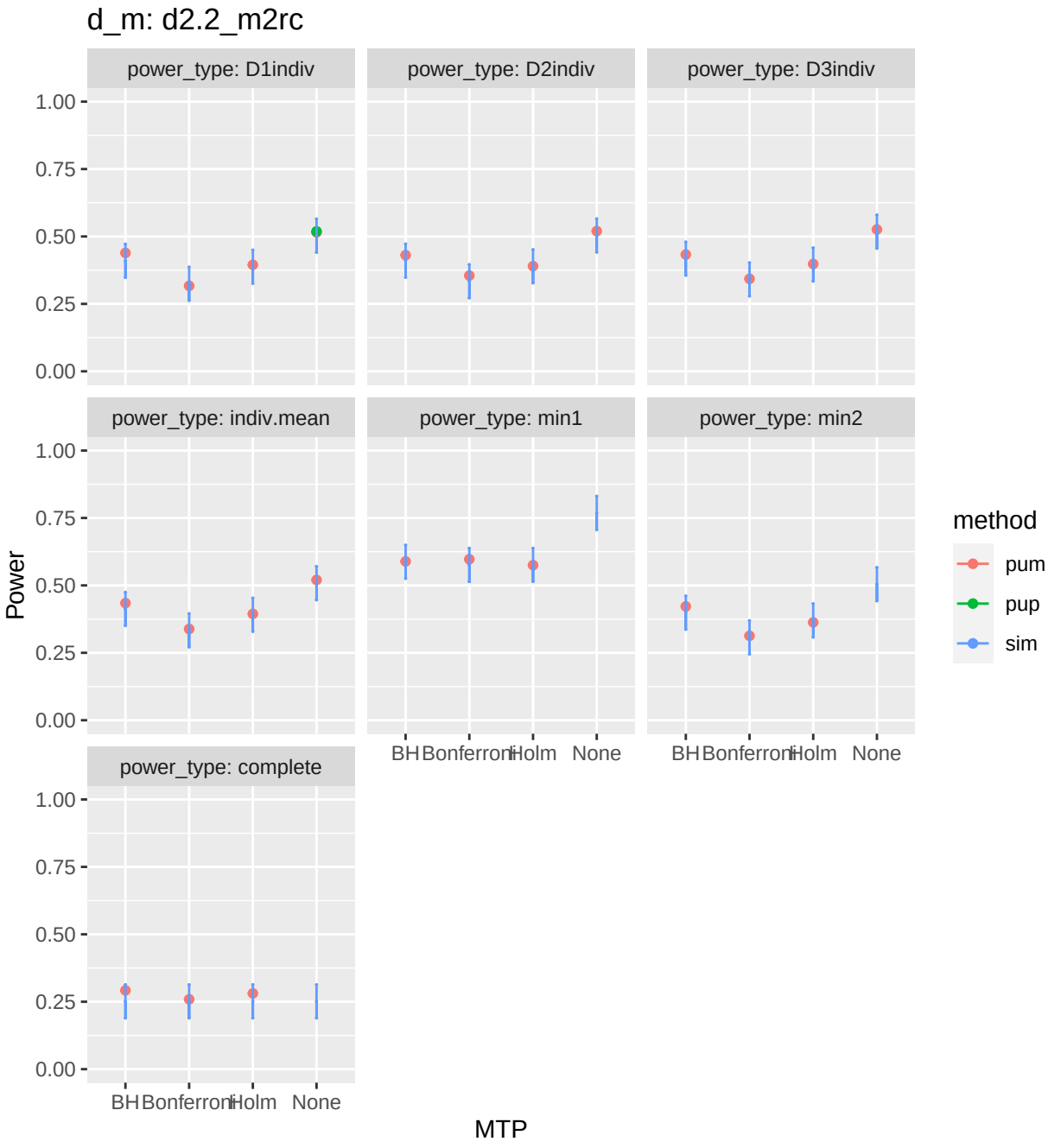

d_m: d2.2_m2rc
power_type: D1indiv
power_type: D2indiv
power_type: D3indiv
power_type: indiv.mean
power_type: min1
power_type: min2
power_type: complete
1.00
0.75
0.50
0.25
0.00
Power
BH
Bonferroni
Holm
None
MTP
method
pum
pup
sim

