

Validate Power: d2.1

December 26, 2021

d_m: Blocked RCT, with 2 levels, and randomization done at level 1 (individual level).

Models: Constant treatment effects, fixed treatment effects, and random treatment effects.

Note: we expect a discrepancy when ICC is not zero between powerup and pump.

Default parameters:

- $M = 3$
- $J = 20$
- $\rho = 0.5$
- $MDES = 0.125, 0.125, 0.125$
- $R_1^2 = 0.1, 0.1, 0.1$
- $ICC_2 = 0.2, 0.2, 0.2$

Parameters by model type:

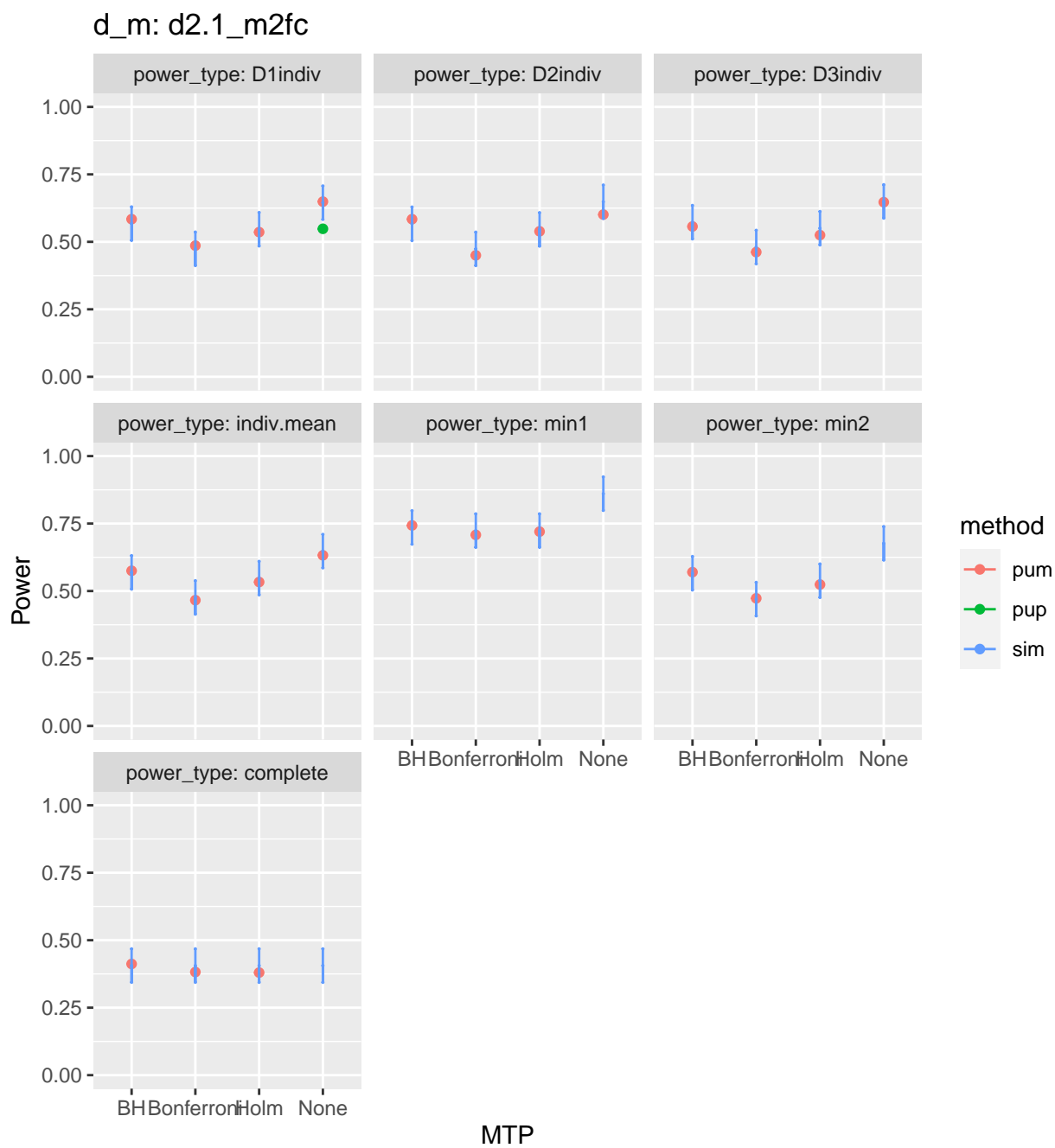
- Omega: $\omega_2 = 0$ for constant effects, $\omega_2 = 0.1, 0.1, 0.1$ for fixed and random

Assumptions:

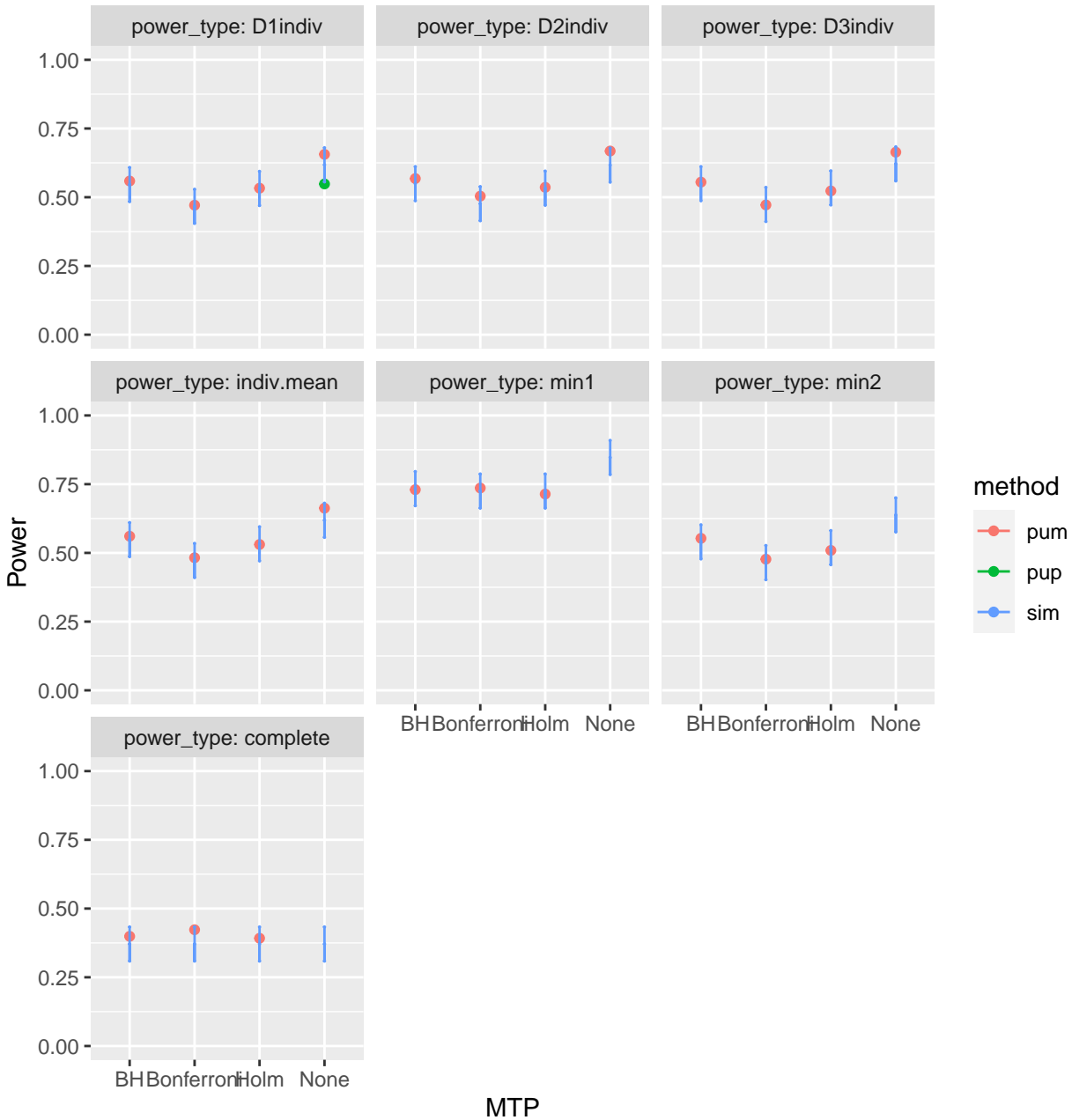
- Two-level design: $ICC_3 = 0, \omega_3 = 0, K = 1$

