Validate Power: d3.1

February 25, 2022

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

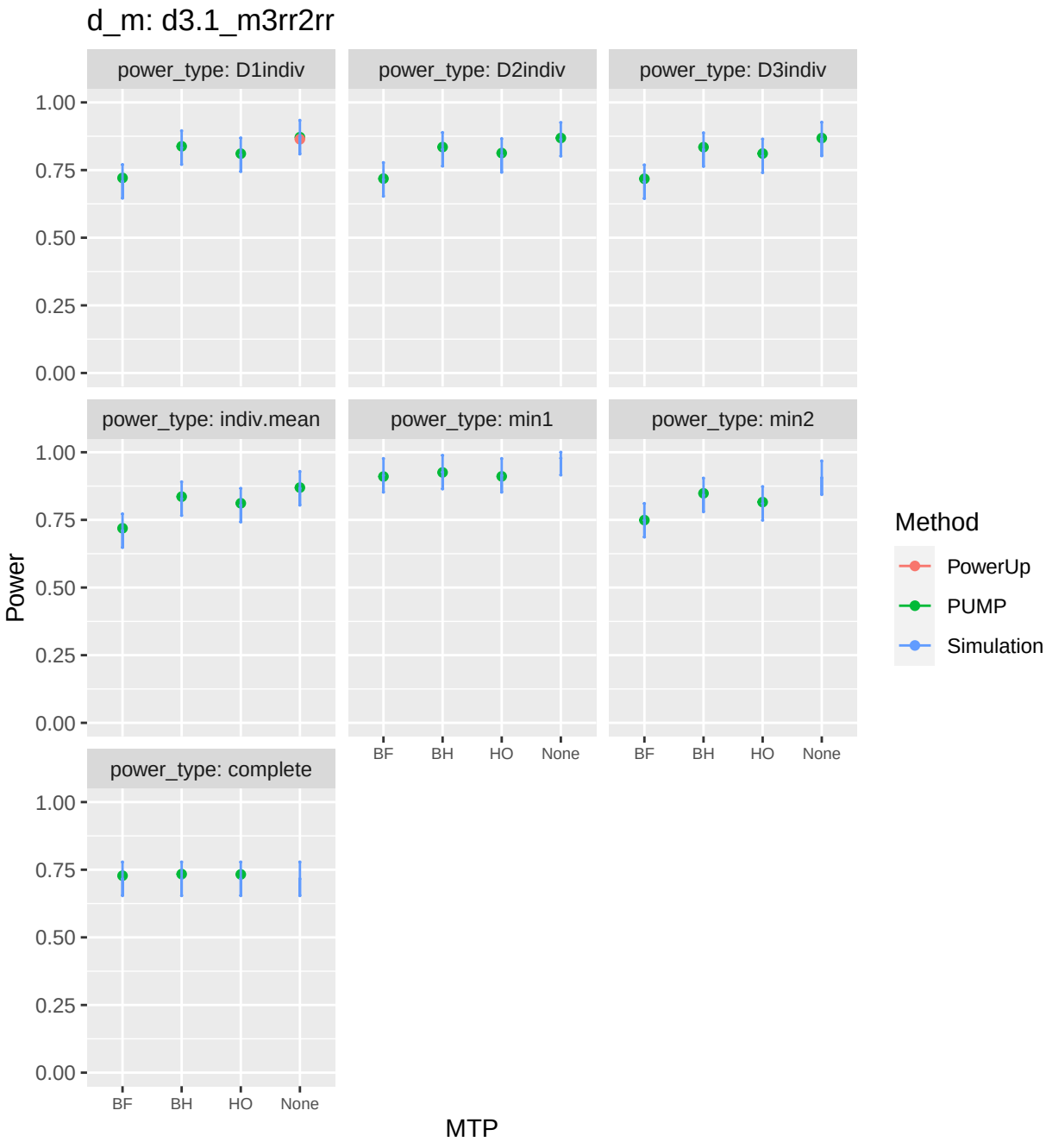
Models: random treatment effects.

d_m codes: `d3.1_m3rr2rr`

- 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: $ICC_2 = 0.2, 0.2, 0.2$, $ICC_3 = 0.2, 0.2, 0.2$
- Omega: $\omega_2 = 0.1, 0.1, 0.1$, $\omega_3 = 0.1, 0.1, 0.1$

