Validate Power: d3.2

December 27, 2021

Design: Blocked Cluster RCT, with 3 levels, and randomization done at level 2 (school level).

Models: random and fixed treatment effects.

Default parameters:

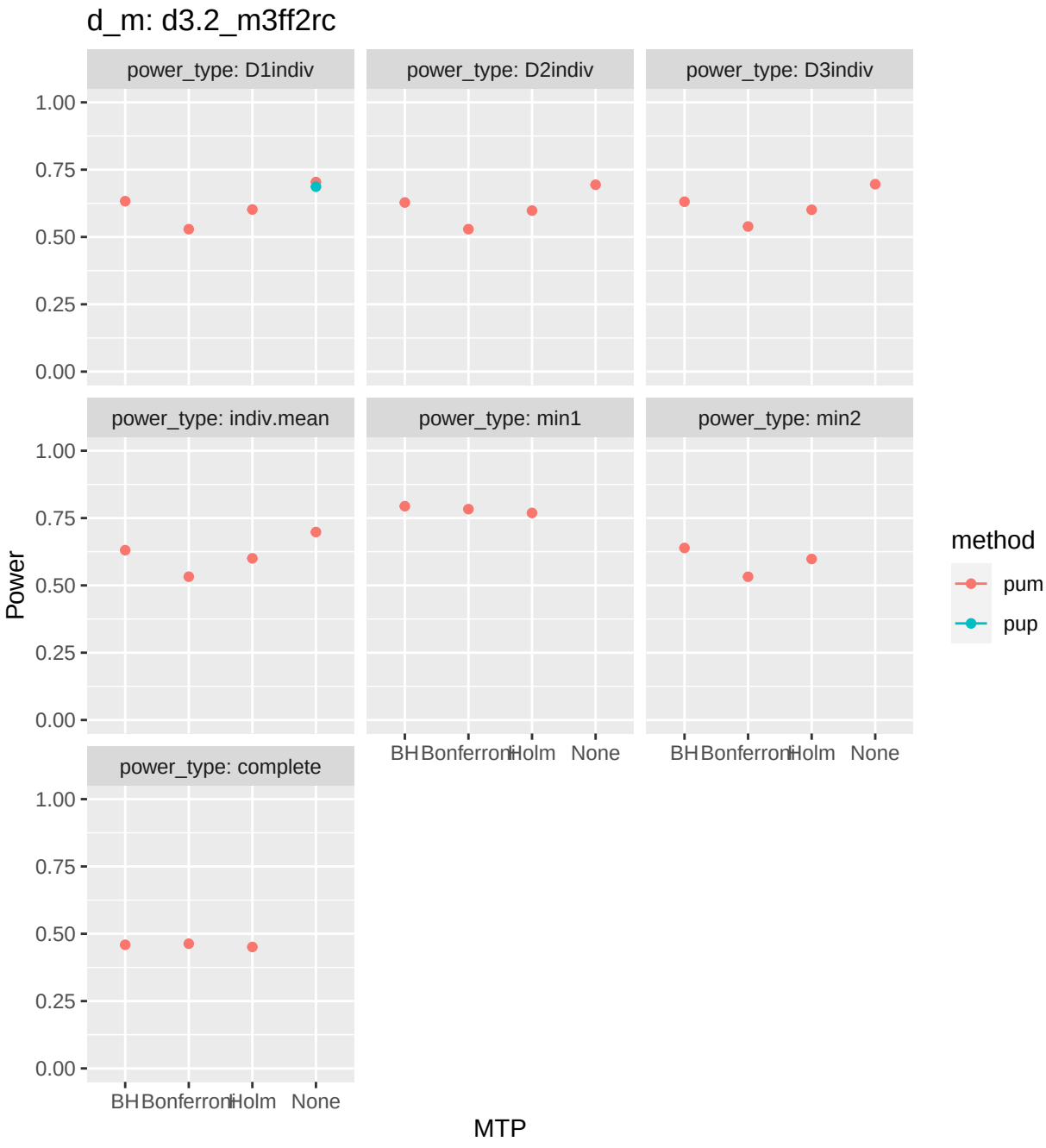
- M = 3
- J = 30
- K = 10
- rho: $\rho = 0.5$
- MDES: 0.125, 0.125, 0.125
- R2: $R_1^2 = 0.1, 0.1, 0.1$, $R_2^2 = 0.1, 0.1, 0.1$, $R_3^2 = 0$
- ICC: $\text{ICC}_2 = 0.2, 0.2, 0.2$, $\text{ICC}_3 = 0.2, 0.2, 0.2$
- Omega2: $\omega_2 = 0$

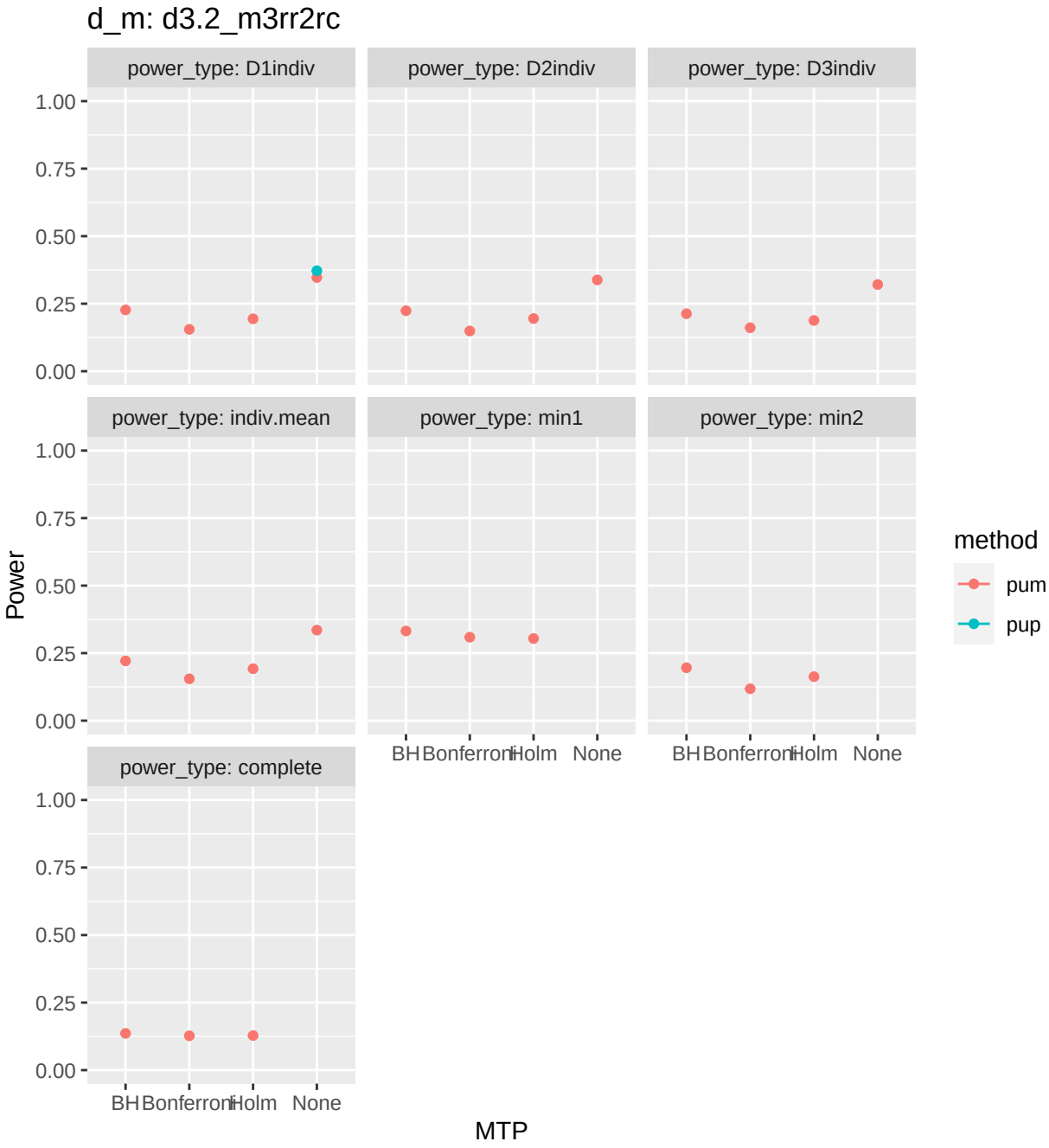
Parameters by model type:

- Omega3: $\omega_3 = 0$ for fixed effects, $\text{omega}_3 = 0.1, 0.1, 0.1$ for random effects