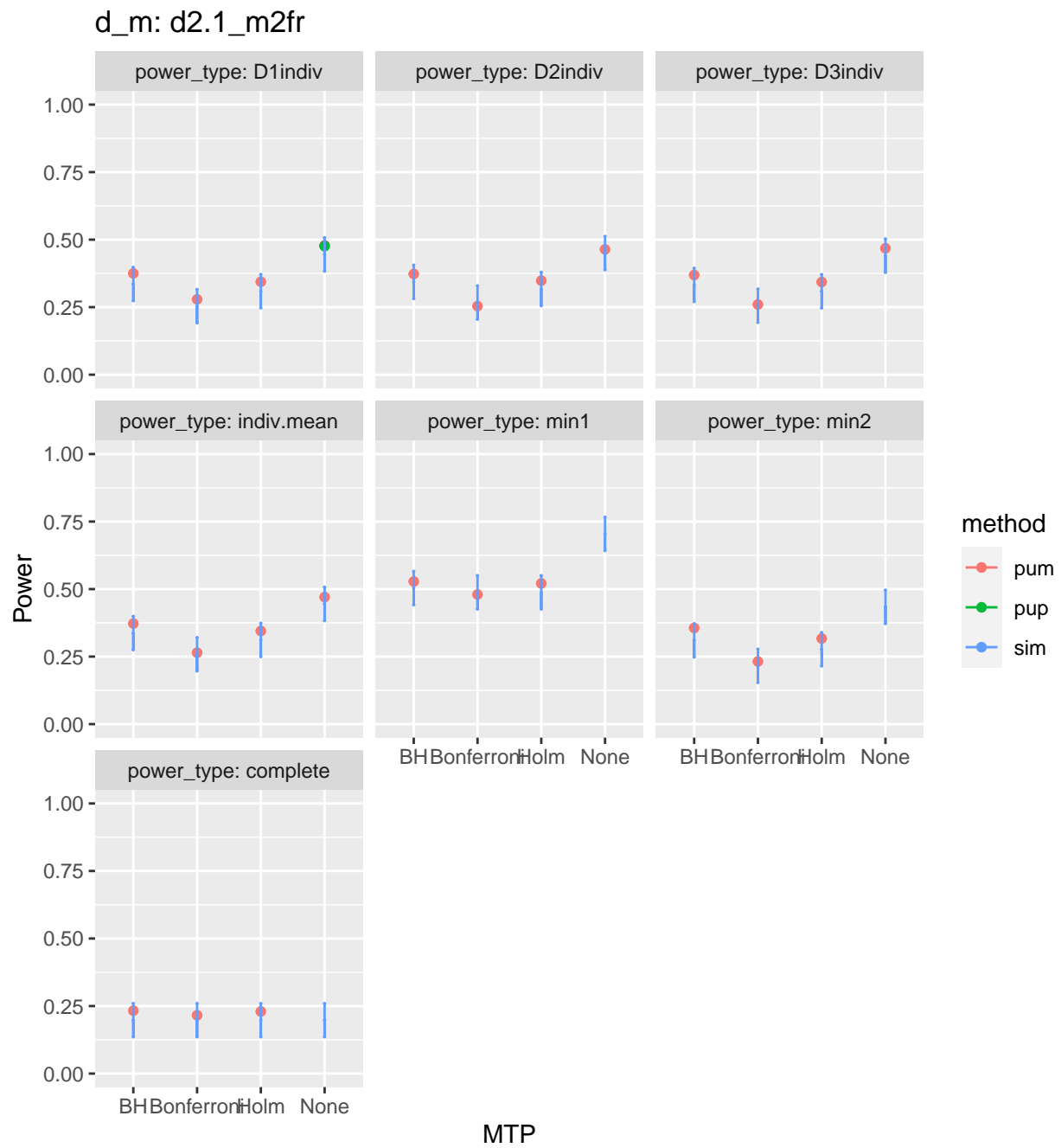
Power Validation

Base case



d m: d2.1 m2ff

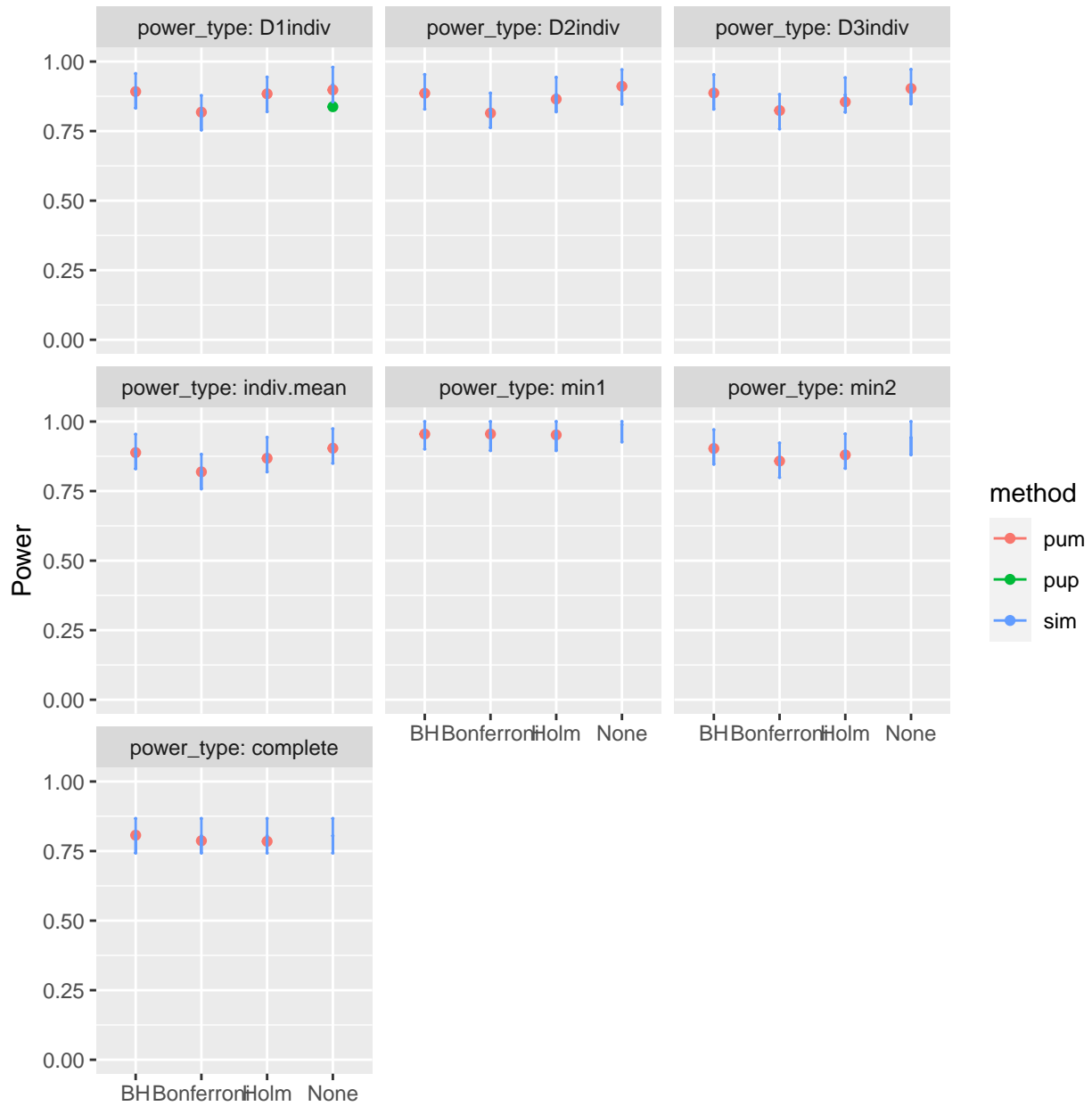