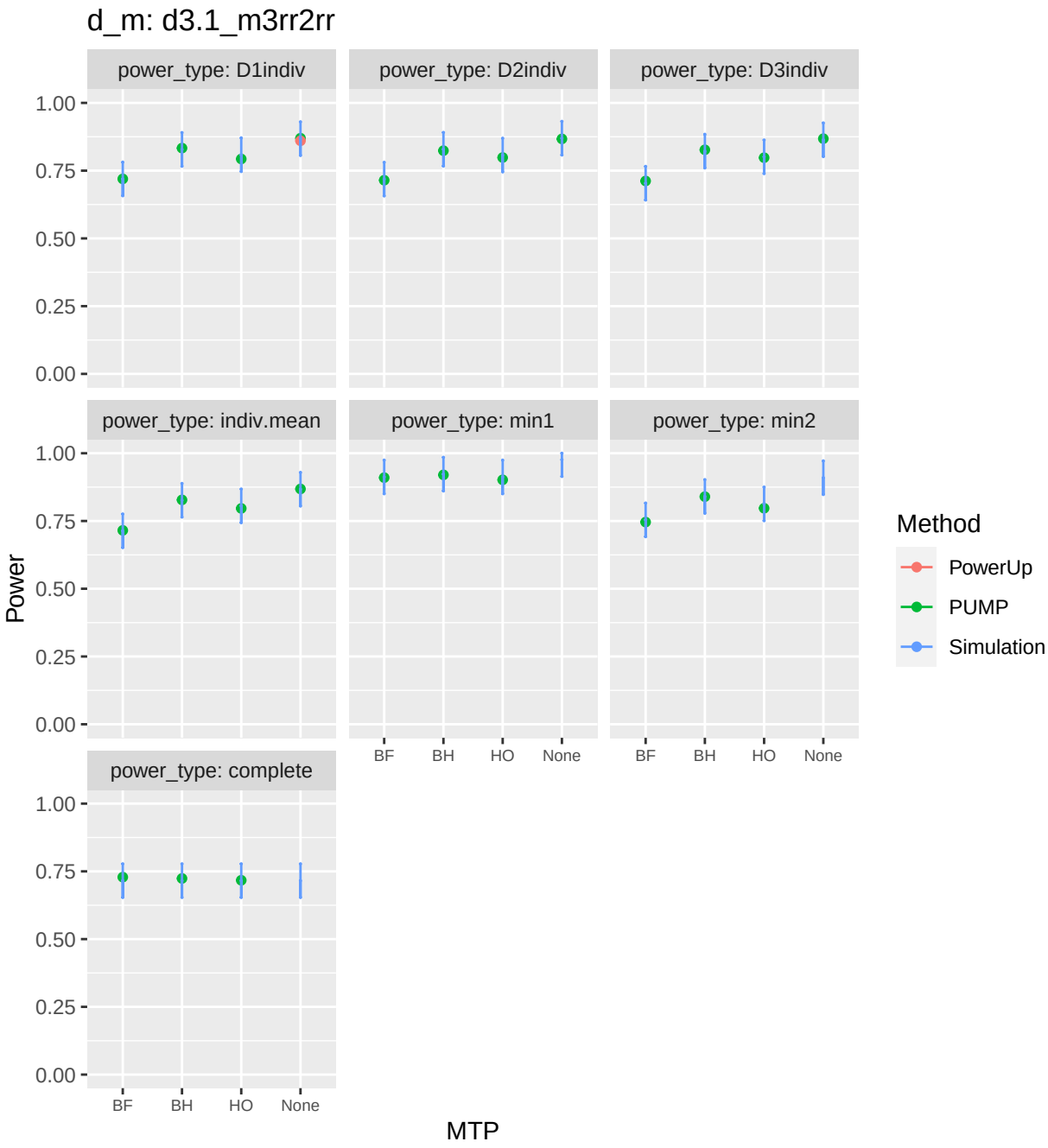
Power Validation

Base case

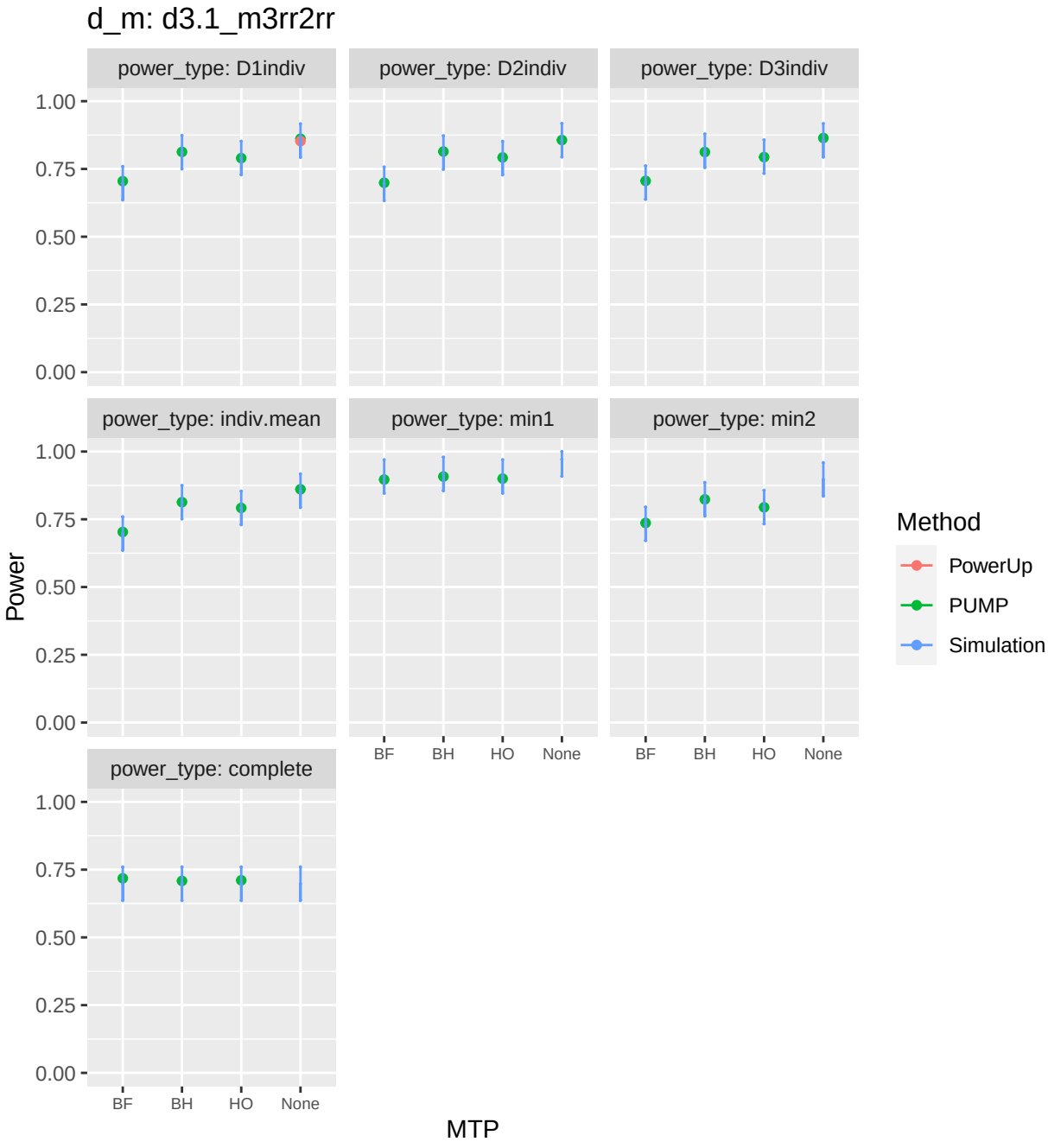


Varying school size

$\bar{n} = 75$

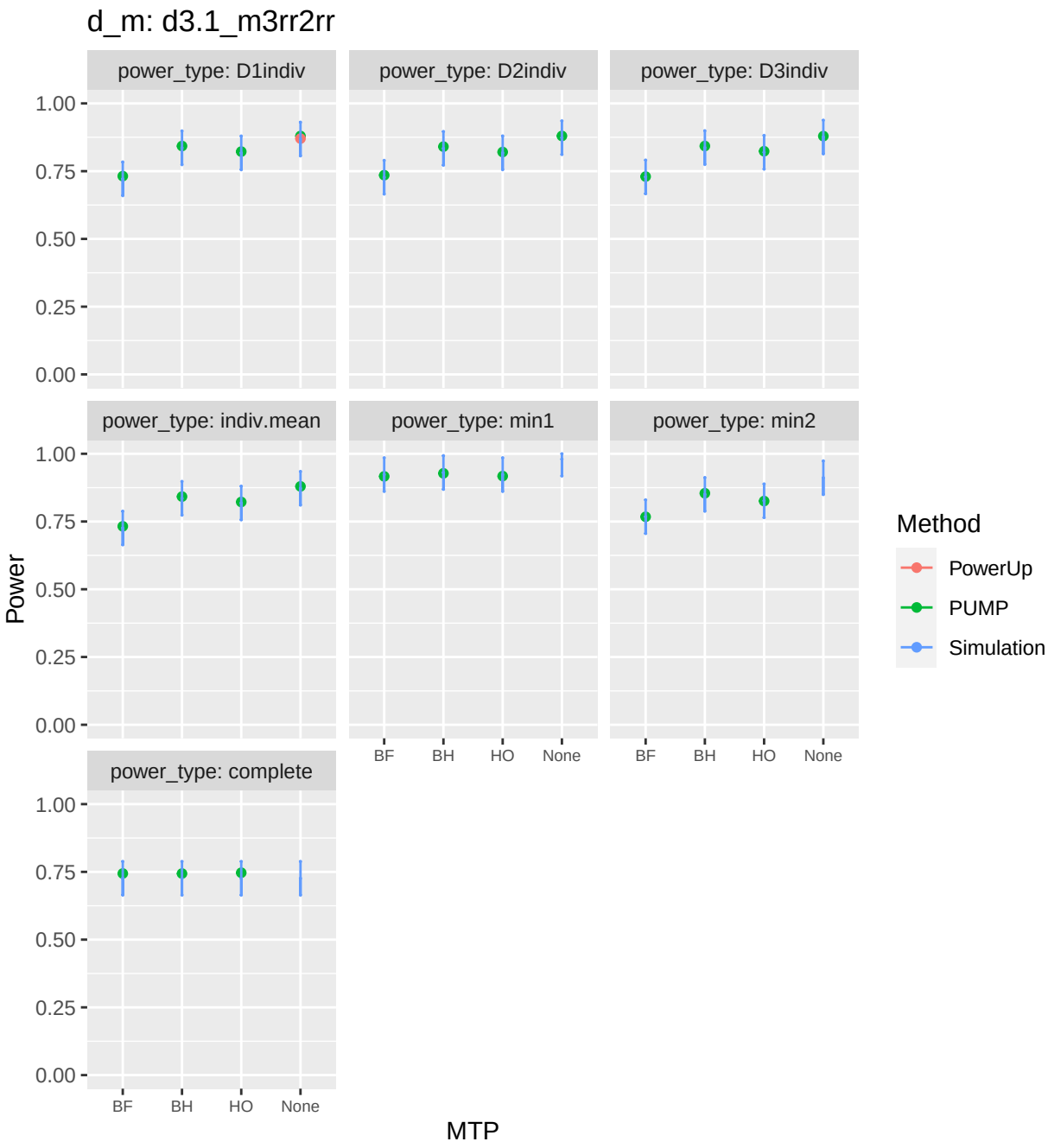


$\bar{n} = 50$

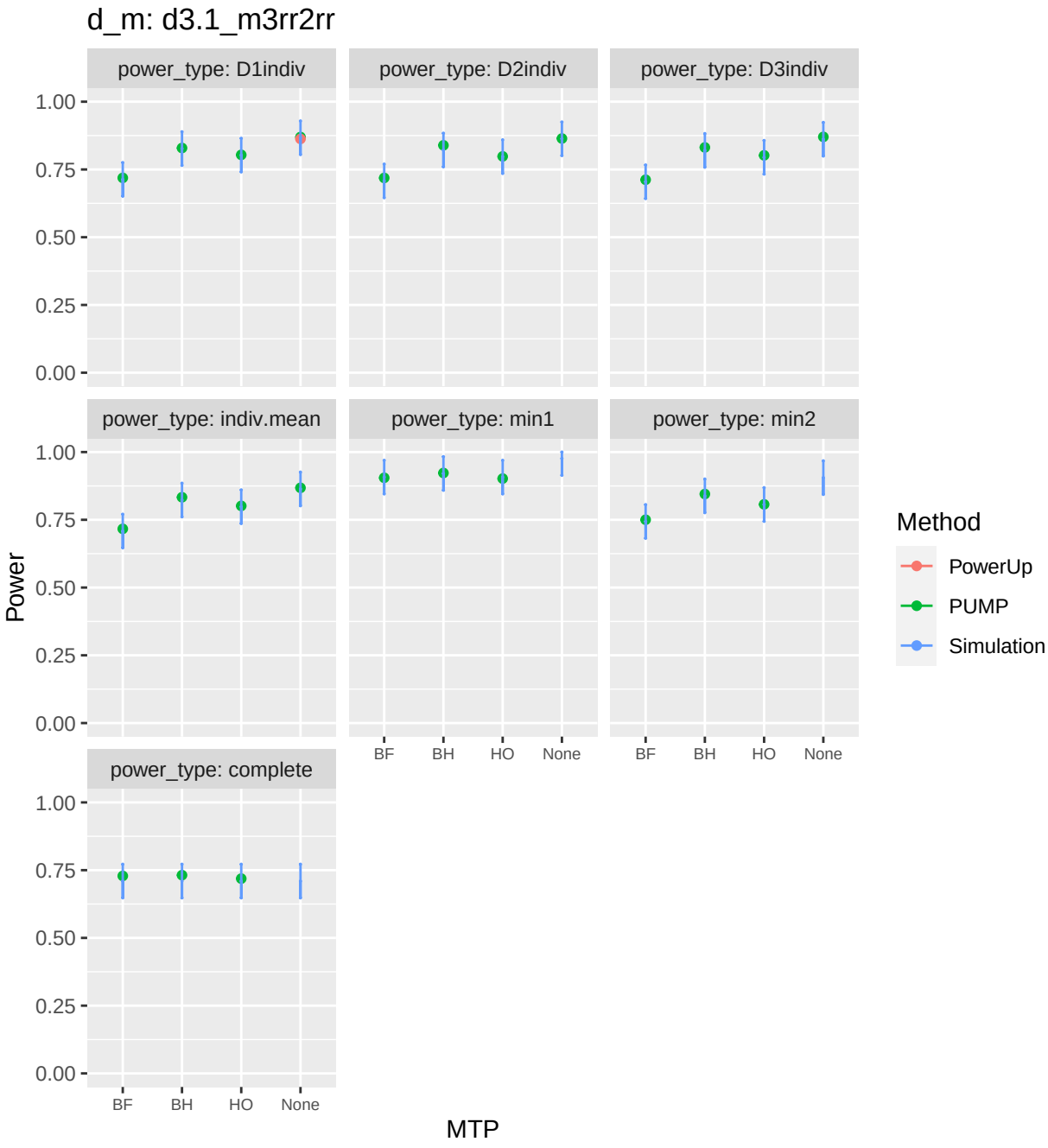

d_m: d3.1_m3rr2rr
power_type: D1indiv
power_type: D2indiv
power_type: D3indiv
power_type: indiv.mean
power_type: min1
power_type: min2
power_type: complete
1.00
0.75
0.50
0.25
0.00
Power
BF
BH
HO
None
MTP
Method
PowerUp
PUMP
Simulation