Power Validation

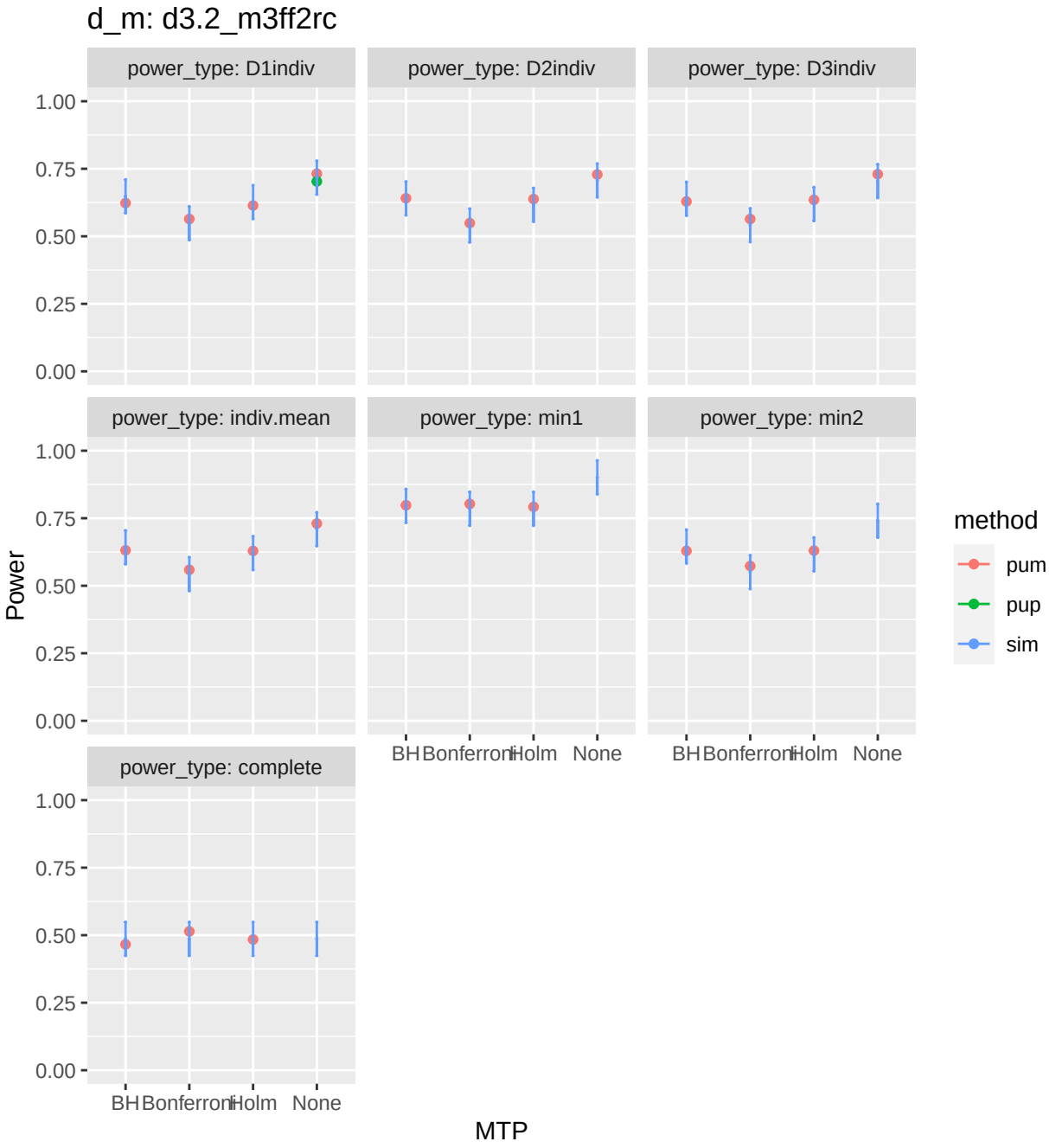
Base case

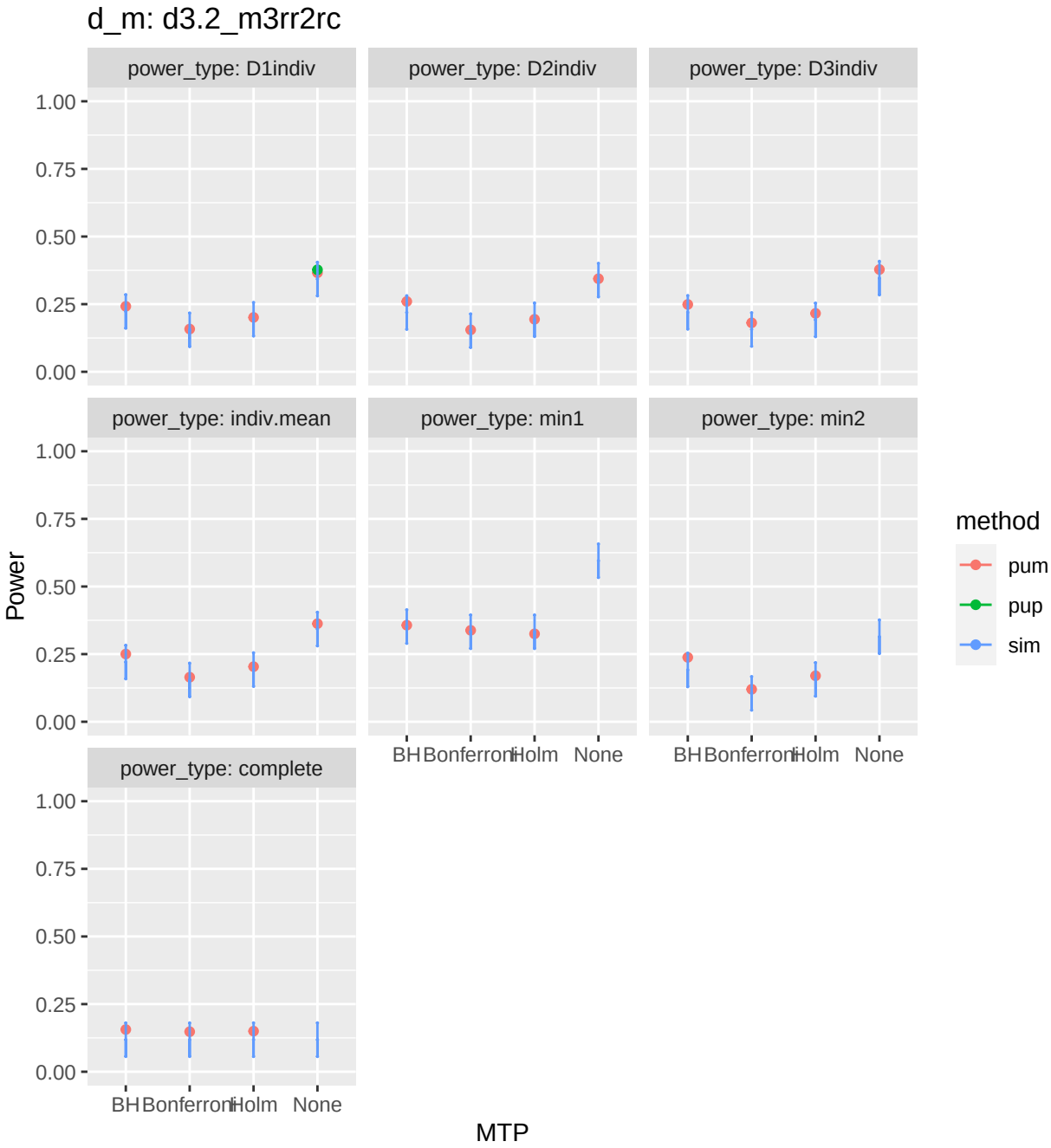



d_m: d3.2_m3rr2rc
power_type: D1indiv
power_type: D2indiv
power_type: D3indiv
power_type: indiv.mean
power_type: min1
power_type: min2
power_type: complete
1.00
0.75
0.50
0.25
0.00
Power
BH
Bonferroni
Holm
None
MTP
method
pum
pup

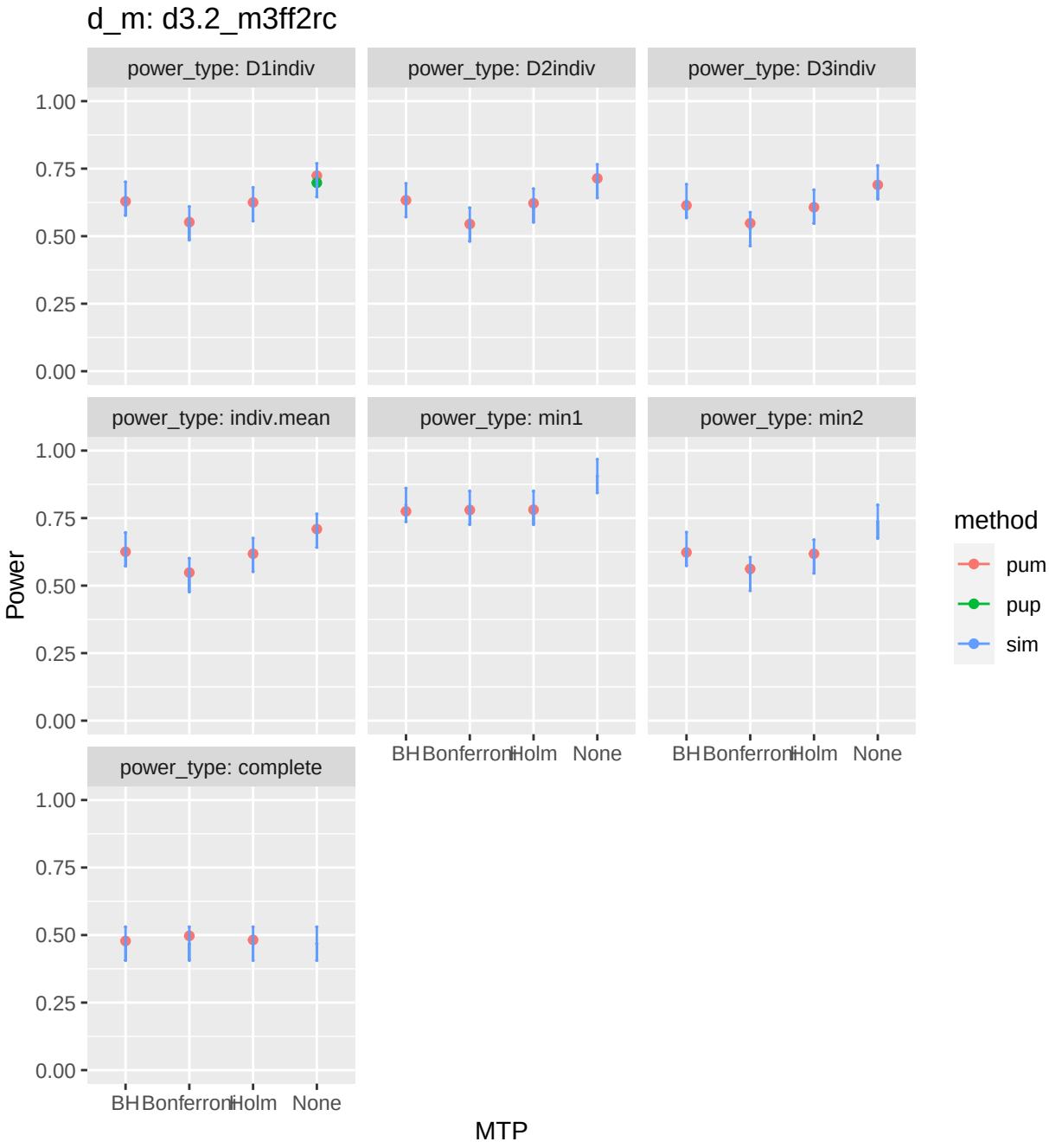
Varying school size

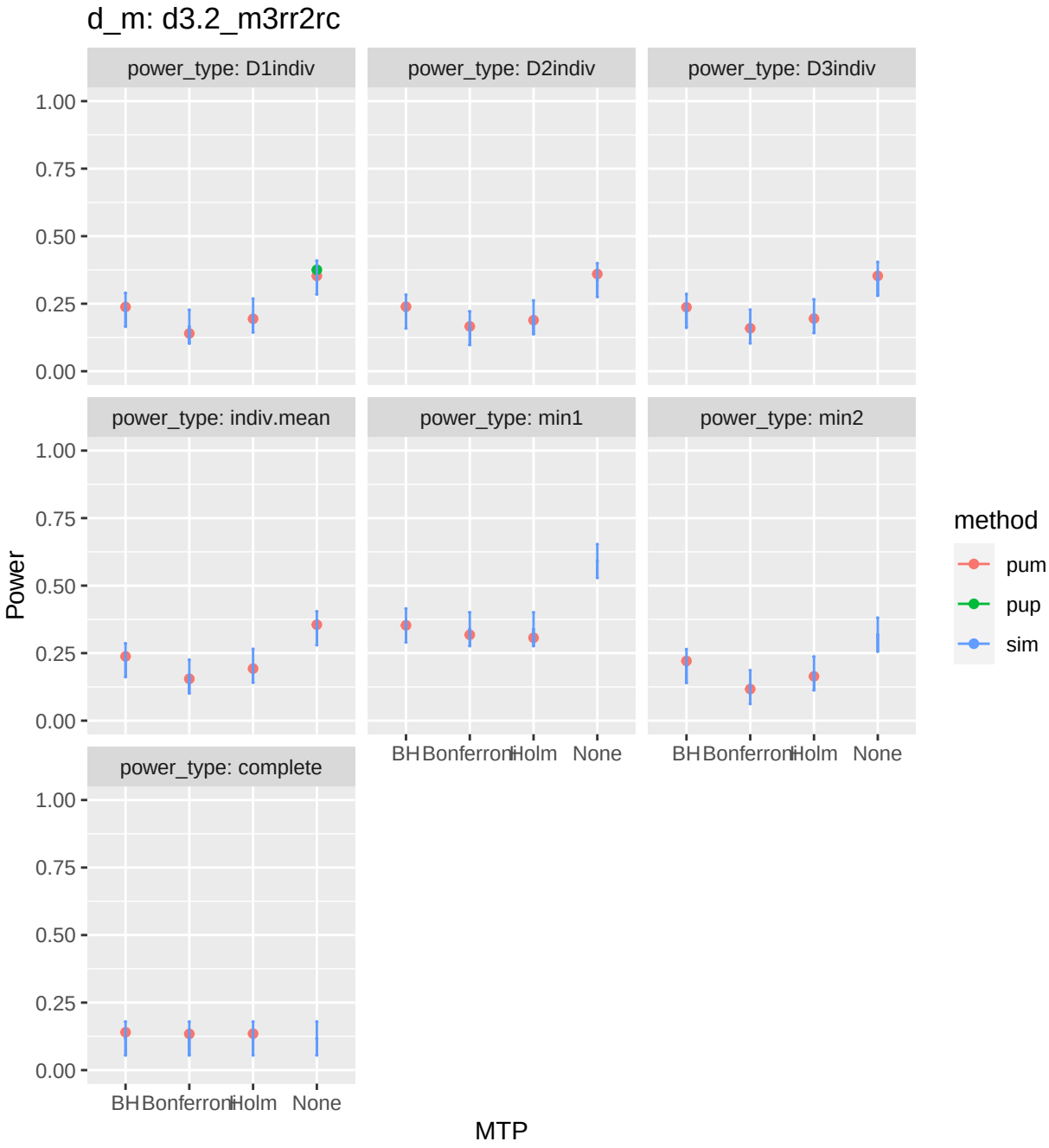
$\bar{n} = 100$




d_m: d3.2_m3rr2rc
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
BH
Bonferroni
Holm
None
MTP
method
pum
pup
sim