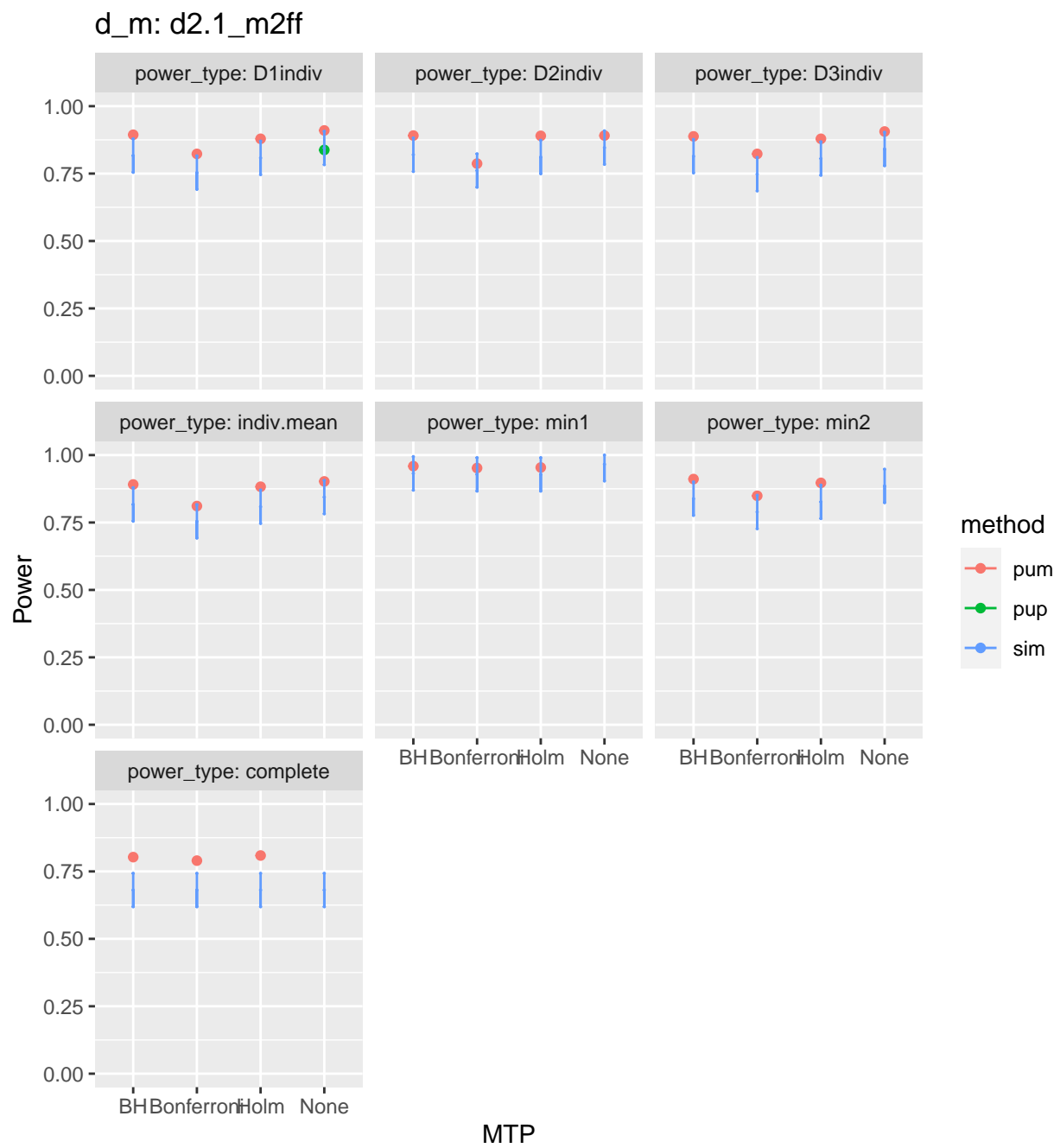
Varying school size

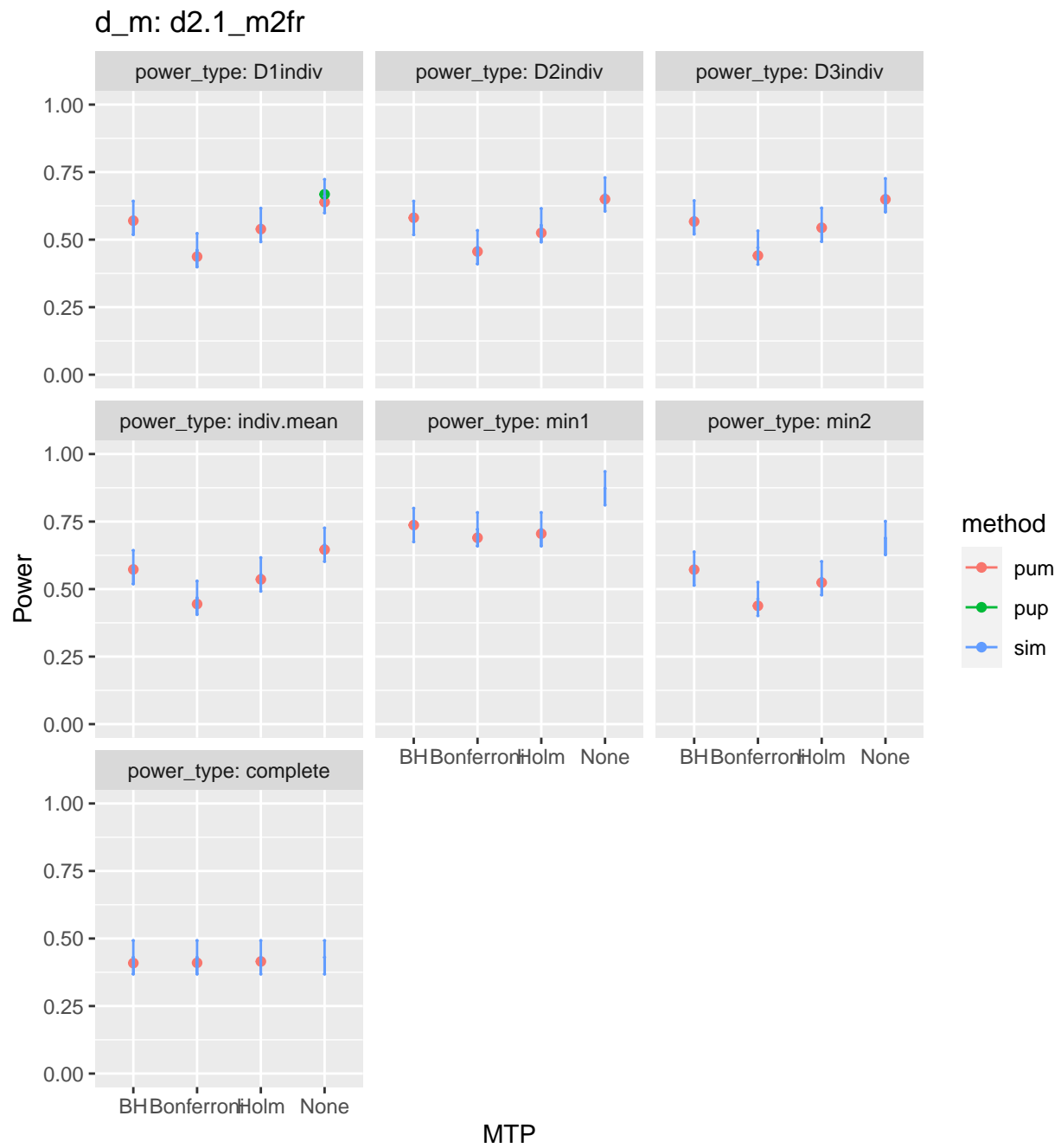