Varying R2

$R_1^2 = 0.6, 0.6, 0.6$

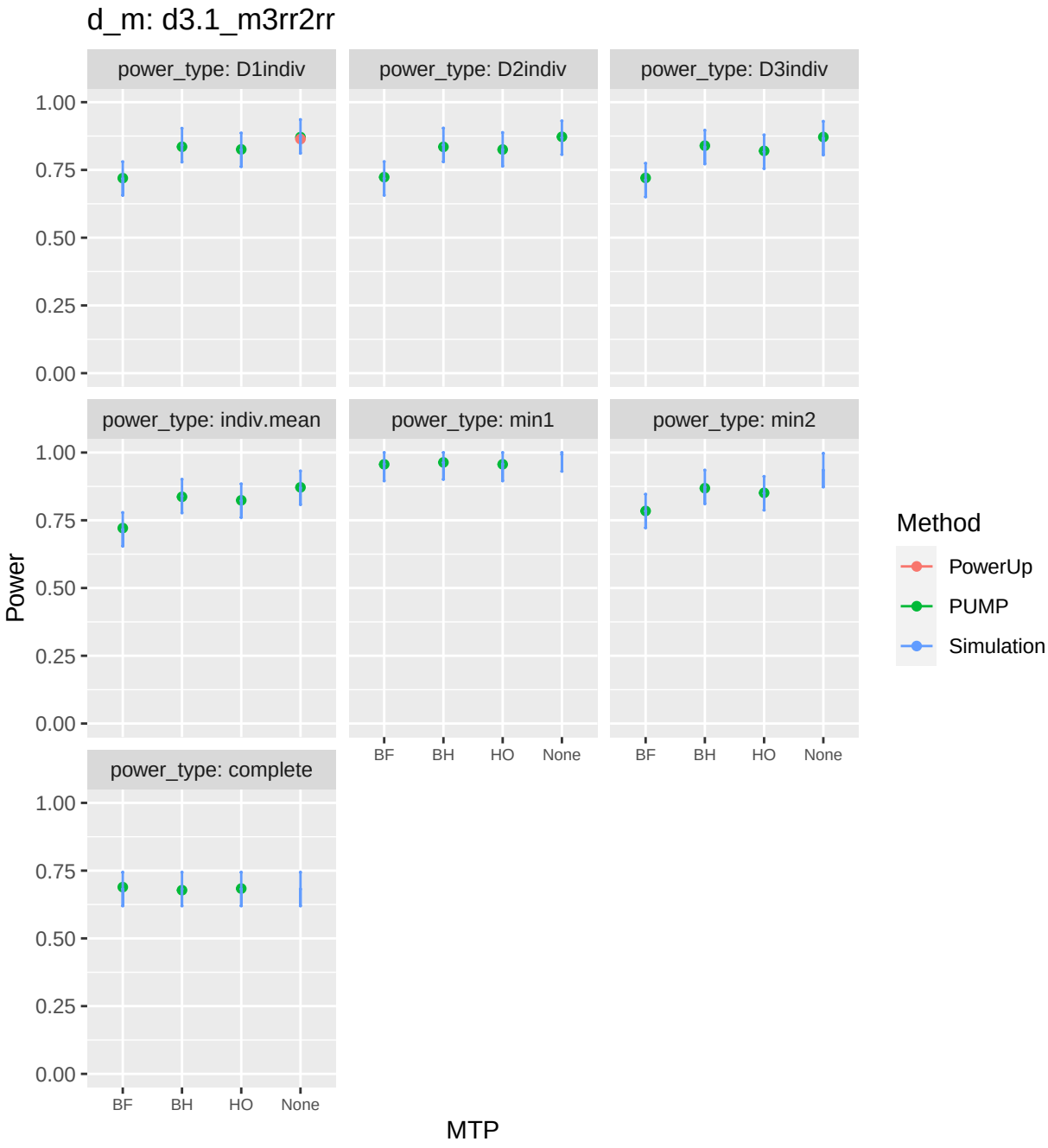


$R_1^2 = 0,\ 0,\ 0$

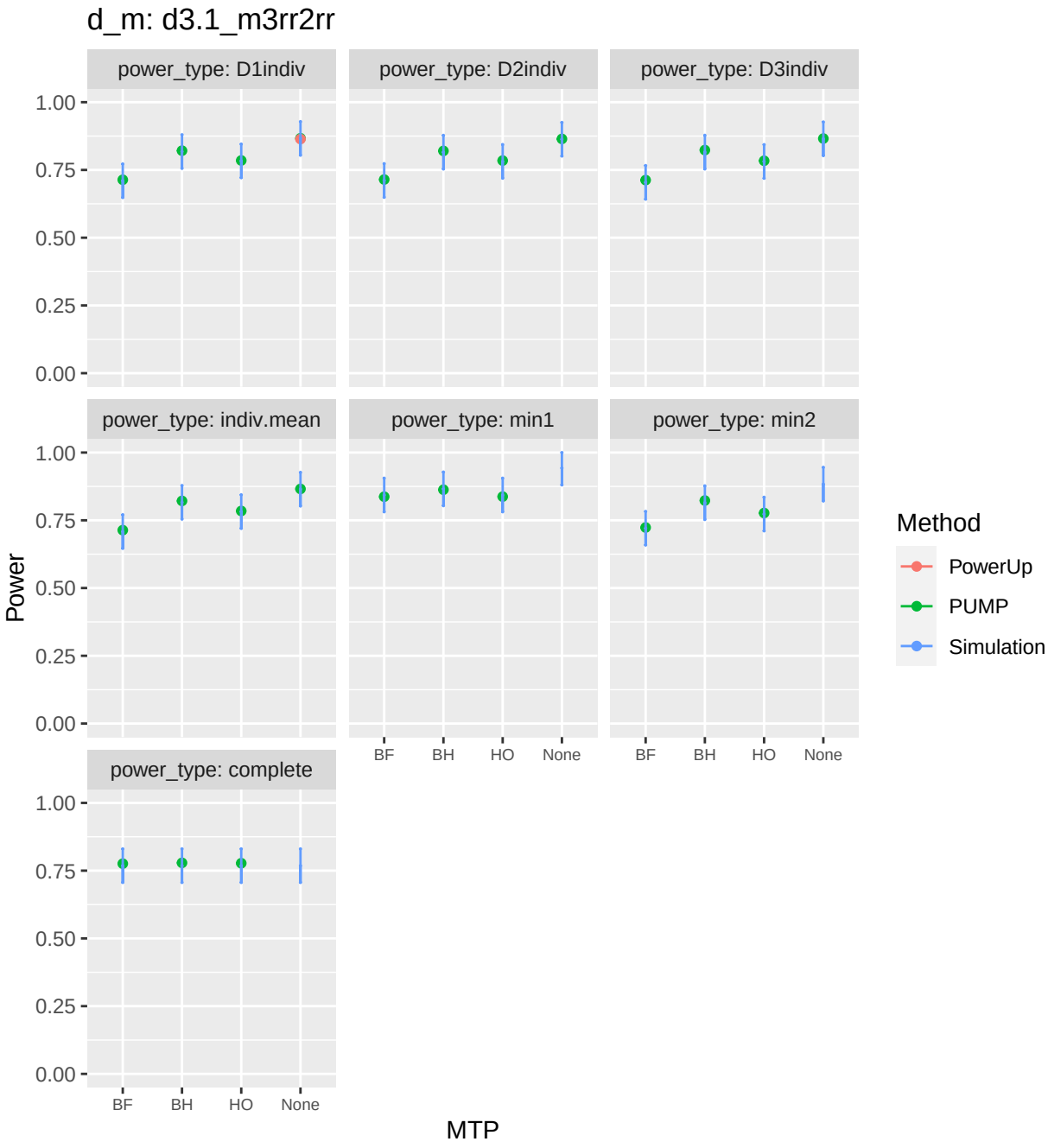

d_m: d3.1_m3rr2rr
power_type: D1indiv
power_type: D2indiv
power_type: D3indiv
power_type: indiv.mean
power_type: min1
power_type: min2
power_type: complete
1.00
0.75
0.50
0.25
0.00
Power
BF
BH
HO
None
MTP
Method
PowerUp
PUMP
Simulation

Varying rho

$\rho = 0.2$

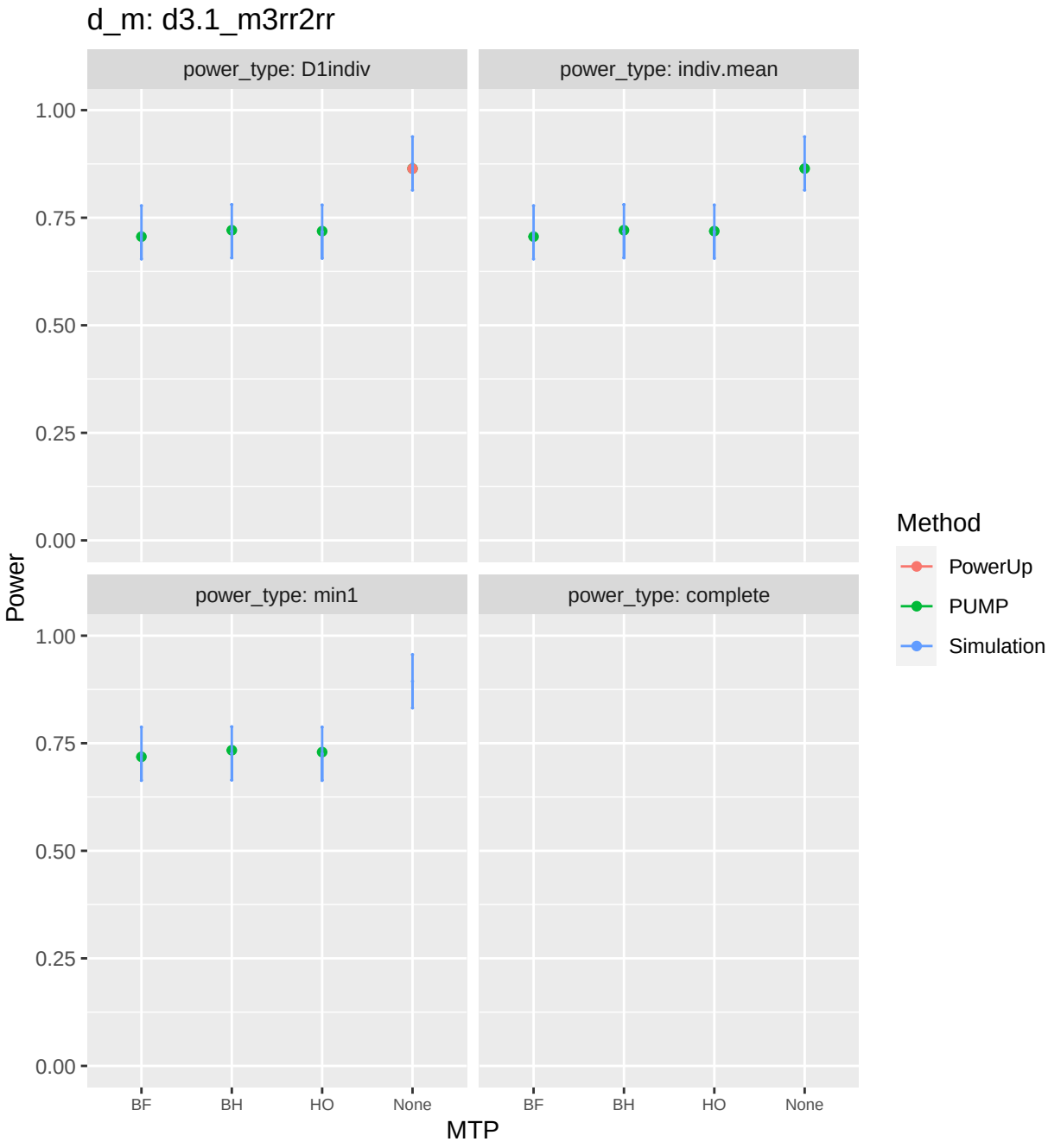


$\rho = 0.8$


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
Power
1.00
0.75
0.50
0.25
0.00
BF
BH
HO
None
MTP
Method
PowerUp
PUMP
Simulation