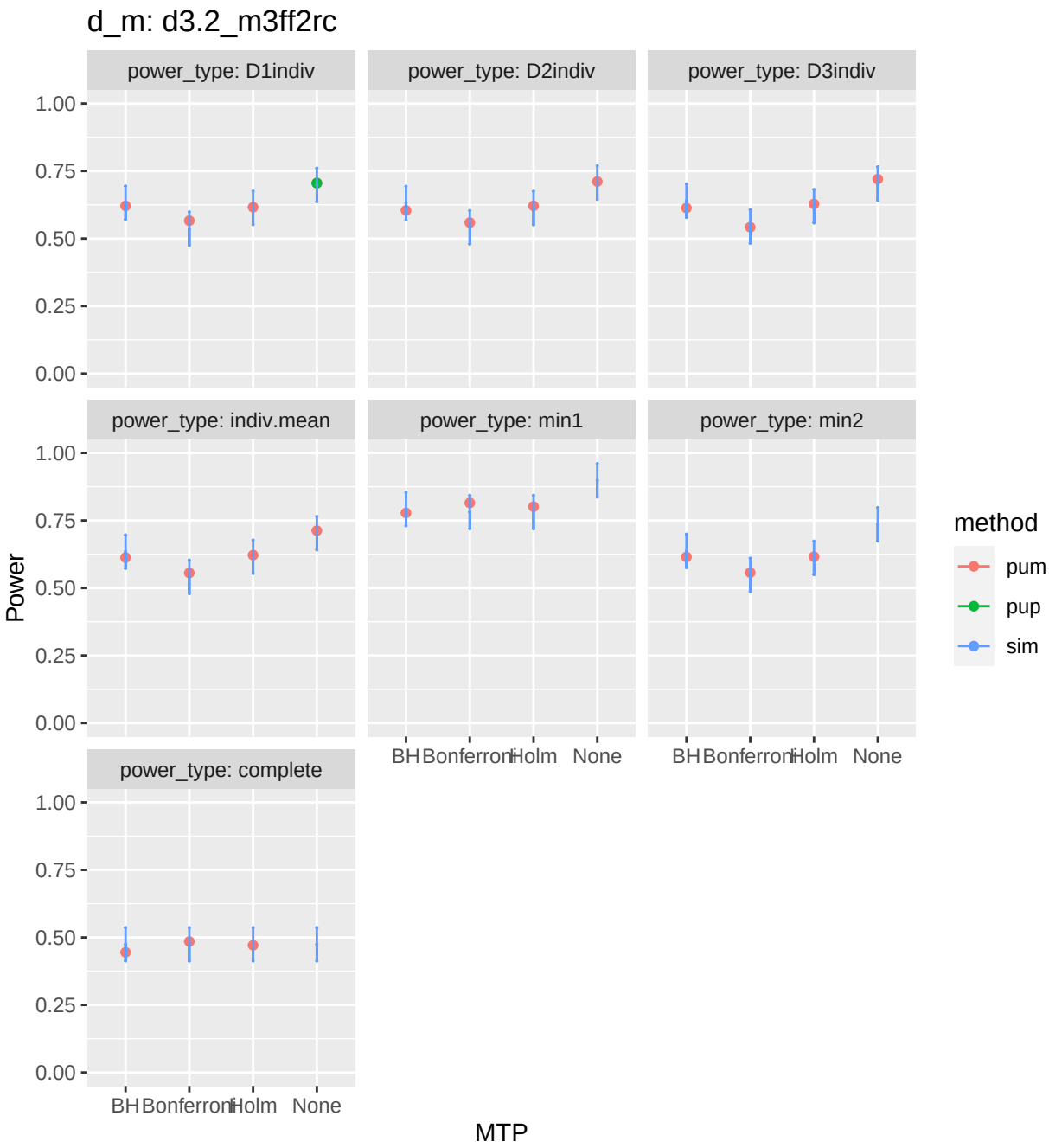
$\bar{n} = 75$

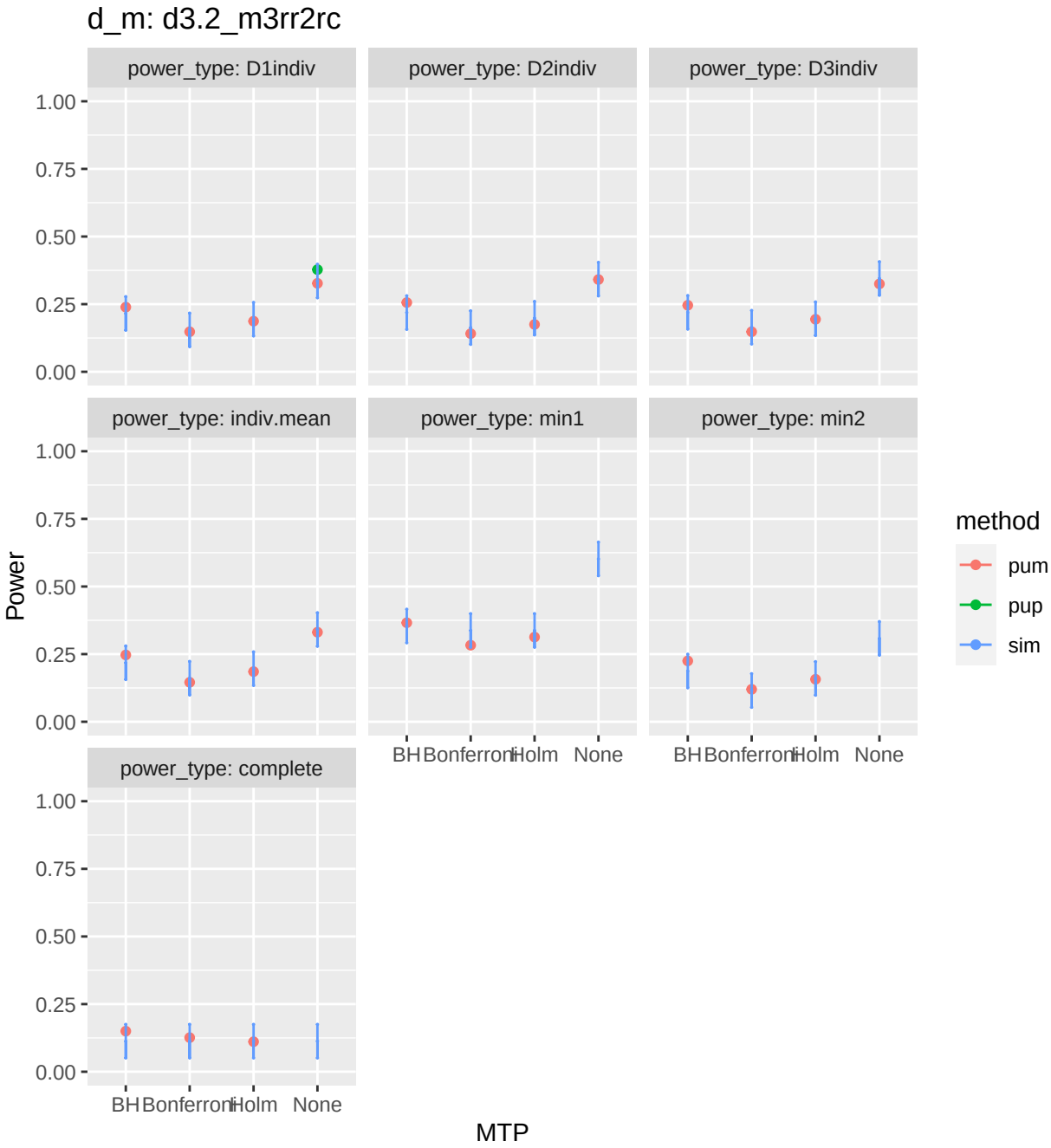

d_m: d3.2_m3ff2rc
power_type: D1indiv
power_type: D2indiv
power_type: D3indiv
power_type: indiv.mean
power_type: min1
power_type: min2
power_type: complete
1.00
0.75
0.50
0.25
0.00
Power
BH
Bonferroni
Holm
None
MTP
method
pum
pup
sim