$\bar{n} = 100$

d_m: d2.1_m2fc

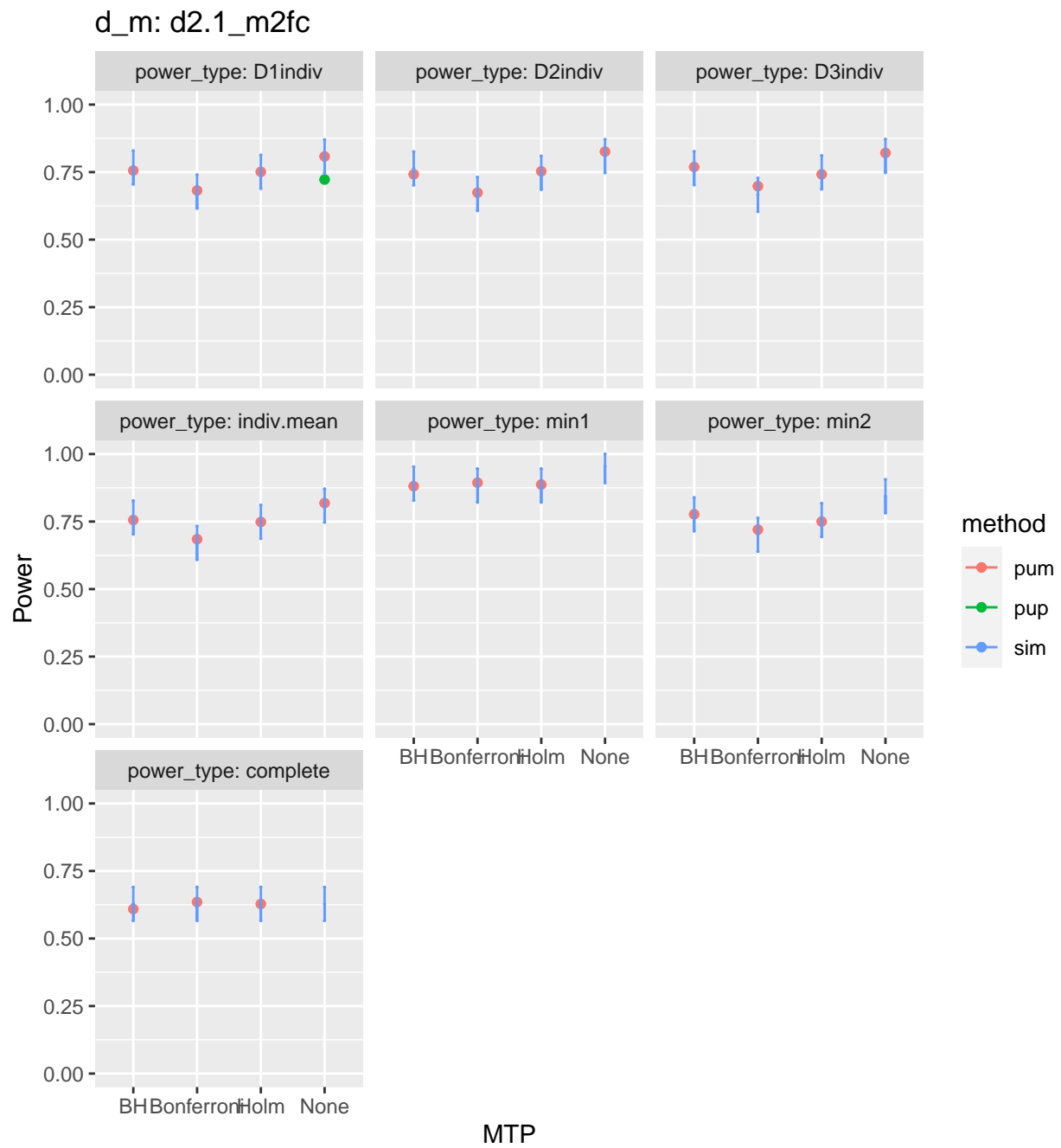


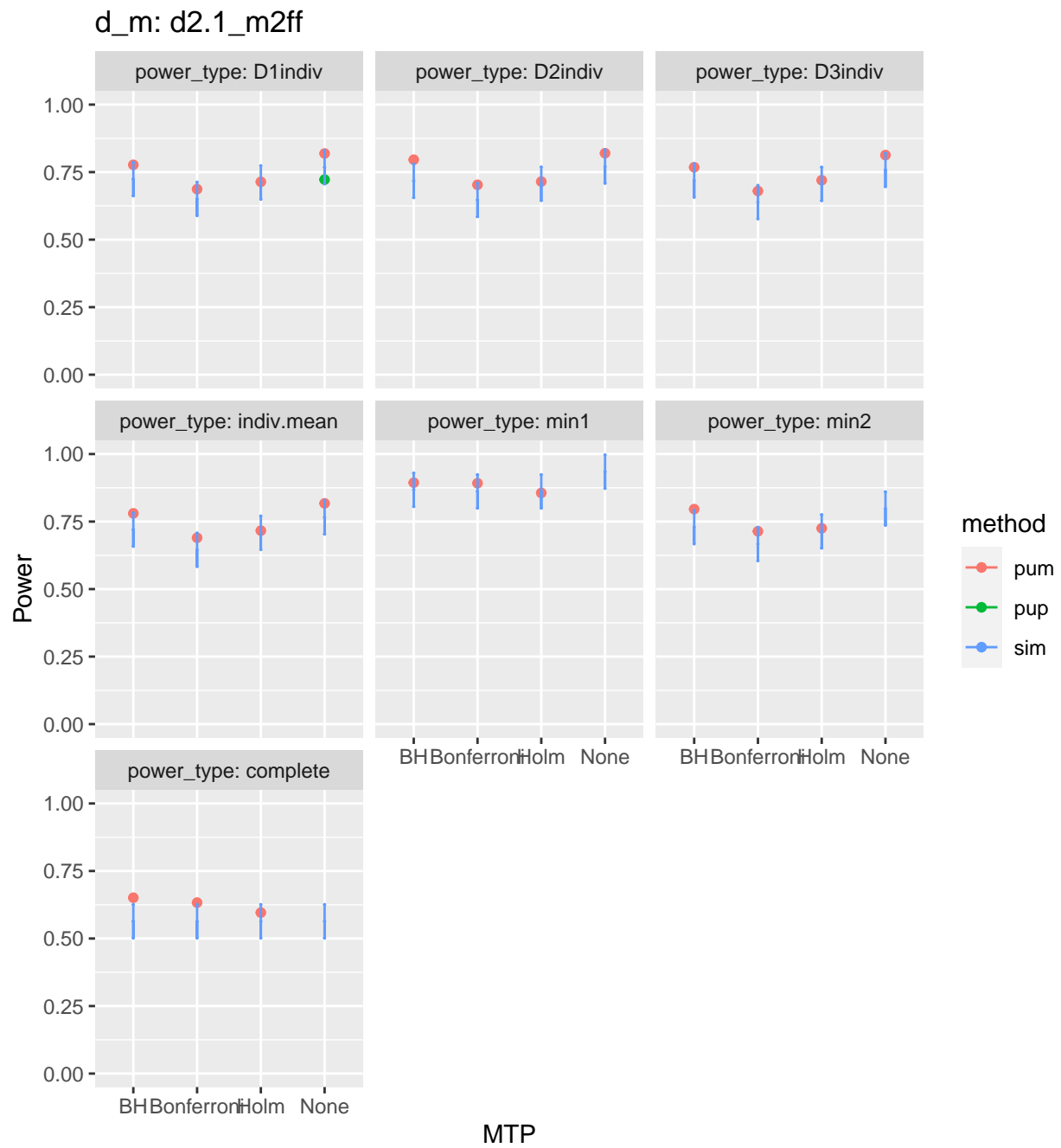
MTP

