

# Validate Power: d3.3

April 08, 2022

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

Models: random treatment effects.

d\_m codes: d3.3\_m3rc2rc

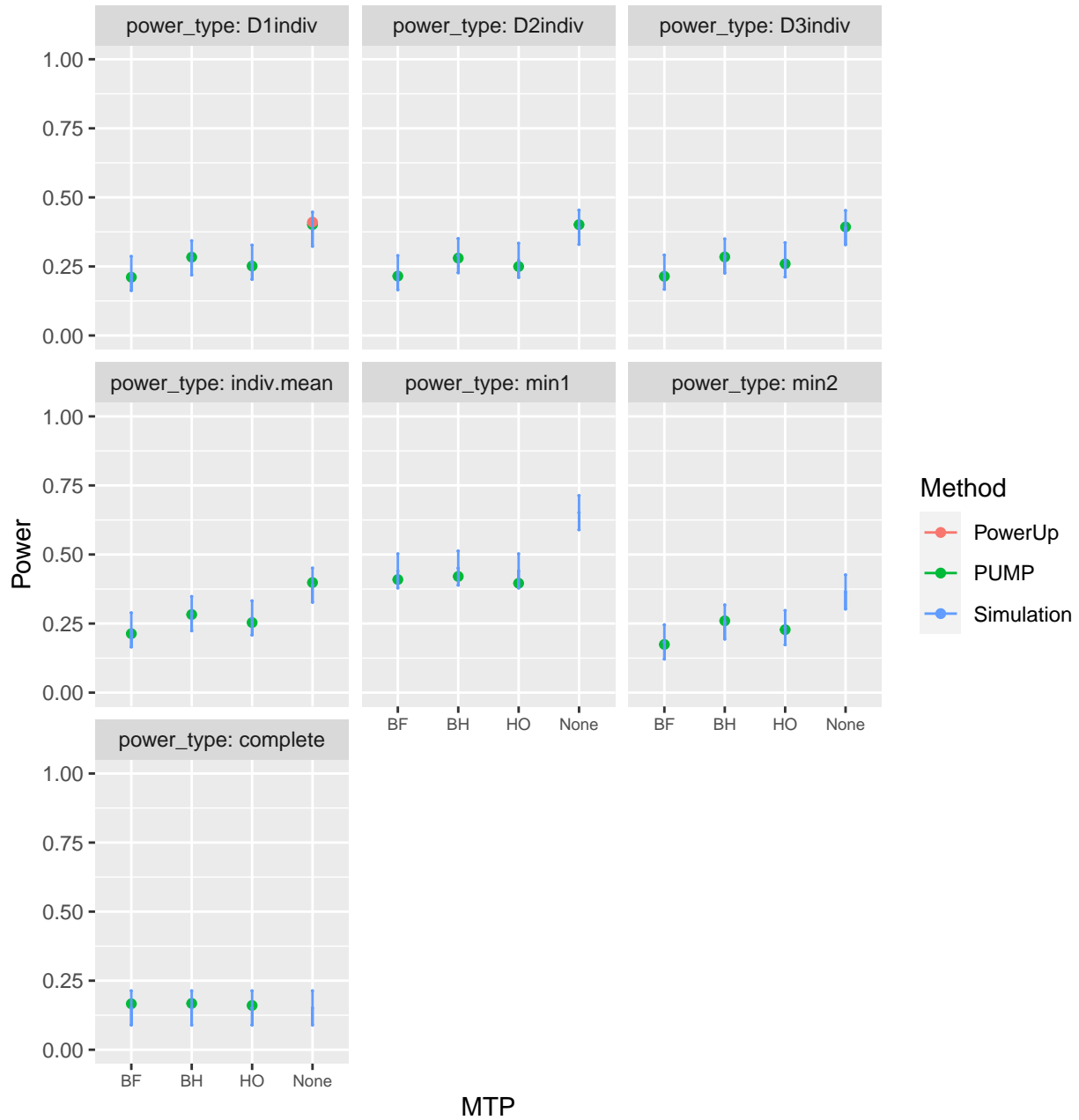
## Power Validation

Default parameters:

- $M = 3$
- $J = 40$
- $K = 20$
- rho:  $\rho = 0.5$
- MDES = 0.25, 0.25, 0.25
- R2:  $R_1^2 = 0.1, 0.1, 0.1, R_2^2 = 0.1, 0.1, 0.1, R_3^2 = 0.1, 0.1, 0.1$
- ICC:  $ICC_2 = 0.1, 0.1, 0.1, ICC_3 = 0.1, 0.1, 0.1$
- Omega:  $\omega_2 = 0, \omega_3 = 0$