d_m: d3.2_m3rr2rc
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

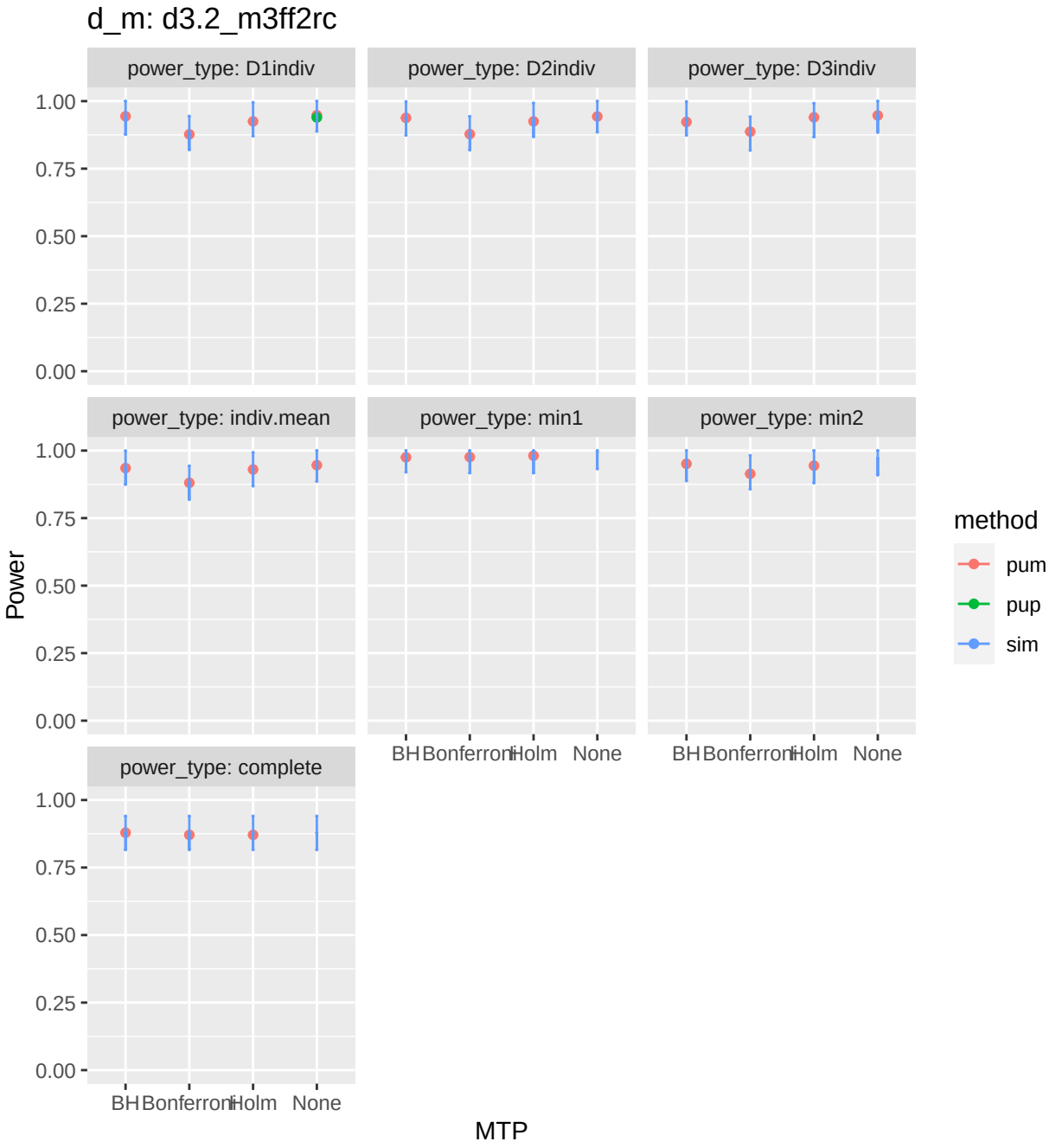
Varying R2

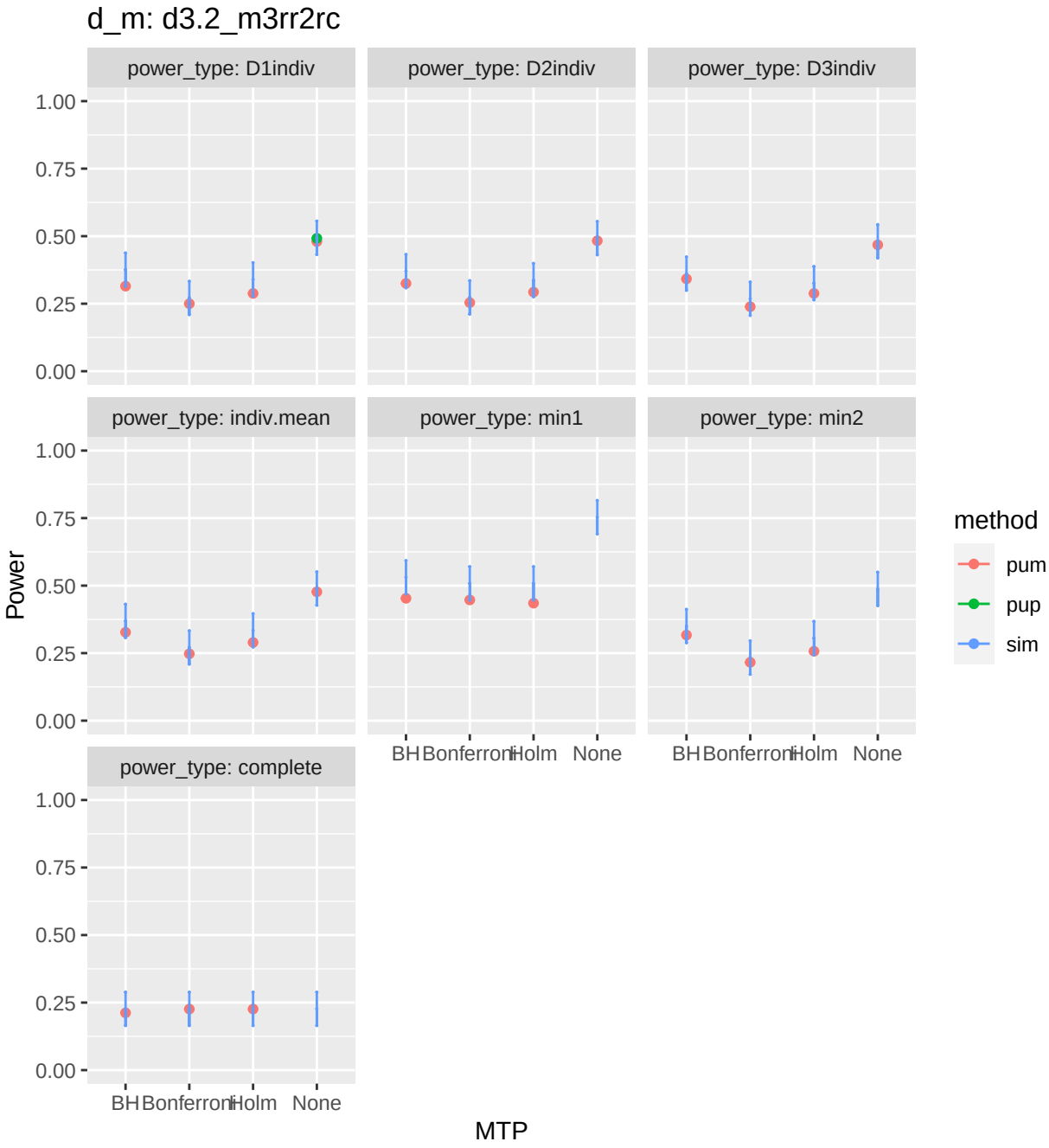
$R_1^2 = 0.6, 0.6, 0.6$



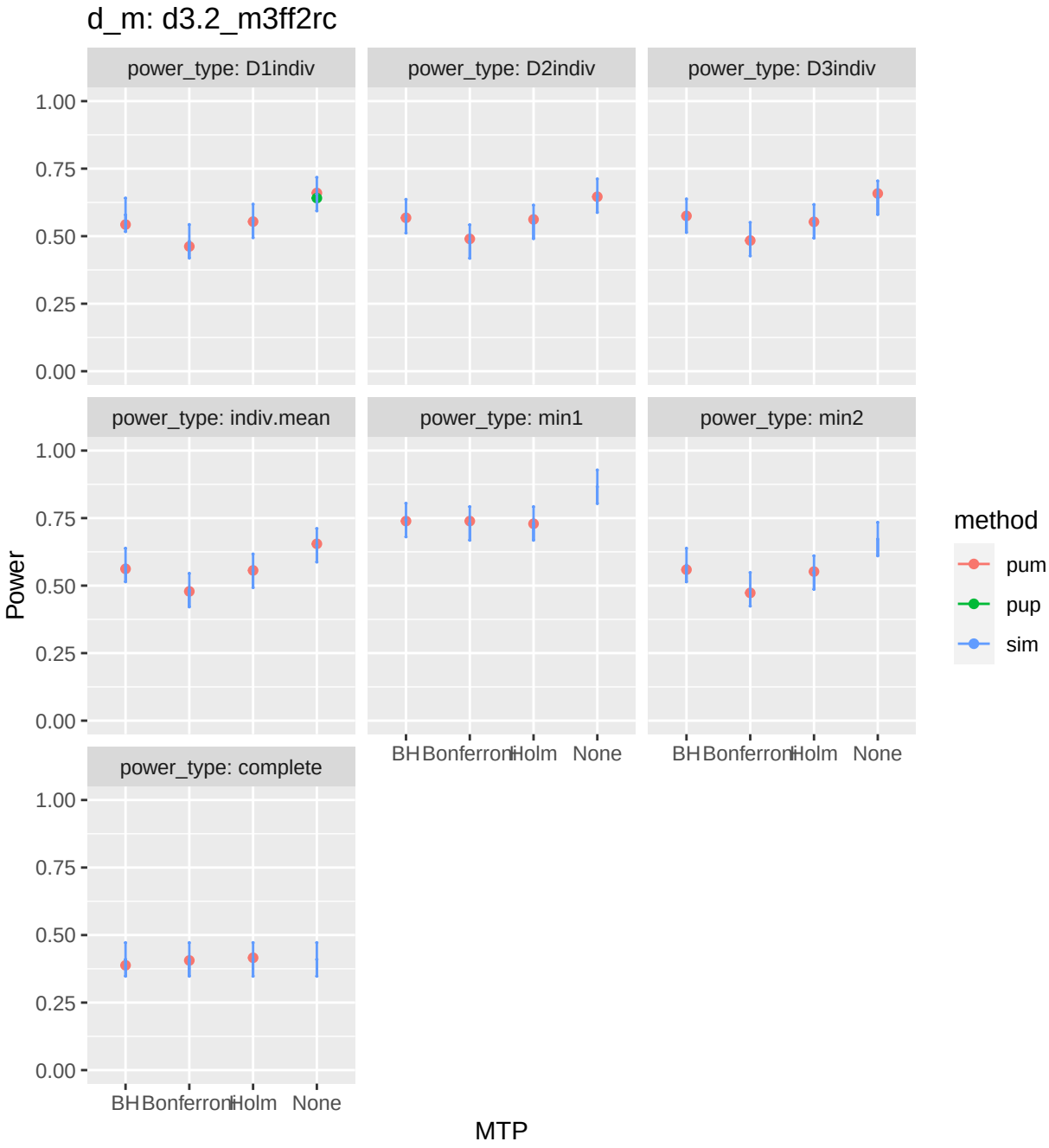

d_m: d3.2_m3rr2rc
power_type: D1indiv
power_type: D2indiv
power_type: D3indiv
power_type: indiv.mean
power_type: min1
power_type: min2
power_type: complete
Power
1.00
0.75
0.50
0.25
0.00
BH
Bonferroni
Holm
None
MTP
method
pum
pup
sim

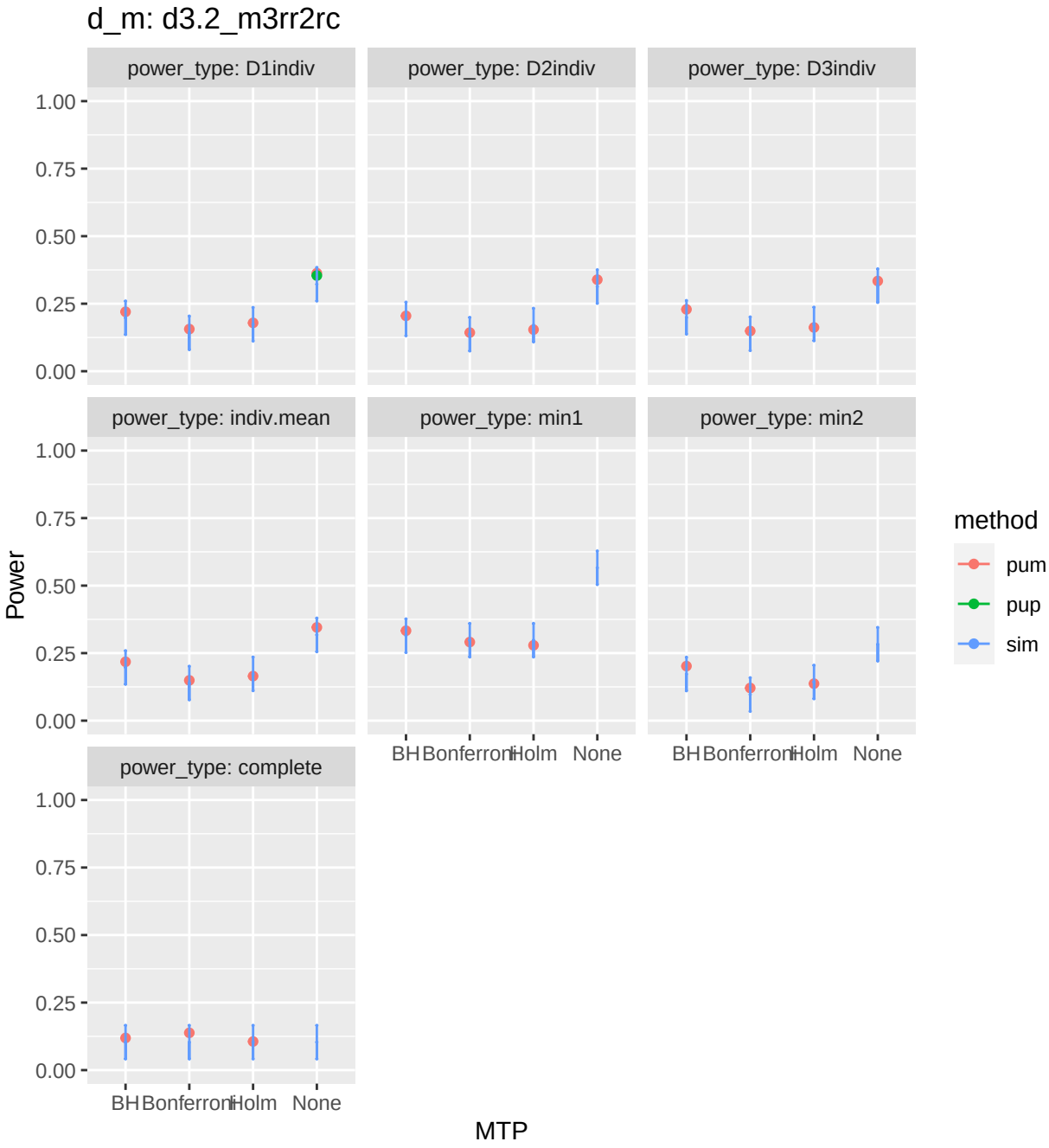
$R_2^2 = 0.6, 0.6, 0.6$


d_m: d3.2_m3ff2rc
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
BH
Bonferroni
Holm
None
MTP
method
pum
pup
sim



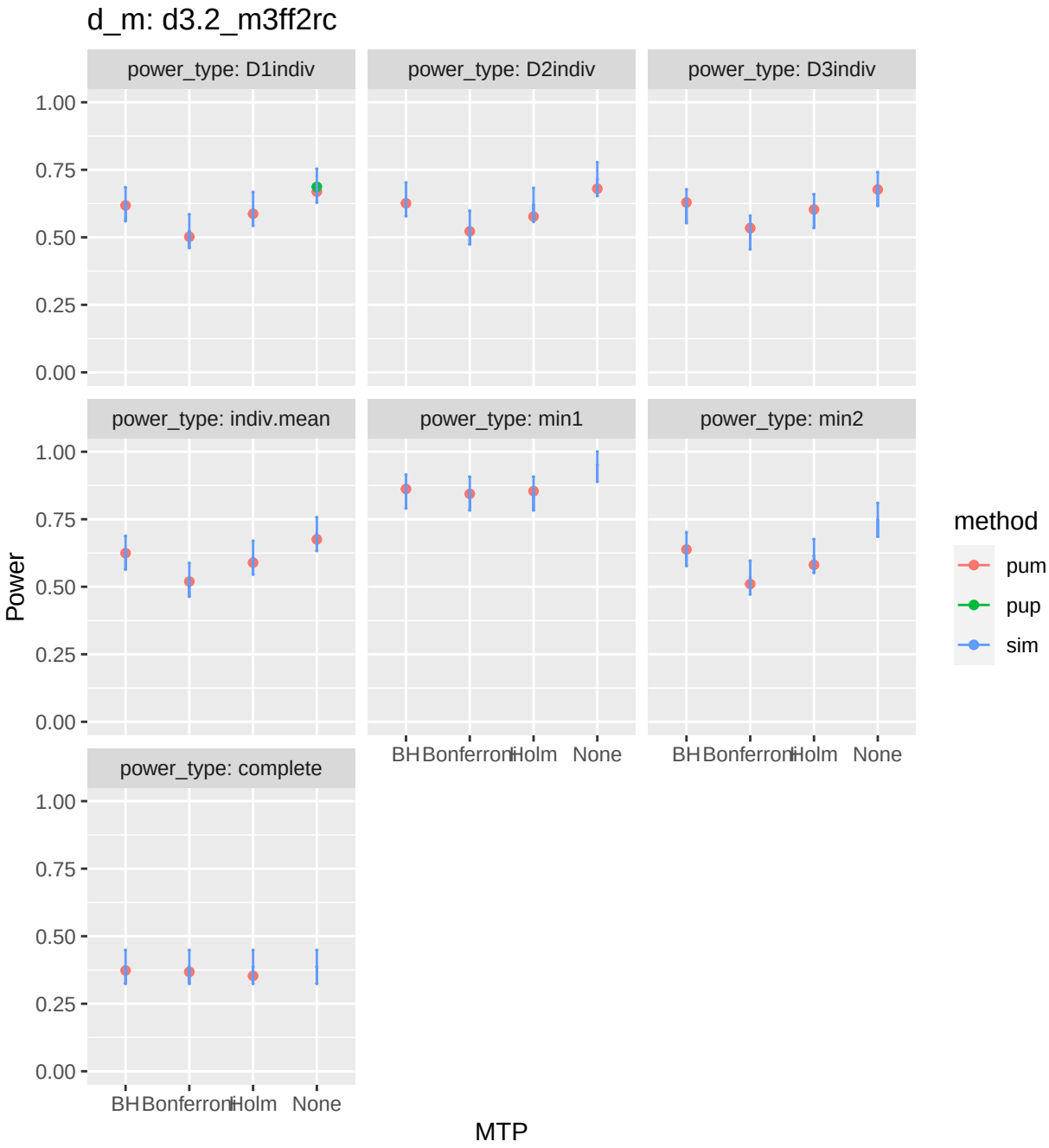
$R_1^2 = 0, 0, 0$ $R_2^2 = 0, 0, 0$


d_m: d3.2_m3ff2rc
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
BH
Bonferroni
Holm
None
MTP
method
pum
pup
sim

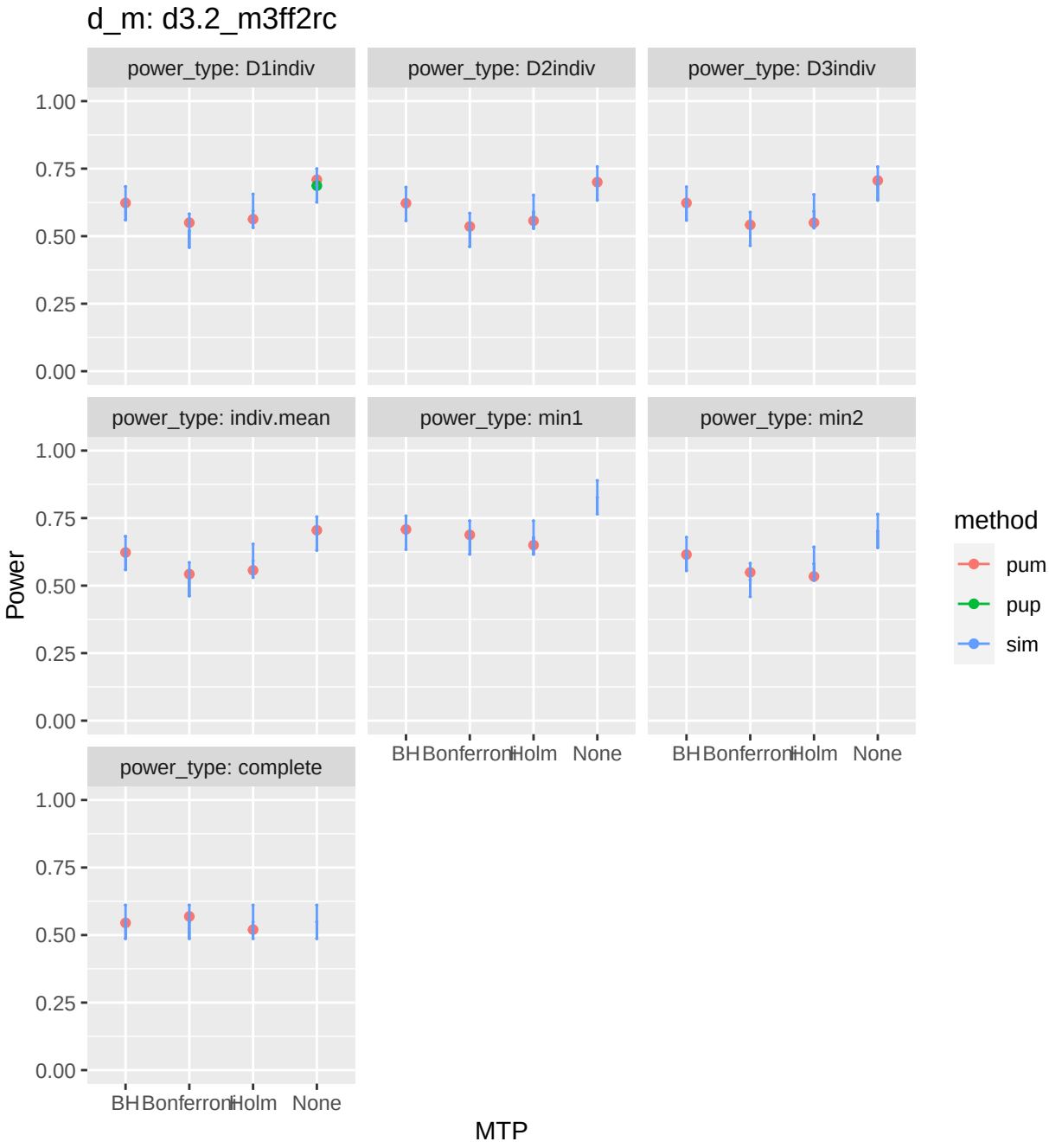

d_m: d3.2_m3rr2rc
power_type: D1indiv
power_type: D2indiv
power_type: D3indiv
power_type: indiv.mean
power_type: min1
power_type: min2
power_type: complete
Power
1.00
0.75
0.50
0.25
0.00
BH
Bonferroni
Holm
None
MTP
method
pum
pup
sim