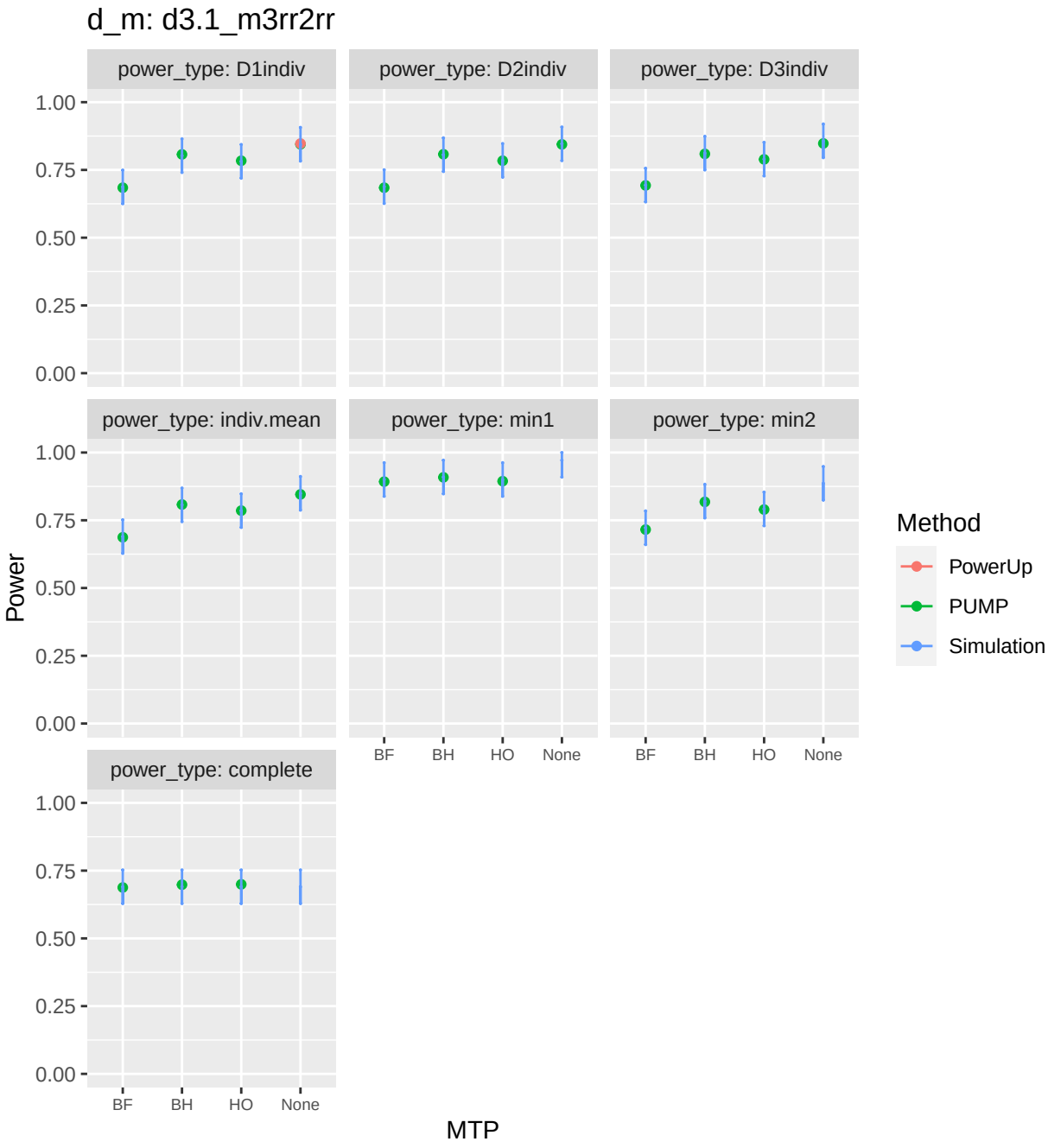
Varying true positives

MDES = 0.125, 0, 0

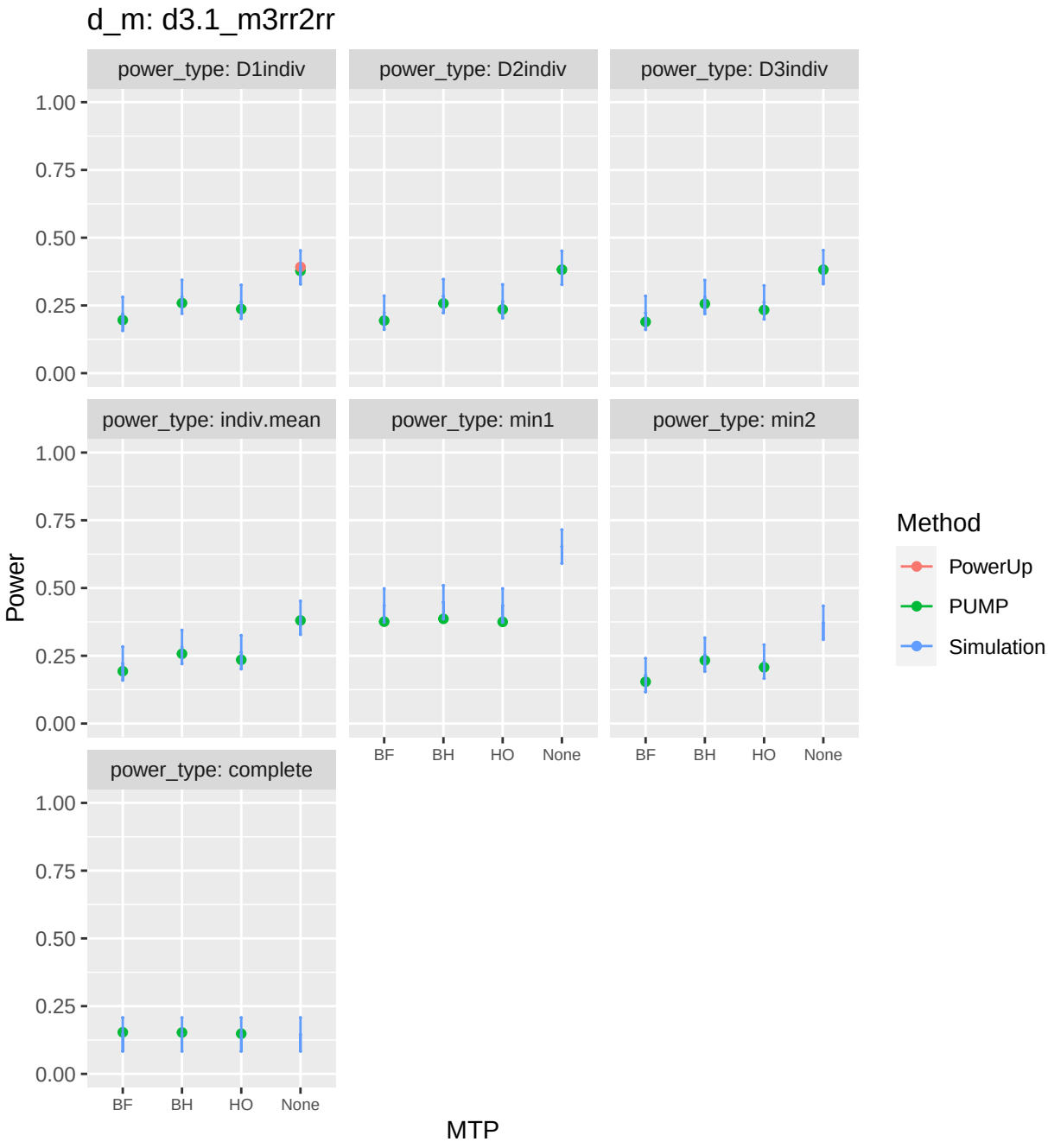


Varying ICC

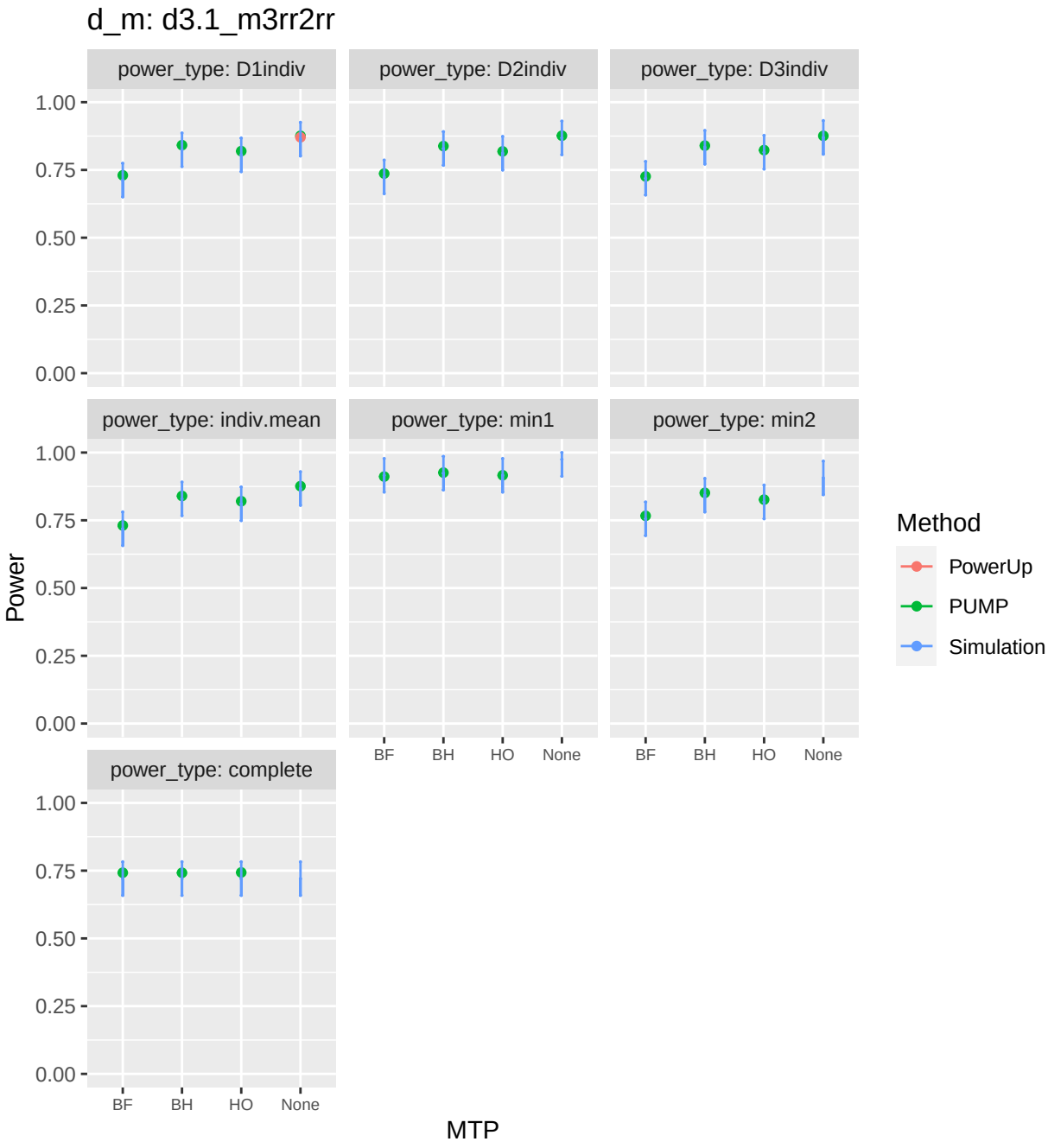
$\text{ICC}_2 = 0.7, 0.7, 0.7$