## Base case

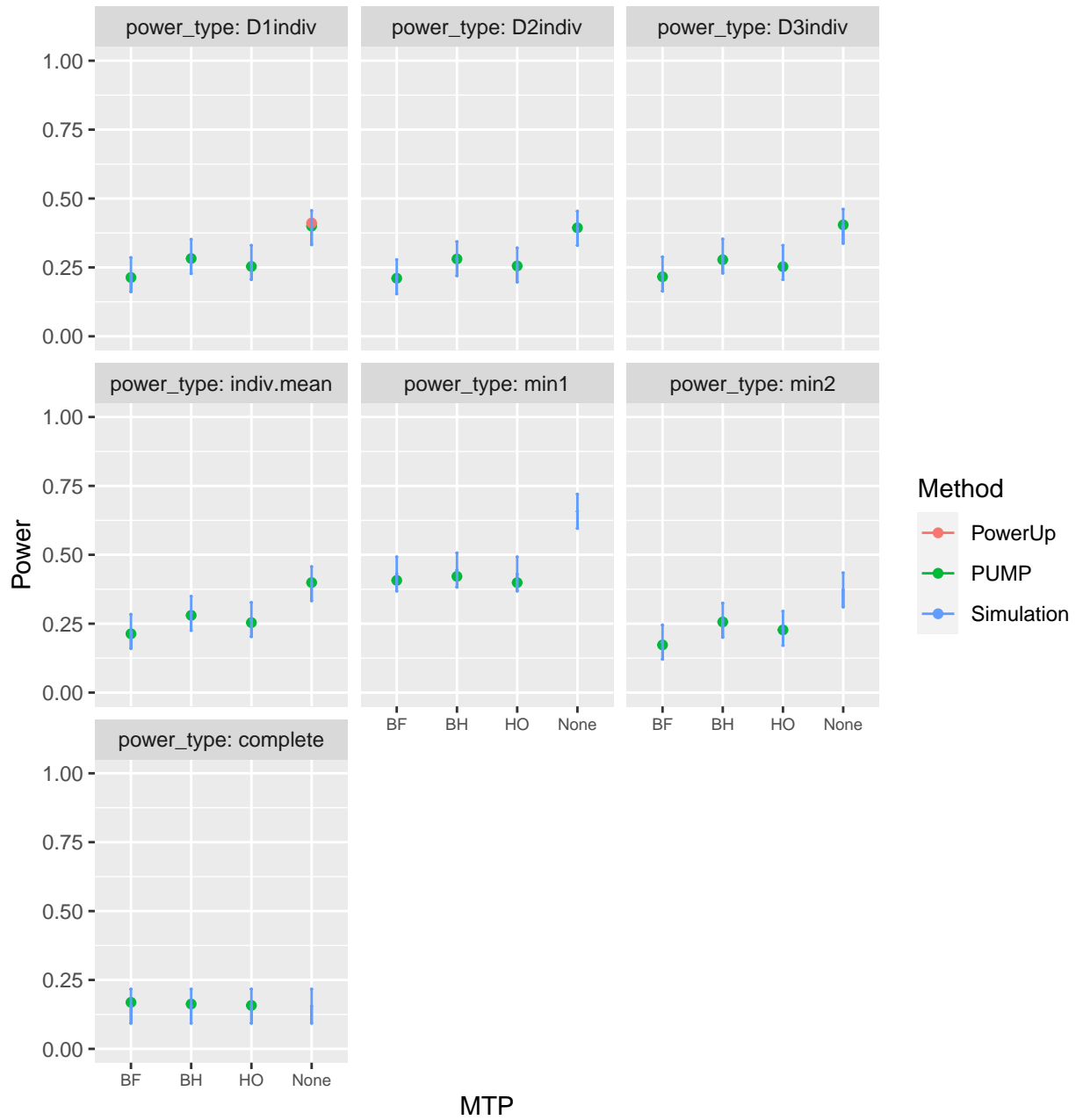
d\_m: d3.3\_m3rc2rc



## Varying school size

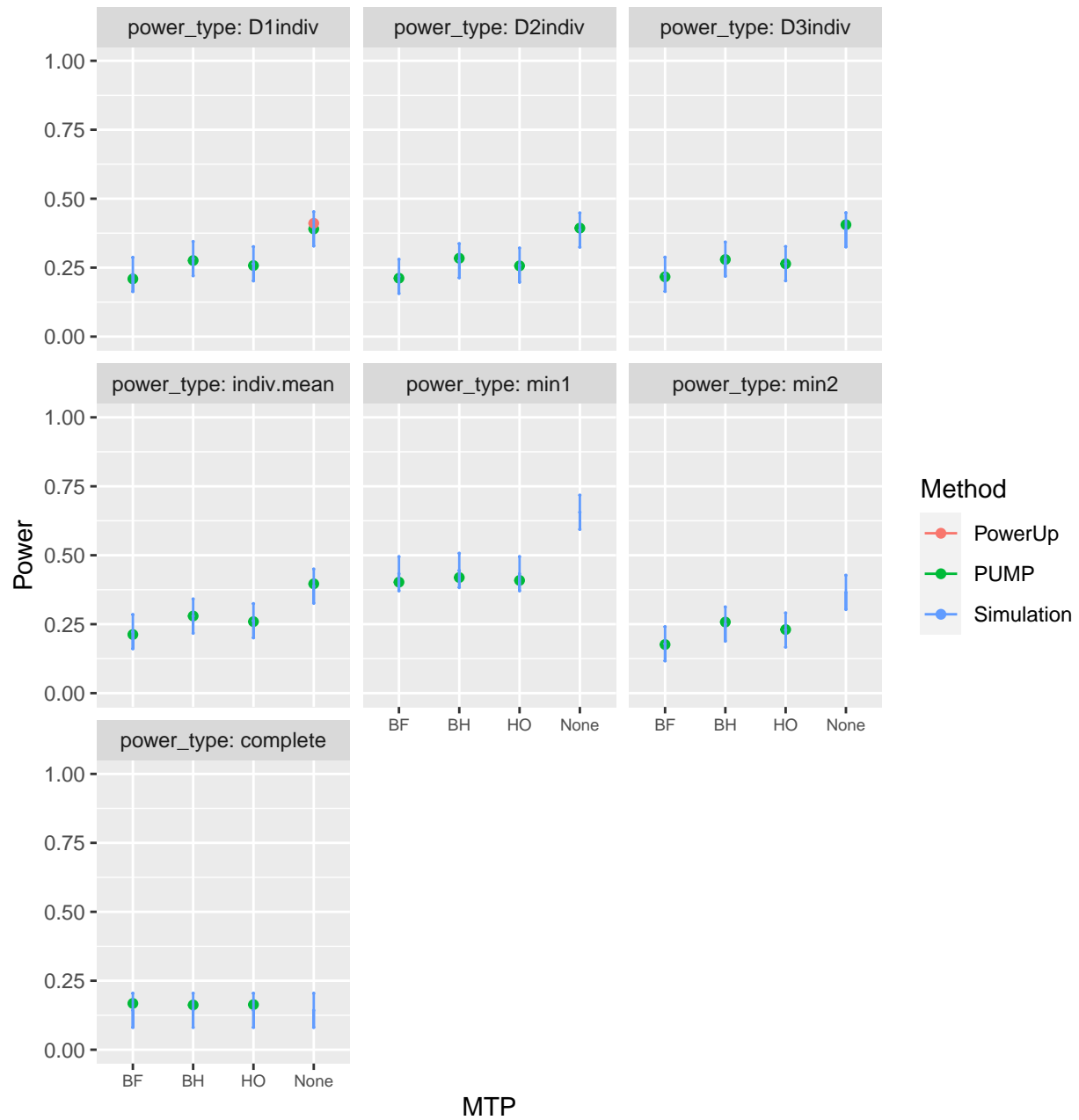
$\bar{n} = 100$

d\_m: d3.3\_m3rc2rc



$\bar{n} = 75$

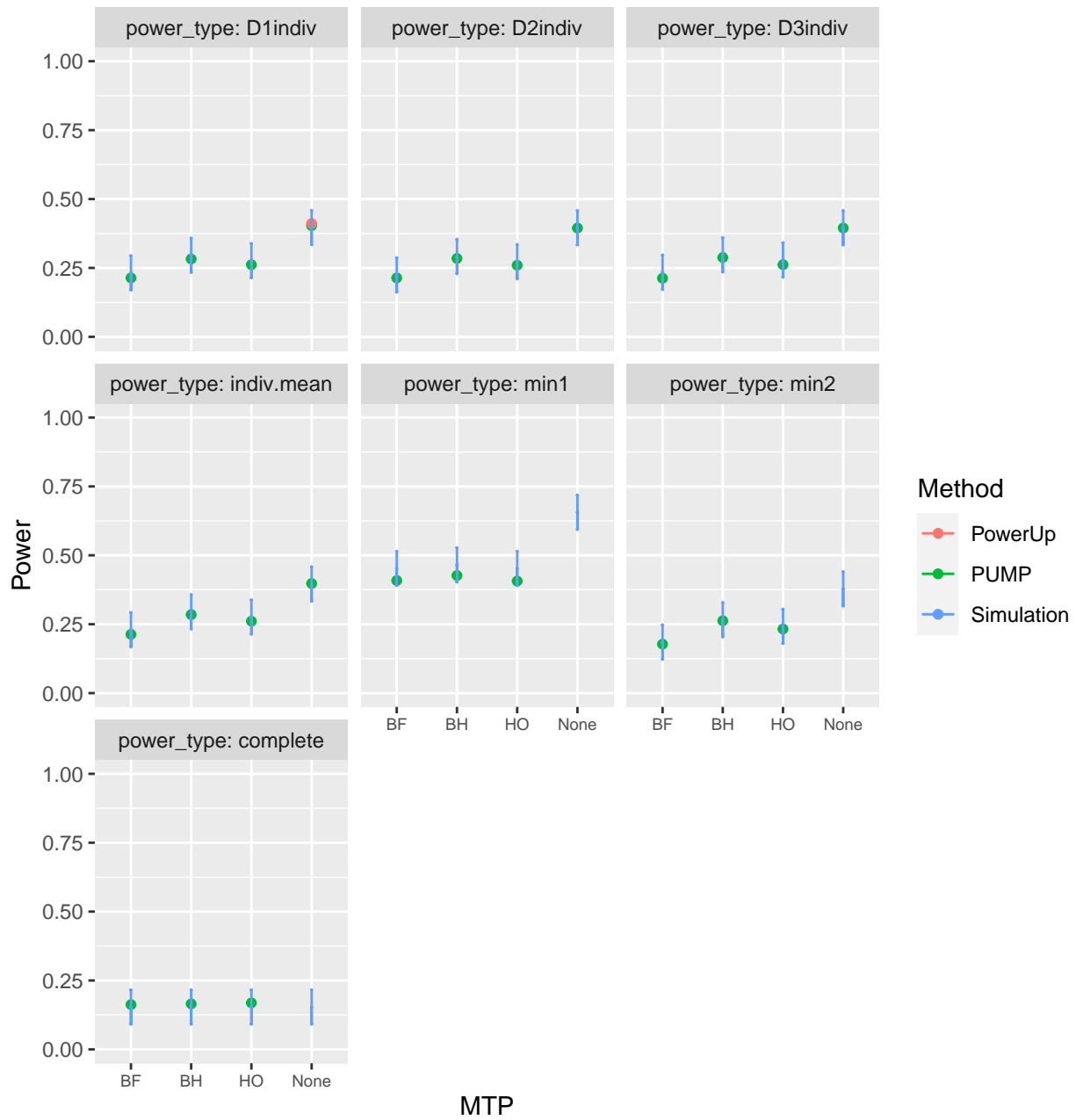
d\_m: d3.3\_m3rc2rc



## Varying R2

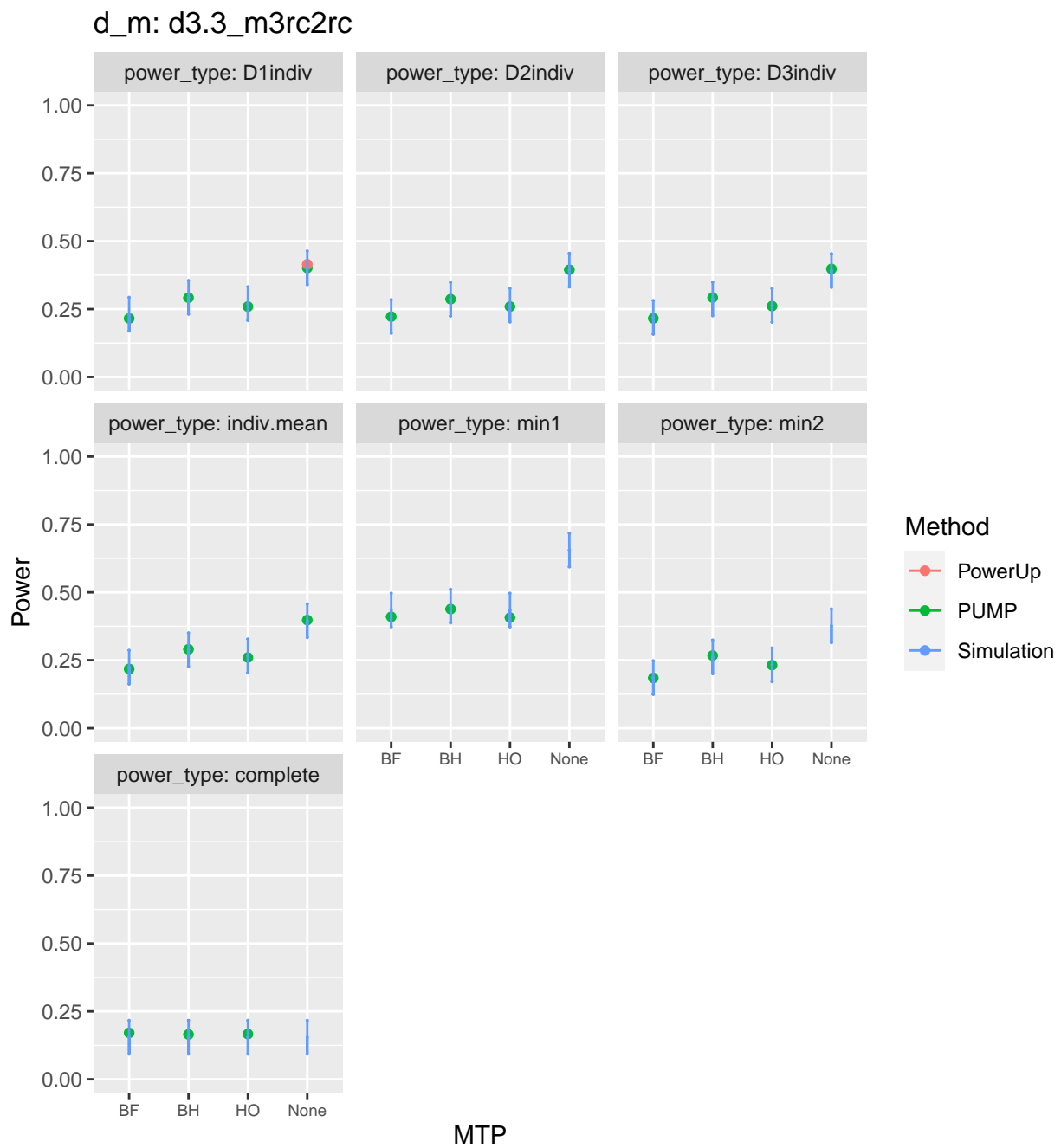
$$R_1^2 = 0.6, 0.6, 0.6$$

d\_m: d3.3\_m3rc2rc