Varying R2

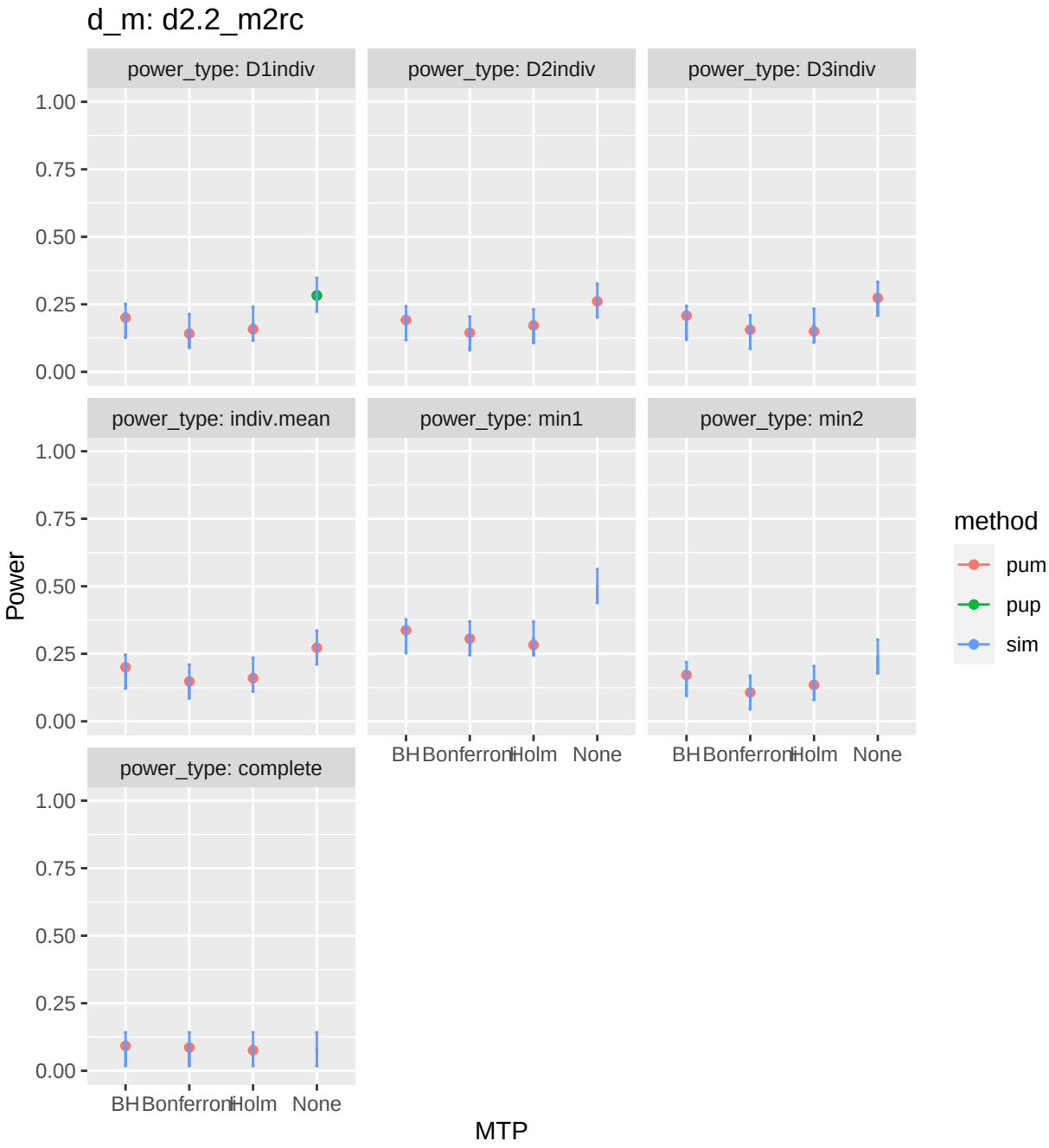
$R_1^2 = 0.6, 0.6, 0.6$



$R_2^2 = 0.6, 0.6, 0.6$

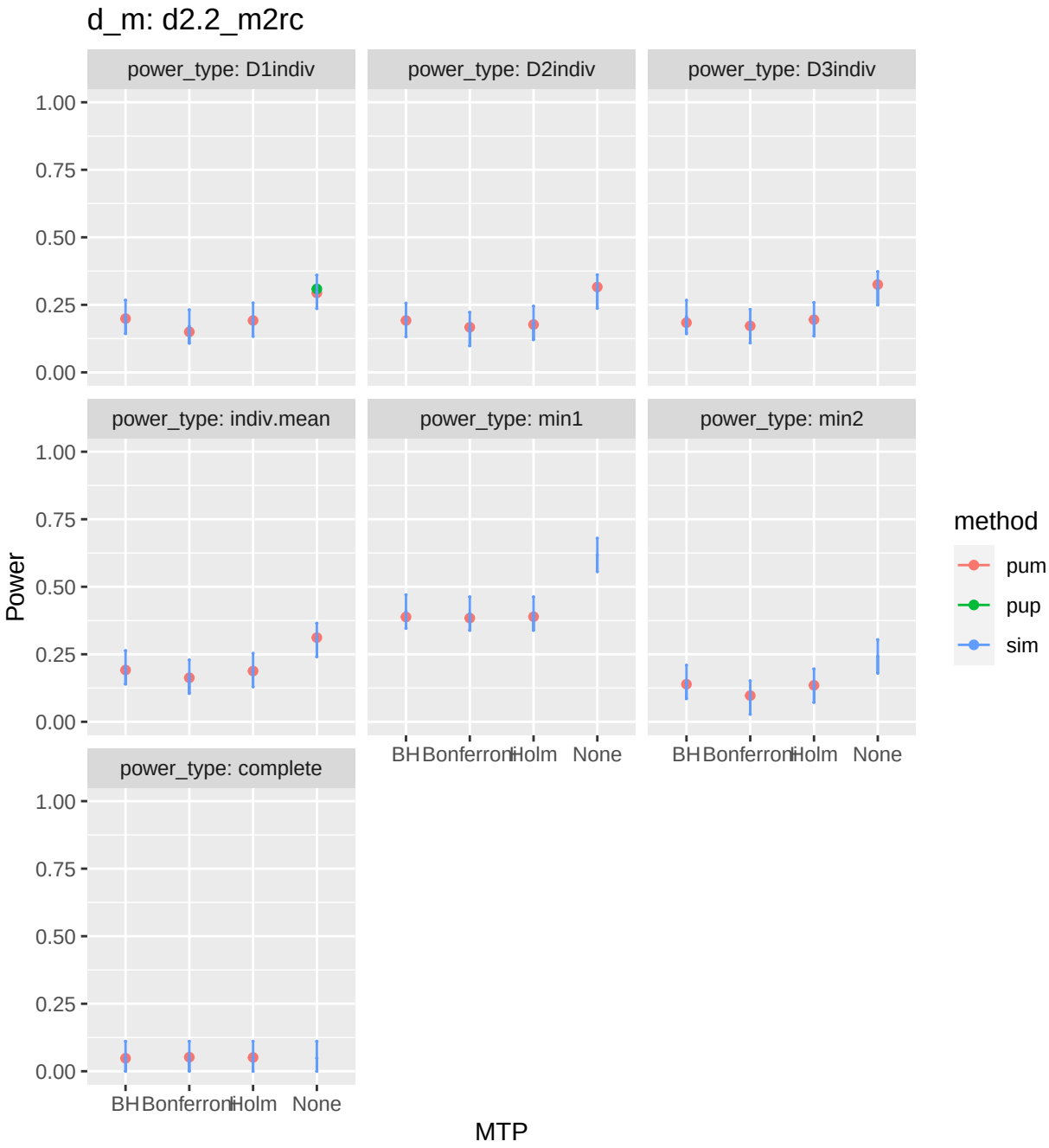

d_m: d2.2_m2rc
power_type: D1indiv
power_type: D2indiv
power_type: D3indiv
power_type: indiv.mean
power_type: min1
power_type: min2
power_type: complete
1.00
0.75
0.50
0.25
0.00
Power
BH
Bonferroni
Holm
None
MTP
method
pum
pup
sim

