# 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: $\text{ICC}_2 = 0.2, 0.2, 0.2$, $\text{ICC}_3 = 0.2, 0.2, 0.2$
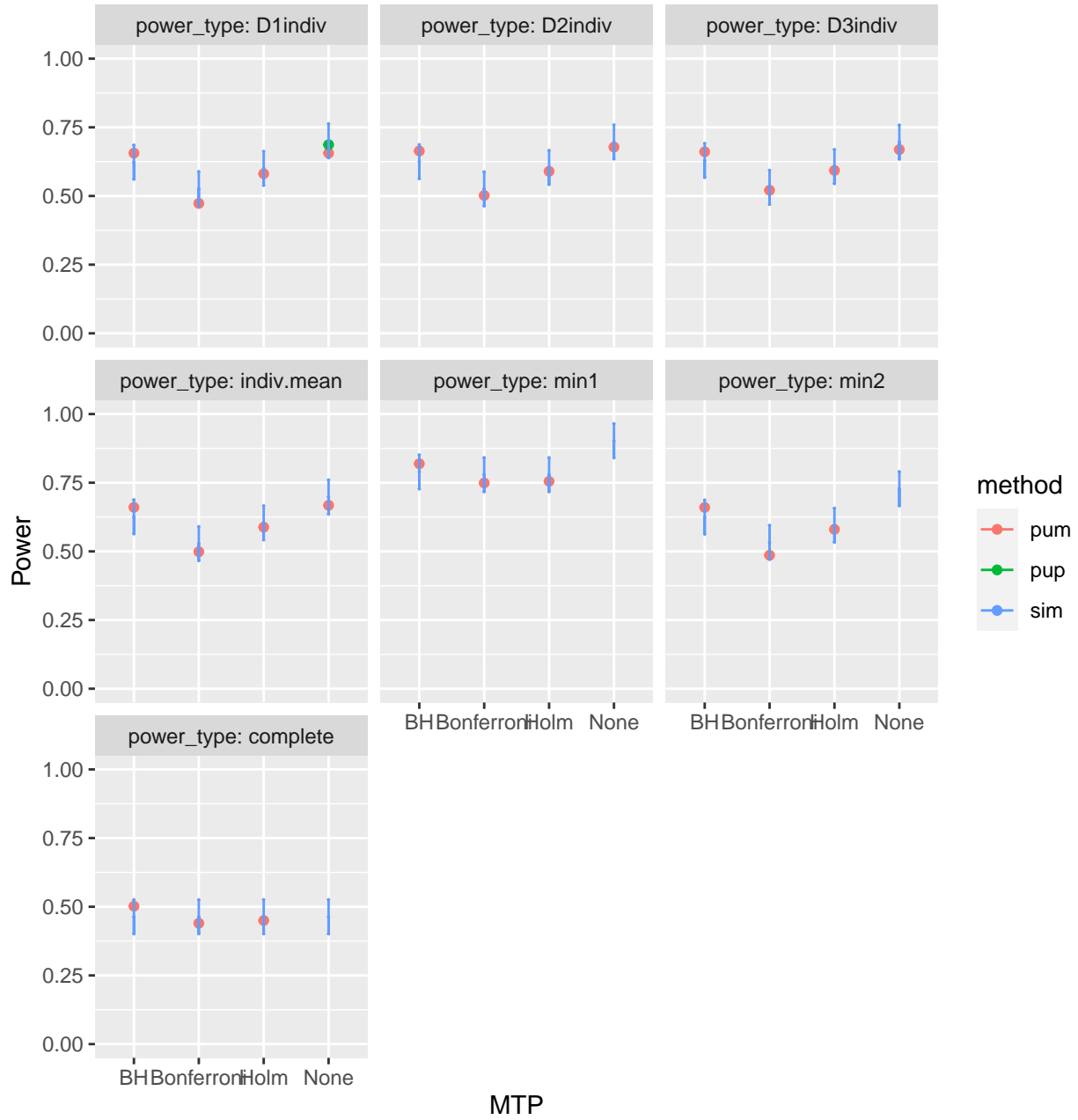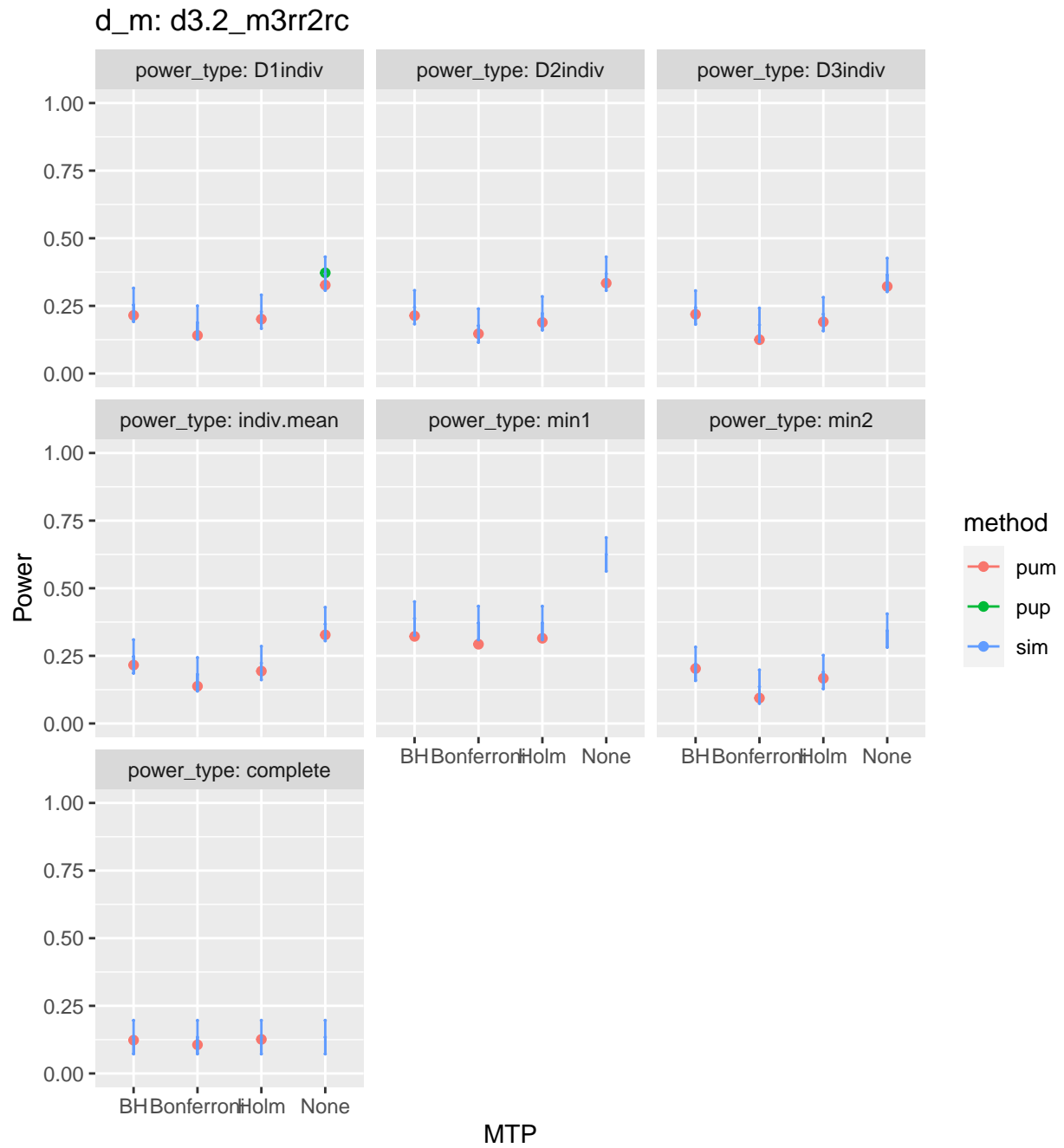- Omega2: $\omega_2 = 0$

Parameters by model type:

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

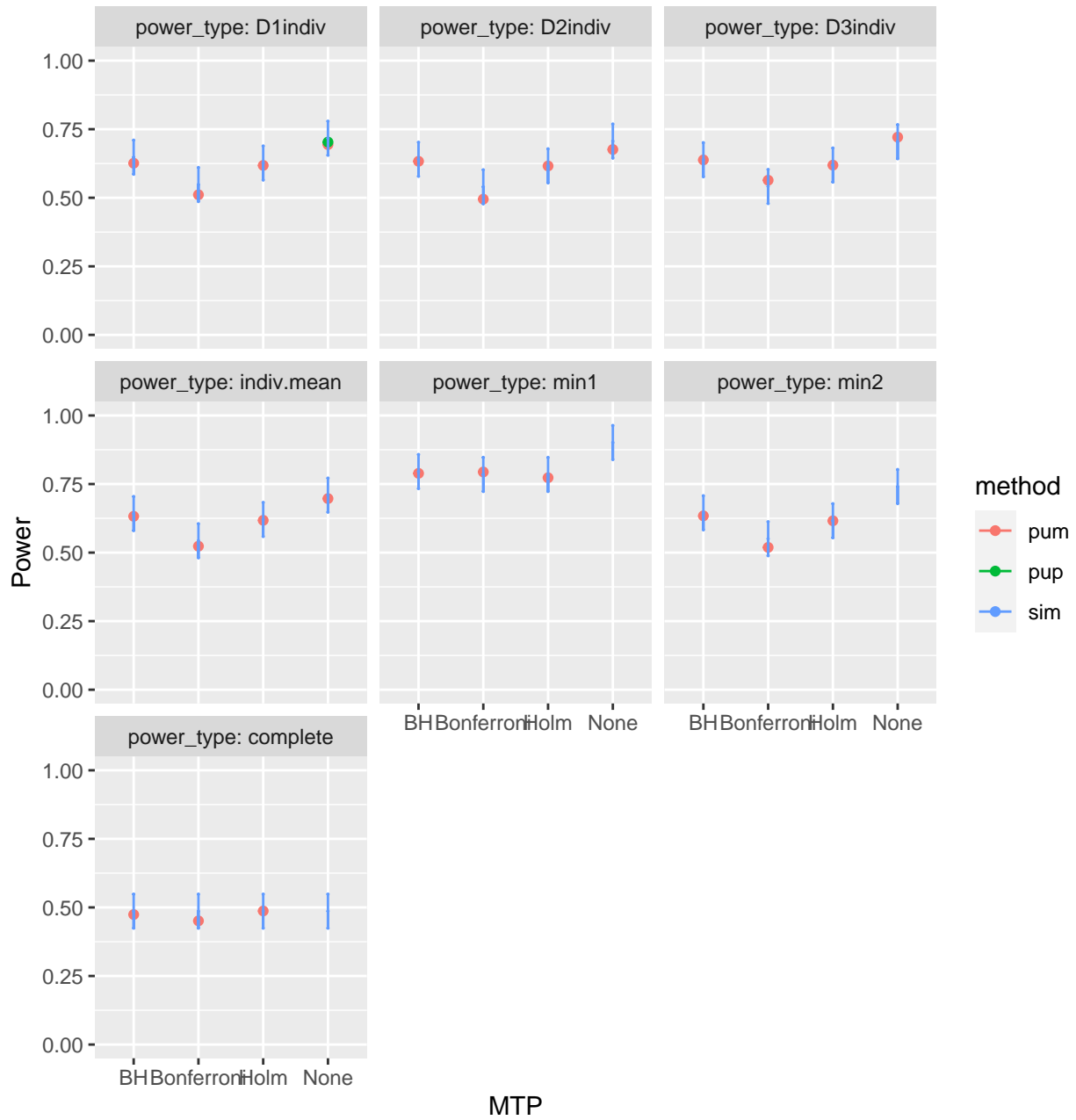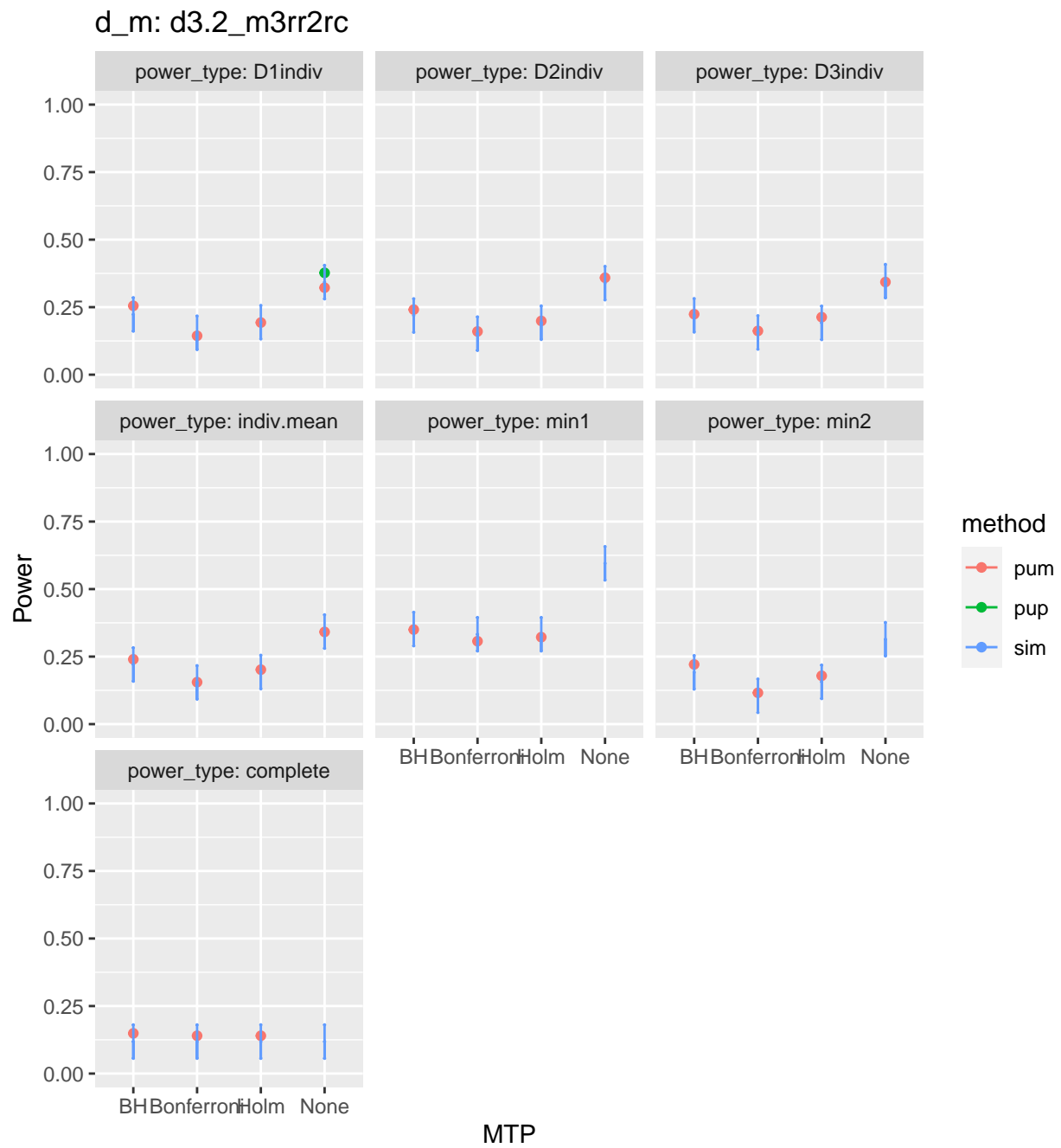# Power Validation