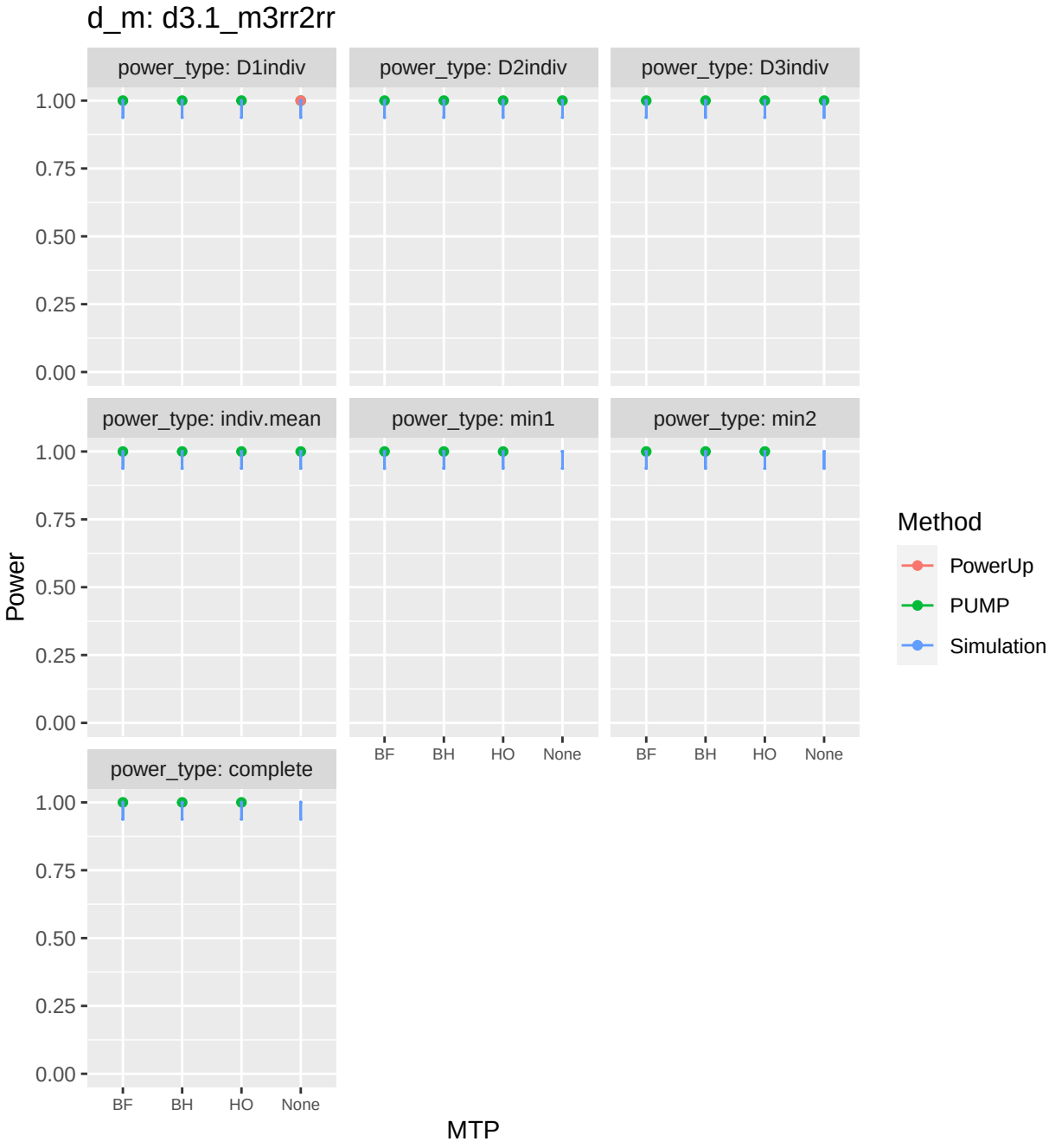
$\text{ICC}_3 = 0.7, 0.7, 0.7$



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

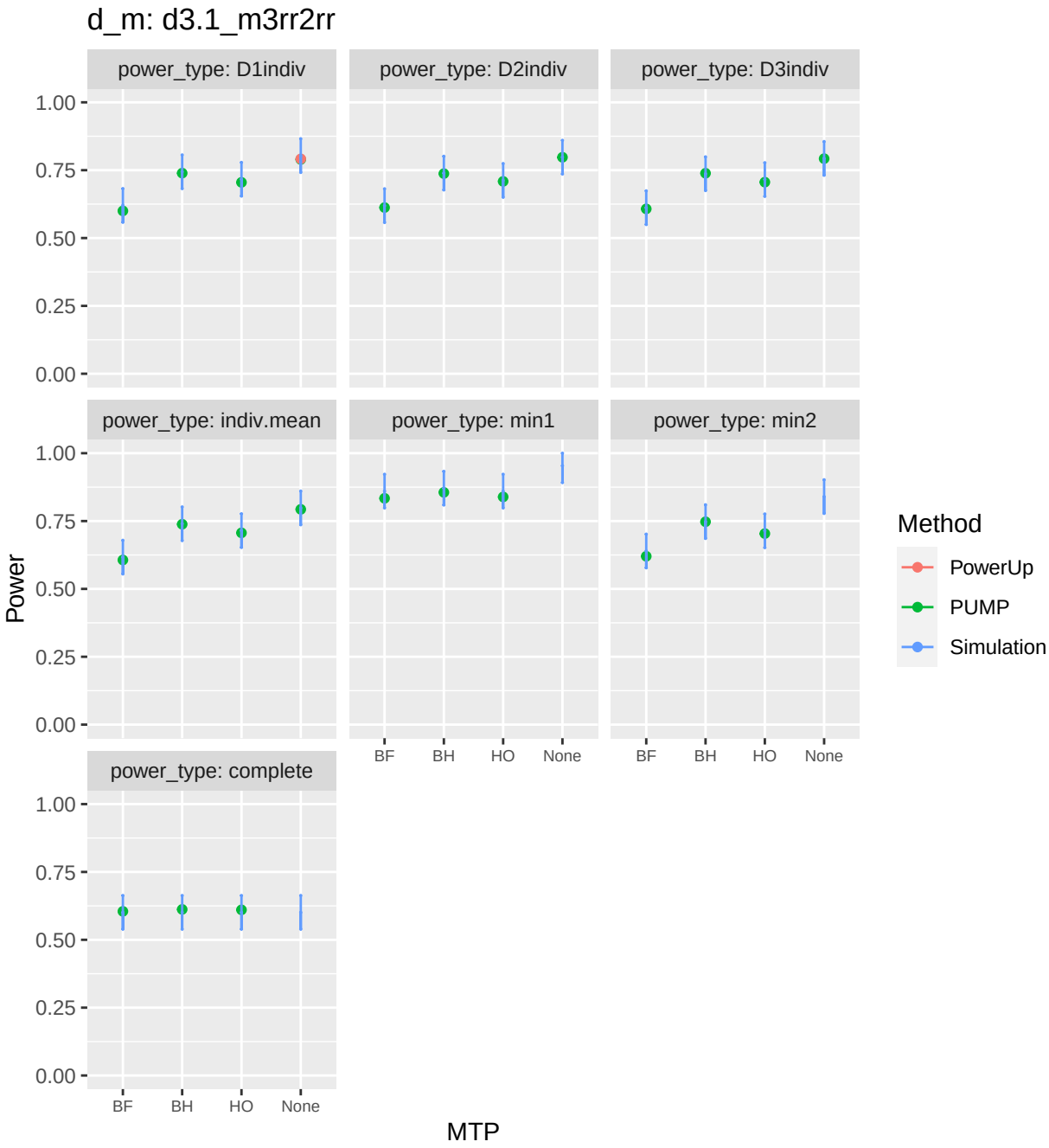


$\text{ICC}_2 = 0.2, 0.2, 0.2$

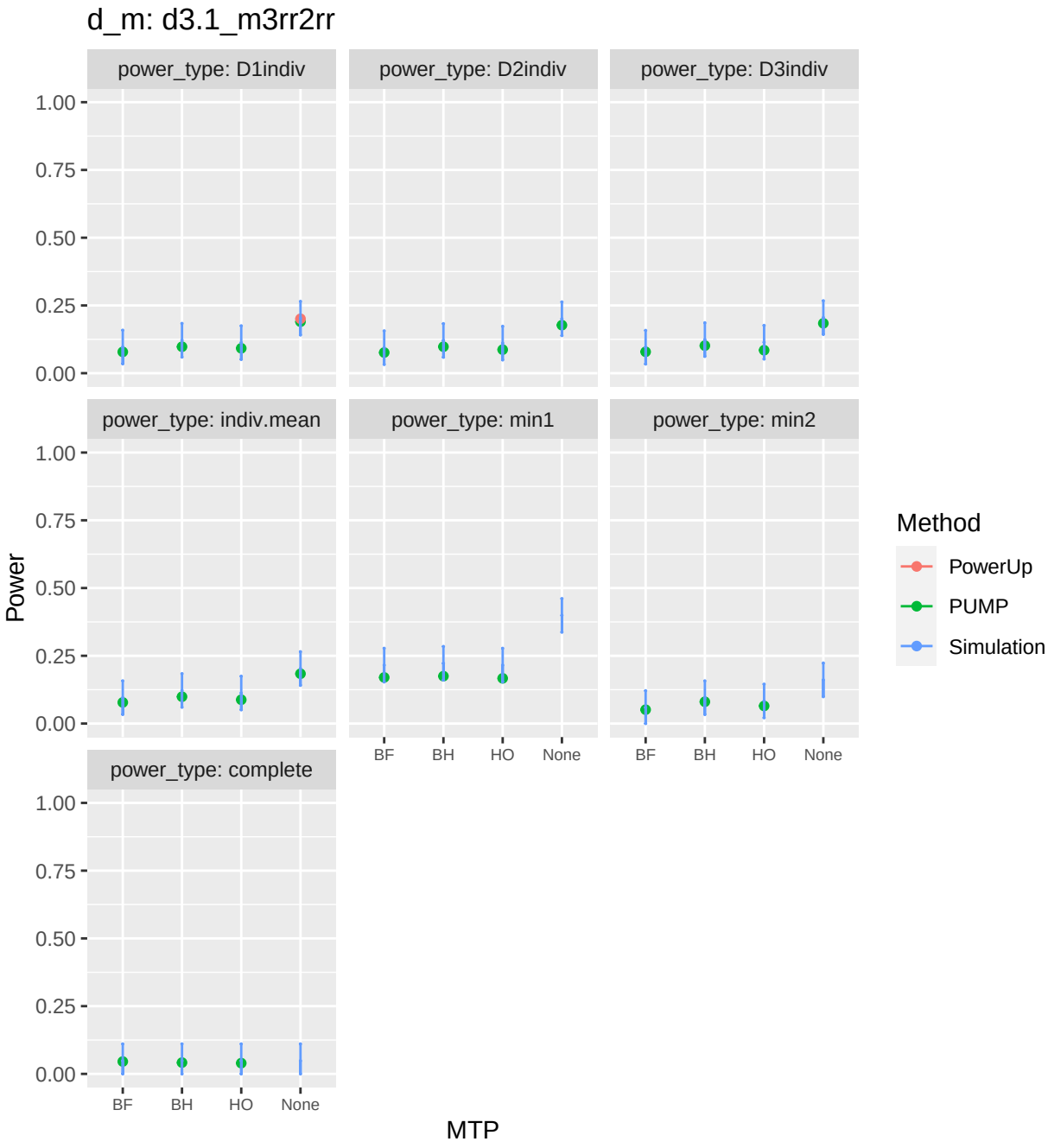