Varying rho

$\rho = 0.2$

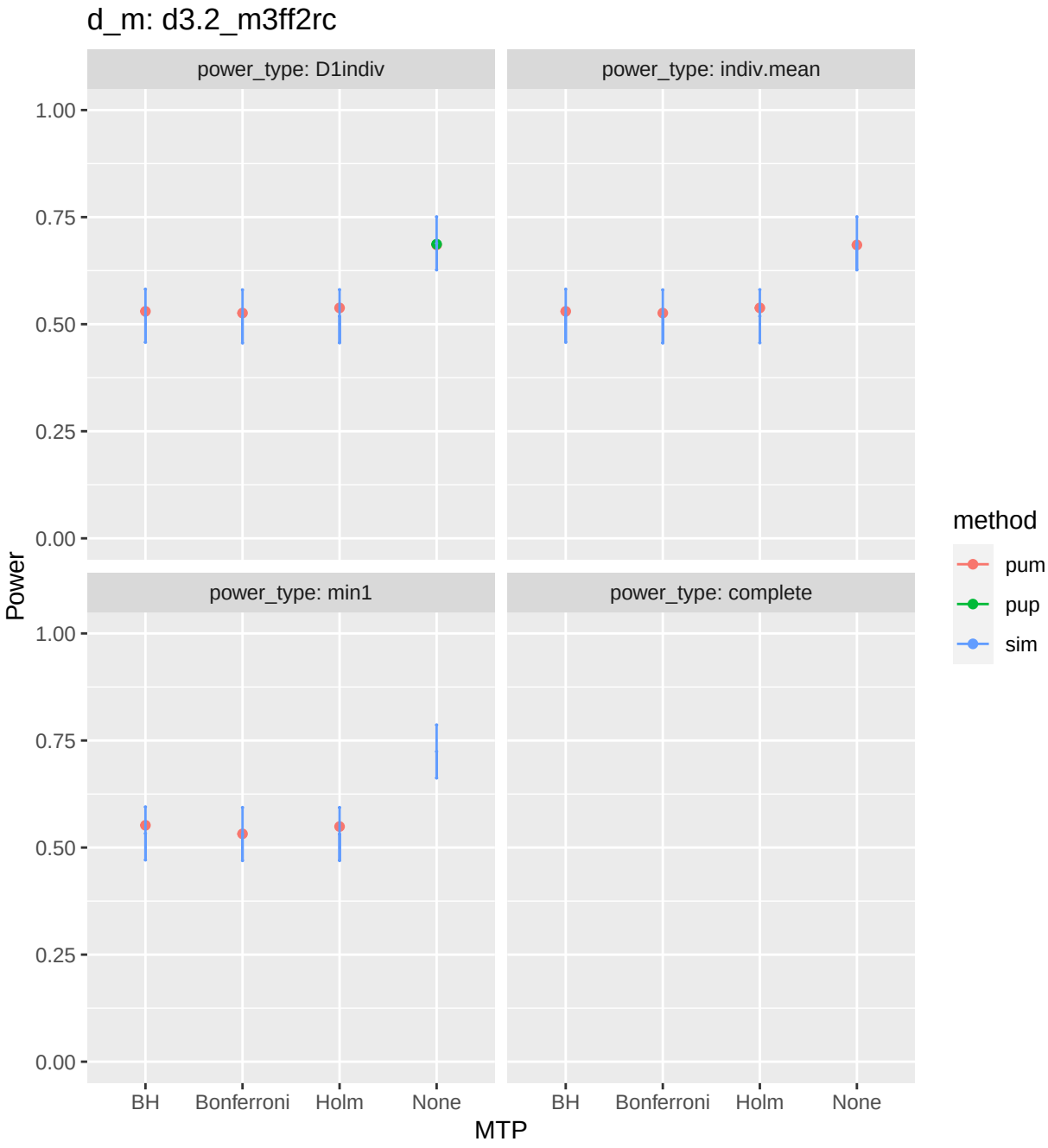


$\rho = 0.8$


d_m: d3.2_m3ff2rc
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
BH
Bonferroni
Holm
None
MTP
method
pum
pup
sim