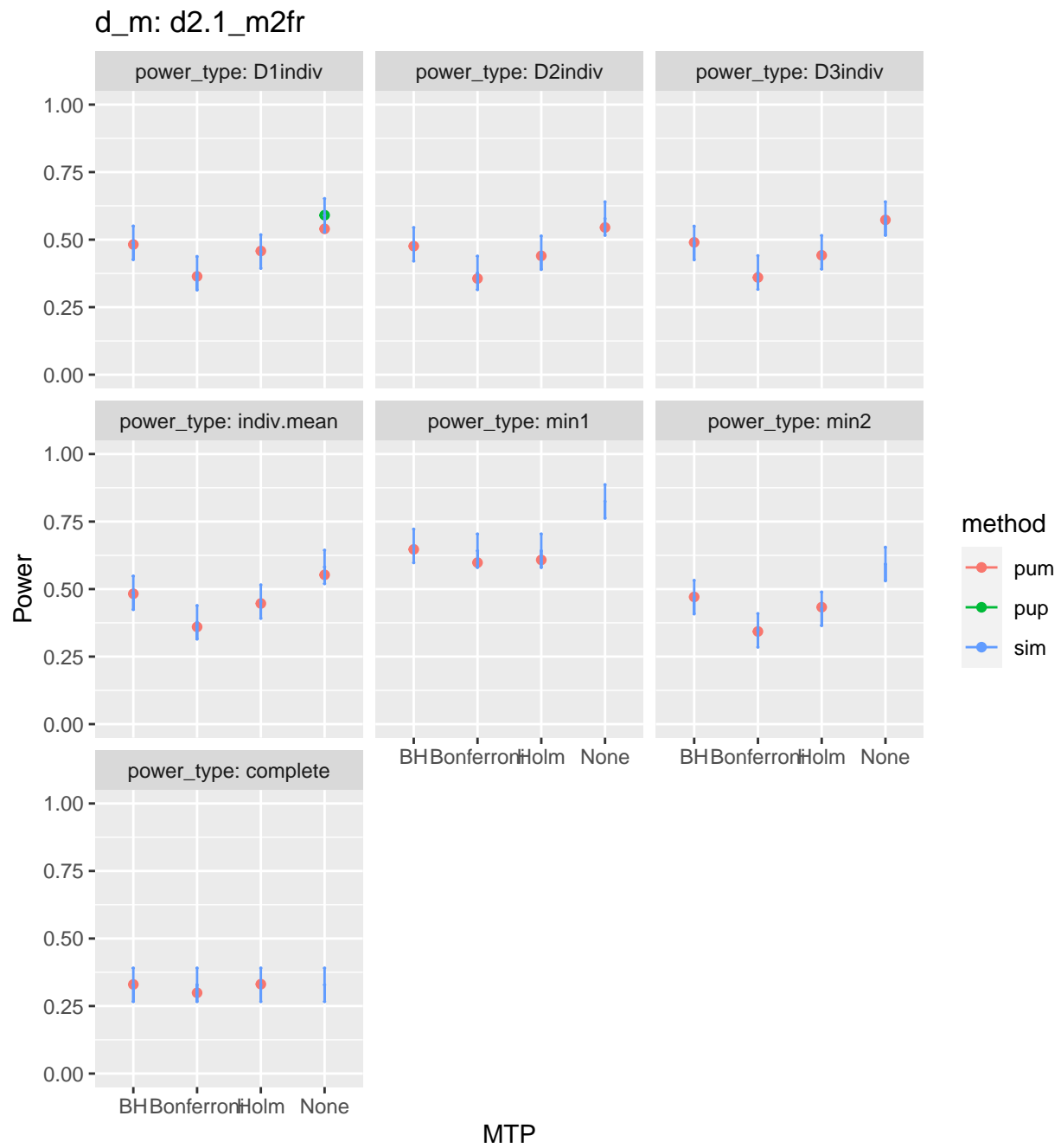




$\bar{n} = 75$



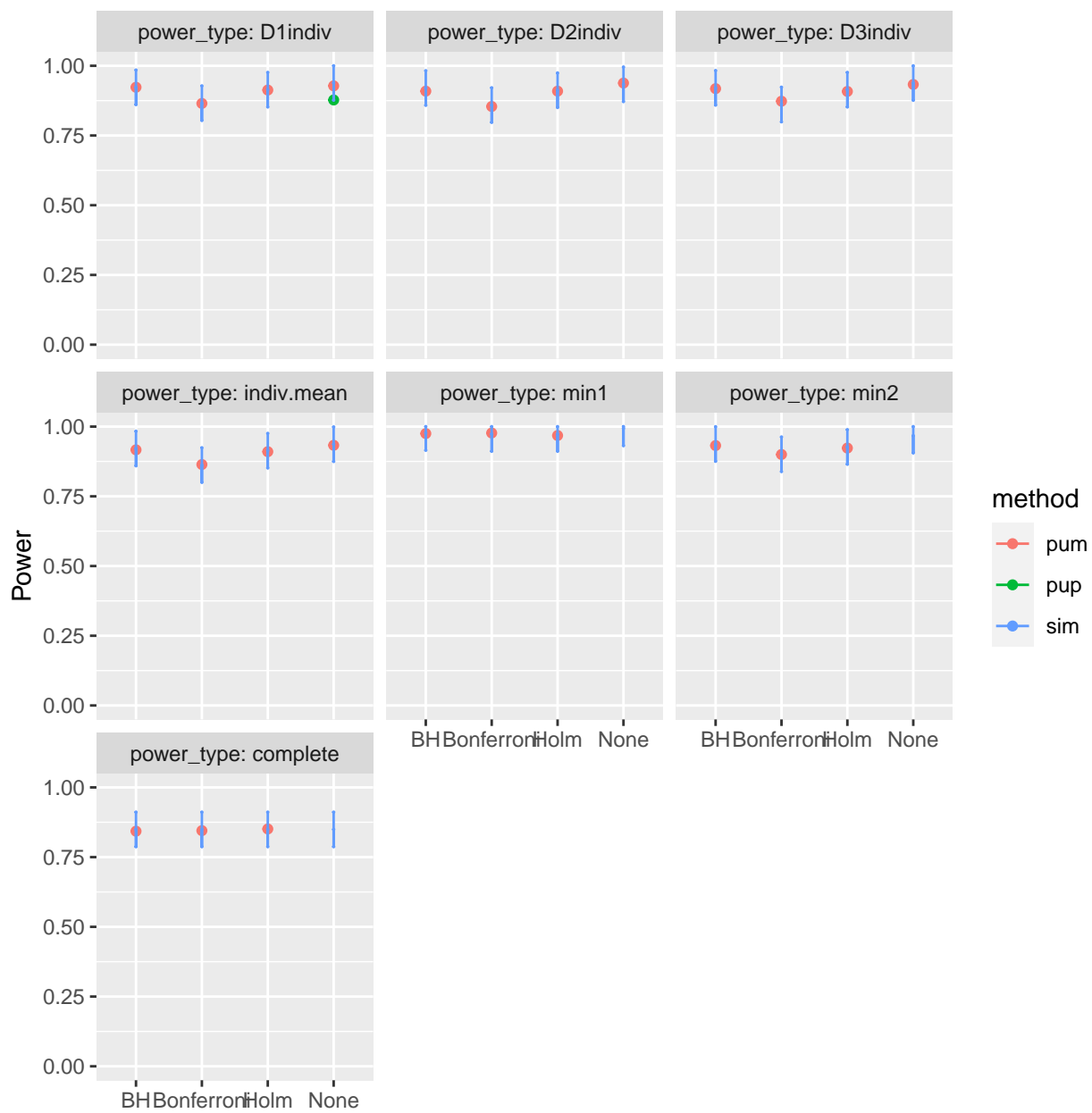




Varying R2