$R_1^2 = 0, 0, 0$ $R_2^2 = 0, 0, 0$

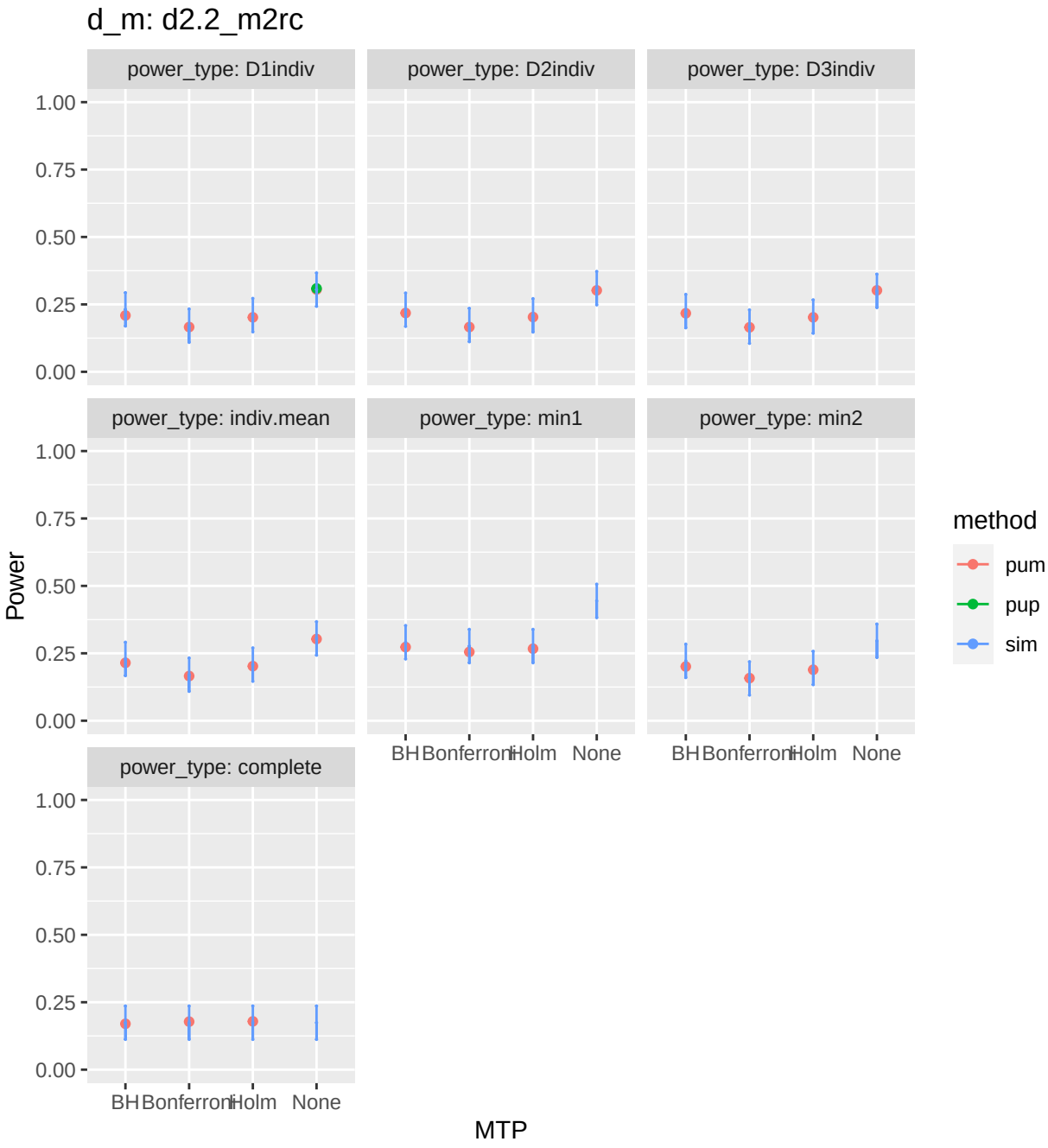


Varying rho

$\rho = 0.2$

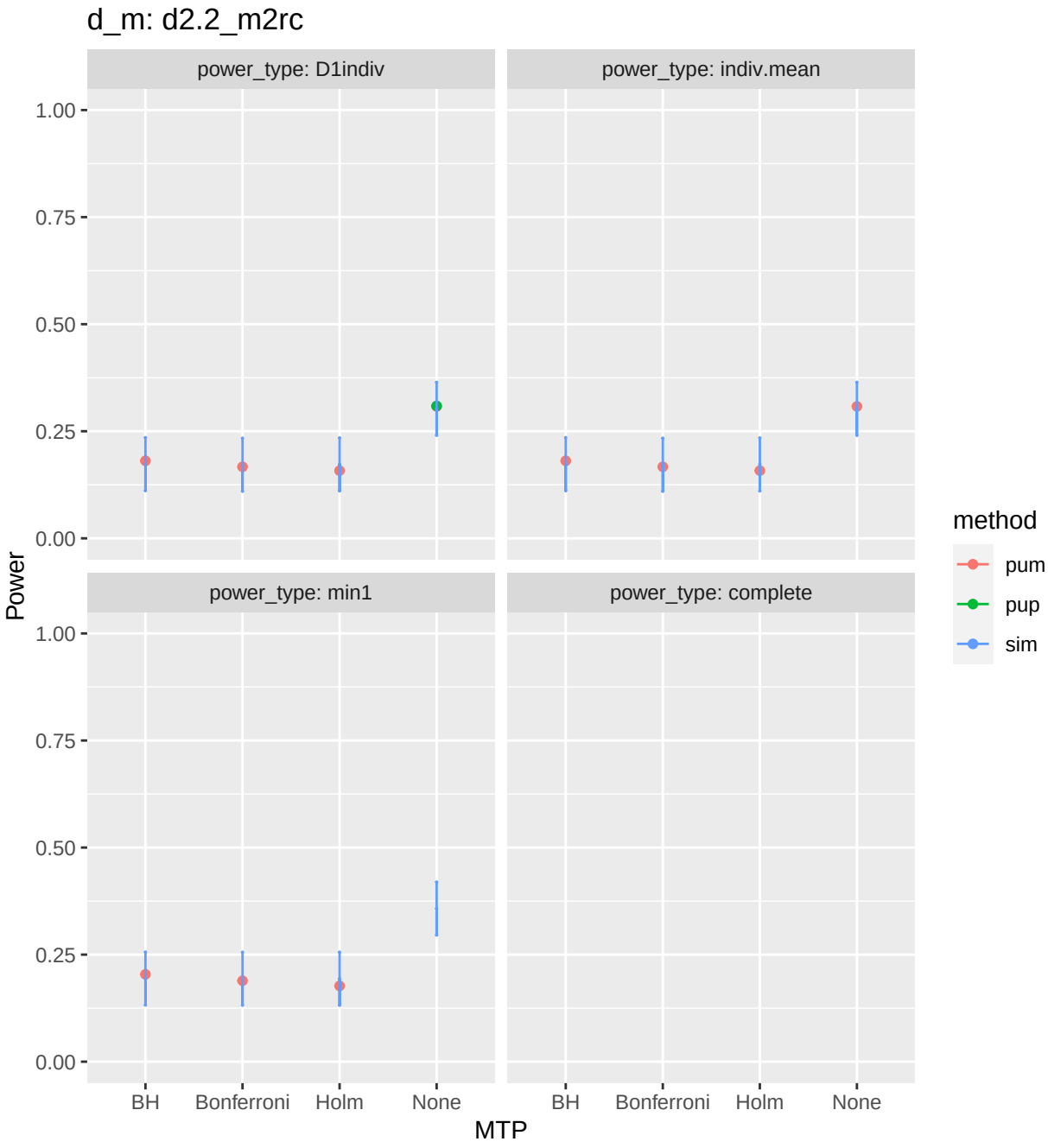


$\rho = 0.8$


d_m: d2.2_m2rc
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
pum
pup
sim

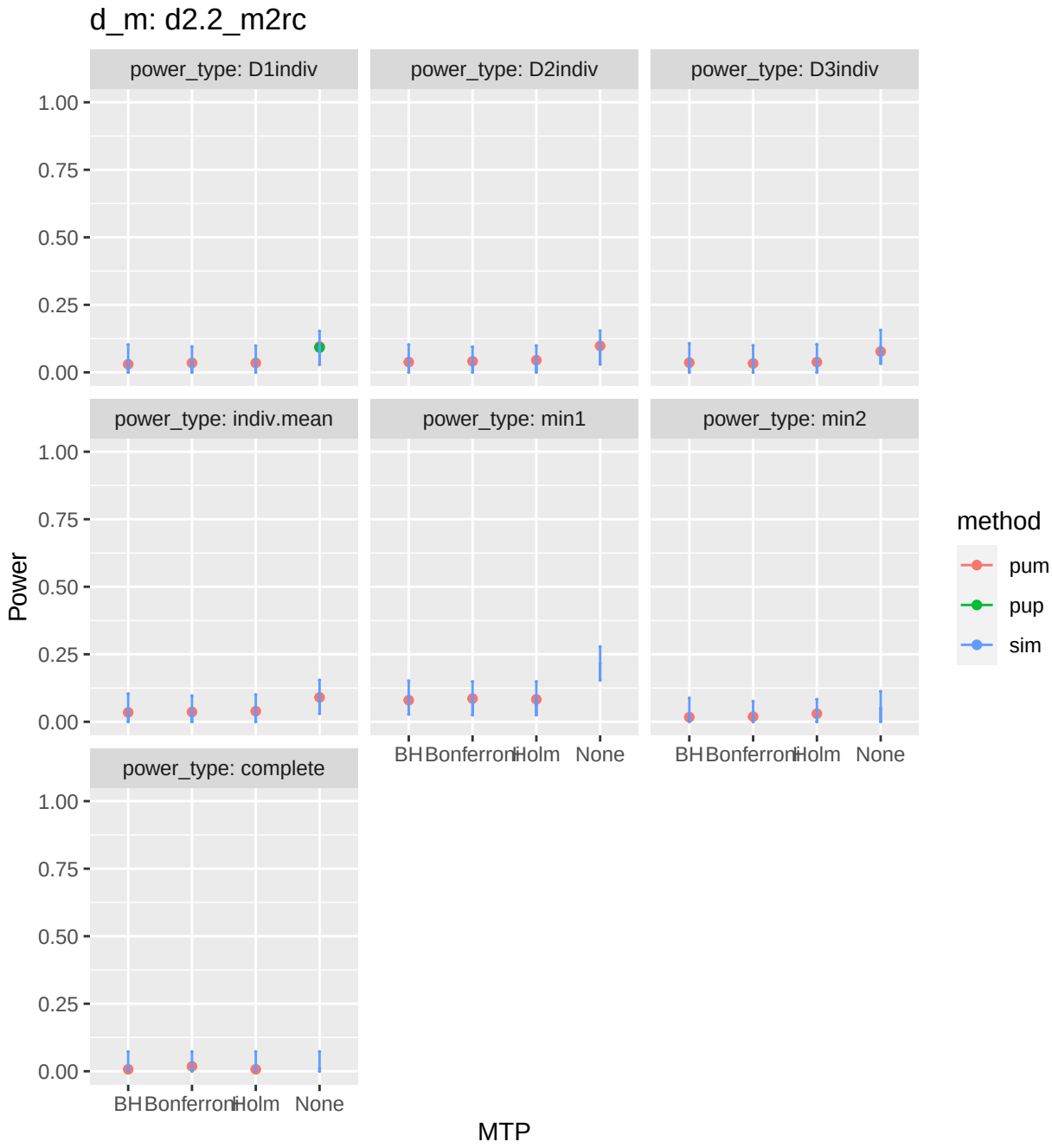
Varying true positives

MDES = 0.125, 0, 0

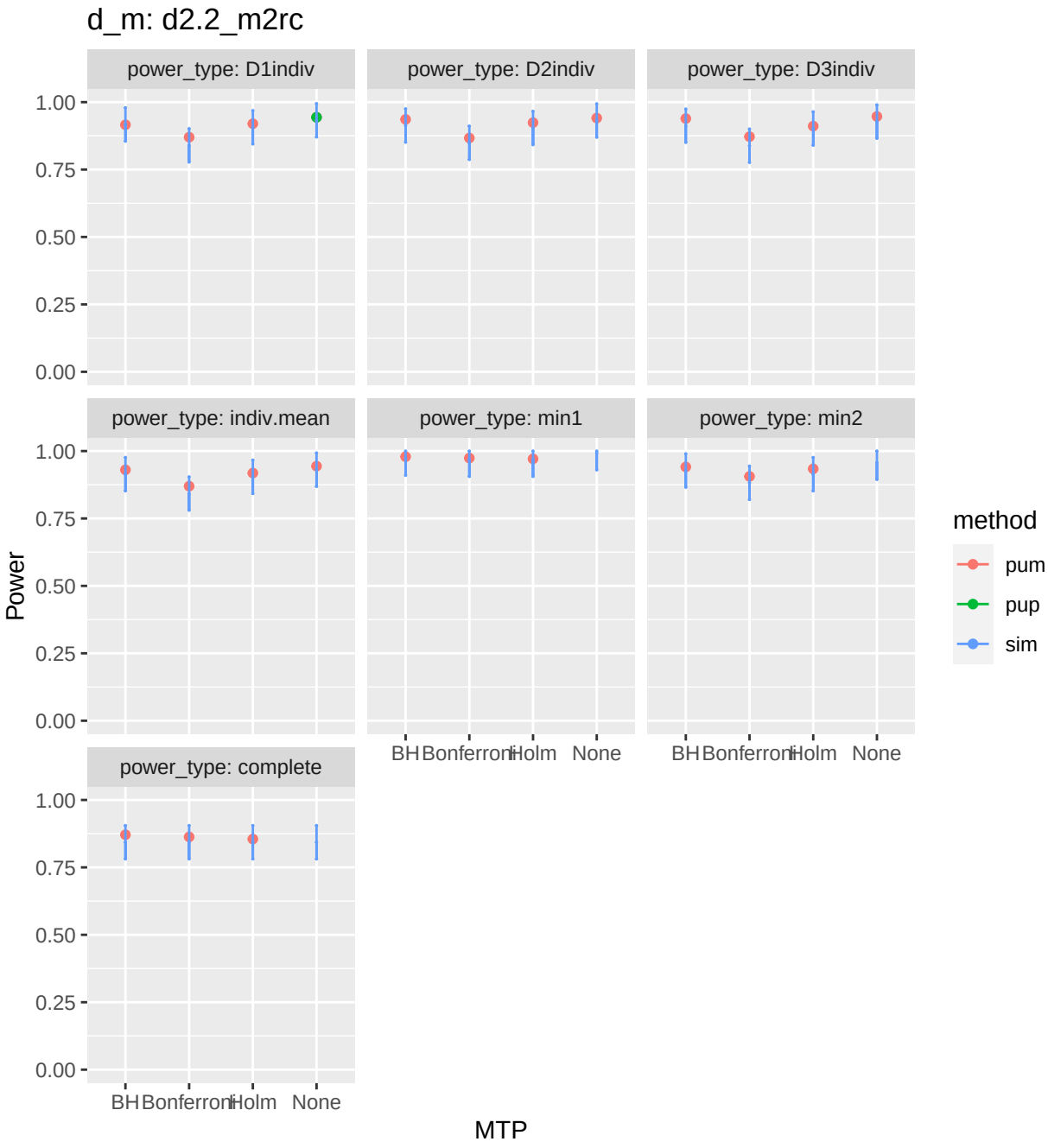


Varying ICC

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