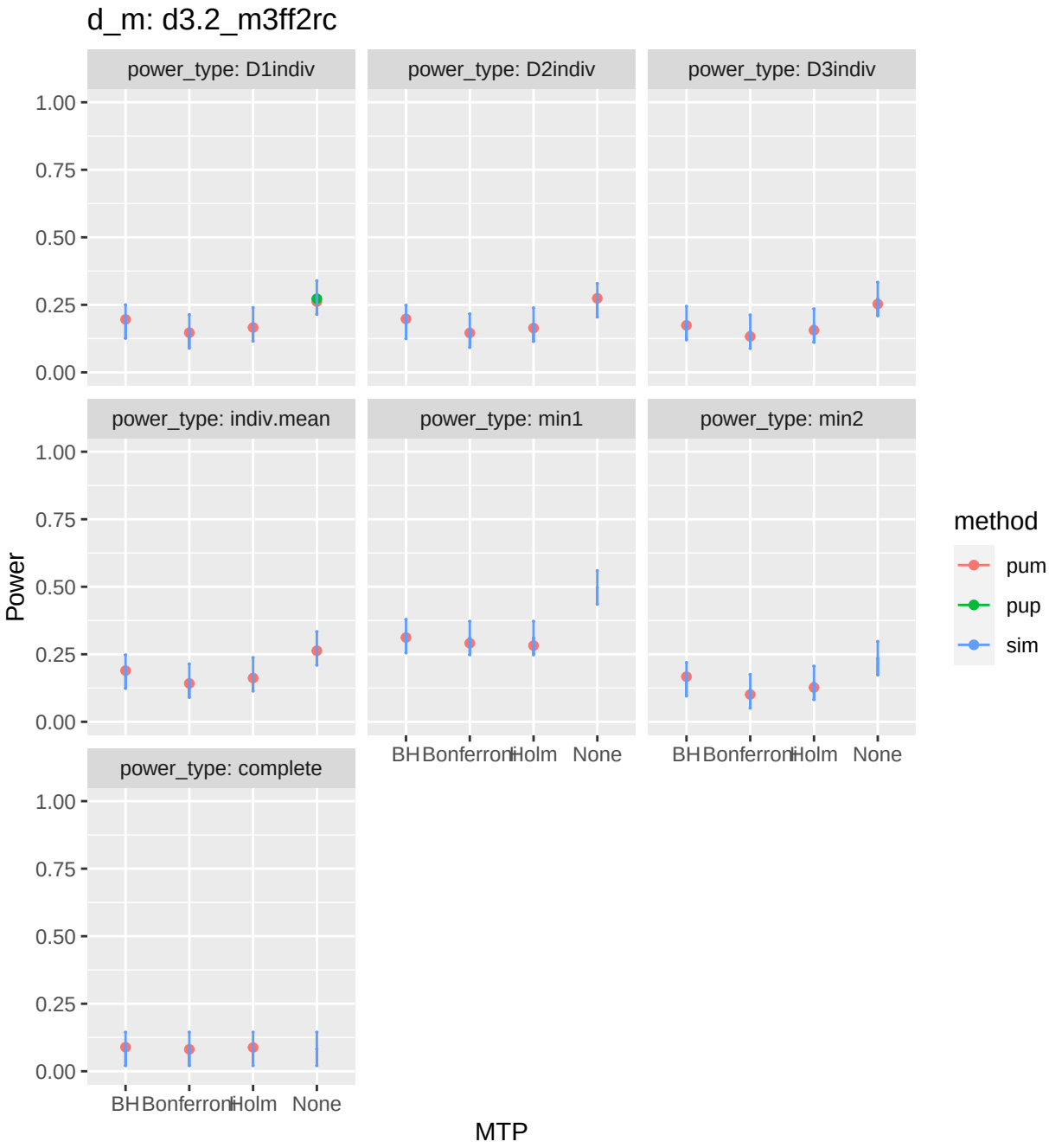
Varying true positives

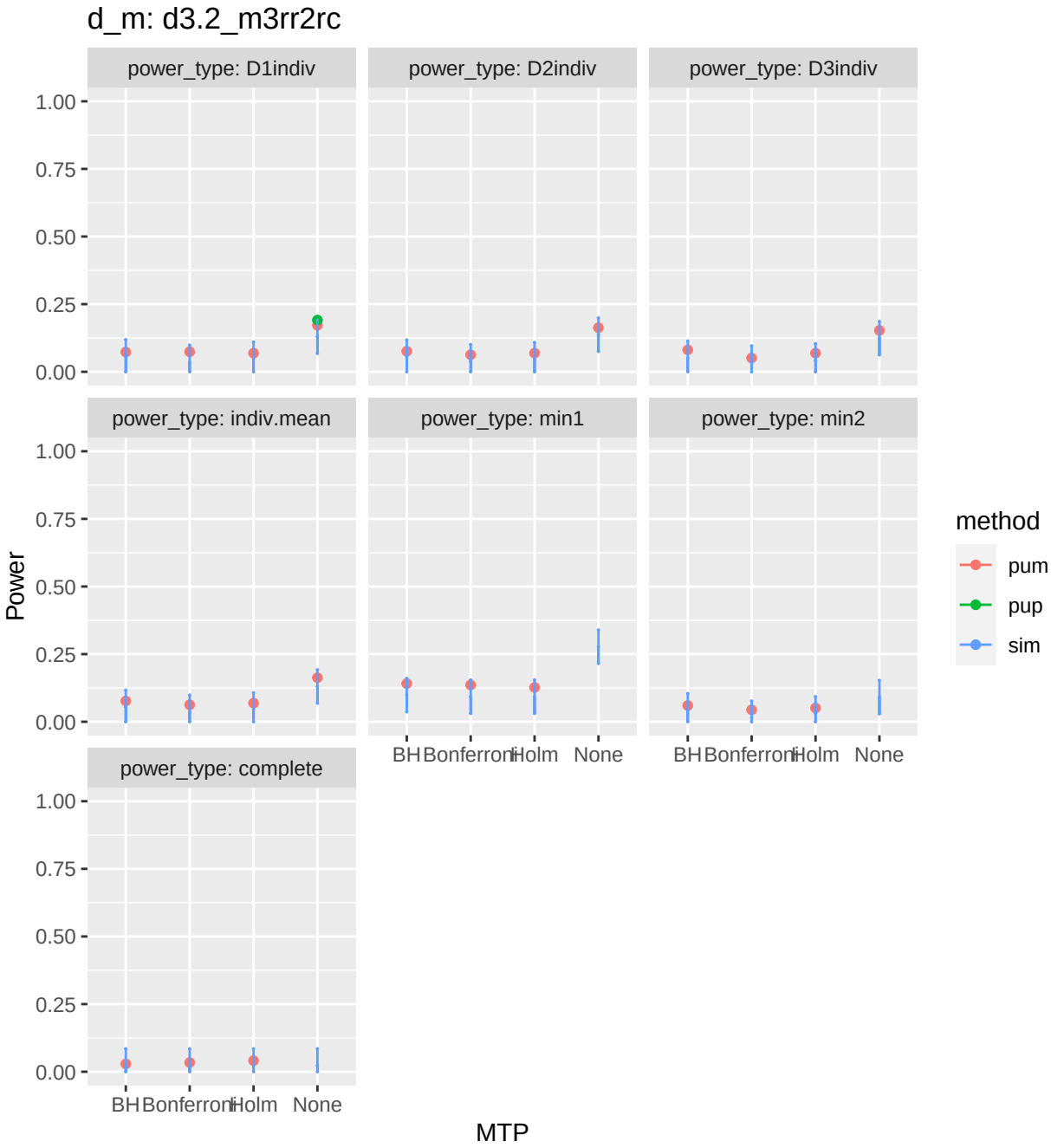
MDES = 0.125, 0, 0



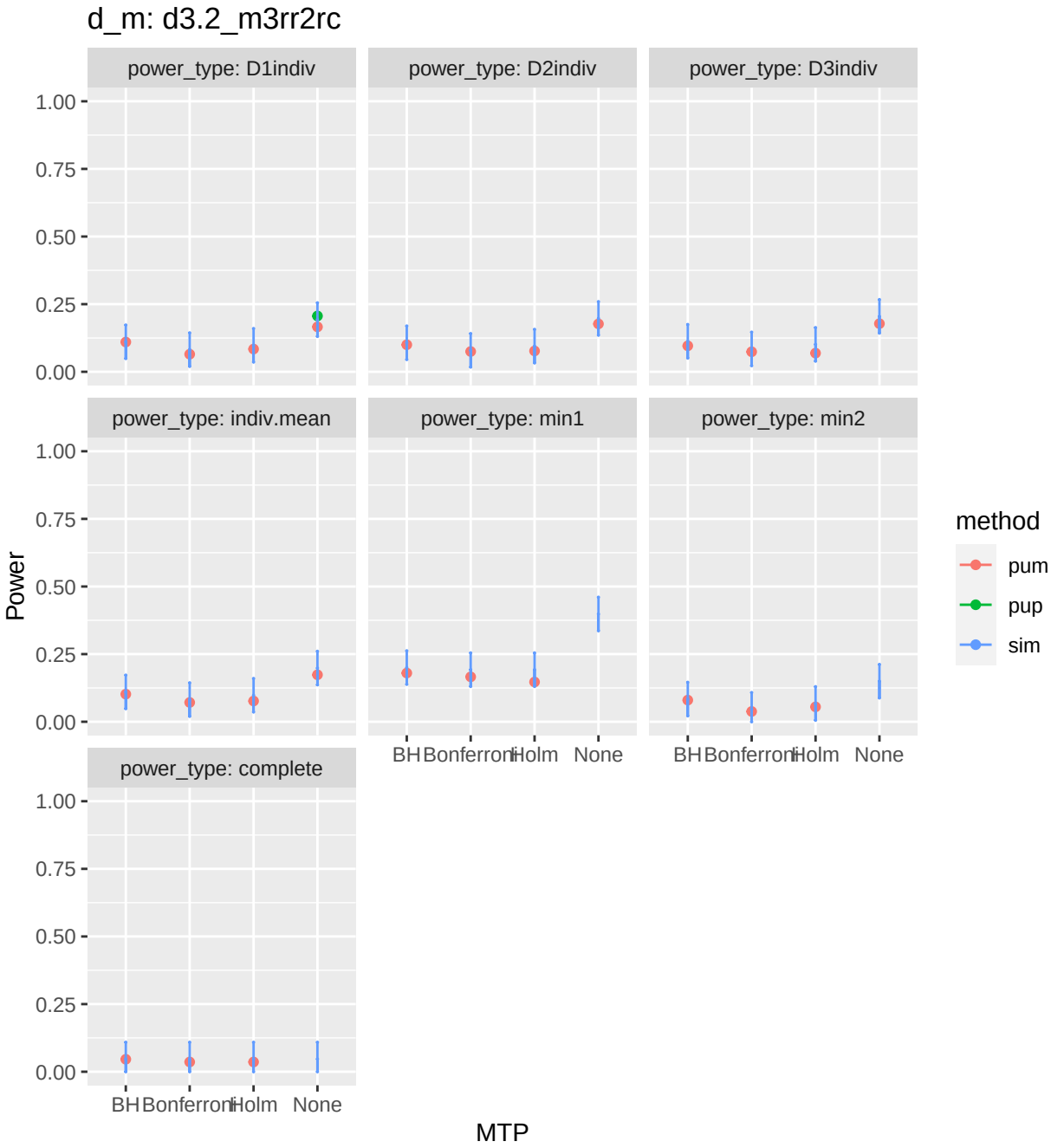
Varying ICC

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

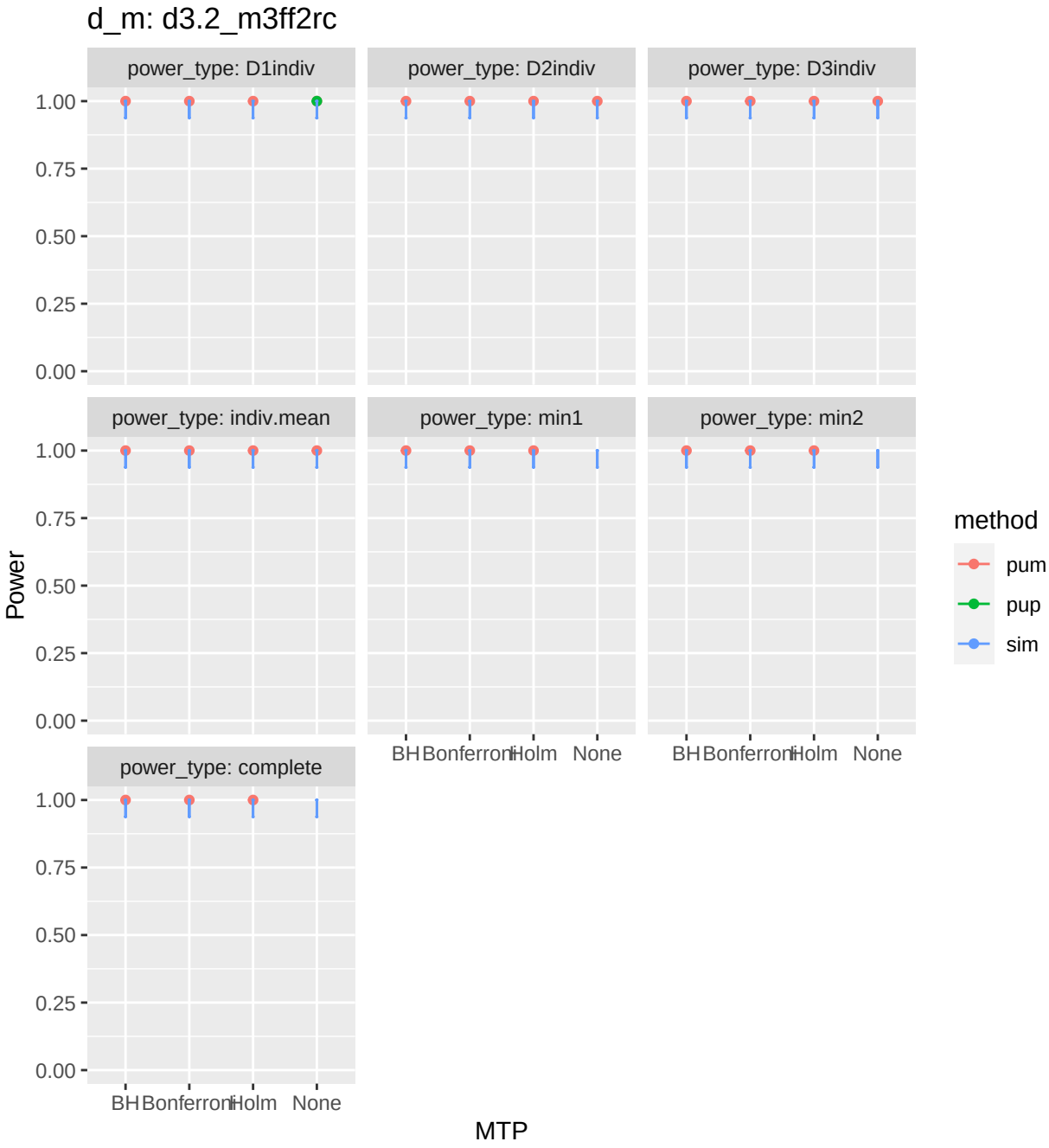


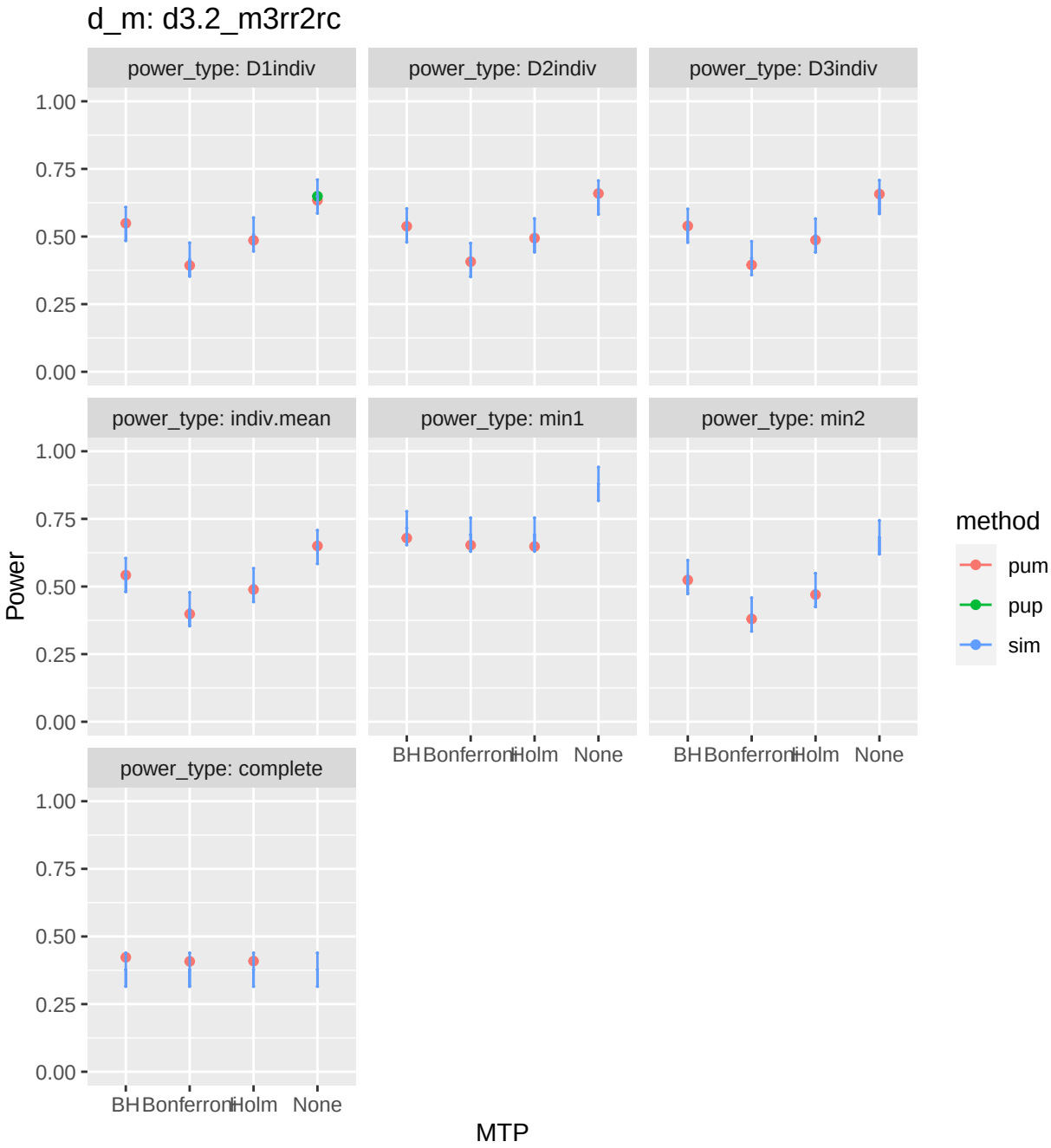


$\mathrm{ICC}_3 = 0.7, 0.7, 0.7$

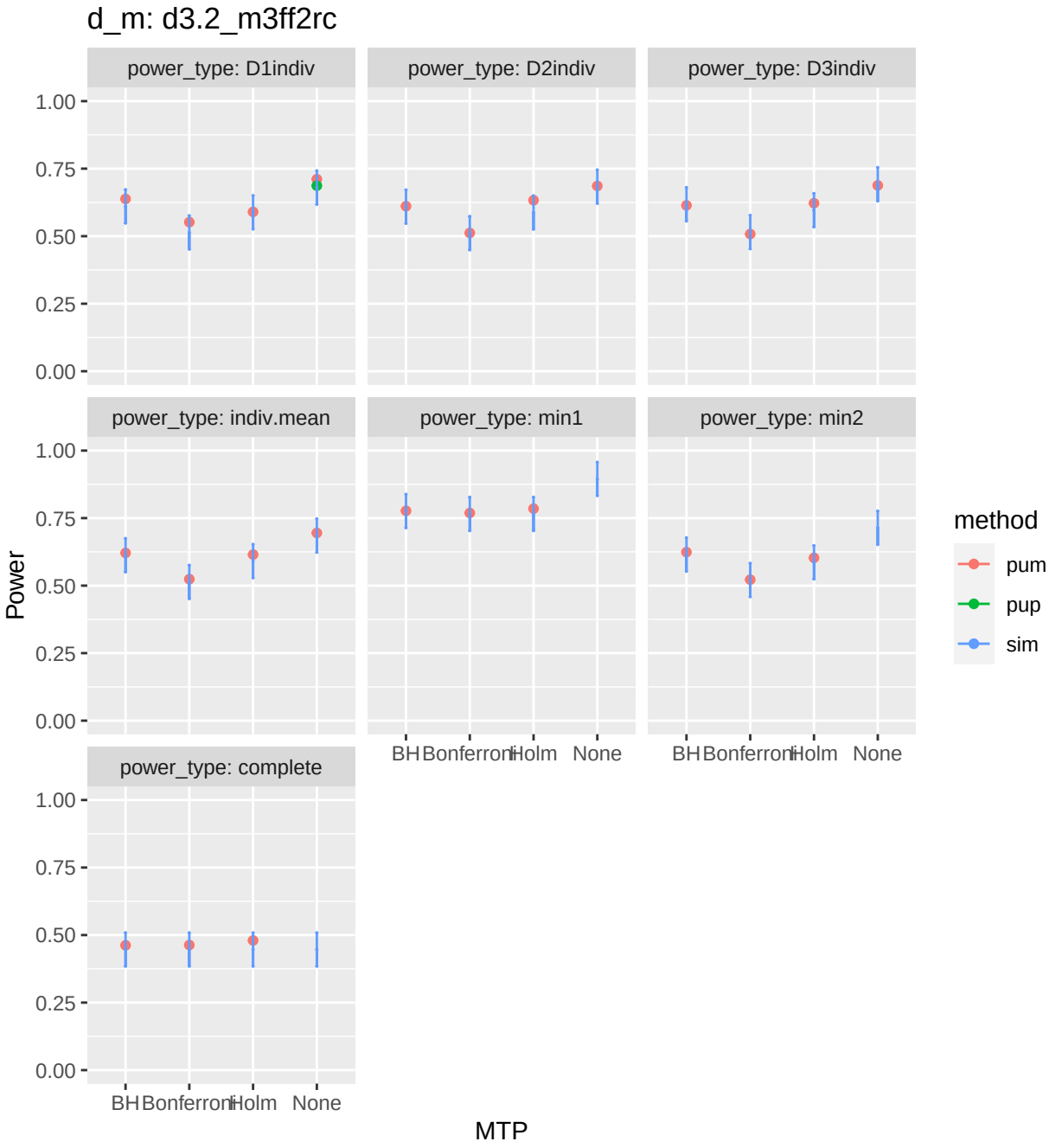


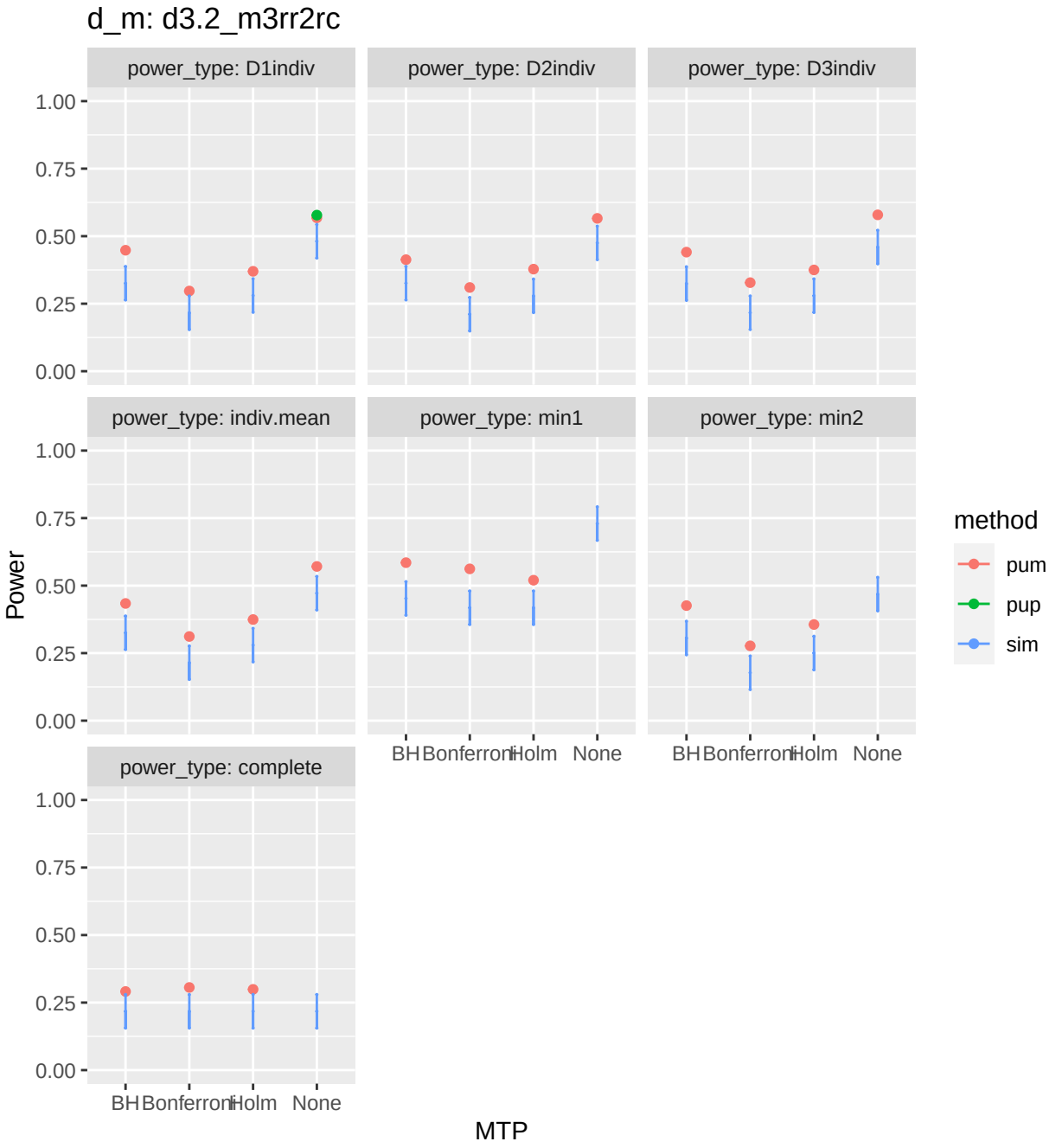
$\mathrm{ICC}_2 = 0, 0, 0$


d_m: d3.2_m3ff2rc
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