Varying Omega

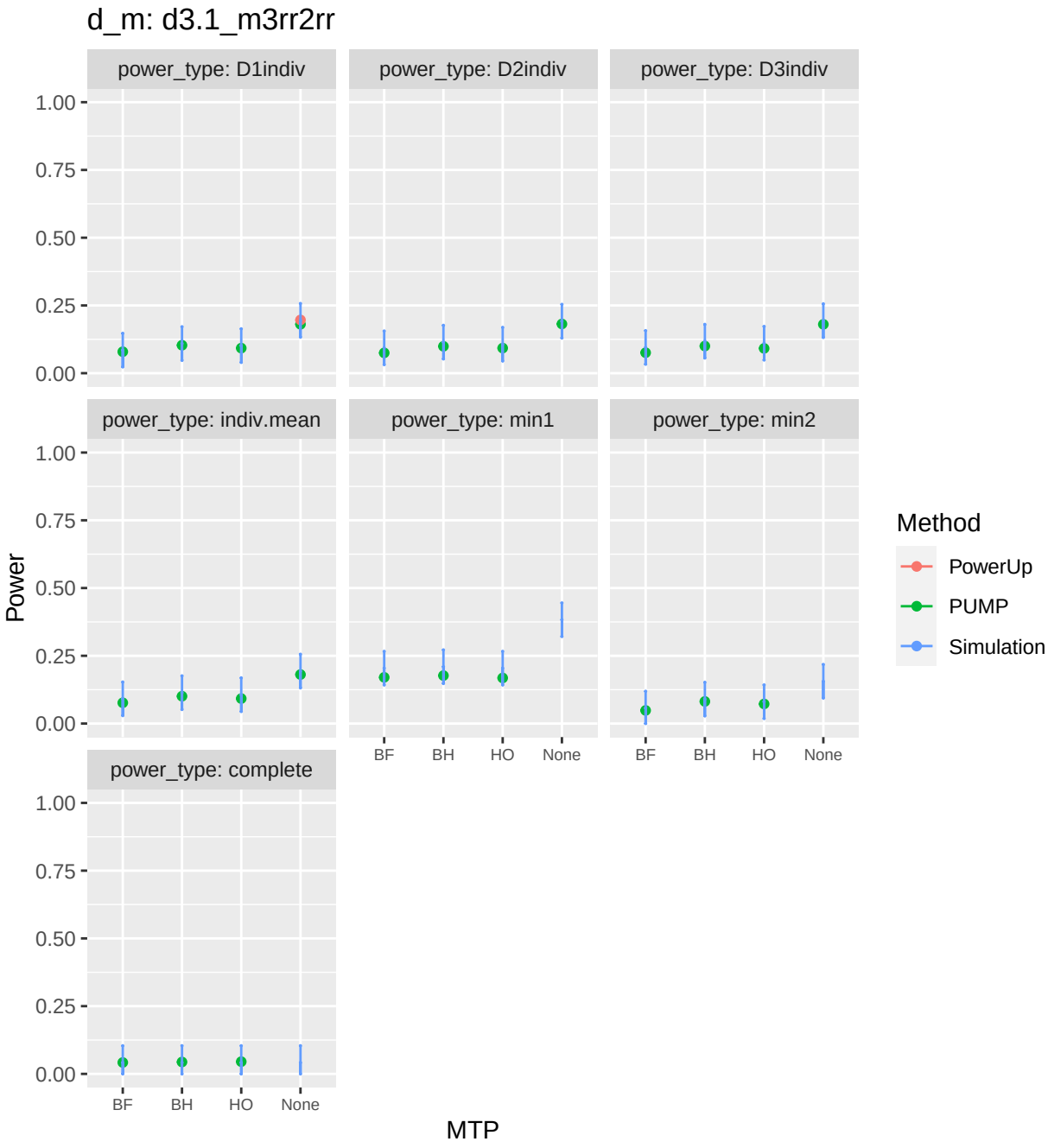
$\omega_2 = 0.8, 0.8, 0.8, \omega_3 = 0.1, 0.1, 0.1$



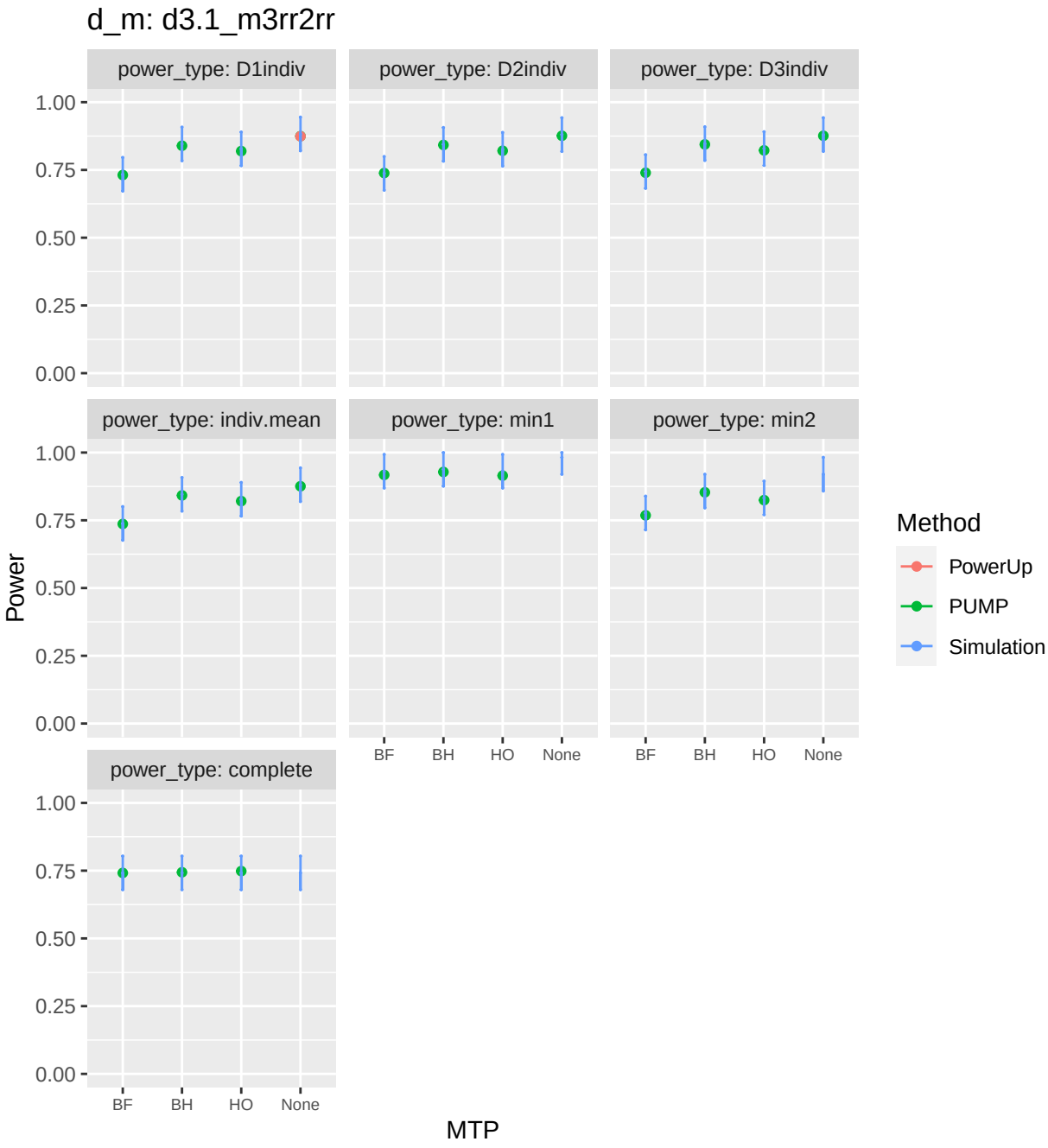
$\omega_2 = 0.1, 0.1, 0.1, \omega_3 = 0.8, 0.8, 0.8$