## Base case

### d_m: d3.2_m3ff2rc

# d_m: d3.2_m3rr2rc
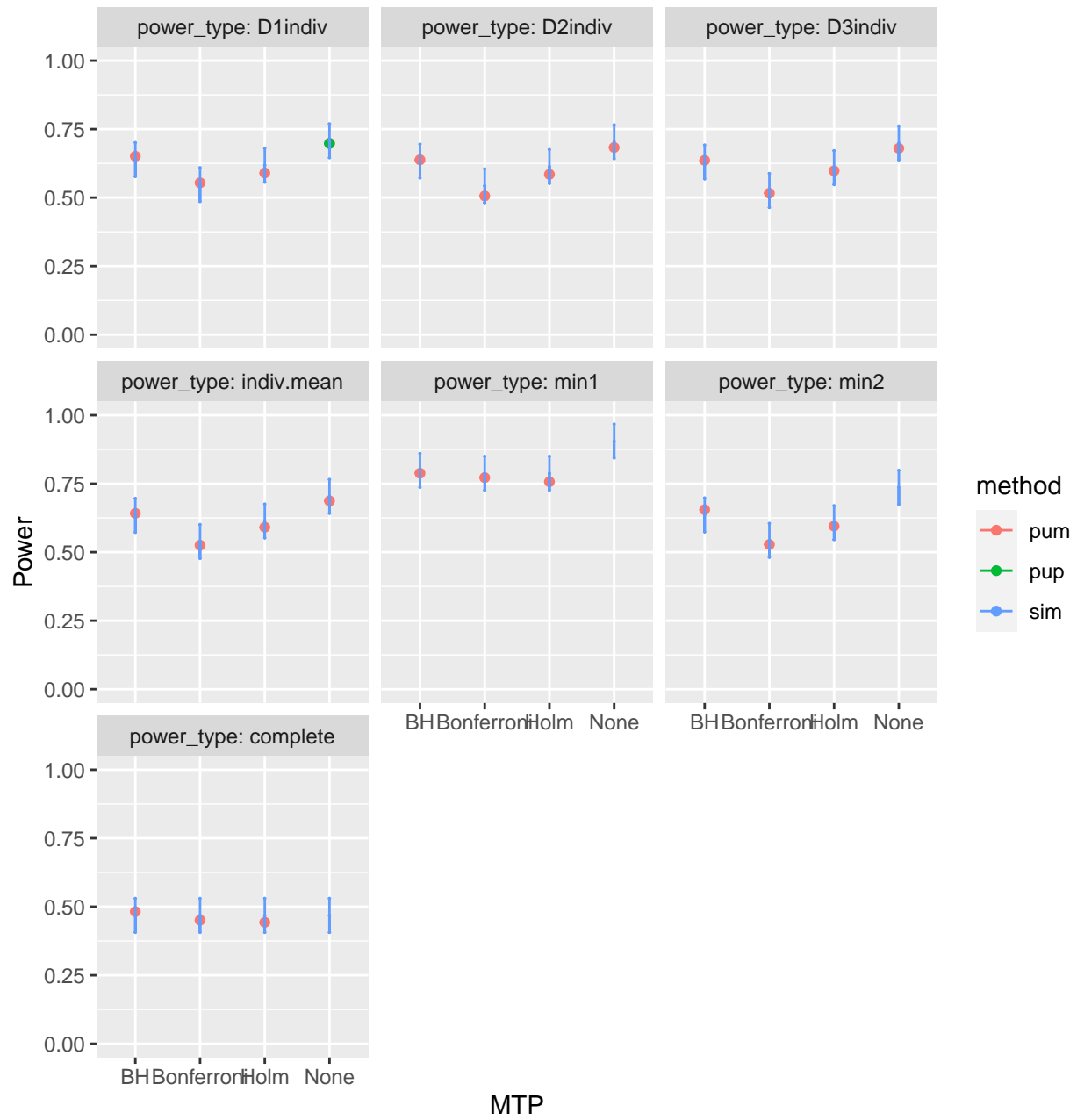
**Varying school size**

$\bar{n} = 100$

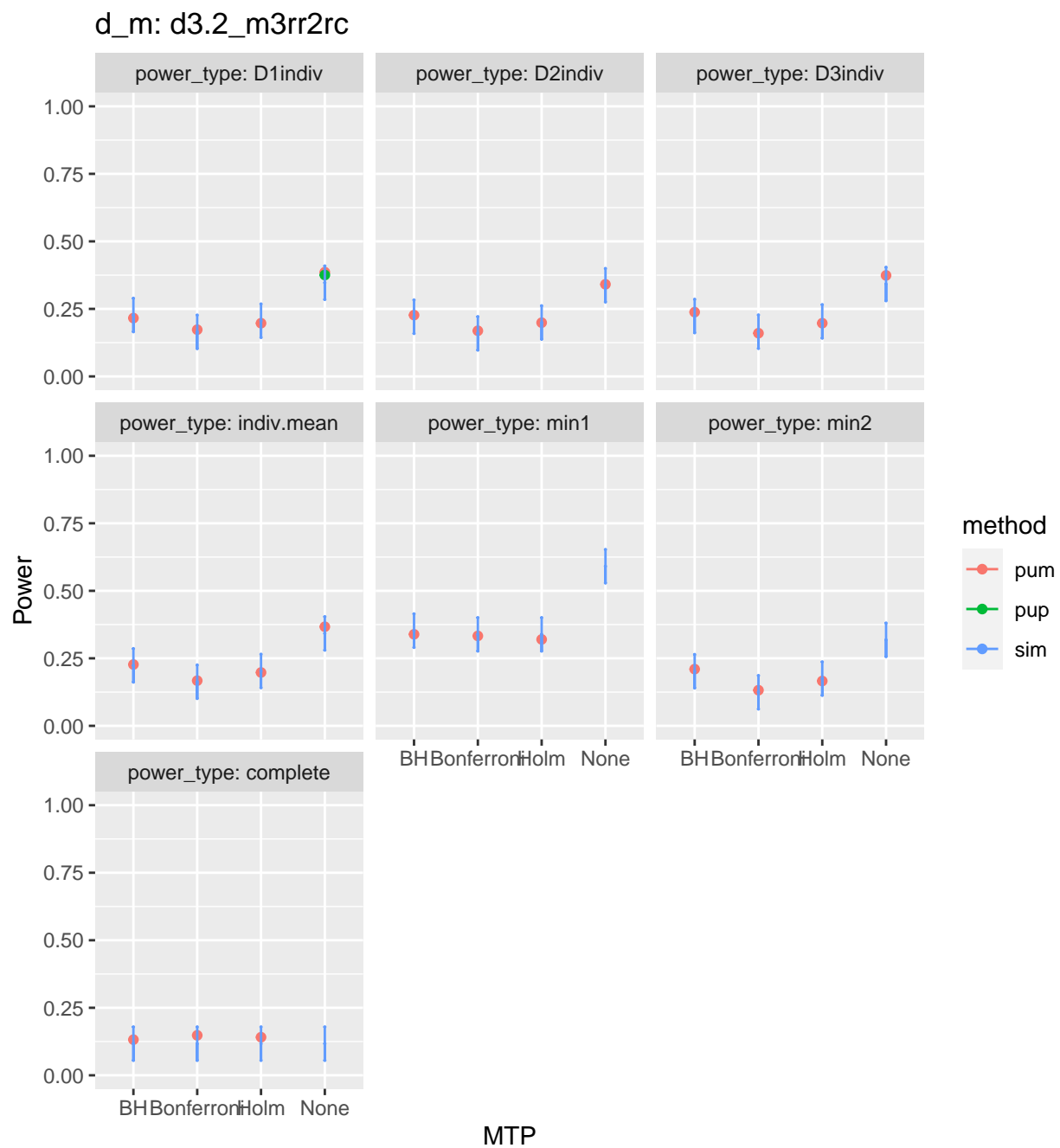## d_m: d3.2_m3ff2rc

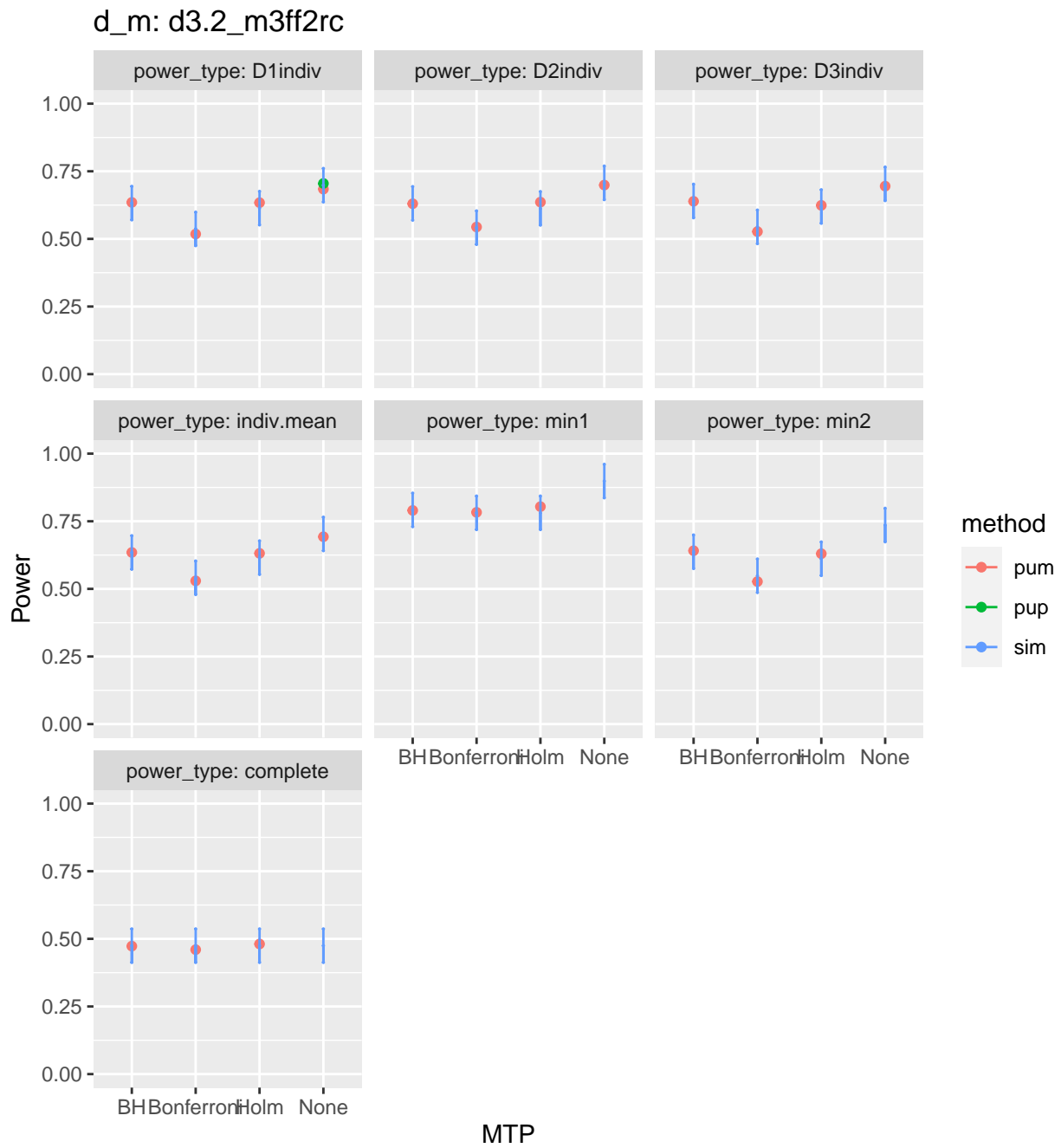# d_m: d3.2_m3rr2rc

$\bar{n} = 75$