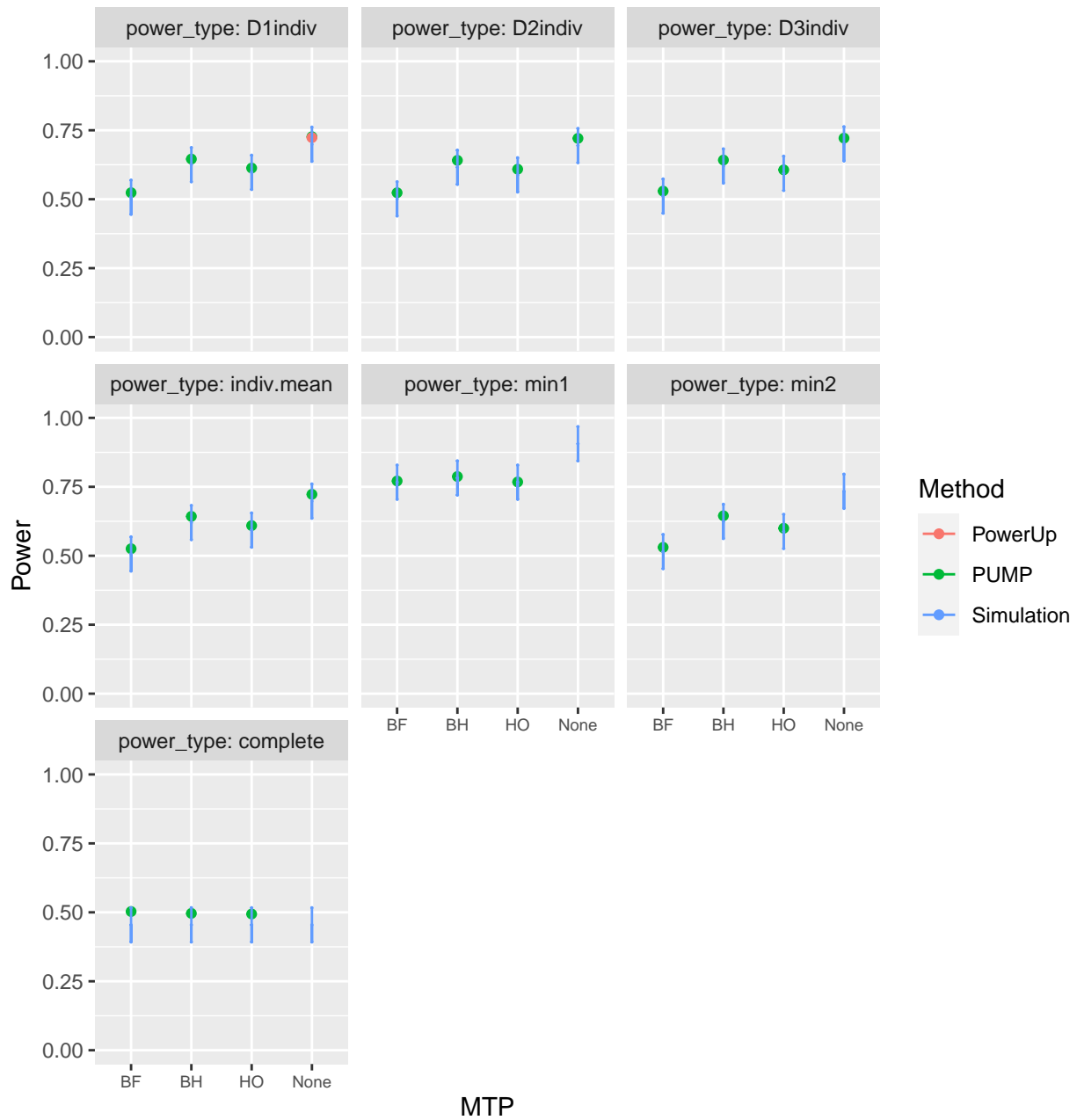
MTP

$$R_2^2 = 0.6, 0.6, 0.6$$



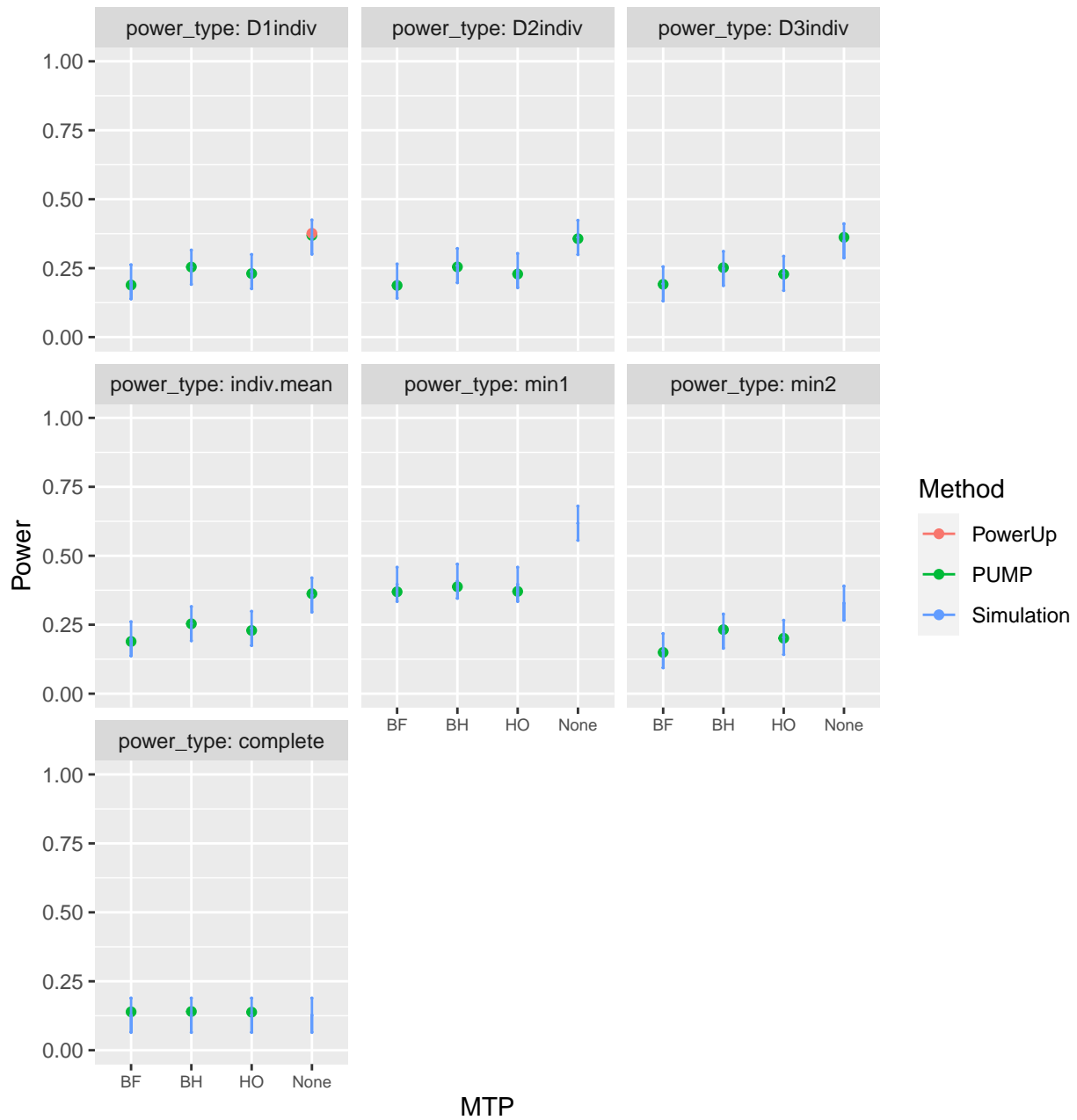
$$R_3^2 = 0.6, 0.6, 0.6$$

d\_m: d3.3\_m3rc2rc



$$R_1^2 = 0, 0, 0 \quad R_2^2 = 0, 0, 0 \quad R_3^2 = 0, 0, 0$$

d\_m: d3.3\_m3rc2rc

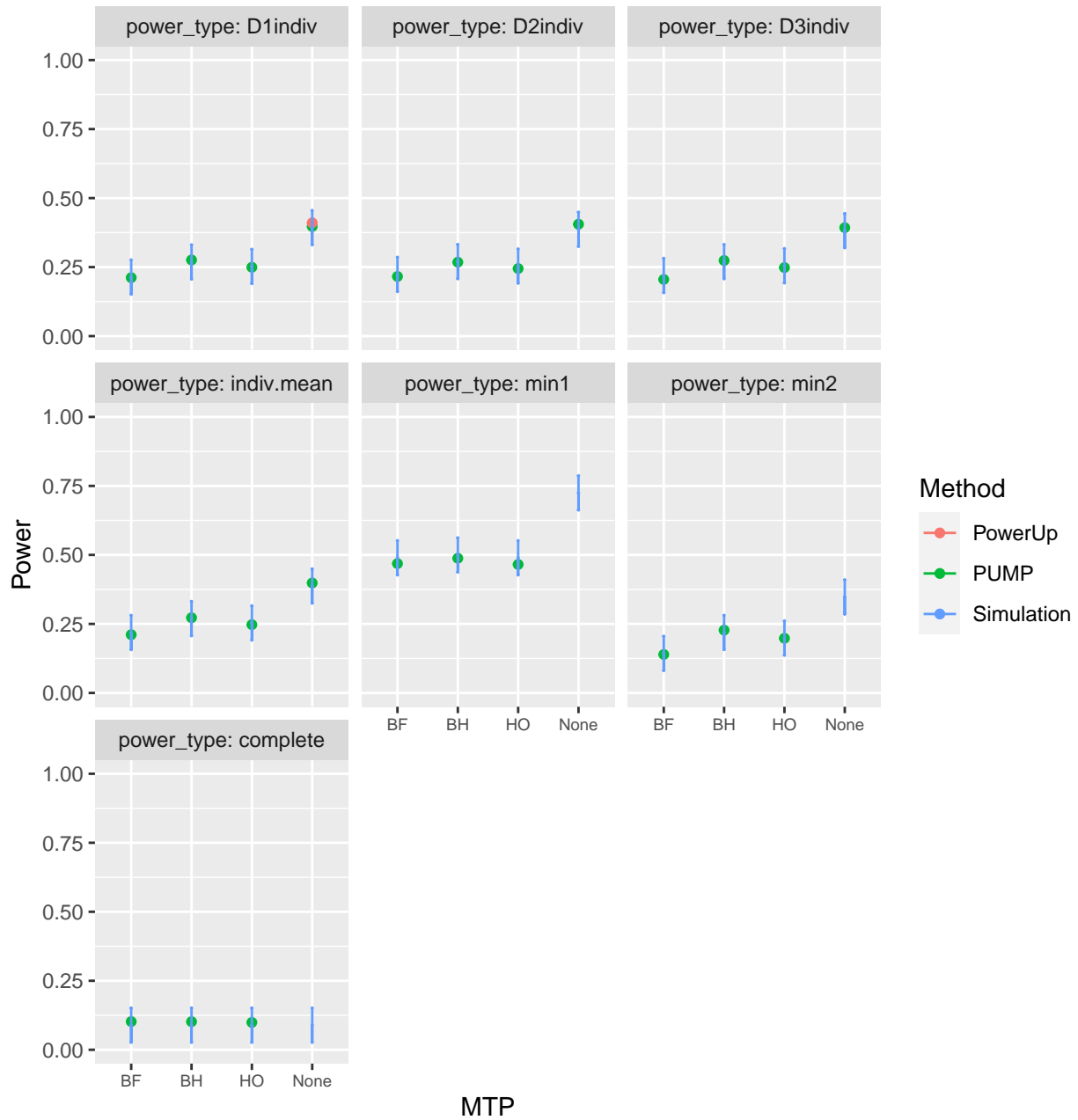




## Varying rho

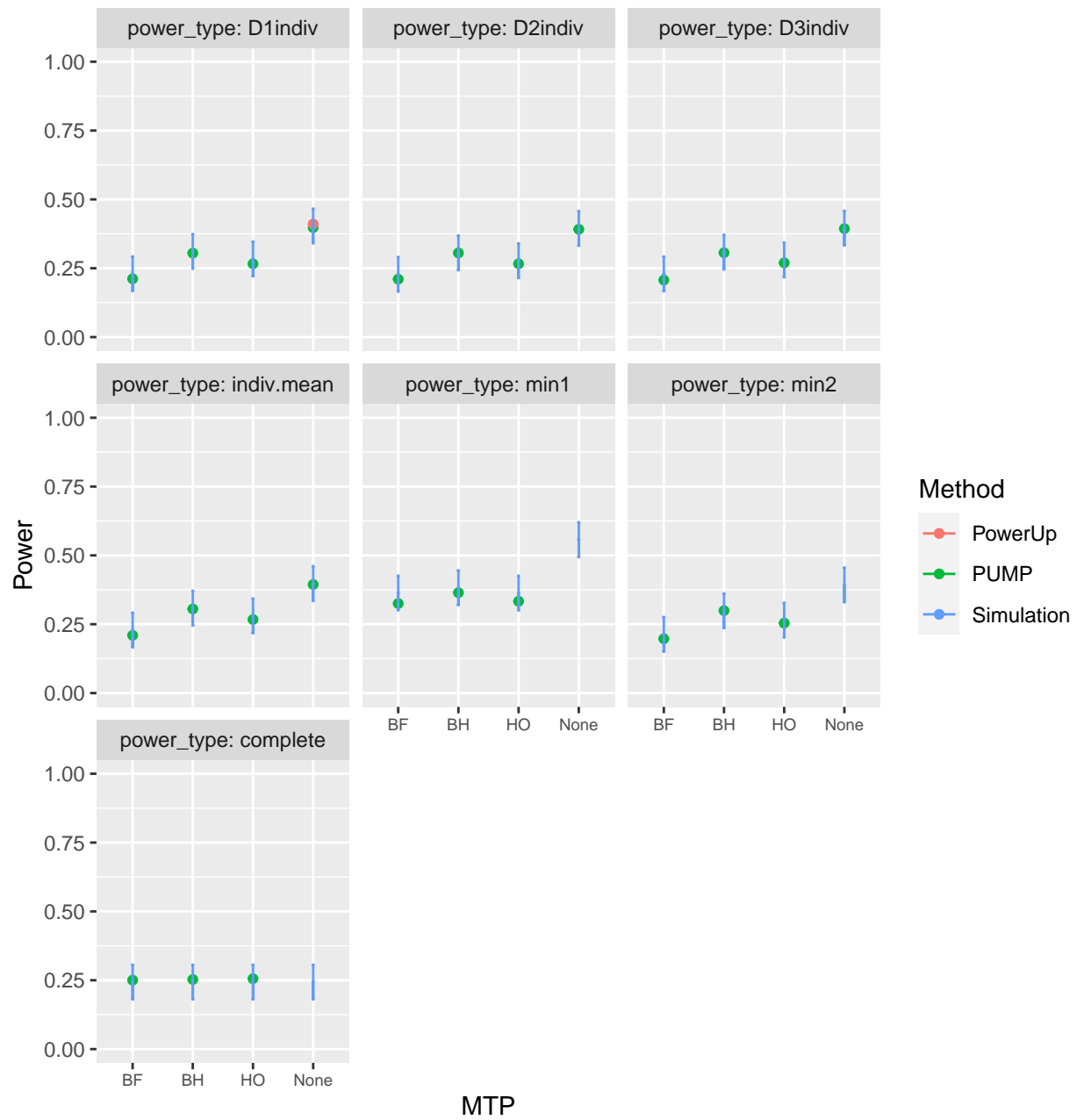
$\rho = 0.2$