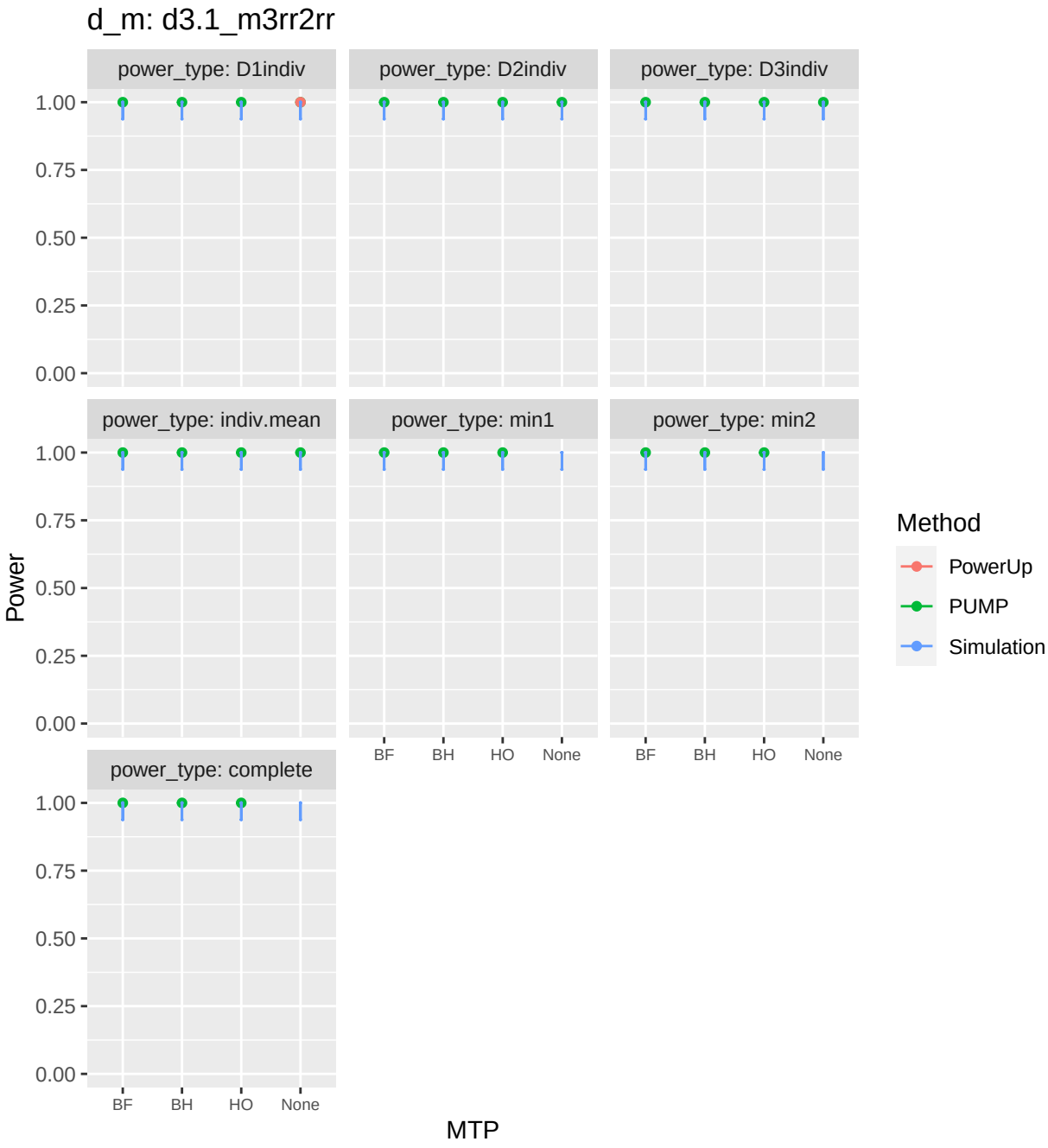
$\omega_2 = 0.8, 0.8, 0.8, \omega_3 = 0.8, 0.8, 0.8$



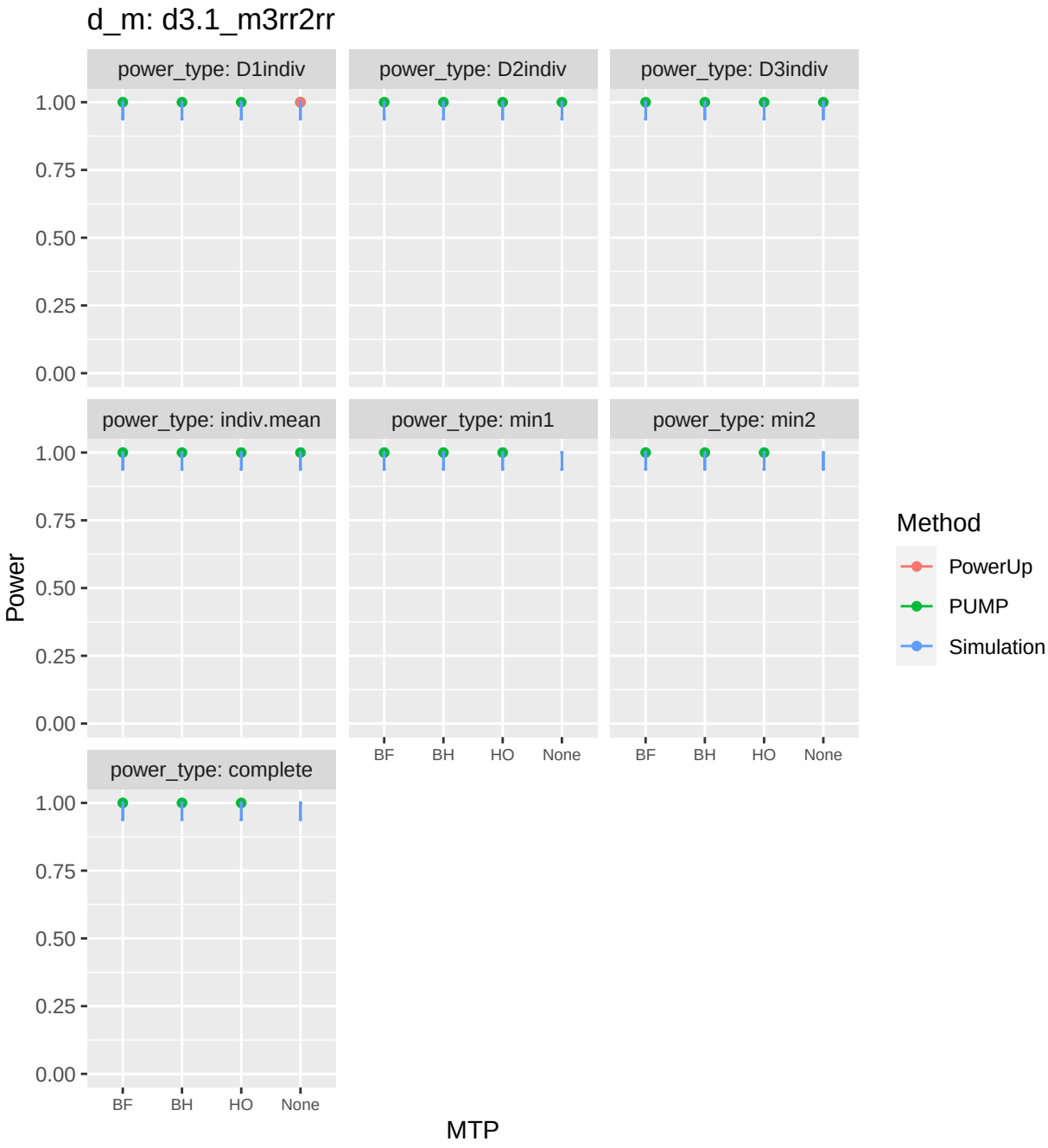
$\omega_2 = 0, 0, 0, \omega_3 = 0.1, 0.1, 0.1$



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



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



MDES validation

Target value: 0.125

```
##
##
## +-----+---------------+---------------+-------------+---------------+------+---+-------+
## | MTP | Adjusted MDES | D1indiv Power | Target MDES |     d_m       |  S   | M | MDES  |
## +=====+===============+===============+=============+===============+======+===+=======+
## | BF  |     0.125     |     0.721     |    0.125    | d3.1_m3rr2rr | 5000 | 3 | 0.125 |
## +-----+---------------+---------------+-------------+---------------+------+---+-------+
## | BH  |     0.127     |     0.842     |    0.125    | d3.1_m3rr2rr | 5000 | 3 | 0.125 |
## +-----+---------------+---------------+-------------+---------------+------+---+-------+
## | HO  |     0.125     |     0.81      |    0.125    | d3.1_m3rr2rr | 5000 | 3 | 0.125 |
## +-----+---------------+---------------+-------------+---------------+------+---+-------+
##
## Table: d3.1_m3rr2rr (continued below)
##
##
##
## +---------+----+----+------+-----+---------+---------+------+------+------+-------+-------+
## | numZero | J  | K  | nbar | rho | omega.2 | omega.3 | R2.1 | R2.2 | R2.3 | ICC.2 | ICC.3 |
## +=========+====+====+======+=====+=========+=========+======+======+======+=======+=======+
## |    0    | 30 | 15 | 100  | 0.5 |   0.1   |   0.1   | 0.1  |  NA  |  NA  |  0.2  |  0.2  |
## +---------+----+----+------+-----+---------+---------+------+------+------+-------+-------+
## |    0    | 30 | 15 | 100  | 0.5 |   0.1   |   0.1   | 0.1  |  NA  |  NA  |  0.2  |  0.2  |
## +---------+----+----+------+-----+---------+---------+------+------+------+-------+-------+
## |    0    | 30 | 15 | 100  | 0.5 |   0.1   |   0.1   | 0.1  |  NA  |  NA  |  0.2  |  0.2  |
## +---------+----+----+------+-----+---------+---------+------+------+------+-------+-------+
```