## d_m: d3.2_m3ff2rc

d_m: d3.2_m3rr2rc

**Varying R2**

$R_1^2 = 0.6, 0.6, 0.6$

## d_m: d3.2_m3ff2rc

# d_m: d3.2_m3rr2rc

$R_2^2 = 0.6, 0.6, 0.6$
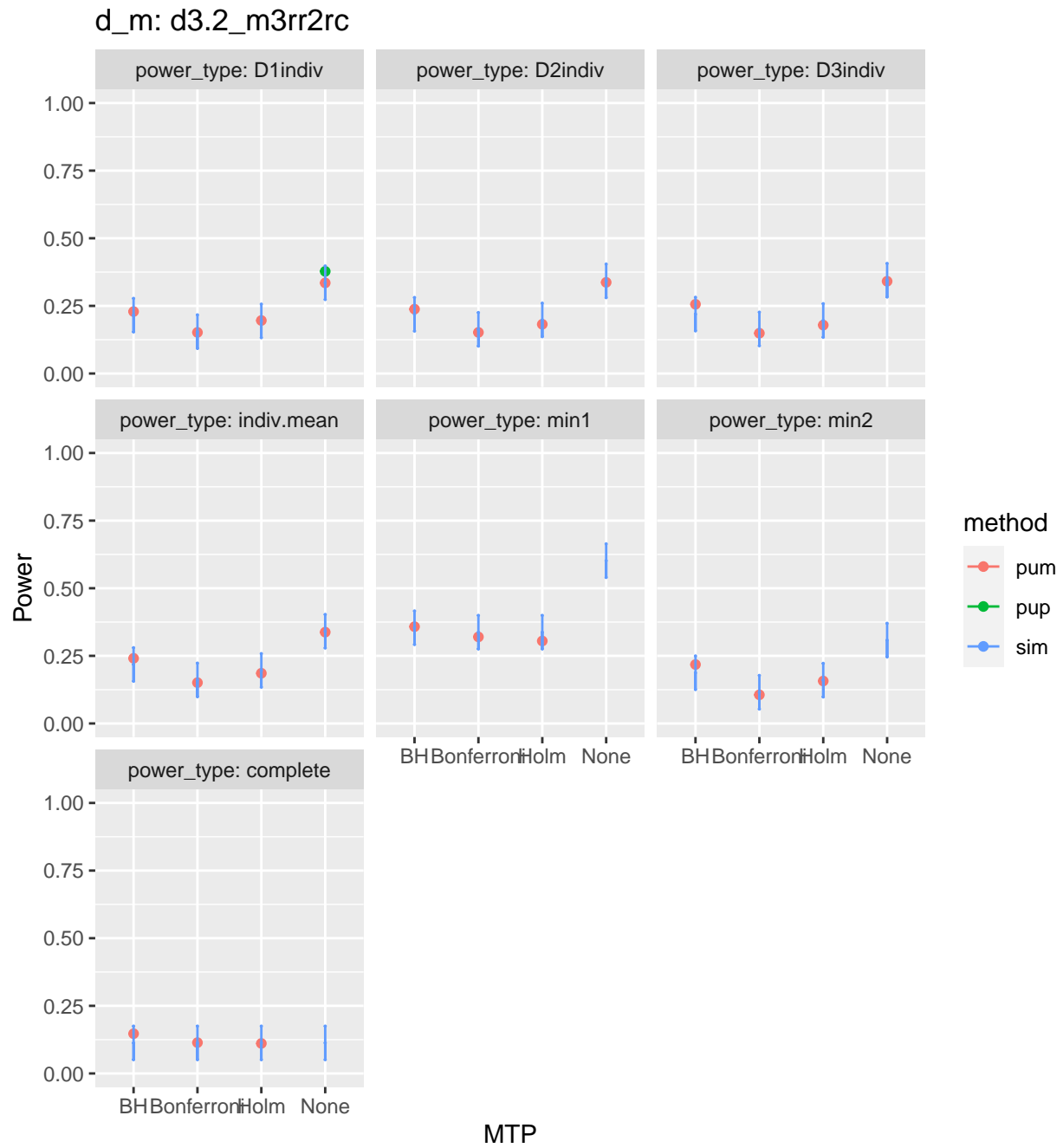
## d_m: d3.2_m3ff2rc
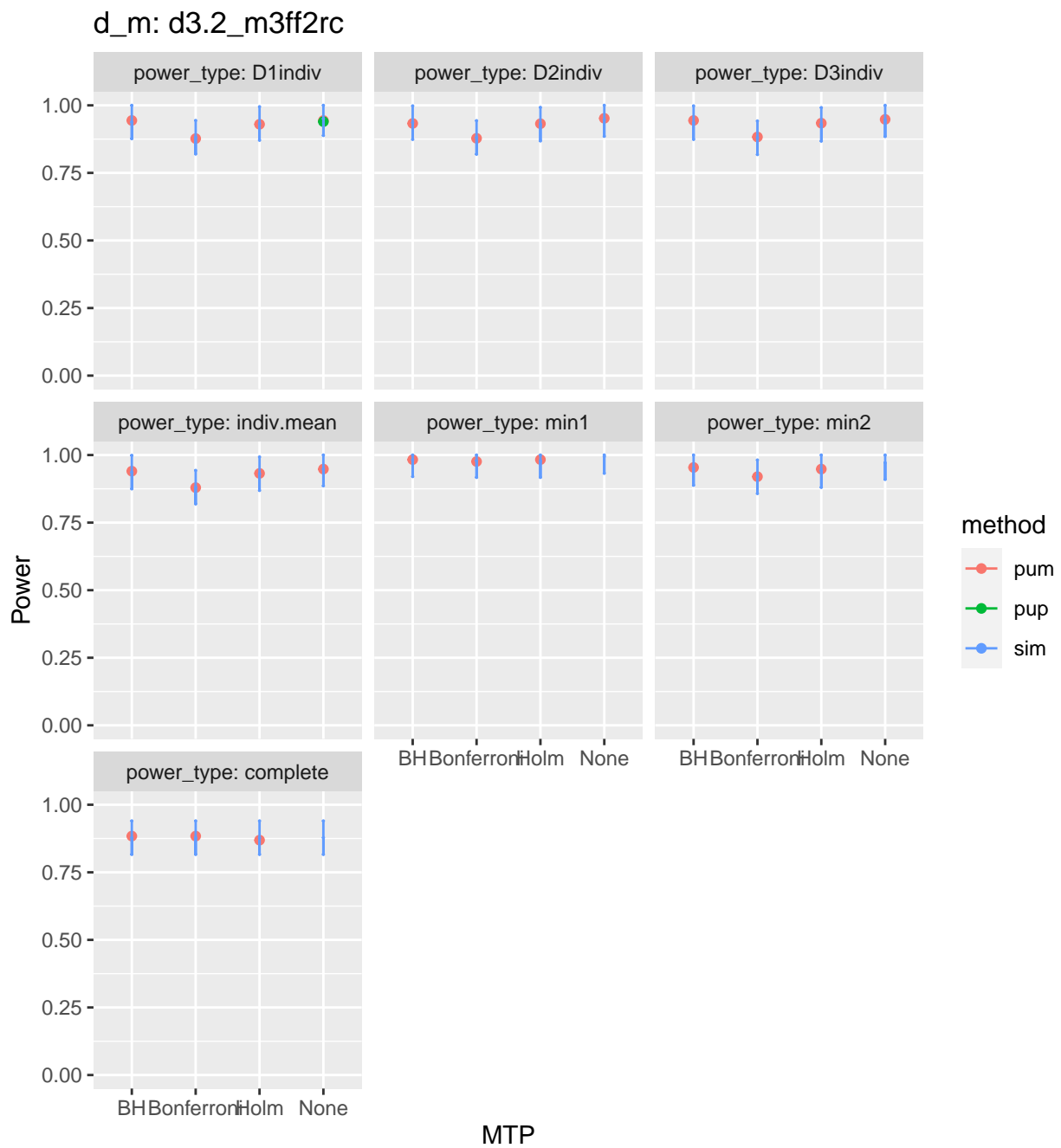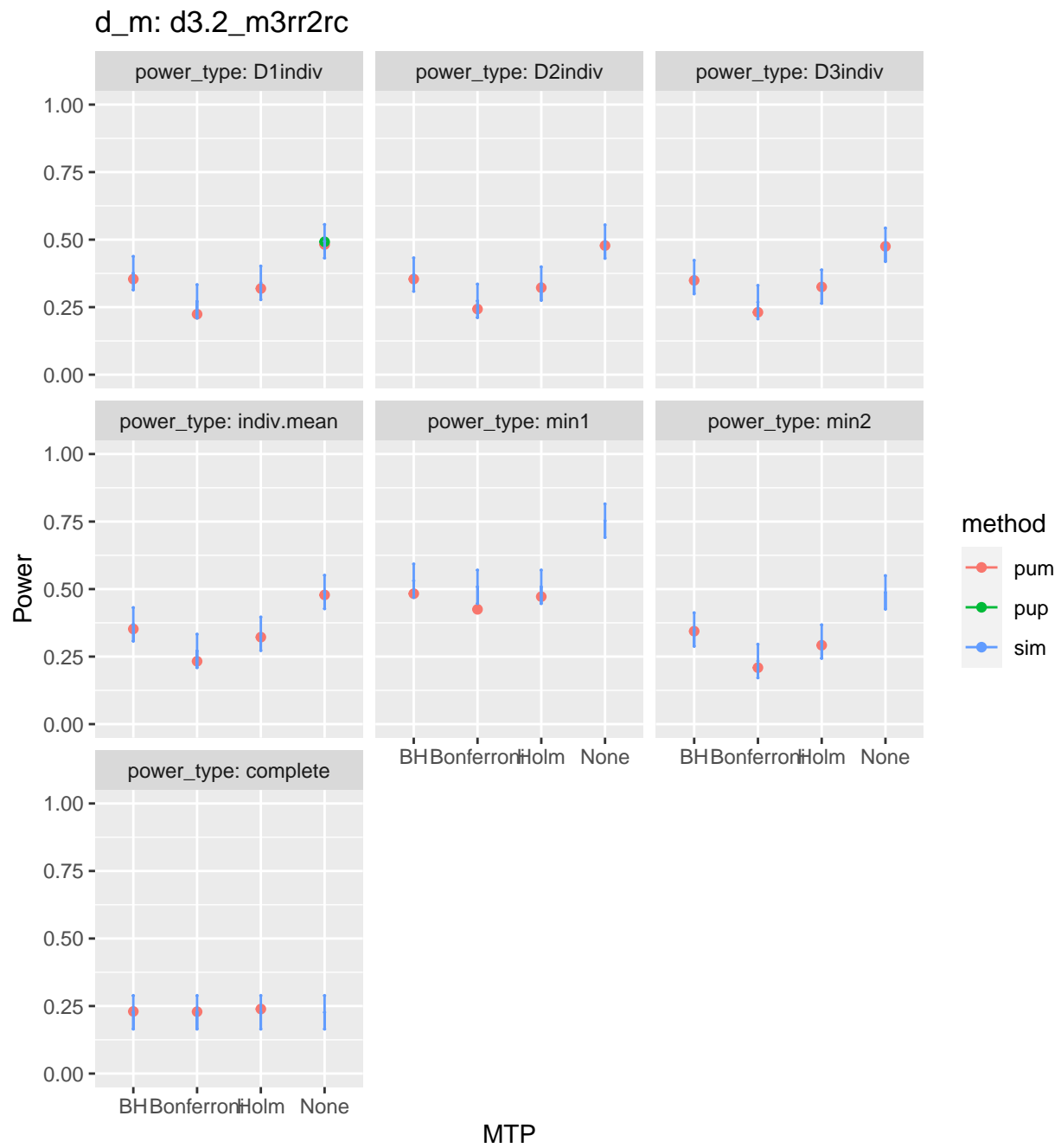
# d_m: d3.2_m3rr2rc