d\_m: d3.3\_m3rc2rc



$\rho = 0.8$

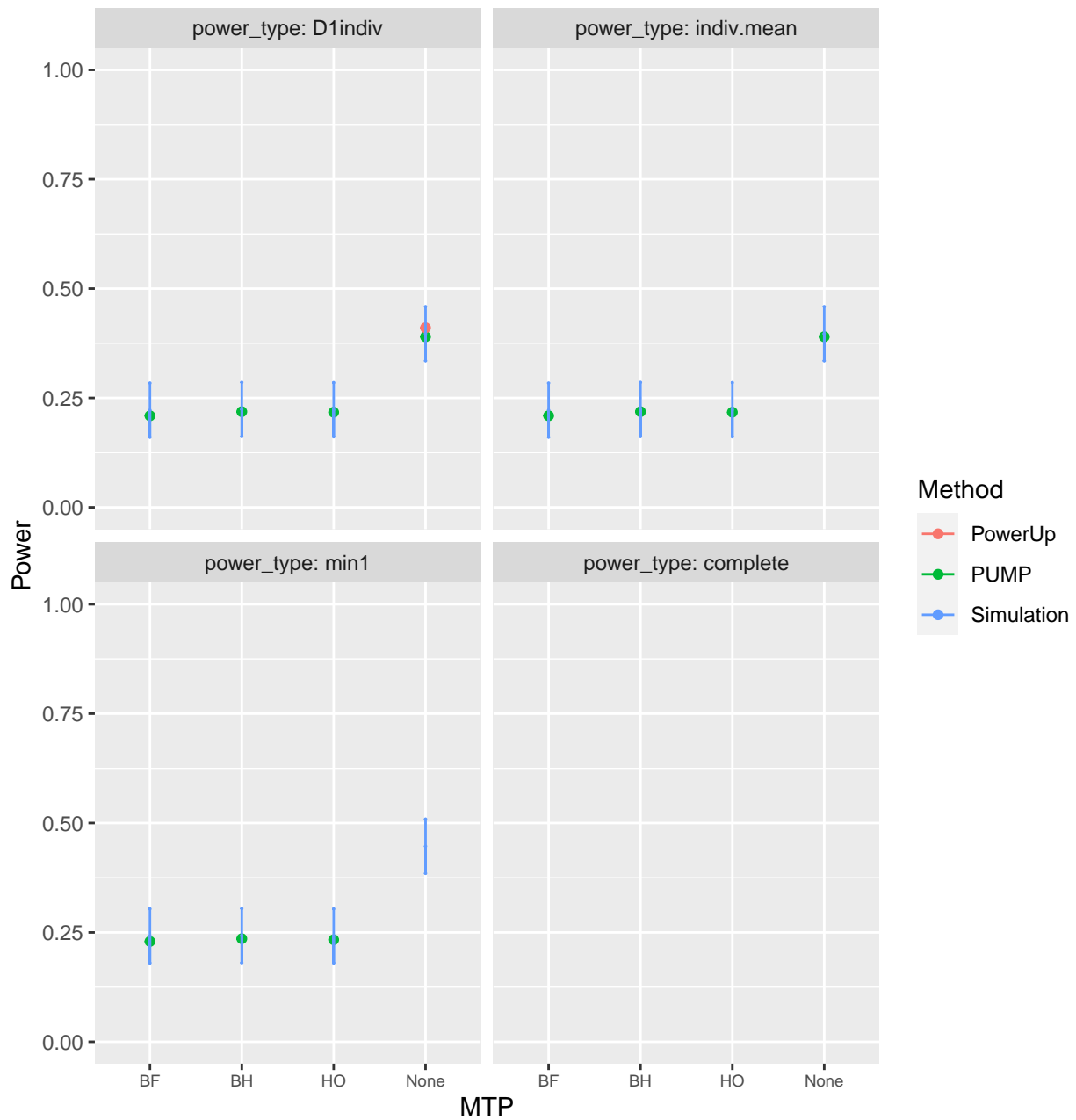
d\_m: d3.3\_m3rc2rc



## Varying true positives

MDES = 0.25, 0, 0

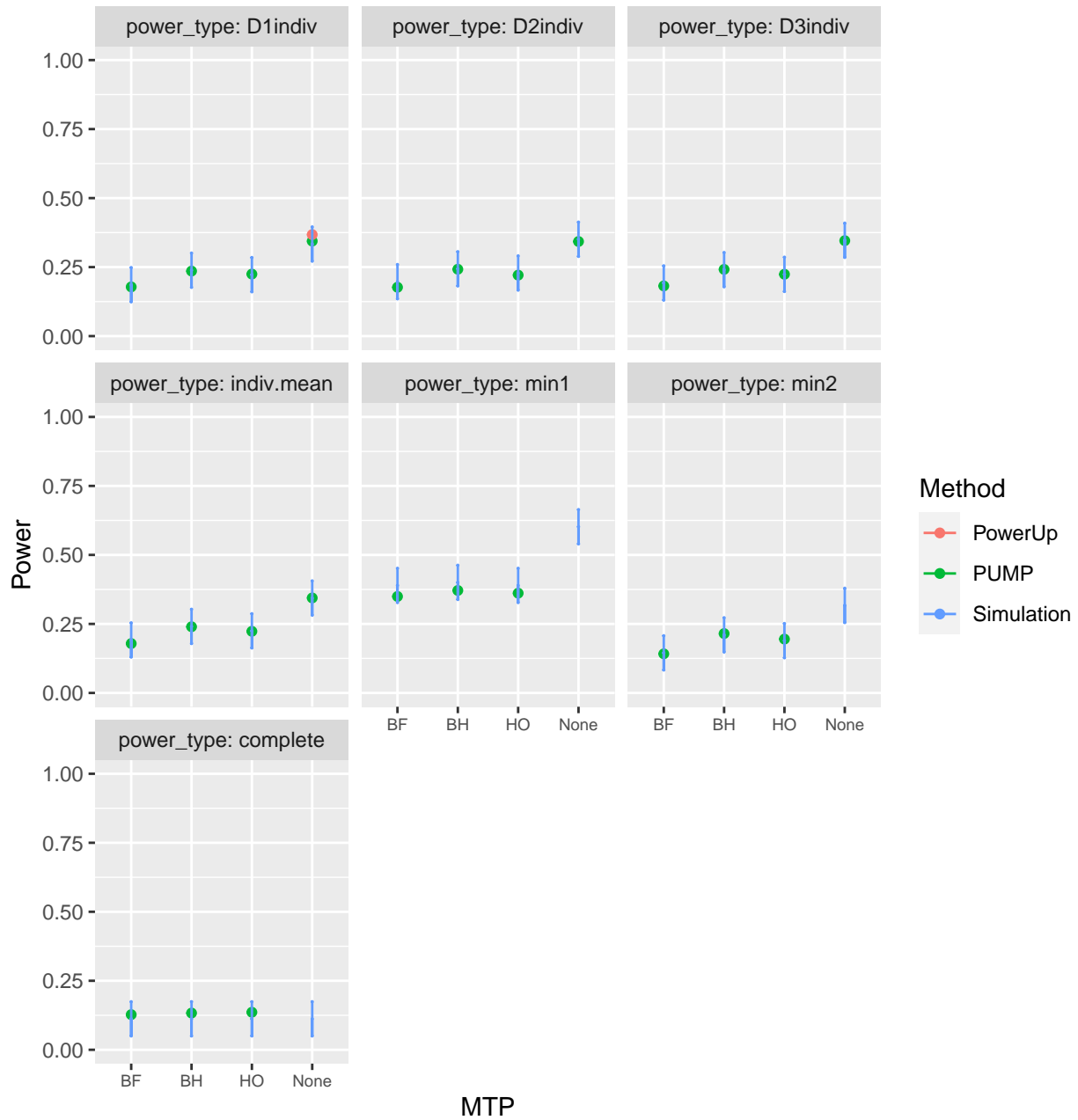
d\_m: d3.3\_m3rc2rc



## Varying ICC

$ICC_2 = 0.7, 0.7, 0.7$

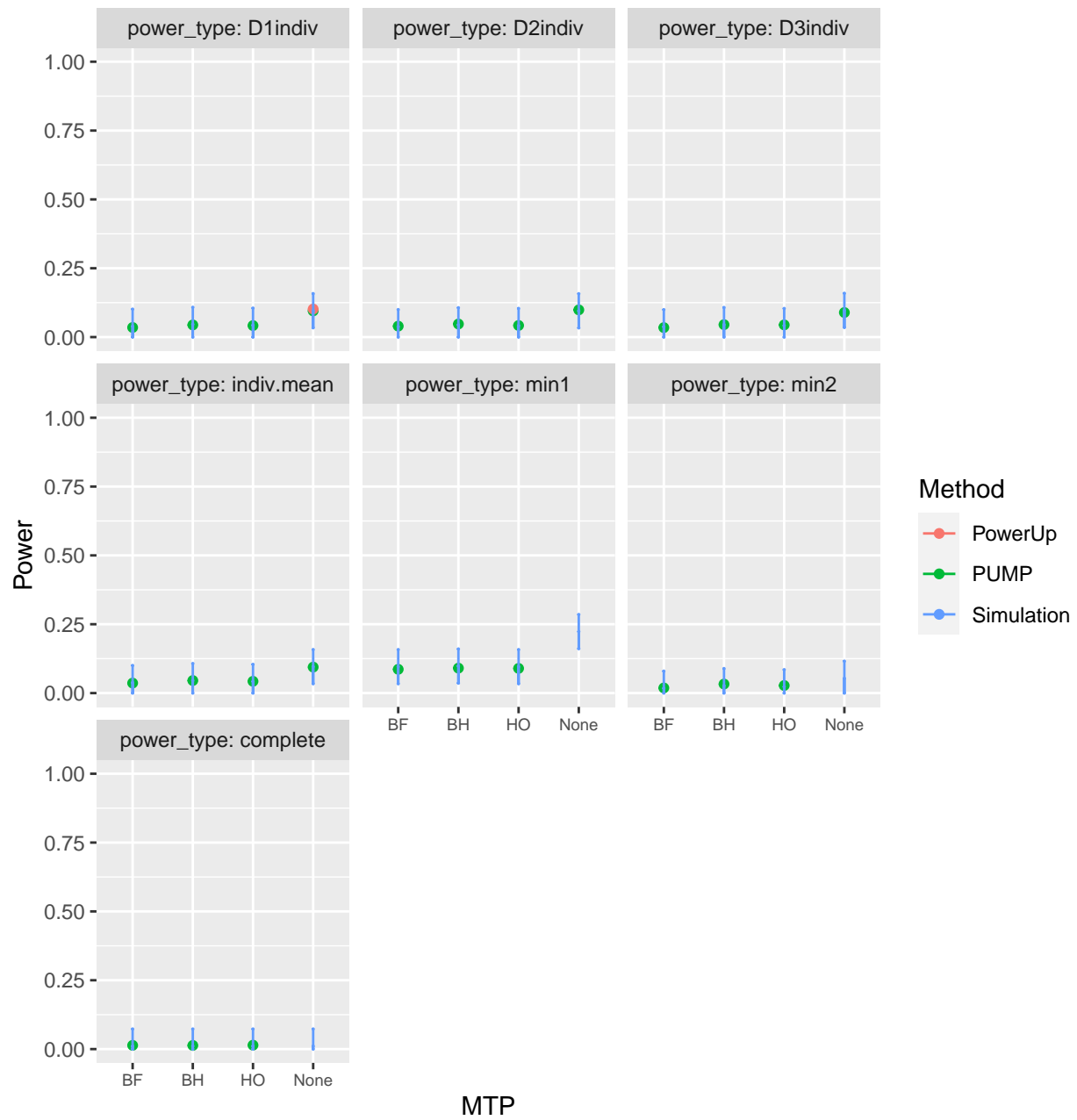
d\_m: d3.3\_m3rc2rc



MTP

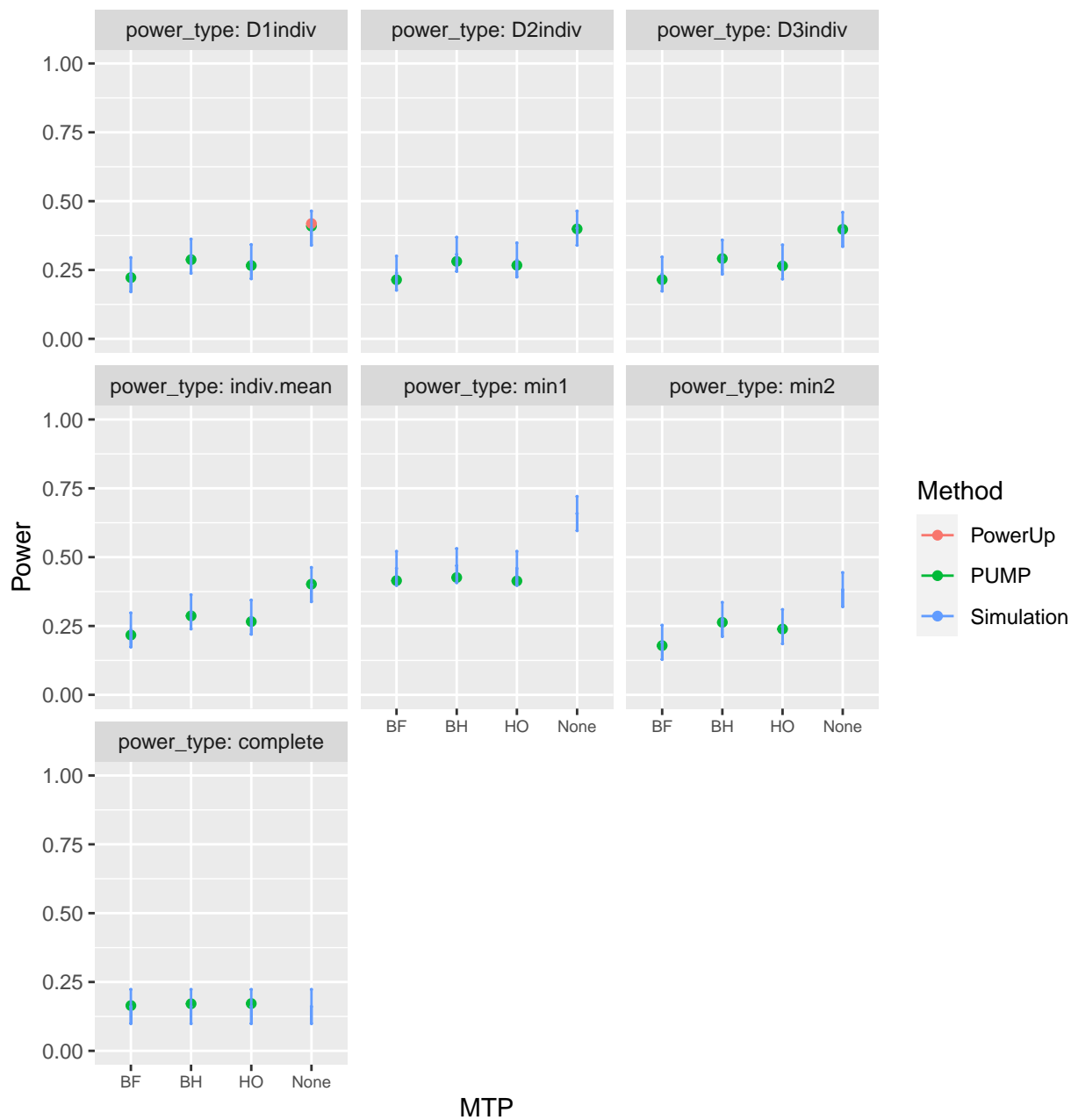