Sample size validation

Target value: 15

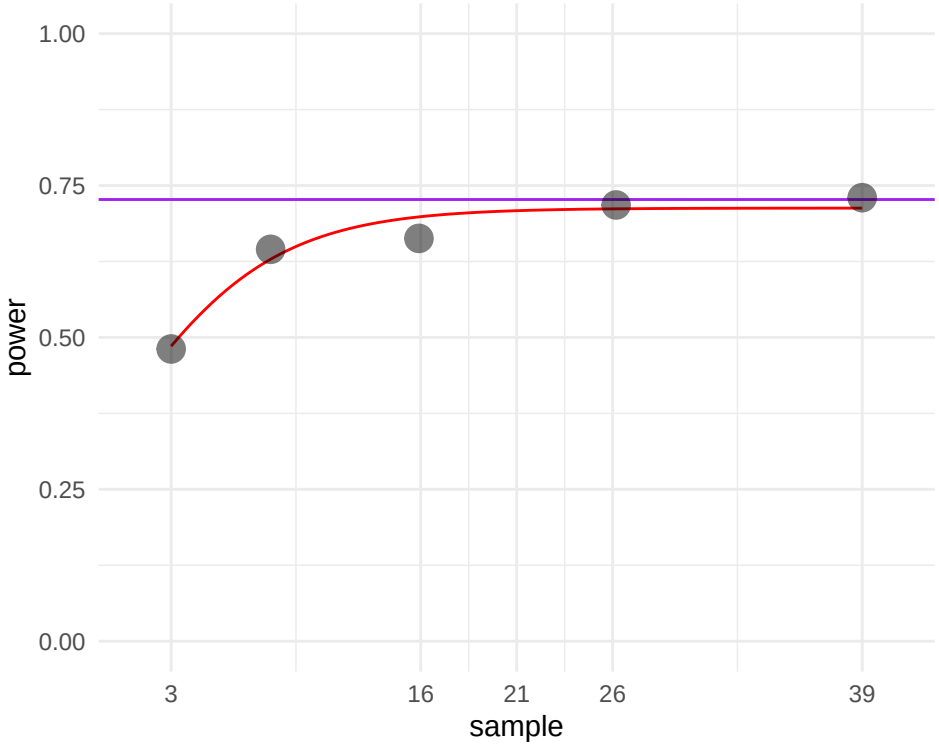
```
##
##
## +-----+-------------+-------------+---------------+---------------+------+---+-------+
## | MTP | Sample.type | Sample.size | D1indiv.power |     d_m       |  S   | M | MDES  |
## +=====+=============+=============+===============+===============+======+===+=======+
## | BF  |      K      |     15      |     0.721     | d3.1_m3rr2rr | 5000 | 3 | 0.125 |
## +-----+-------------+-------------+---------------+---------------+------+---+-------+
## | BH  |      K      |     16      |     0.842     | d3.1_m3rr2rr | 5000 | 3 | 0.125 |
## +-----+-------------+-------------+---------------+---------------+------+---+-------+
## | HO  |      K      |     16      |     0.818     | d3.1_m3rr2rr | 5000 | 3 | 0.125 |
## +-----+-------------+-------------+---------------+---------------+------+---+-------+
##
## Table: d3.1_m3rr2rr (continued below)
##
##
##
## +---------+----+----+------+-----+---------+---------+------+------+------+-------+-------+
## | numZero | J  | K  | nbar | rho | omega.2 | omega.3 | R2.1 | R2.2 | R2.3 | ICC.2 | ICC.3 |
## +=========+====+====+======+=====+=========+=========+======+======+======+=======+=======+
## |    0    | 30 | NA | 100  | 0.5 |   0.1   |   0.1   | 0.1  |  NA  |  NA  |  0.2  |  0.2  |
```

```
## +---------+----+----+------+-----+---------+---------+------+------+------+-------+-------+
## |    0    | 30 | NA | 100  | 0.5 |   0.1   |   0.1   | 0.1  |  NA  |  NA  |  0.2  |  0.2  |
## +---------+----+----+------+-----+---------+---------+------+------+------+-------+-------+
## |    0    | 30 | NA | 100  | 0.5 |   0.1   |   0.1   | 0.1  |  NA  |  NA  |  0.2  |  0.2  |
## +---------+----+----+------+-----+---------+---------+------+------+------+-------+-------+
```

Target value: 30

```
##
##
## +-----+-------------+-------------+---------------+--------------+------+---+-------+
## | MTP | Sample.type | Sample.size | D1indiv.power |     d_m      |  S   | M | MDES  |
## +=====+=============+=============+===============+==============+======+===+=======+
## | BF  |      J      |     32      |     0.721     | d3.1_m3rr2rr | 5000 | 3 | 0.125 |
## +-----+-------------+-------------+---------------+--------------+------+---+-------+
## | BH  |      J      |     64      |     0.846     | d3.1_m3rr2rr | 5000 | 3 | 0.125 |
## +-----+-------------+-------------+---------------+--------------+------+---+-------+
## | HO  |      J      |     36      |     0.812     | d3.1_m3rr2rr | 5000 | 3 | 0.125 |
## +-----+-------------+-------------+---------------+--------------+------+---+-------+
##
## Table: d3.1_m3rr2rr (continued below)
##
##
##
## +---------+----+----+------+-----+---------+---------+------+------+------+-------+-------+
## | numZero | J  | K  | nbar | rho | omega.2 | omega.3 | R2.1 | R2.2 | R2.3 | ICC.2 | ICC.3 |
## +=========+====+====+======+=====+=========+=========+======+======+======+=======+=======+
## |    0    | NA | 15 | 100  | 0.5 |   0.1   |   0.1   | 0.1  |  NA  |  NA  |  0.2  |  0.2  |
## +---------+----+----+------+-----+---------+---------+------+------+------+-------+-------+
## |    0    | NA | 15 | 100  | 0.5 |   0.1   |   0.1   | 0.1  |  NA  |  NA  |  0.2  |  0.2  |
## +---------+----+----+------+-----+---------+---------+------+------+------+-------+-------+
## |    0    | NA | 15 | 100  | 0.5 |   0.1   |   0.1   | 0.1  |  NA  |  NA  |  0.2  |  0.2  |
## +---------+----+----+------+-----+---------+---------+------+------+------+-------+-------+
```

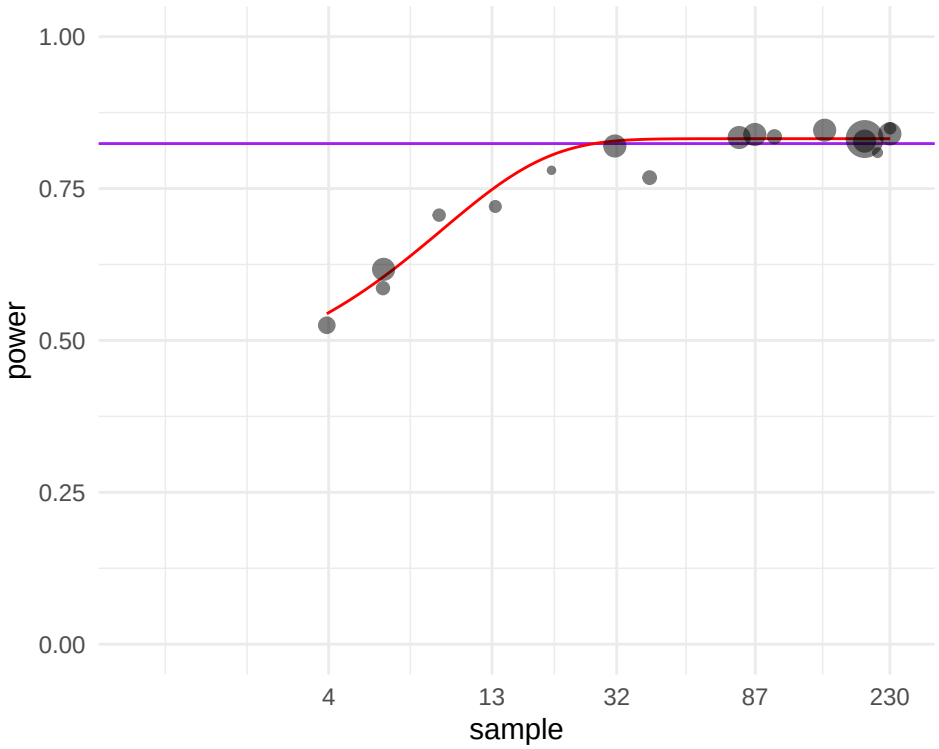
Note: particularly flat power curves results in discrepancy for J.



Target value: 100

```
##
##
## +-----+-------------+-------------+---------------+--------------+------+---+-------+
## | MTP | Sample.type | Sample.size | D1indiv.power |     d_m      |  S   | M | MDES  |
## +=====+=============+=============+===============+==============+======+===+=======+
## | BF  |    nbar     |    114.7    |     0.721     | d3.1_m3rr2rr | 5000 | 3 | 0.125 |
## +-----+-------------+-------------+---------------+--------------+------+---+-------+
## | BH  |    nbar     |    5785     |     0.842     | d3.1_m3rr2rr | 5000 | 3 | 0.125 |
## +-----+-------------+-------------+---------------+--------------+------+---+-------+
## | HO  |    nbar     |     180     |     0.813     | d3.1_m3rr2rr | 5000 | 3 | 0.125 |
## +-----+-------------+-------------+---------------+--------------+------+---+-------+
##
## Table: d3.1_m3rr2rr (continued below)
##
##
##
## +---------+----+----+-----+---------+---------+------+------+------+-------+-------+
## | numZero | J  | K  | rho | omega.2 | omega.3 | R2.1 | R2.2 | R2.3 | ICC.2 | ICC.3 |
## +=========+====+====+=====+=========+=========+======+======+======+=======+=======+
## |    0    | 30 | 15 | 0.5 |   0.1   |   0.1   | 0.1  |  NA  |  NA  |  0.2  |  0.2  |
## +---------+----+----+-----+---------+---------+------+------+------+-------+-------+
## |    0    | 30 | 15 | 0.5 |   0.1   |   0.1   | 0.1  |  NA  |  NA  |  0.2  |  0.2  |
## +---------+----+----+-----+---------+---------+------+------+------+-------+-------+
## |    0    | 30 | 15 | 0.5 |   0.1   |   0.1   | 0.1  |  NA  |  NA  |  0.2  |  0.2  |
## +---------+----+----+-----+---------+---------+------+------+------+-------+-------+
```

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


1.00
0.75
0.50
0.25
0.00
power
4
13
32
87
230
sample