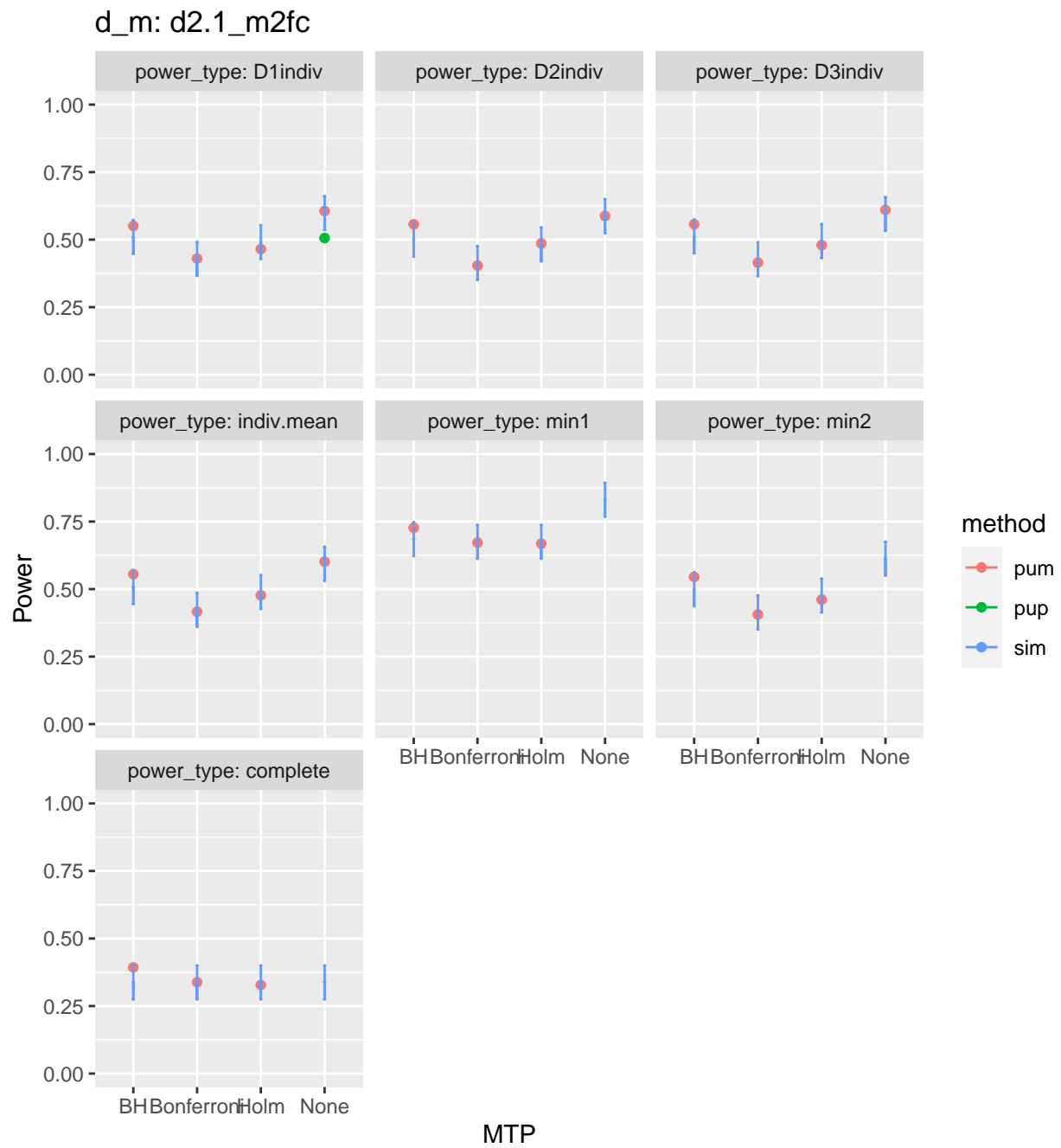
$$R_1^2 = 0.6, 0.6, 0.6$$

d_m: d2.1_m2fc



MTP

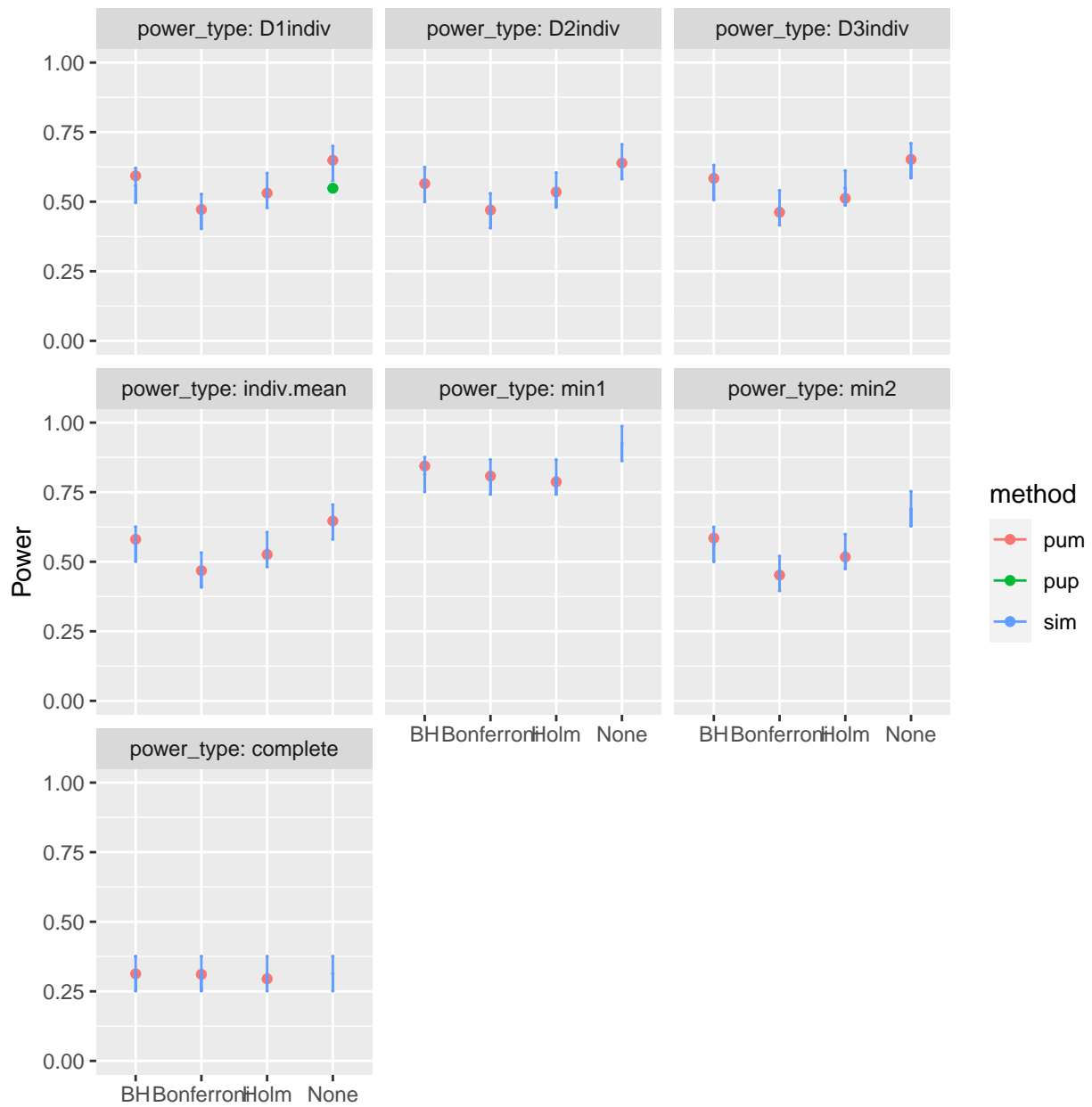