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

## d_m: d3.2_m3ff2rc
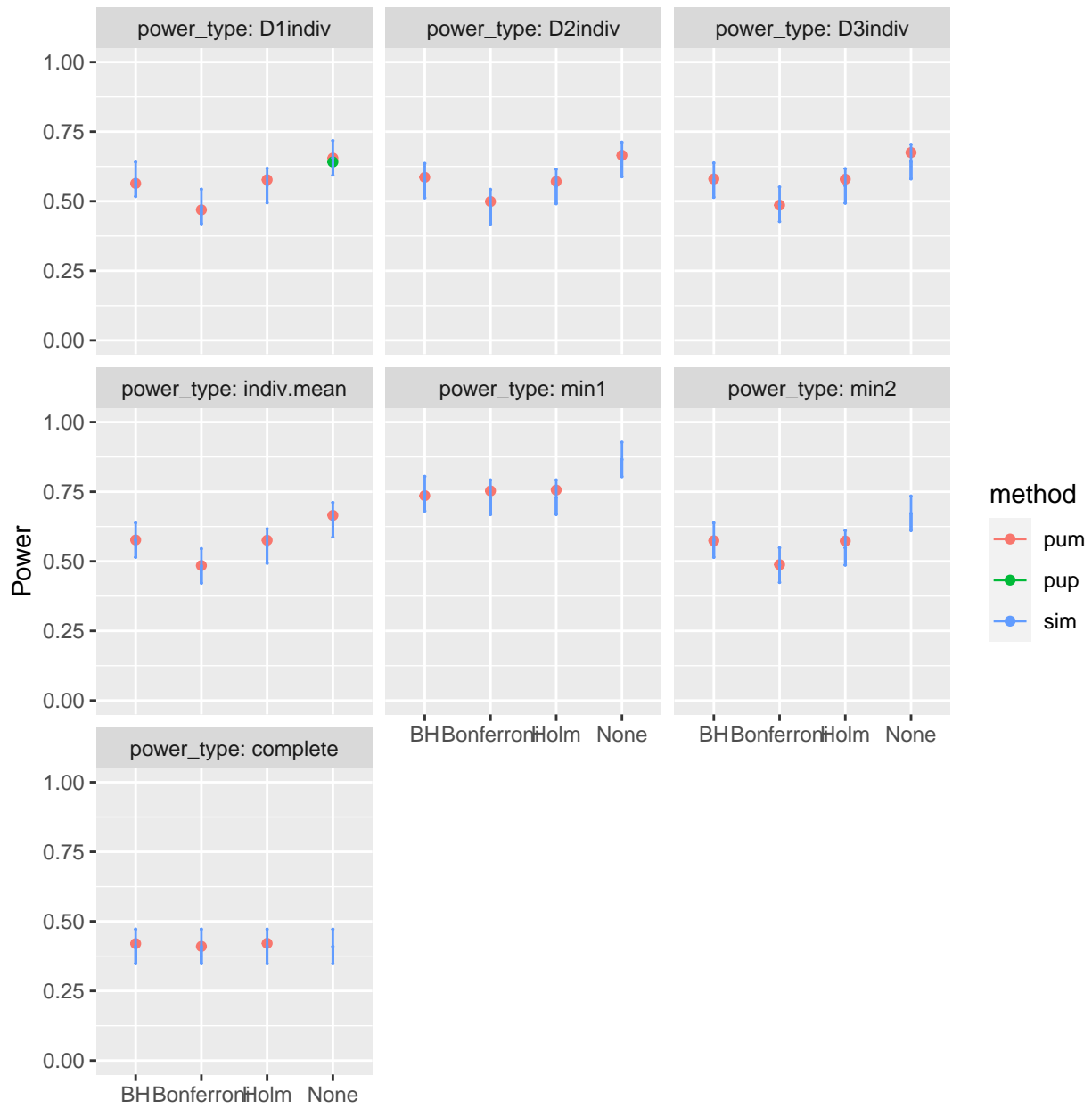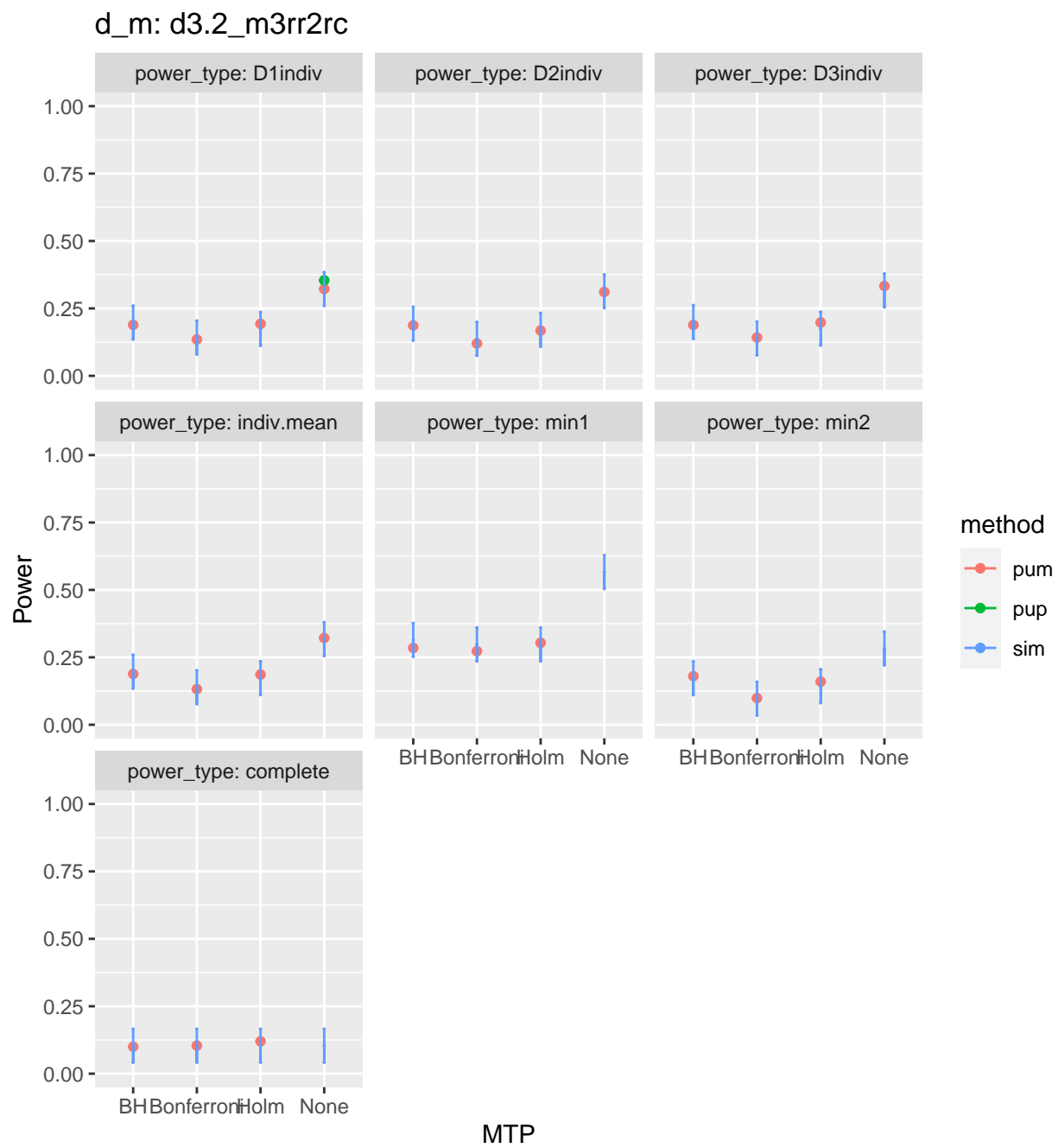
# d_m: d3.2_m3rr2rc