BH
Bonferroni
Holm
None
MTP
method
pum
pup
sim



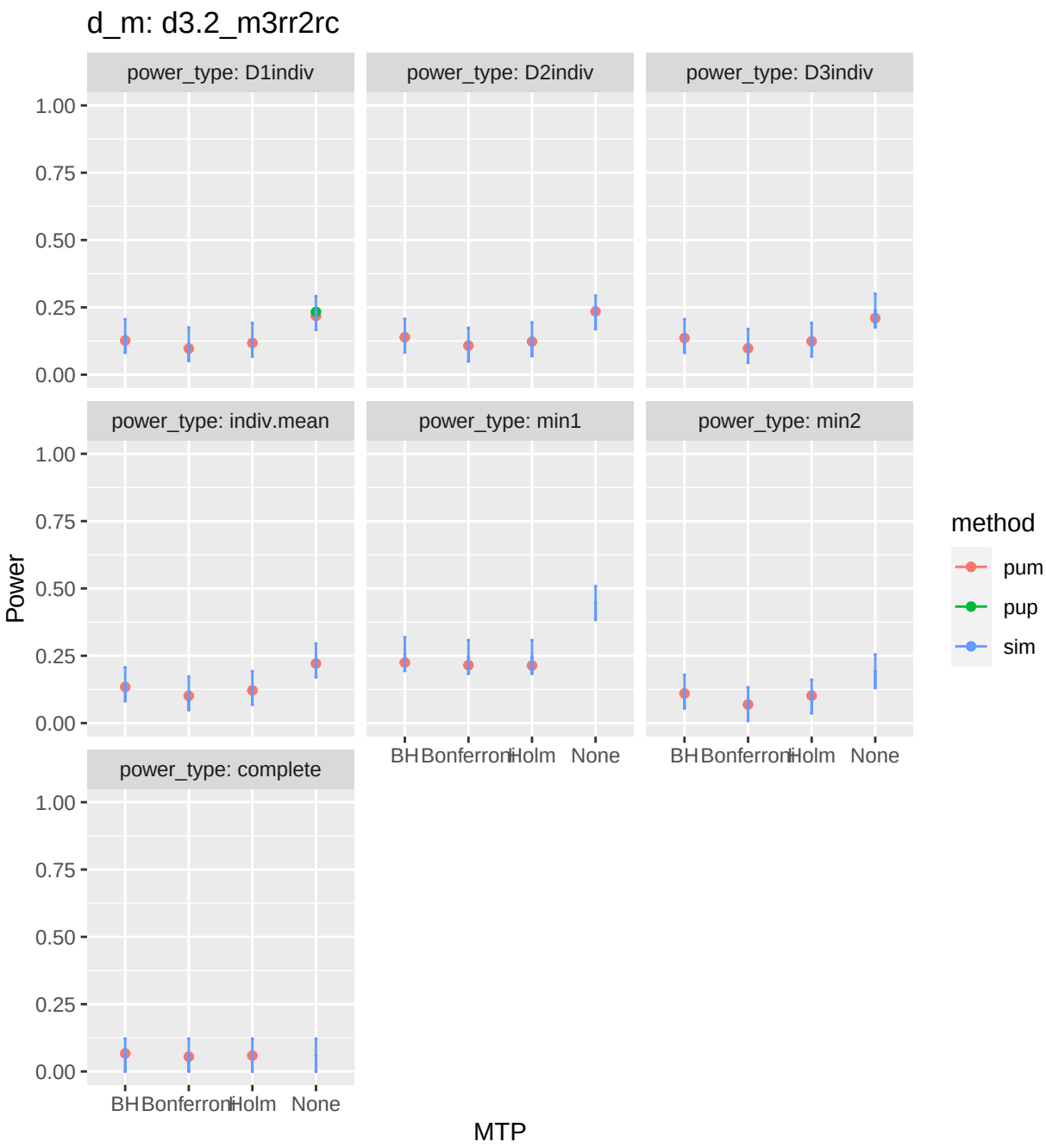
$\text{ICC}_2 = 0.2, 0.2, 0.2$


d_m: d3.2_m3ff2rc
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
BH
Bonferroni
Holm
None
MTP
method
pum
pup
sim

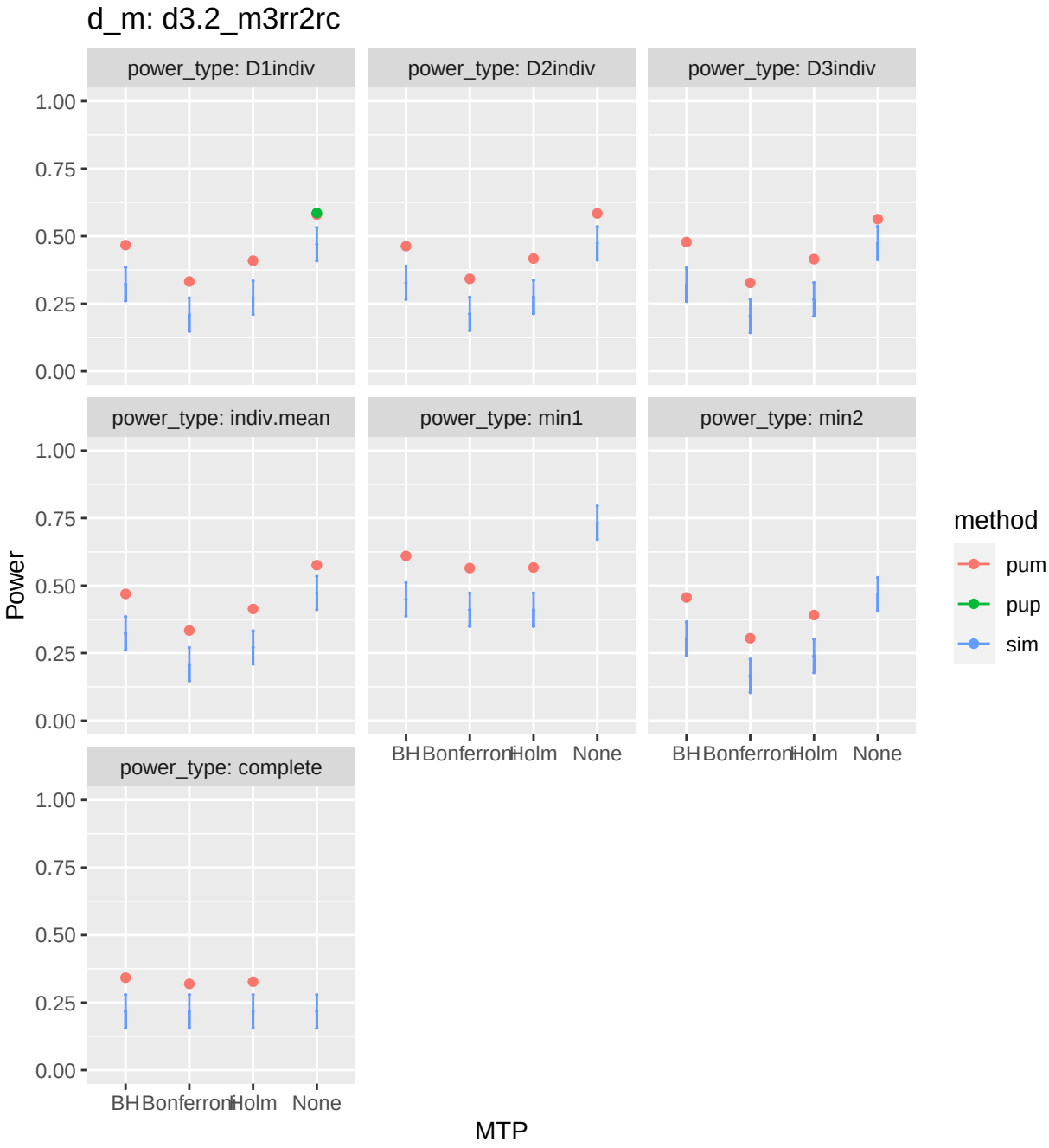

d_m: d3.2_m3rr2rc
power_type: D1indiv
power_type: D2indiv
power_type: D3indiv
power_type: indiv.mean
power_type: min1
power_type: min2
power_type: complete
1.00
0.75
0.50
0.25
0.00
Power
BH
Bonferroni
Holm
None
MTP
method
pum
pup
sim