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



MDES validation

Target value: 0.125

```
##
##
## +------------+---------------+---------------+-------------+
## |    MTP     | Adjusted MDES | D1indiv Power | Target MDES |
## +============+===============+===============+=============+
## | Bonferroni |     0.128     |     0.174     |    0.125    |
## +------------+---------------+---------------+-------------+
## |     BH     |     0.127     |     0.218     |    0.125    |
## +------------+---------------+---------------+-------------+
## |    Holm    |     0.115     |     0.161     |    0.125    |
## +------------+---------------+---------------+-------------+
##
## Table: d2.2_m2rc
```

Sample size validation

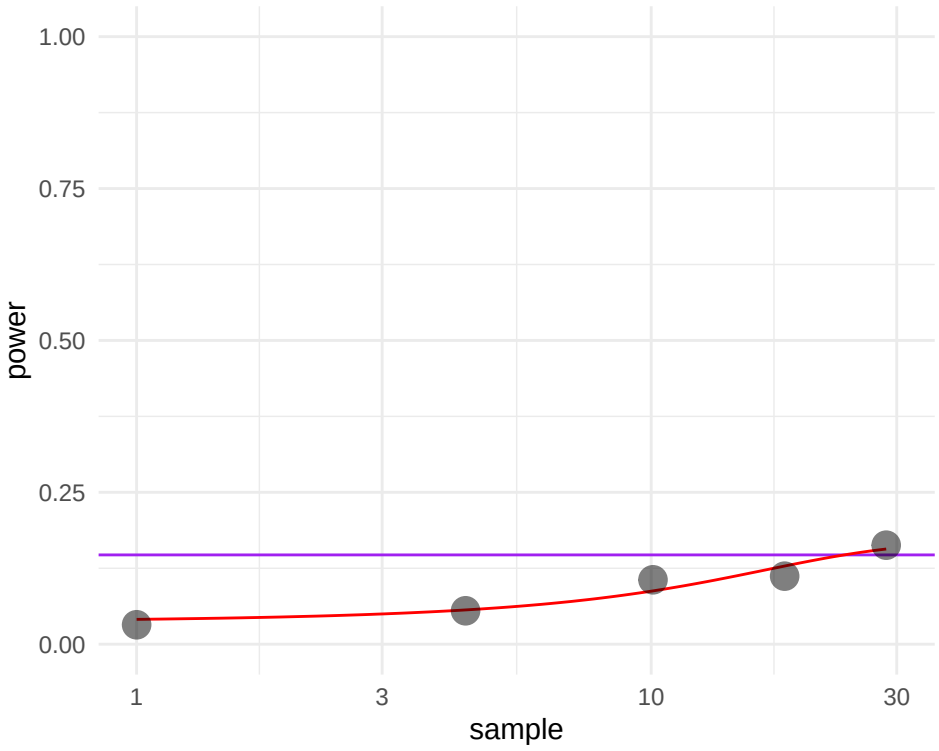
Target value: 60

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |      J      |     63      |     0.174     |
## +------------+-------------+-------------+---------------+
## |     BH     |      J      |     62      |     0.215     |
## +------------+-------------+-------------+---------------+
## |    Holm    |      J      |     55      |     0.175     |
## +------------+-------------+-------------+---------------+
##
## Table: d2.2_m2rc
```

Target value: 50

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |    nbar     |    71.12    |     0.174     |
## +------------+-------------+-------------+---------------+
## |     BH     |    nbar     |     60      |     0.216     |
## +------------+-------------+-------------+---------------+
## |    Holm    |    nbar     |     25      |     0.164     |
## +------------+-------------+-------------+---------------+
##
## Table: d2.2_m2rc
```

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


1.00
0.75
0.50
0.25
0.00
power
1
3
10
30
sample