**Varying rho**

$\rho = 0.2$

### d_m: d3.2_m3ff2rc
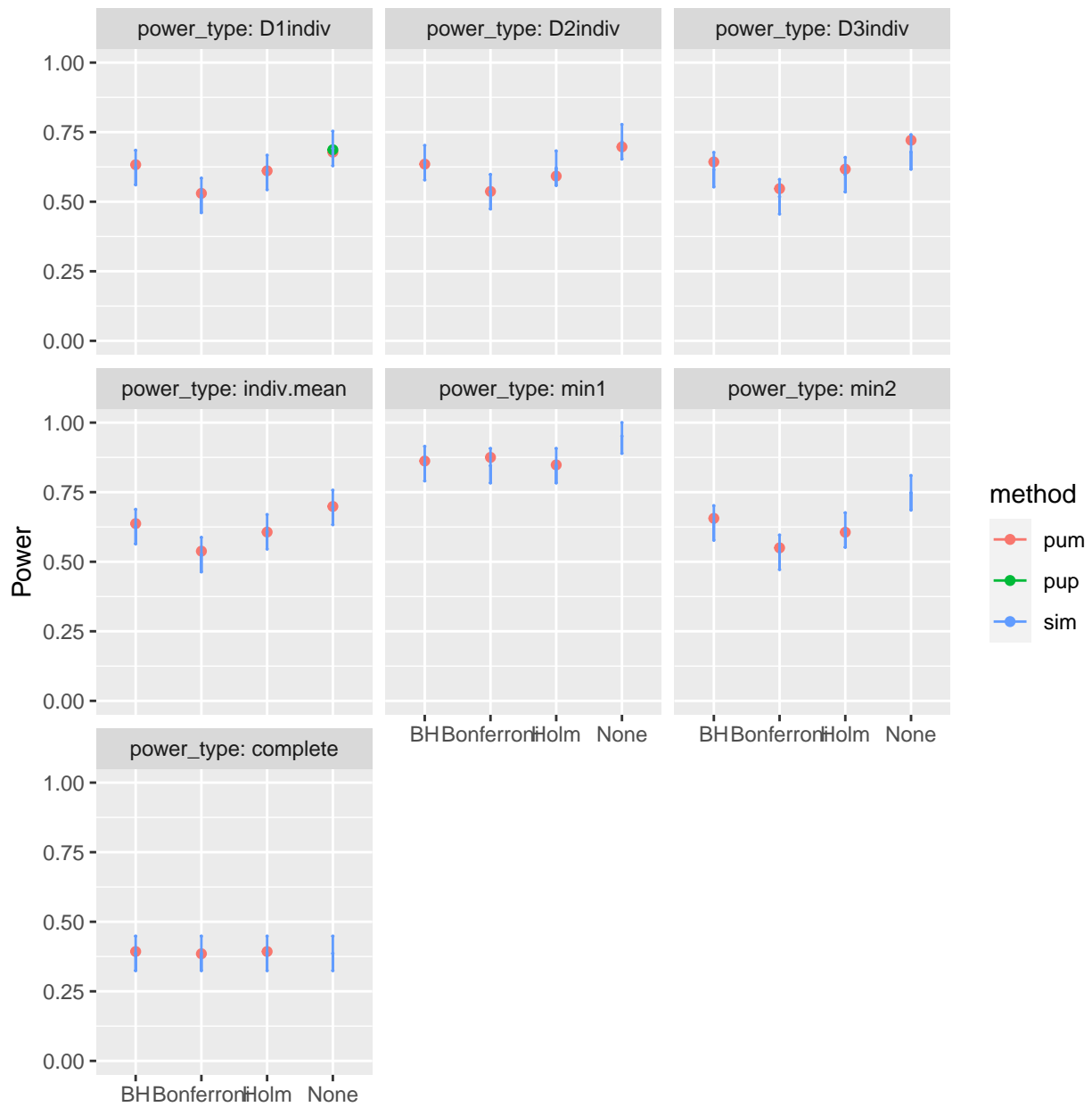
$\rho = 0.8$
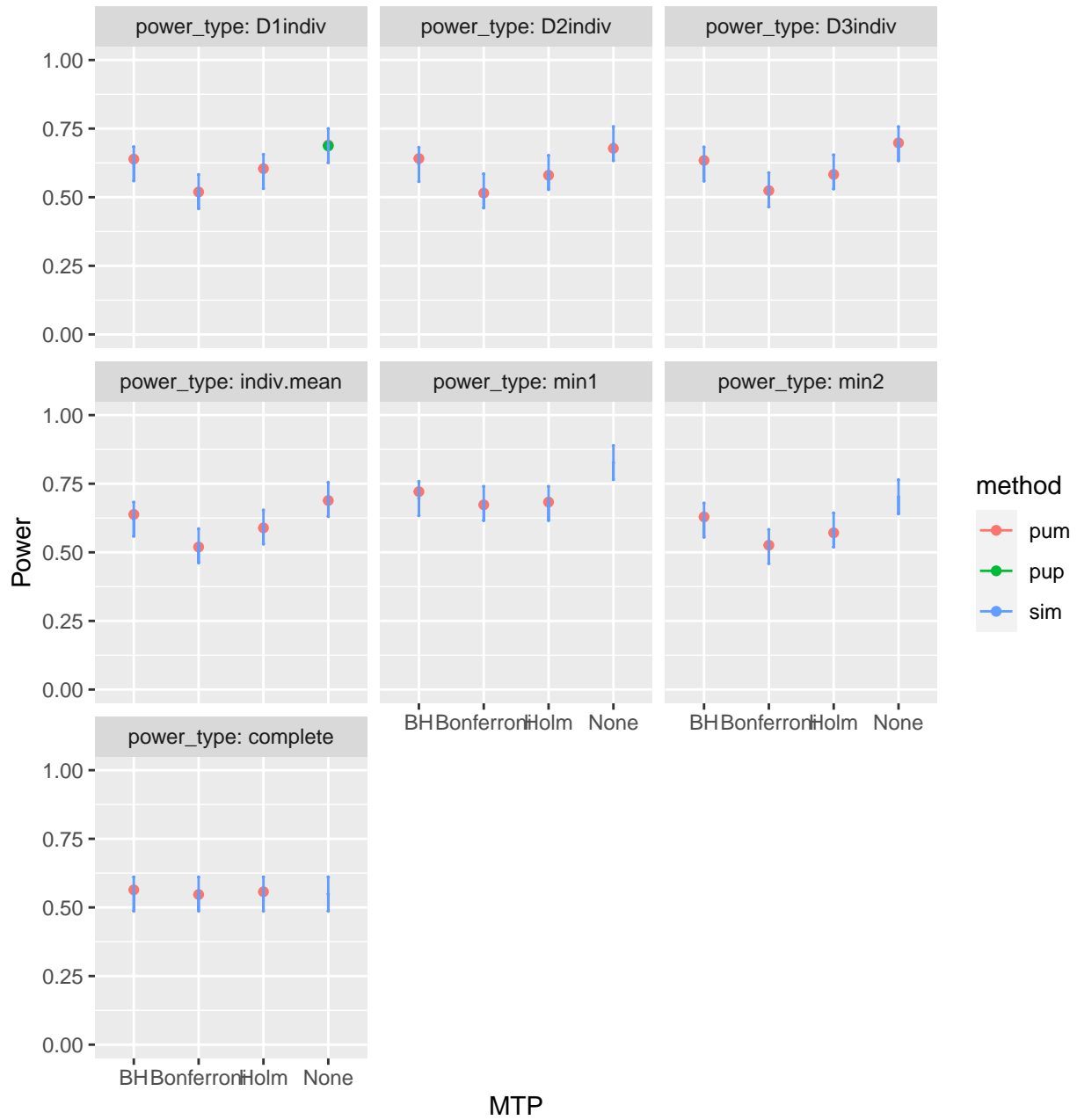
## d_m: d3.2_m3ff2rc

**Varying true positives**

MDES = 0.125, 0, 0



d_m: d3.2_m3ff2rc
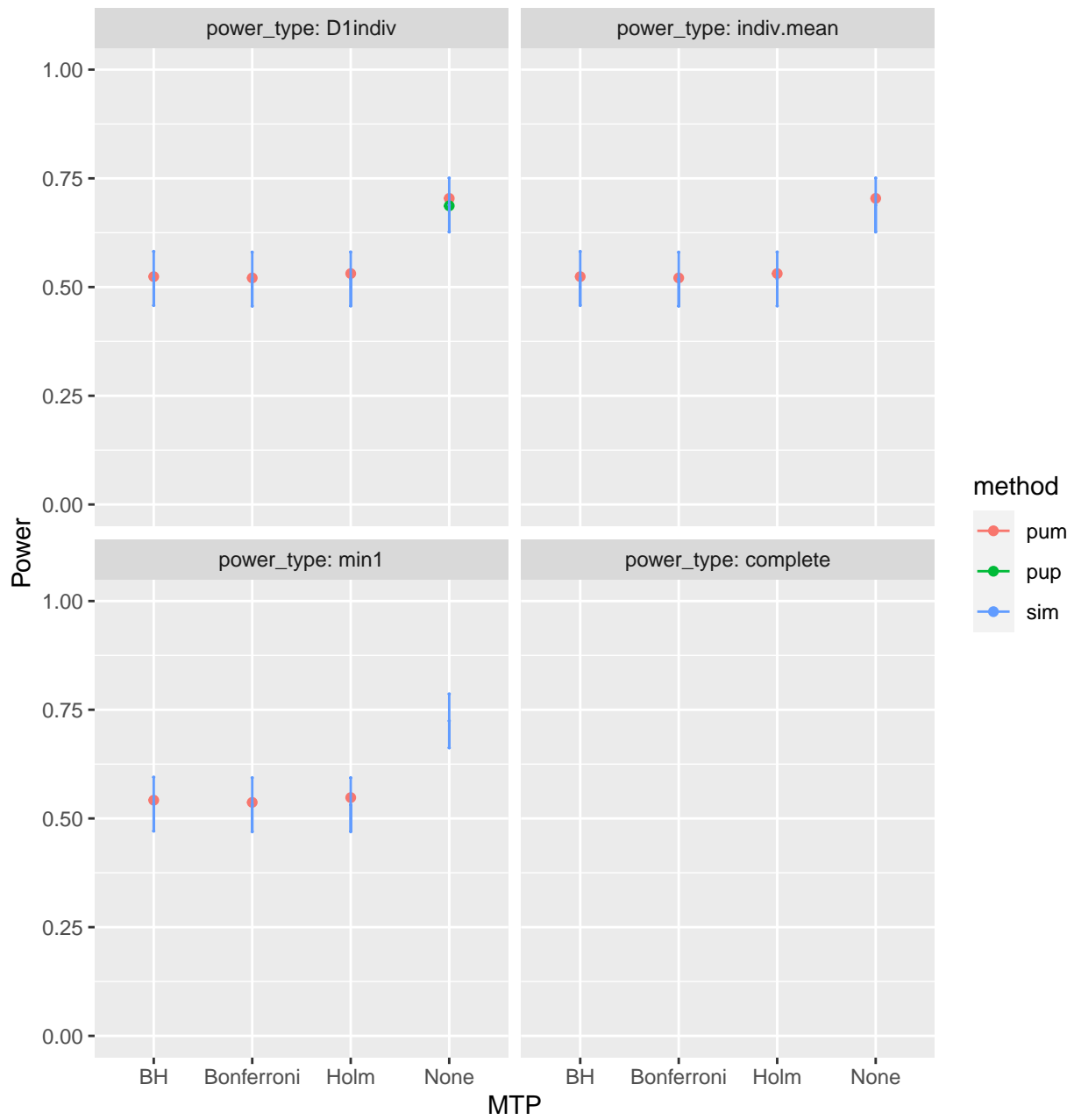
**Varying ICC**

$ICC_2 = 0.7, 0.7, 0.7$

## d_m: d3.2_m3ff2rc

# d_m: d3.2_m3rr2rc

$\mathrm{ICC}_3 = 0.7,\ 0.7,\ 0.7$
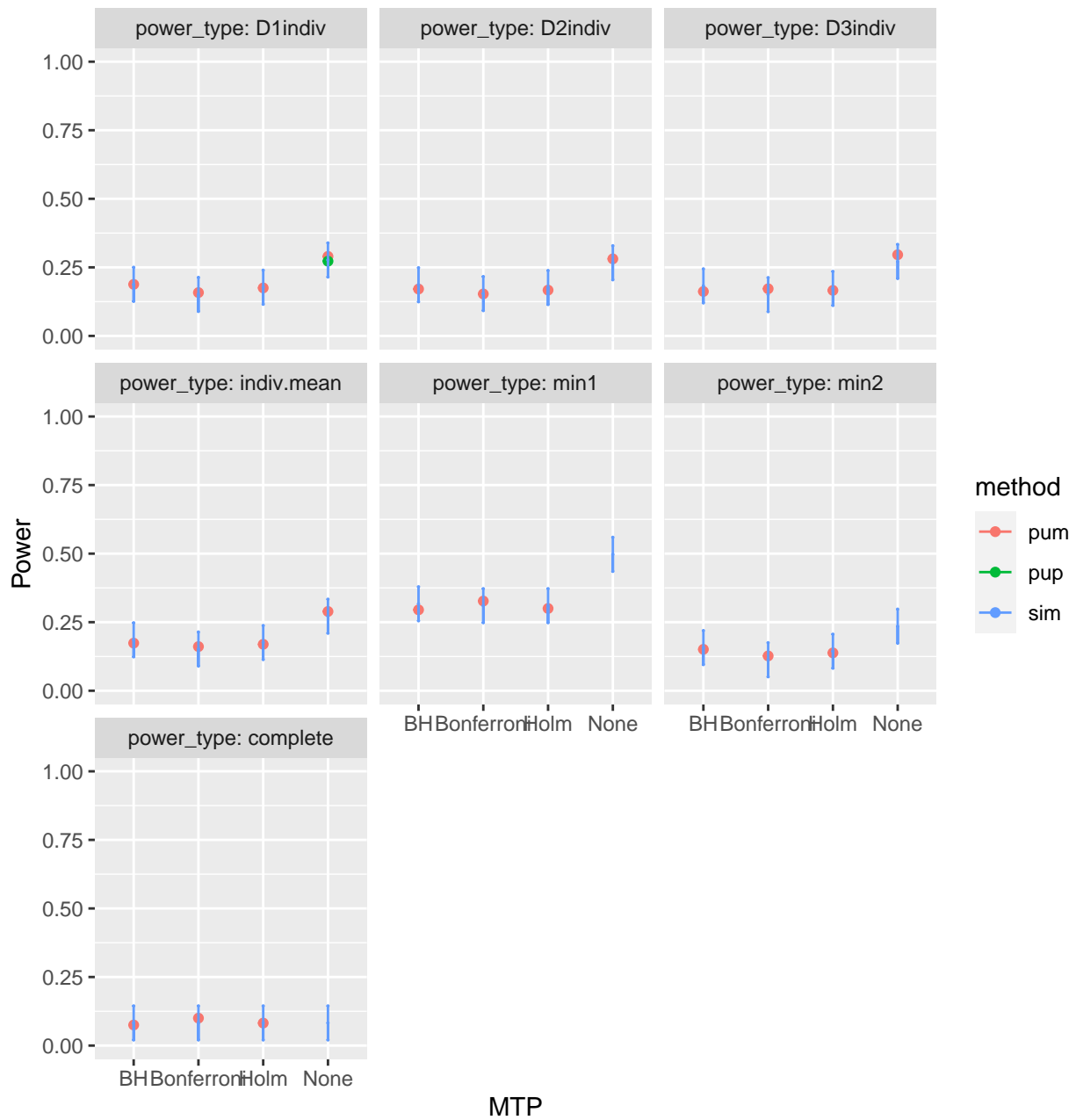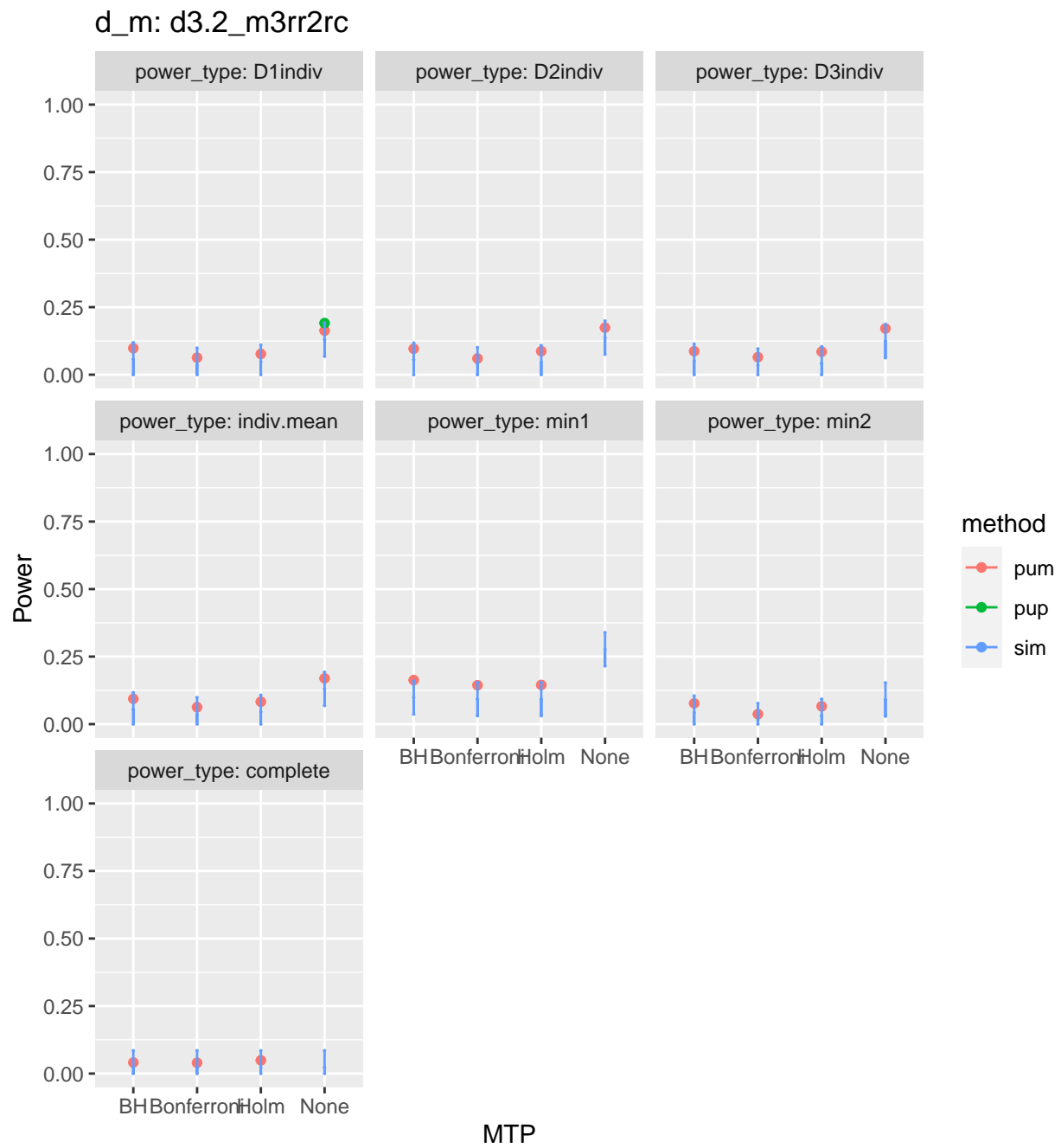
## d_m: d3.2_m3rr2rc