Varying Omega

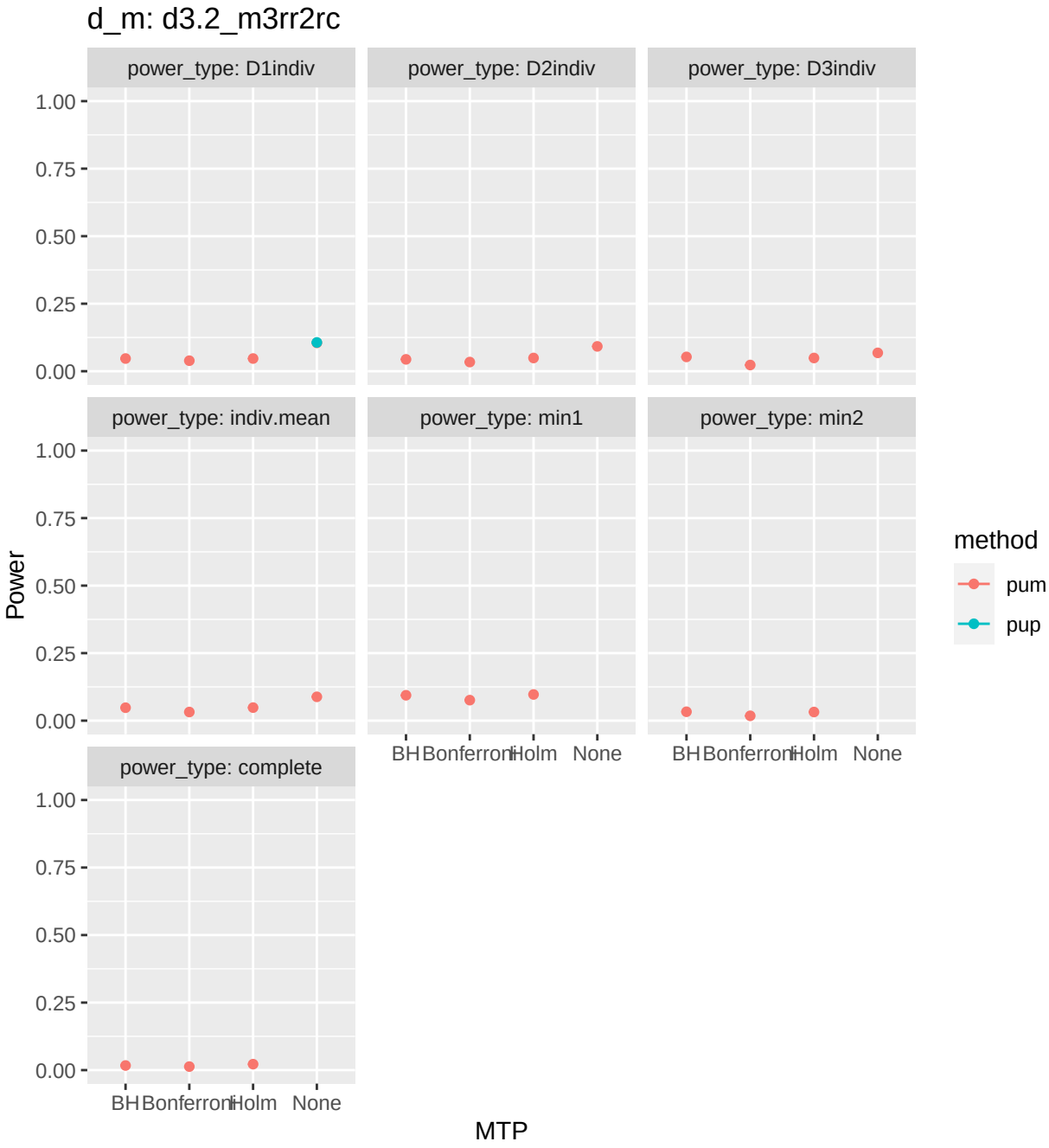
$\omega_3 = 0.8, 0.8, 0.8$



$\omega_3 = 0, 0, 0$ $\text{ICC}_3 = 0.2, 0.2, 0.2$

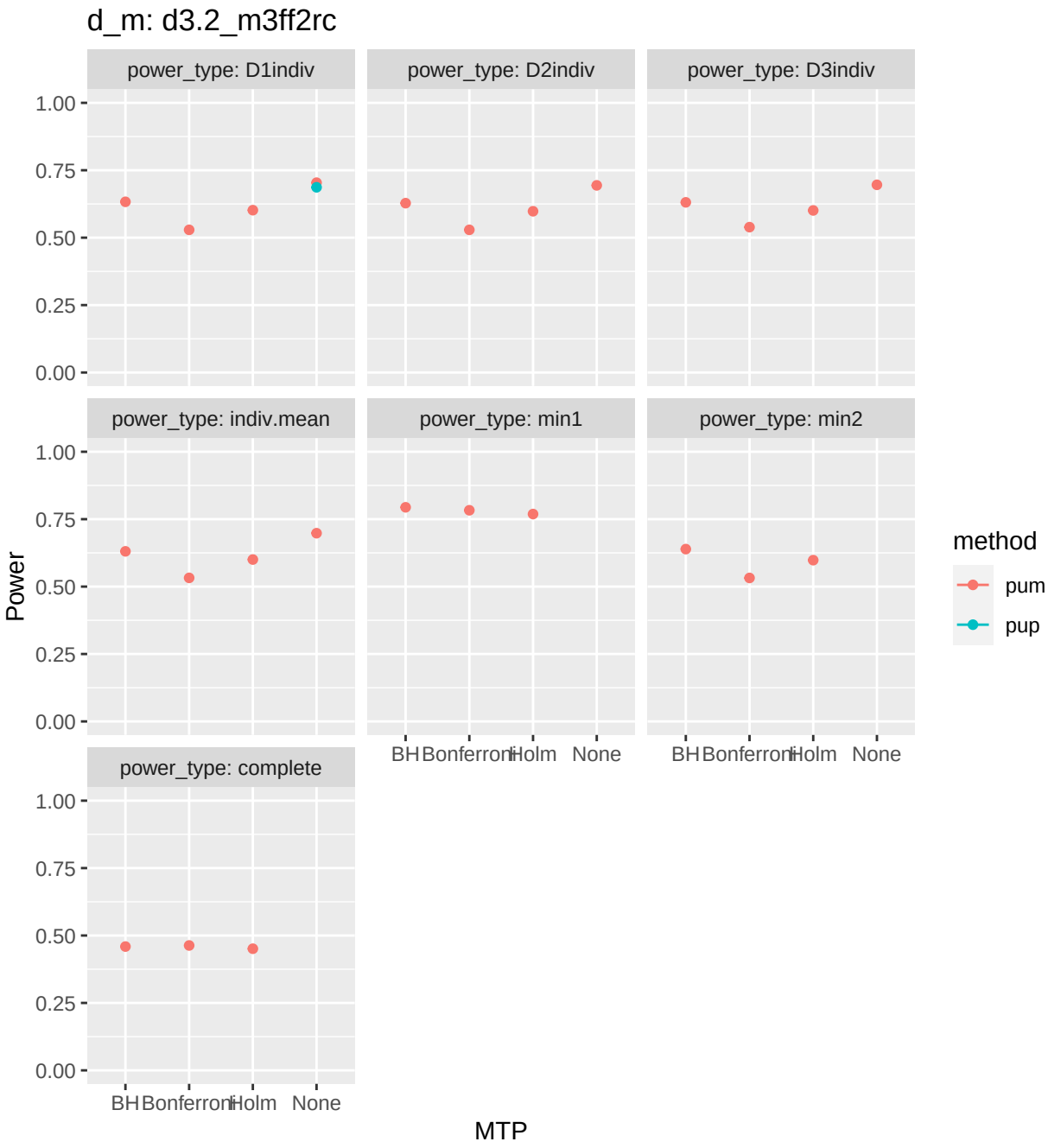


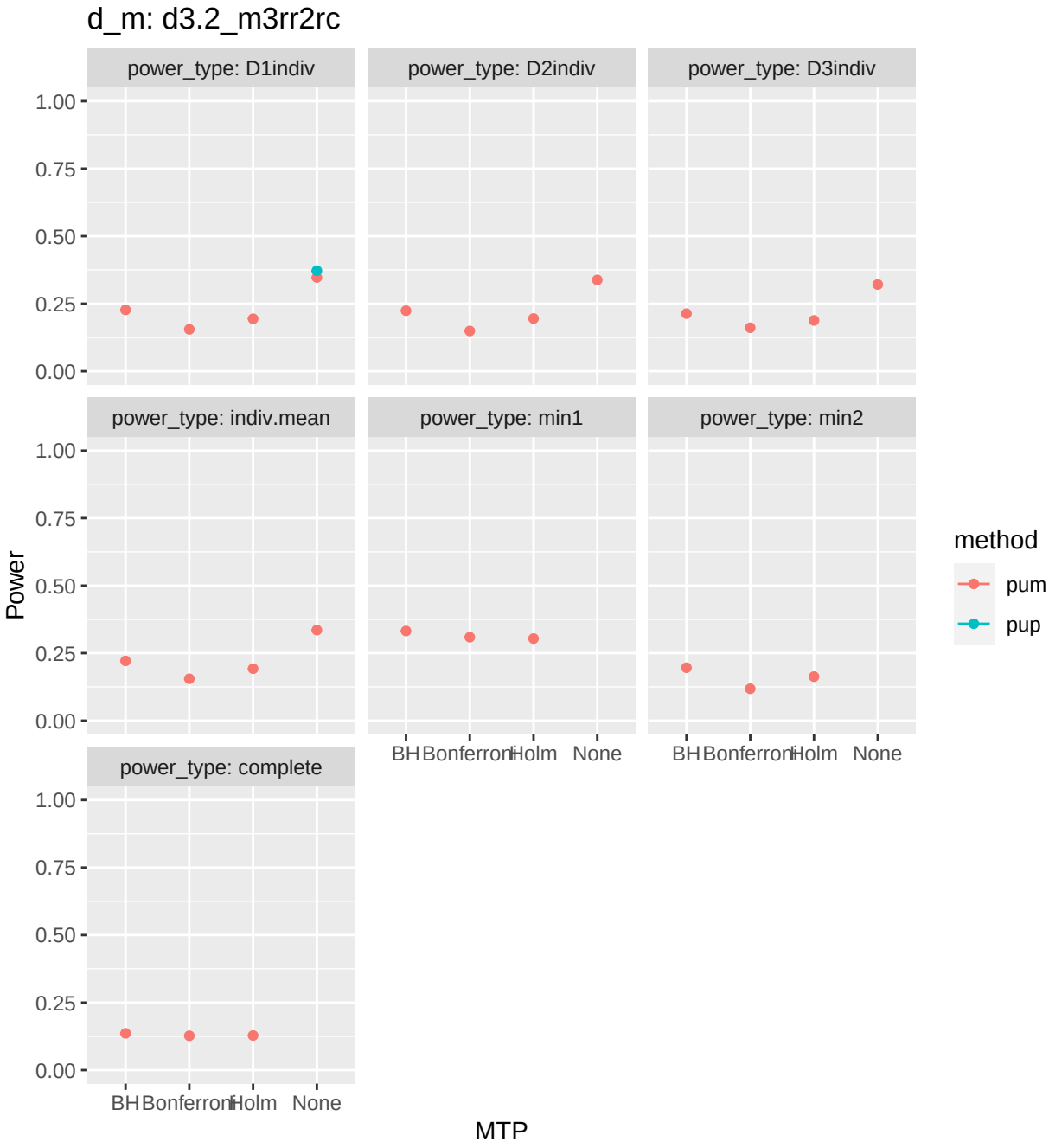
$\omega_3 = 0.8, 0.8, 0.8$ $\text{ICC}_3 = 0.7, 0.7, 0.7$


d_m: d3.2_m3rr2rc
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

Kappa

$\kappa = 0.4$




d_m: d3.2_m3rr2rc
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
BH
Bonferroni
Holm
None
MTP
method
pum
pup

MDES validation

```
##
##
## +------------+---------------+---------------+-------------+
## |    MTP     | Adjusted MDES | D1indiv Power | Target MDES |
## +============+===============+===============+=============+
## | Bonferroni |     0.125     |     0.529     |    0.125    |
## +------------+---------------+---------------+-------------+
## |     BH     |     0.126     |     0.632     |    0.125    |
## +------------+---------------+---------------+-------------+
## |    Holm    |     0.126     |     0.611     |    0.125    |
## +------------+---------------+---------------+-------------+
##
## Table: d3.2_m3ff2rc
```

```
##
##
## +------------+---------------+---------------+-------------+
## |    MTP     | Adjusted MDES | D1indiv Power | Target MDES |
## +============+===============+===============+=============+
## | Bonferroni |     0.125     |     0.155     |    0.125    |
## +------------+---------------+---------------+-------------+
## |     BH     |     0.124     |     0.22      |    0.125    |
## +------------+---------------+---------------+-------------+
## |    Holm    |     0.126     |     0.198     |    0.125    |
## +------------+---------------+---------------+-------------+
##
## Table: d3.2_m3rr2rc
```

Sample size validation

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |      J      |     30      |     0.529     |
## +------------+-------------+-------------+---------------+
## |     BH     |      J      |     31      |     0.631     |
## +------------+-------------+-------------+---------------+
## |    Holm    |      J      |     30      |      0.6      |
## +------------+-------------+-------------+---------------+
##
## Table: d3.2_m3ff2rc
```

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |      K      |     10      |     0.529     |
## +------------+-------------+-------------+---------------+
```

```
## |     BH     |      K      |     11      |     0.64      |
## +------------+-------------+-------------+---------------+
## |    Holm    |      K      |     11      |     0.606     |
## +------------+-------------+-------------+---------------+
##
## Table: d3.2_m3ff2rc
```

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |    nbar     |    52.26    |     0.529     |
## +------------+-------------+-------------+---------------+
## |     BH     |    nbar     |     102     |     0.64      |
## +------------+-------------+-------------+---------------+
## |    Holm    |    nbar     |     48      |     0.601     |
## +------------+-------------+-------------+---------------+
##
## Table: d3.2_m3ff2rc
```

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |      J      |     30      |     0.155     |
## +------------+-------------+-------------+---------------+
## |     BH     |      J      |     33      |     0.233     |
## +------------+-------------+-------------+---------------+
## |    Holm    |      J      |     30      |     0.189     |
## +------------+-------------+-------------+---------------+
##
## Table: d3.2_m3rr2rc
```

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |      K      |     10      |     0.155     |
## +------------+-------------+-------------+---------------+
## |     BH     |      K      |     11      |     0.234     |
## +------------+-------------+-------------+---------------+
## |    Holm    |      K      |     11      |      0.2      |
## +------------+-------------+-------------+---------------+
##
## Table: d3.2_m3rr2rc
```

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |    nbar     |     56      |     0.155     |
## +------------+-------------+-------------+---------------+
```

```
## |     BH     |    nbar     |    15000    |     0.233     |
## +------------+-------------+-------------+---------------+
## |    Holm    |    nbar     |    1199     |     0.199     |
## +------------+-------------+-------------+---------------+
##
## Table: d3.2_m3rr2rc
```