$ICC_3 = 0.7, 0.7, 0.7$

d\_m: d3.3\_m3rc2rc



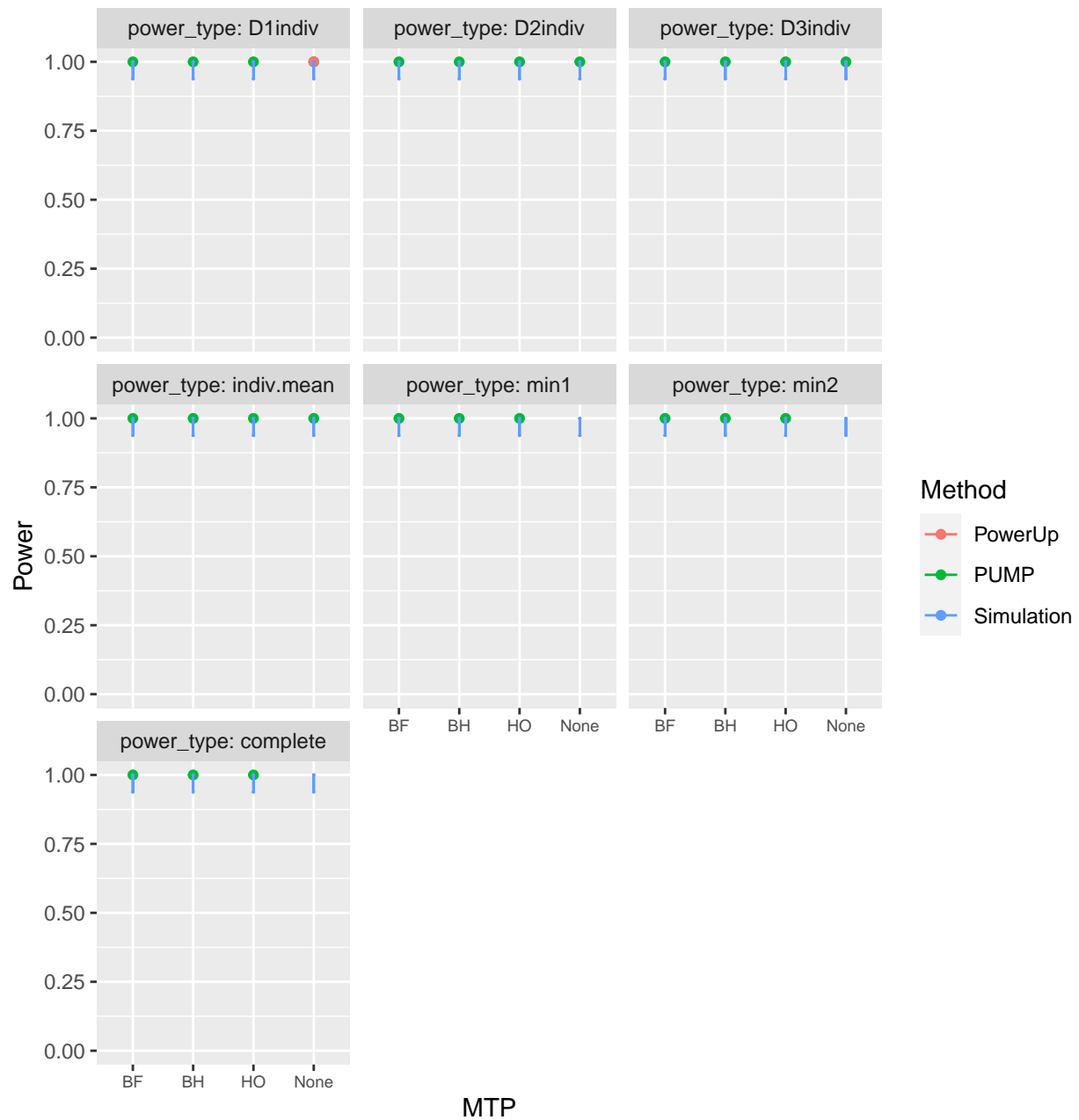
$ICC_2 = 0, 0, 0$

d\_m: d3.3\_m3rc2rc



ICC<sub>3</sub> = 0, 0, 0

d\_m: d3.3\_m3rc2rc



## MDES validation

Target value: 0.25

```
##
##
## +-----+-----+-----+-----+
## | MTP | Adjusted MDES | D1indiv Power | Target MDES |
## +=====+=====+=====+=====+
## | BF  |      0.249      |      0.211      |      0.25      |
## +-----+-----+-----+-----+
## | BH  |      0.251      |      0.284      |      0.25      |
## +-----+-----+-----+-----+
## | HO  |      0.247      |      0.25       |      0.25      |
## +-----+-----+-----+-----+
##
## Table: d3.3_m3rc2rc
```

## Sample size validation

Target value: 20

```
##
##
## +-----+-----+-----+-----+
## | MTP | Sample.type | Sample.size | D1indiv.power |
## +=====+=====+=====+=====+
## | BF  |      K      |      20      |      0.211      |
## +-----+-----+-----+-----+
## | BH  |      K      |      20      |      0.278      |
## +-----+-----+-----+-----+
## | HO  |      K      |      21      |      0.26       |
## +-----+-----+-----+-----+
##
## Table: d3.3_m3rc2rc
```