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

d_m: d3.2_m3ff2rc
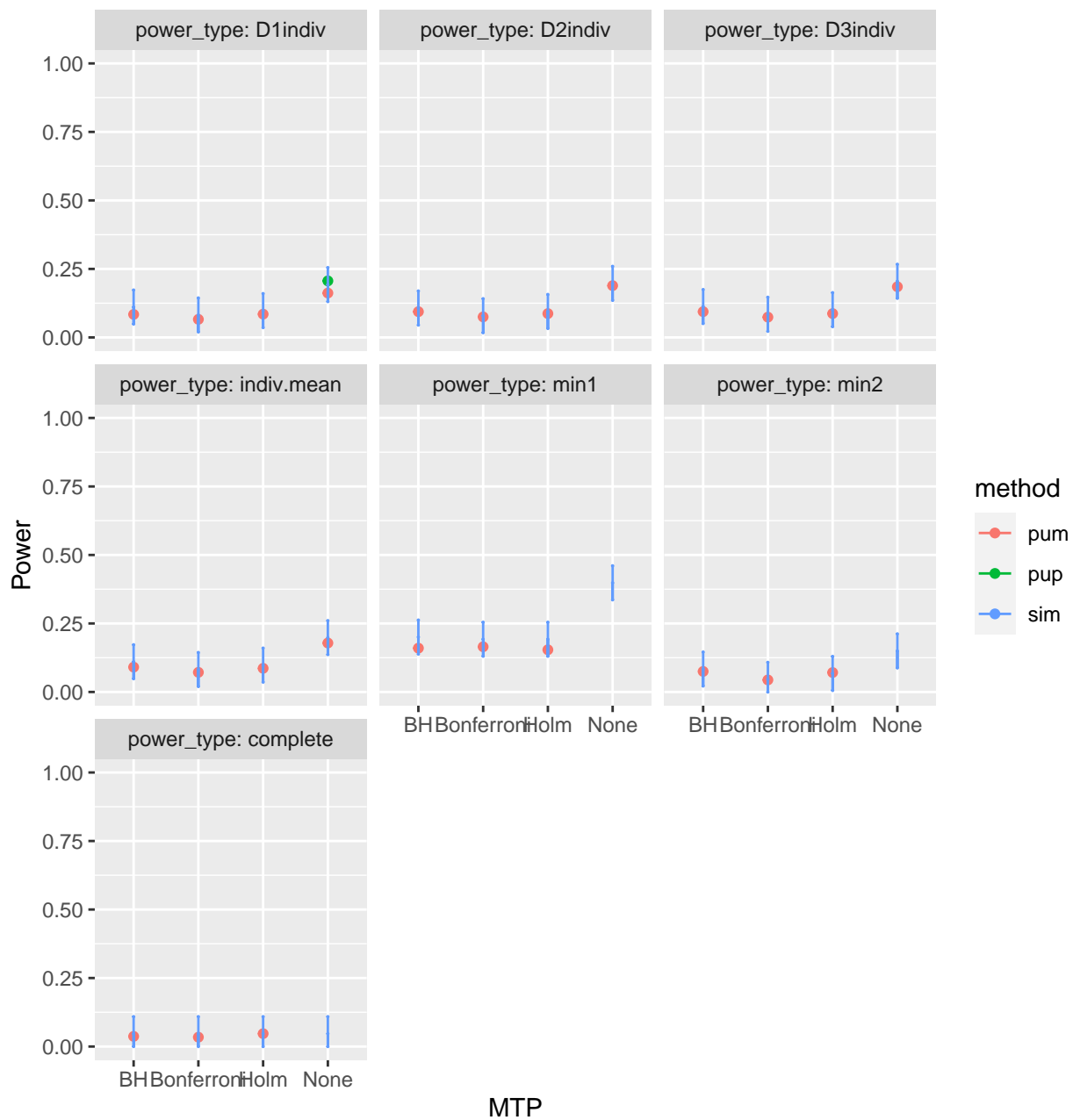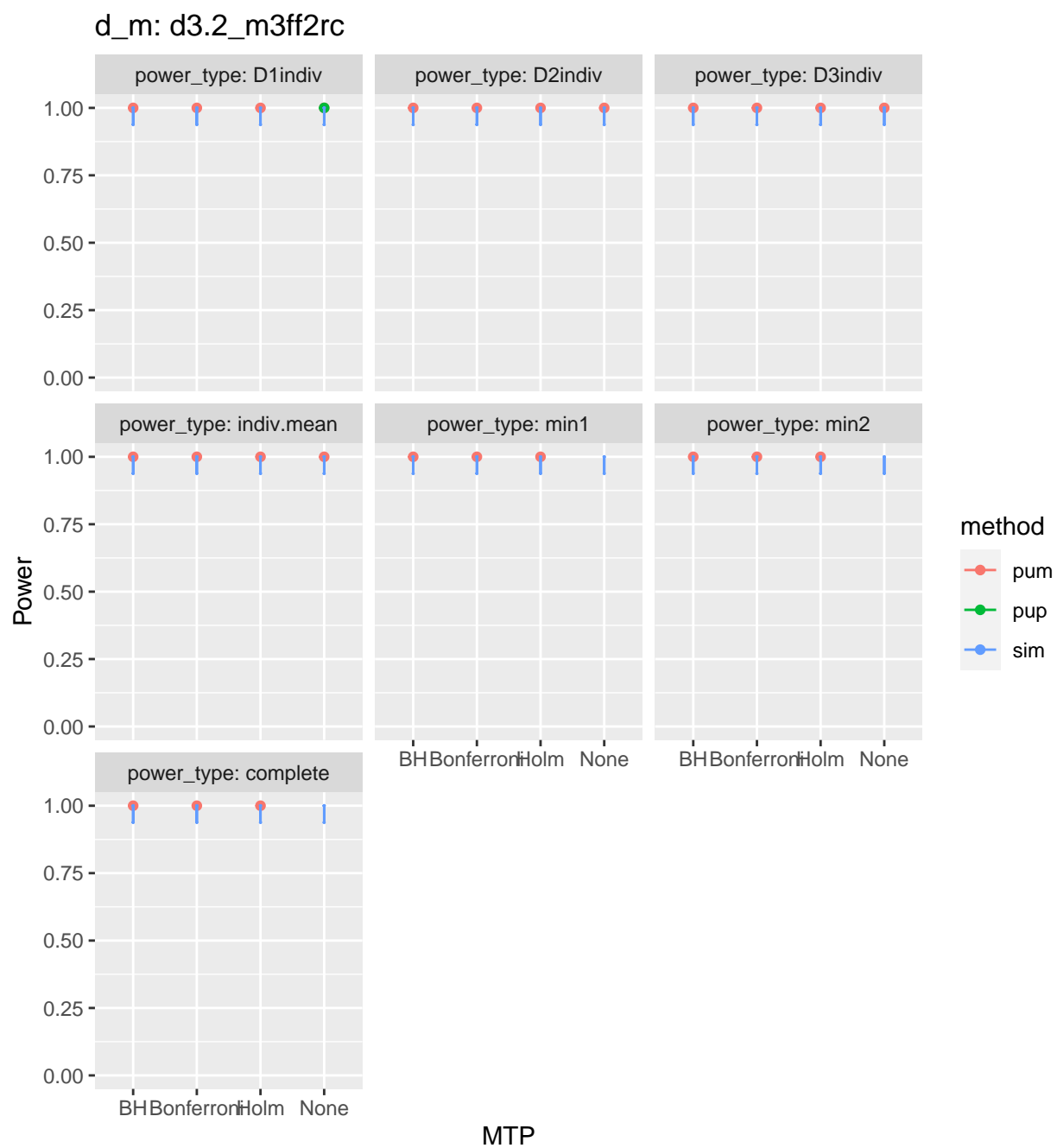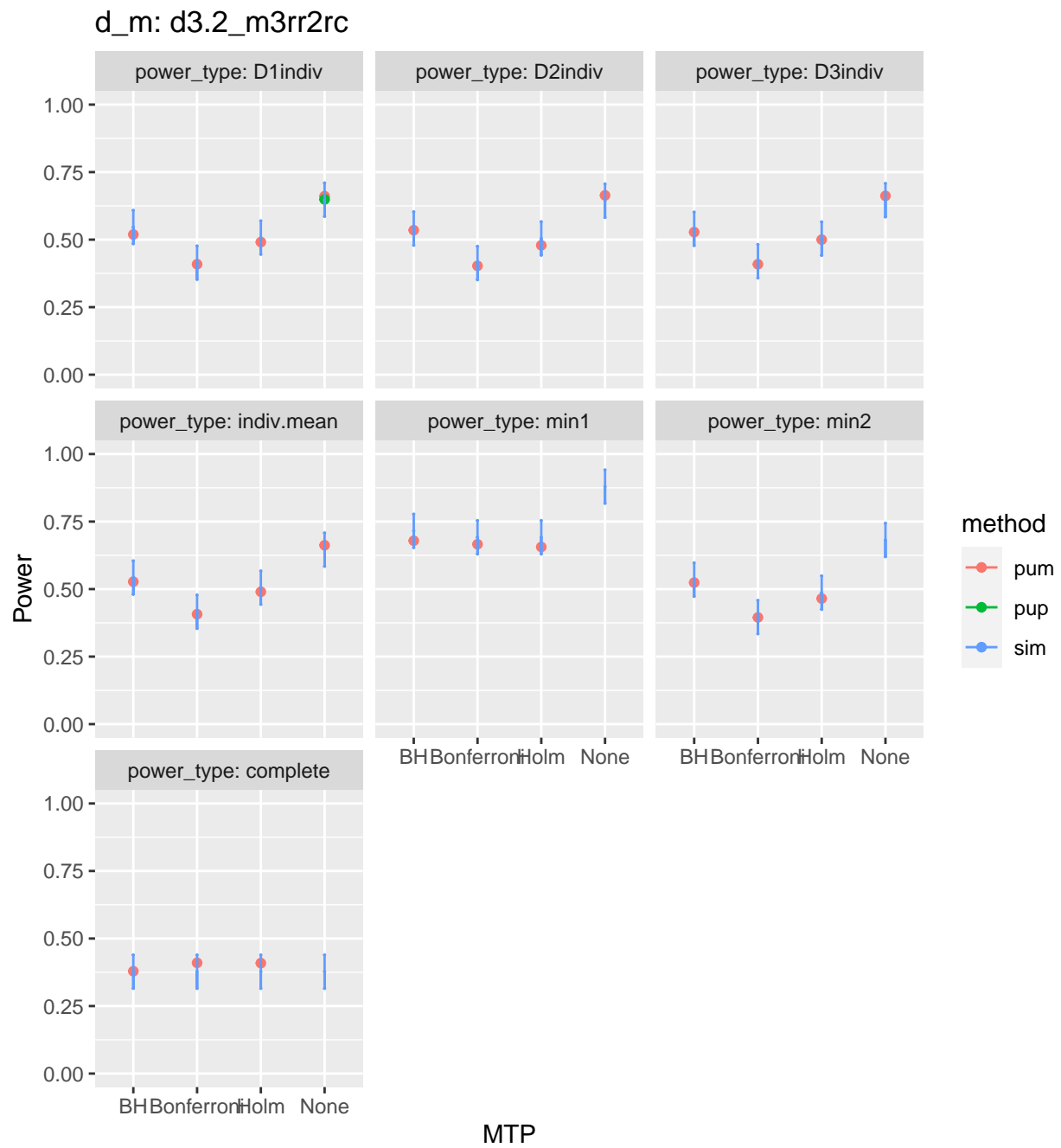
# d_m: d3.2_m3rr2rc

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

d_m: d3.2_m3ff2rc
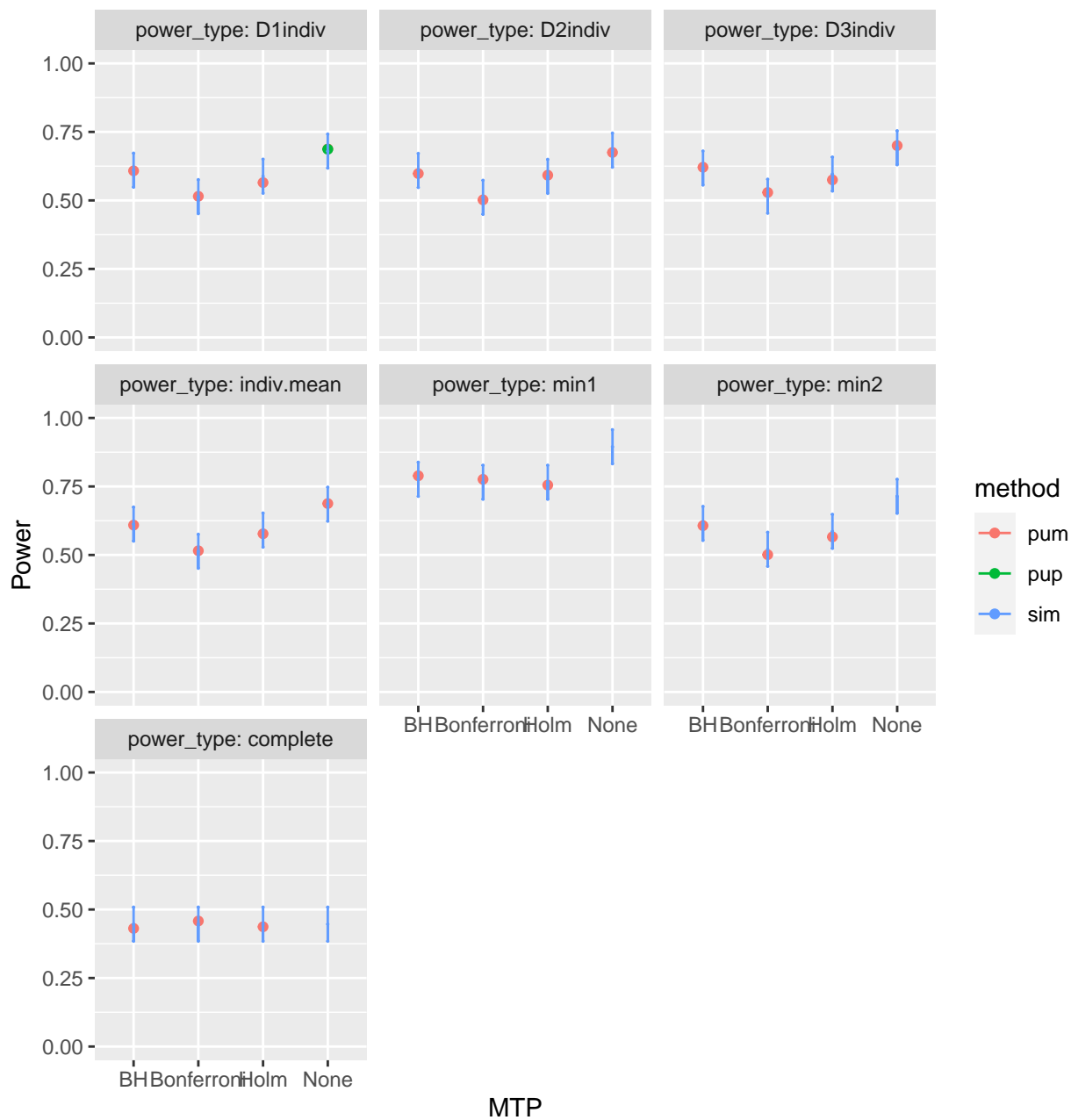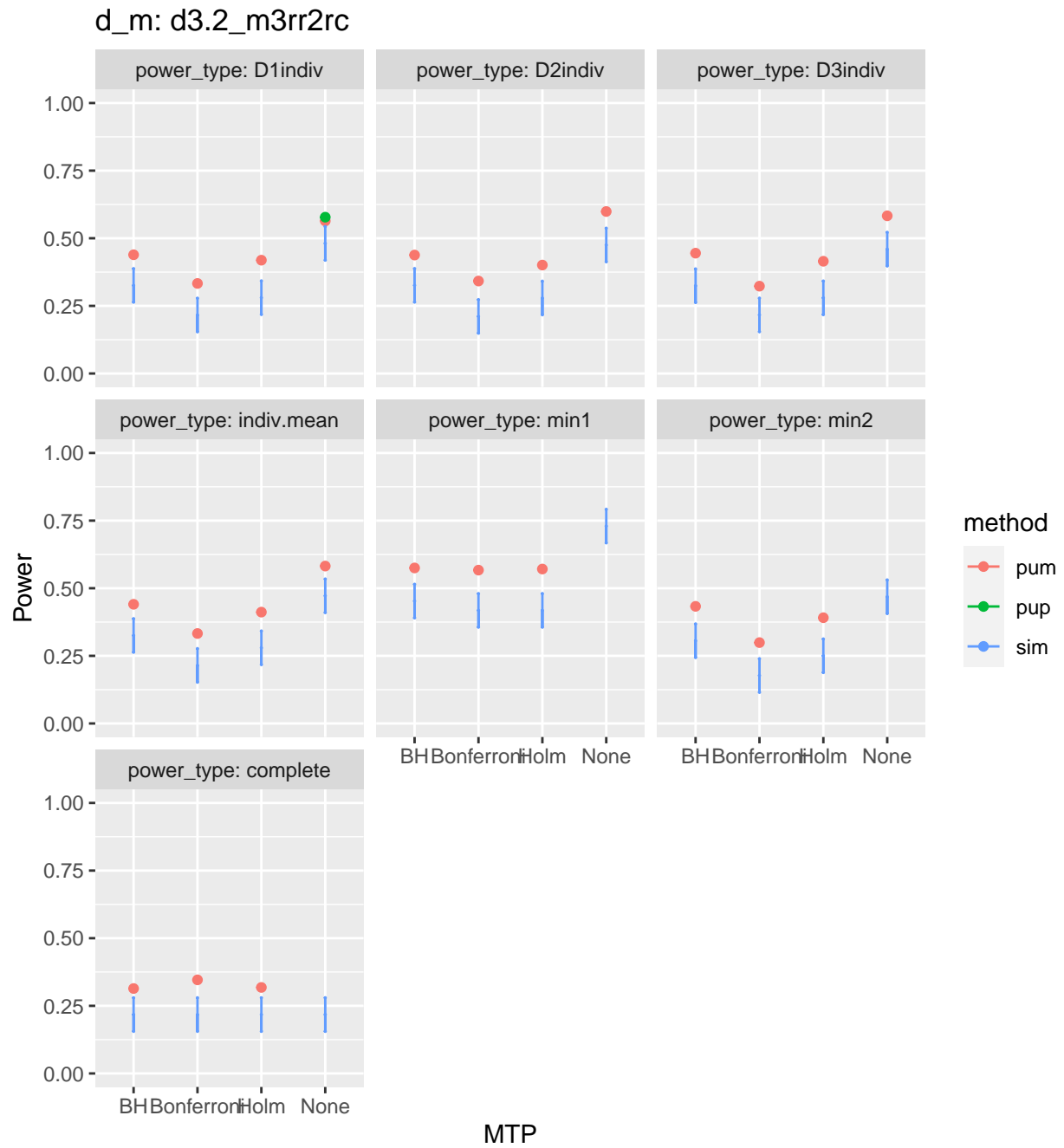
# d_m: d3.2_m3rr2rc

**Varying Omega**

$\omega_3 = 0.8, 0.8, 0.8$

d_m: d3.2_m3rr2rc

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

# d_m: d3.2_m3rr2rc
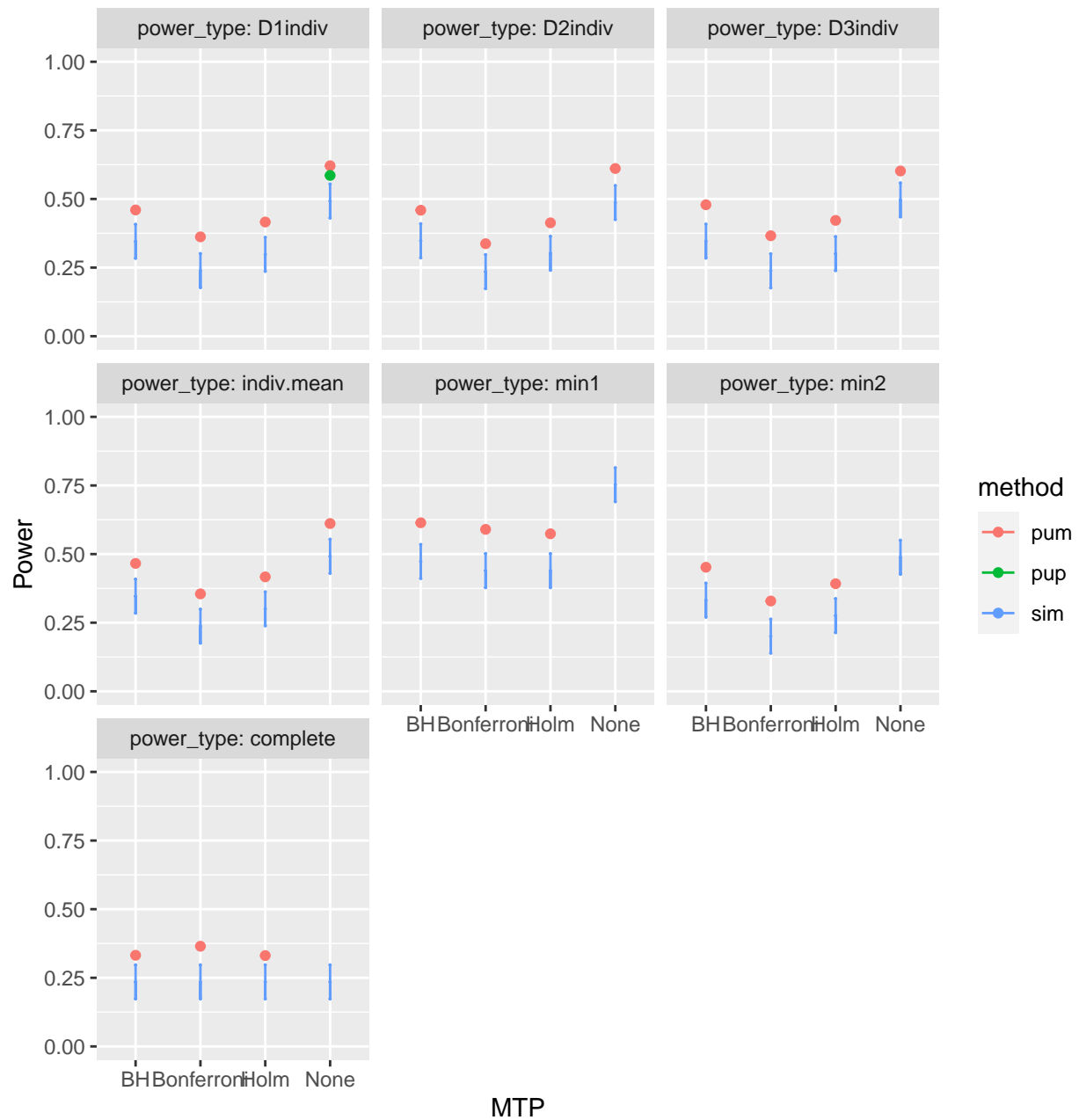
$\omega_3 = 0.8,\ 0.8,\ 0.8 \ \mathrm{ICC}_3 = 0.7,\ 0.7,\ 0.7$