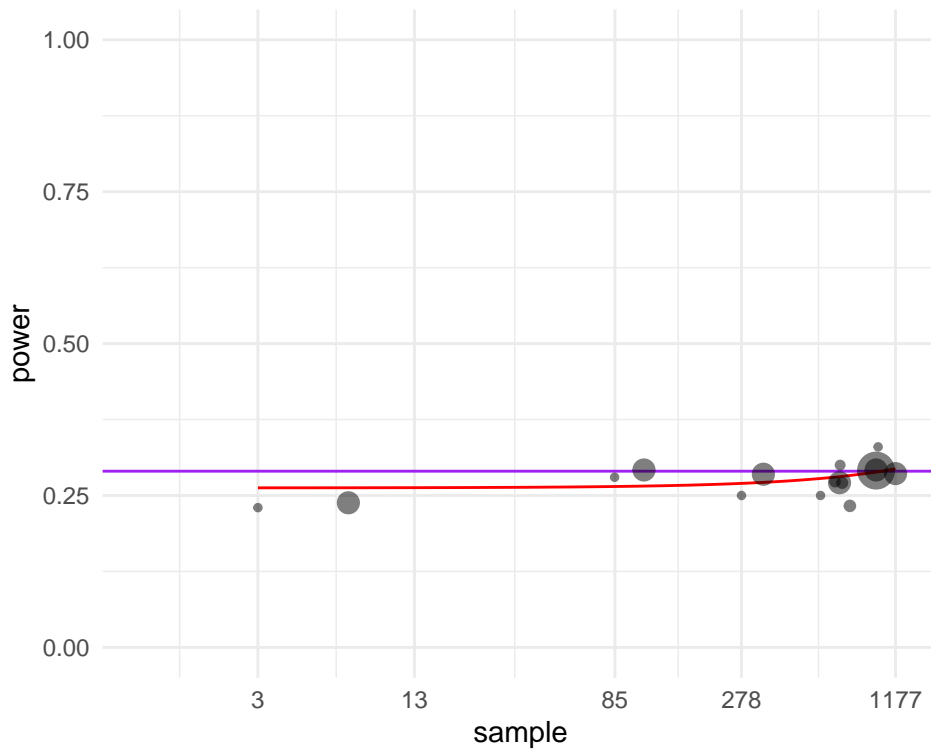
Target value: 40

```
##
##
## +-----+-----+-----+-----+
## | MTP | Sample.type | Sample.size | D1indiv.power |
## +=====+=====+=====+=====+
## | BF  |      J      |      34      |      0.211      |
## +-----+-----+-----+-----+
## | BH  |      J      |     998      |      0.29       |
## +-----+-----+-----+-----+
## | HO  |      J      |      36      |      0.255      |
## +-----+-----+-----+-----+
##
## Table: d3.3_m3rc2rc
```

The target power cannot be achieved with the conservative Bonferroni correction. For other corrections, the power curve is very flat.



For MTP = "BH":

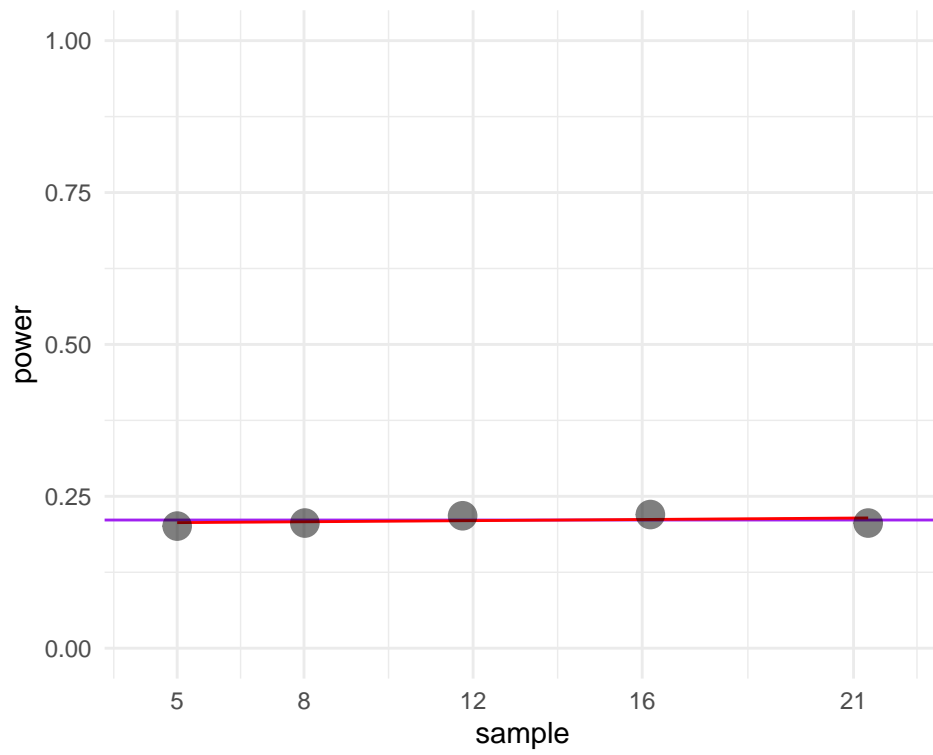


Target value: 50

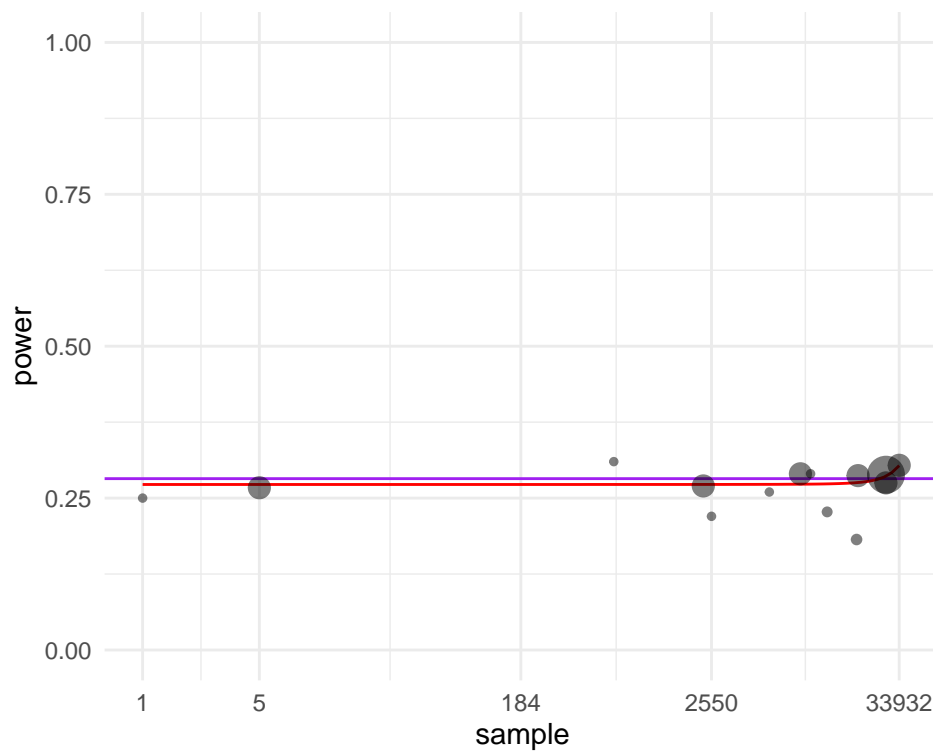
```
##
##
## +-----+-----+-----+-----+
## | MTP | Sample.type | Sample.size | D1indiv.power |
## +=====+=====+=====+=====+
## | BF  | nbar        | 21.35      | 0.211         |
## +-----+-----+-----+-----+
## | BH  | nbar        | 408        | 0.282         |
## +-----+-----+-----+-----+
## | HO  | nbar        | NA         | NA            |
## +-----+-----+-----+-----+
##
## Table: d3.3_m3rc2rc
```

Sometimes, the power cannot be achieved even with a very large sample size.

For MTP = "BF":



For MTP = "BH":



For MTP = "H0":