d_m: d3.2_m3rr2rc
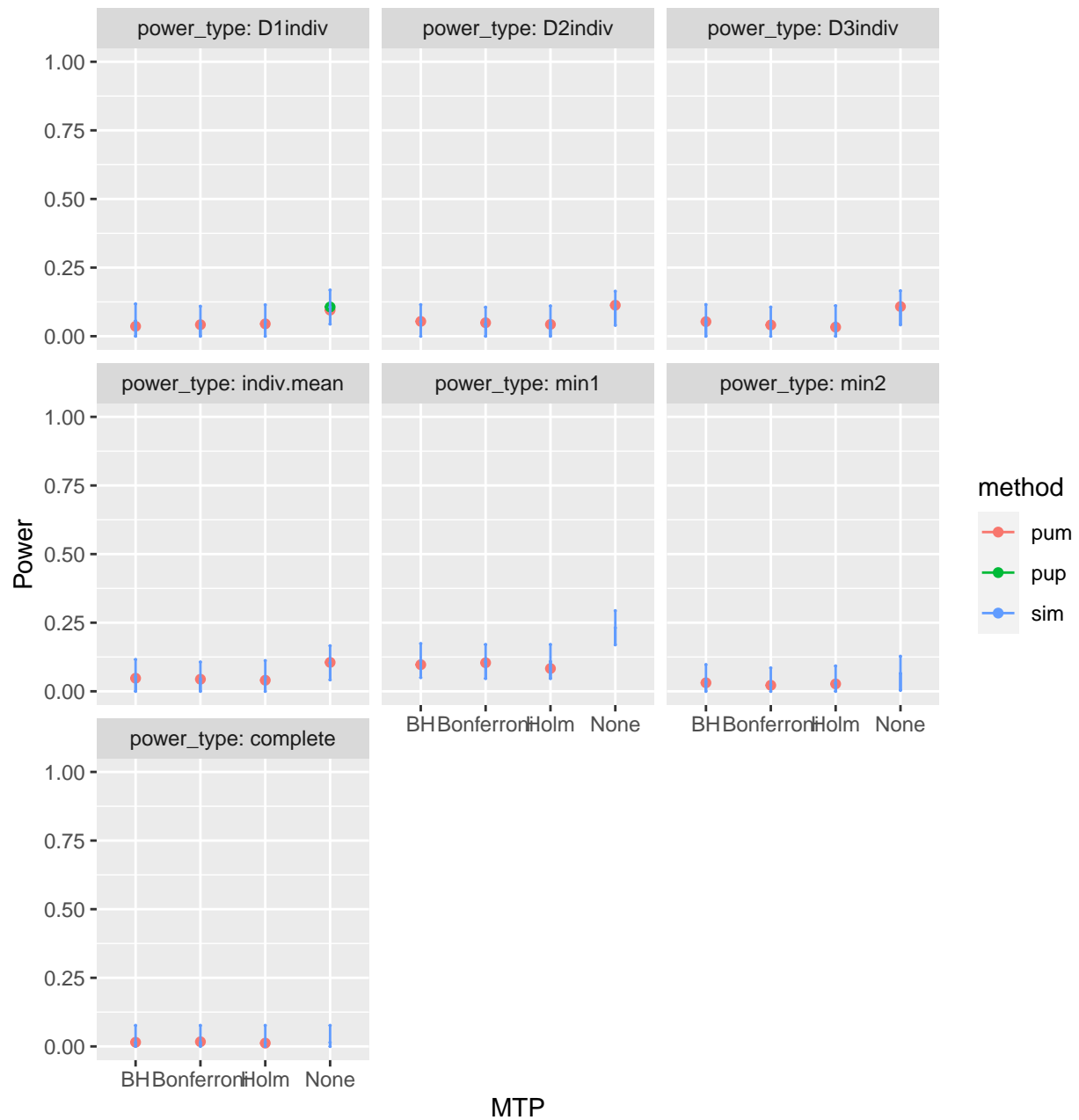
# MDES validation

Target value: 0.125

```
##
##
## +------------+--------------+---------------+-------------+
## |    MTP     | Adjusted MDES | D1indiv Power | Target MDES |
## +============+==============+===============+=============+
## | Bonferroni |    0.118     |     0.473     |    0.125    |
## +------------+--------------+---------------+-------------+
## |     BH     |    0.129     |     0.659     |    0.125    |
## +------------+--------------+---------------+-------------+
## |    Holm    |    0.123     |     0.583     |    0.125    |
## +------------+--------------+---------------+-------------+
##
## Table: d3.2_m3ff2rc

##
##
## +------------+--------------+---------------+-------------+
## |    MTP     | Adjusted MDES | D1indiv Power | Target MDES |
## +============+==============+===============+=============+
## | Bonferroni |    0.121     |     0.141     |    0.125    |
## +------------+--------------+---------------+-------------+
## |     BH     |    0.125     |     0.219     |    0.125    |
## +------------+--------------+---------------+-------------+
## |    Holm    |    0.126     |     0.192     |    0.125    |
## +------------+--------------+---------------+-------------+
##
## Table: d3.2_m3rr2rc
```
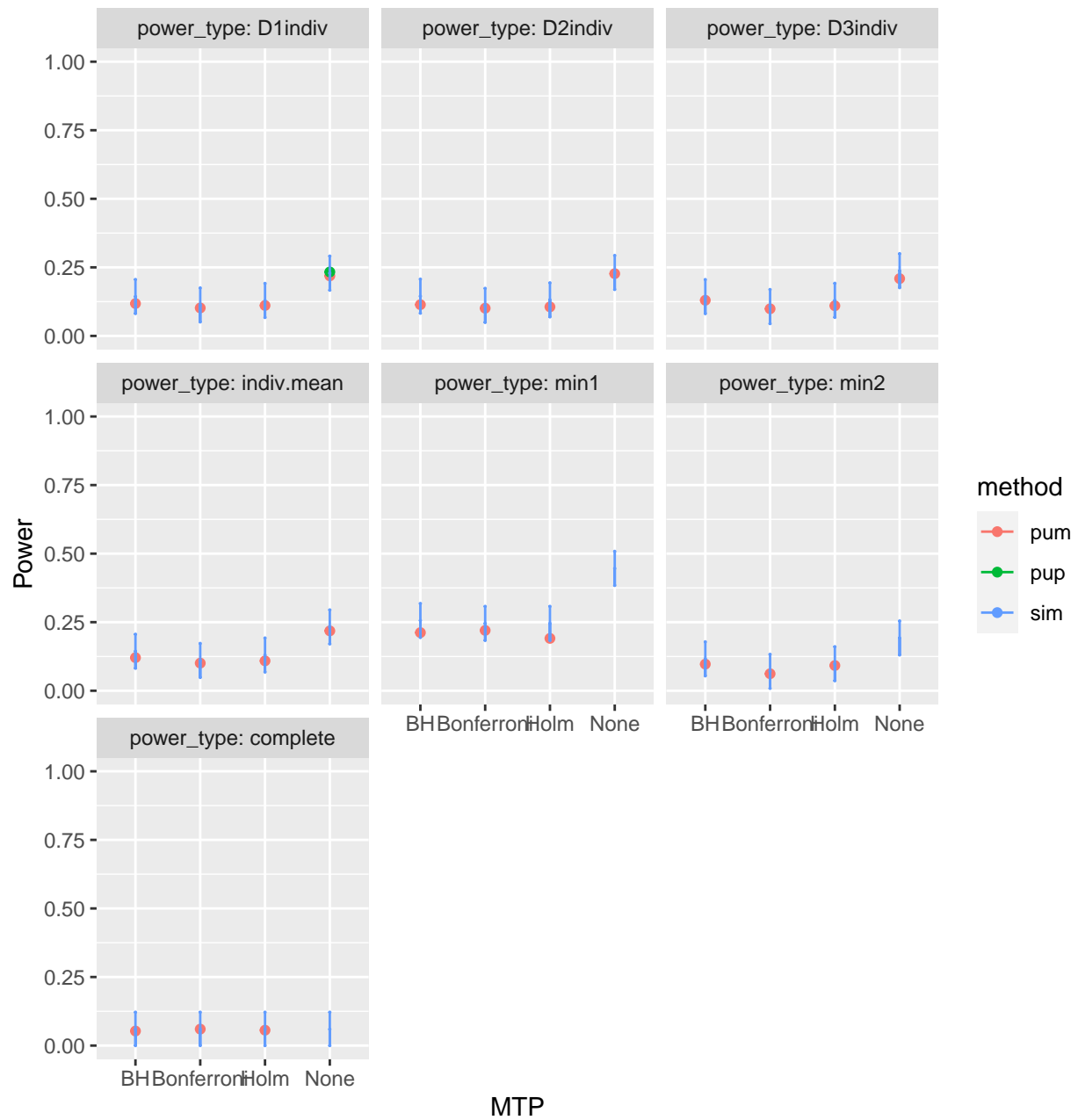
# Sample size validation

Target value: 10

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |      K      |      9      |     0.473     |
## +------------+-------------+-------------+---------------+
## |     BH     |      K      |     11      |     0.653     |
## +------------+-------------+-------------+---------------+
## |    Holm    |      K      |     10      |     0.59      |
## +------------+-------------+-------------+---------------+
##
## Table: d3.2_m3ff2rc
```

Target value: 30

```
##
##
## +------------+-------------+-------------+---------------+
```

```
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +===========+============+============+==============+
## | Bonferroni |      J      |     27      |     0.473     |
## +-----------+------------+------------+--------------+
## |    BH      |      J      |     32      |     0.653     |
## +-----------+------------+------------+--------------+
## |   Holm     |      J      |     29      |     0.577     |
## +-----------+------------+------------+--------------+
##
## Table: d3.2_m3ff2rc
```

Target value: 50

```
##
##
## +-----------+------------+------------+--------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +===========+============+============+==============+
## | Bonferroni |     nbar    |    15.94    |     0.473     |
## +-----------+------------+------------+--------------+
## |    BH      |     nbar    |    1581     |     0.655     |
## +-----------+------------+------------+--------------+
## |   Holm     |     nbar    |     28      |     0.582     |
## +-----------+------------+------------+--------------+
##
## Table: d3.2_m3ff2rc
```

Target value: 10

```
##
##
## +-----------+------------+------------+--------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +===========+============+============+==============+
## | Bonferroni |      K      |     10      |     0.141     |
## +-----------+------------+------------+--------------+
## |    BH      |      K      |     10      |     0.213     |
## +-----------+------------+------------+--------------+
## |   Holm     |      K      |     11      |     0.206     |
## +-----------+------------+------------+--------------+
##
## Table: d3.2_m3rr2rc
```

Target value: 30

```
##
##
## +-----------+------------+------------+--------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +===========+============+============+==============+
## | Bonferroni |      J      |     26      |     0.141     |
## +-----------+------------+------------+--------------+
## |    BH      |      J      |     29      |     0.217     |
## +-----------+------------+------------+--------------+
## |   Holm     |      J      |     33      |     0.205     |
## +-----------+------------+------------+--------------+
##
```

```
## Table: d3.2_m3rr2rc
```

Target value: 50

```
##
##
## +------------+-------------+-------------+----------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power  |
## +============+=============+=============+================+
## | Bonferroni |    nbar     |    14.93    |     0.141      |
## +------------+-------------+-------------+----------------+
## |     BH     |    nbar     |      2      |     0.079      |
## +------------+-------------+-------------+----------------+
## |    Holm    |    nbar     |    263      |     0.198      |
## +------------+-------------+-------------+----------------+
##
## Table: d3.2_m3rr2rc
```