$$R_1^2 = 0, 0, 0$$



Varying rho

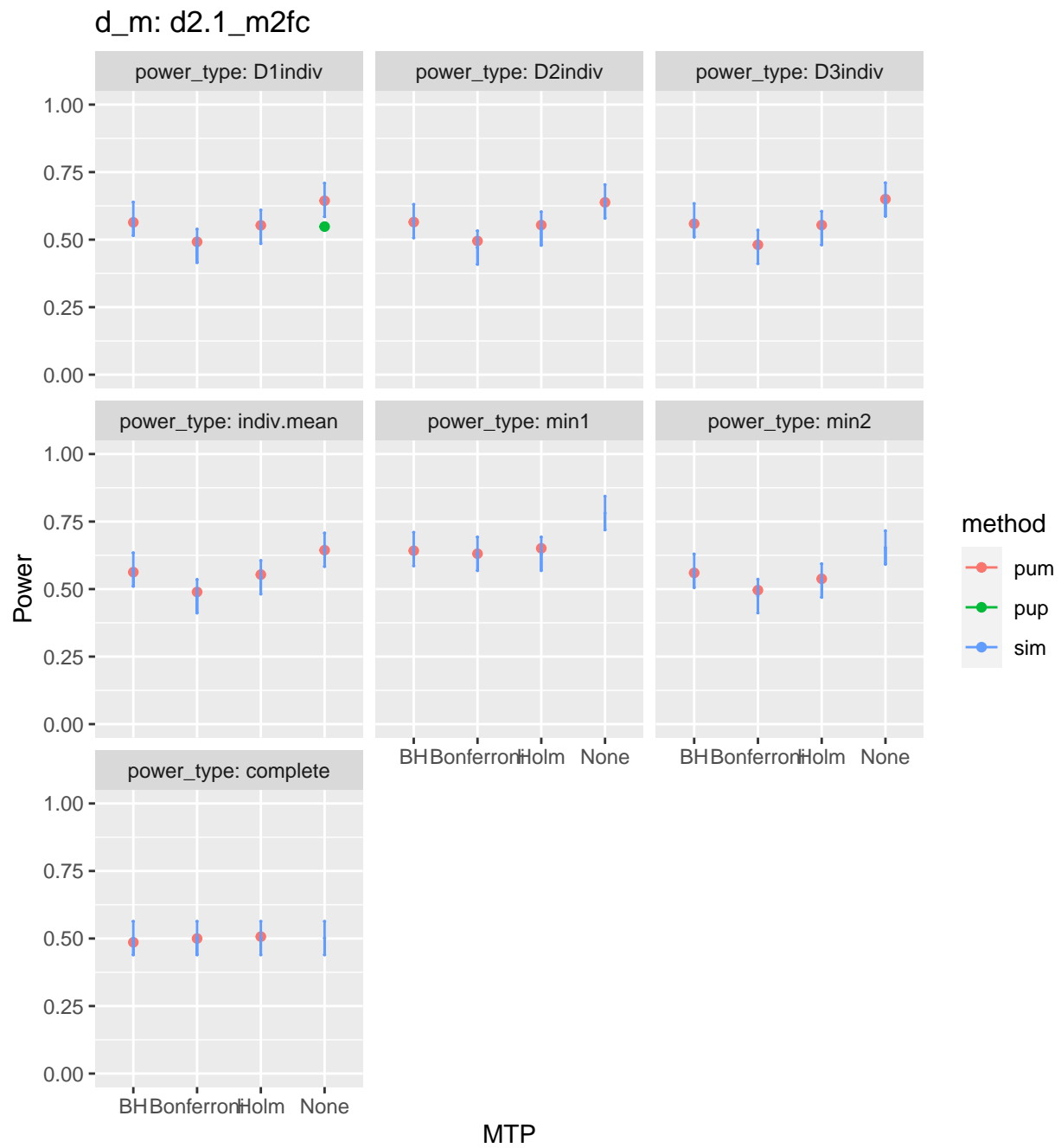
$\rho = 0.2$

d_m: d2.1_m2fc



MTP

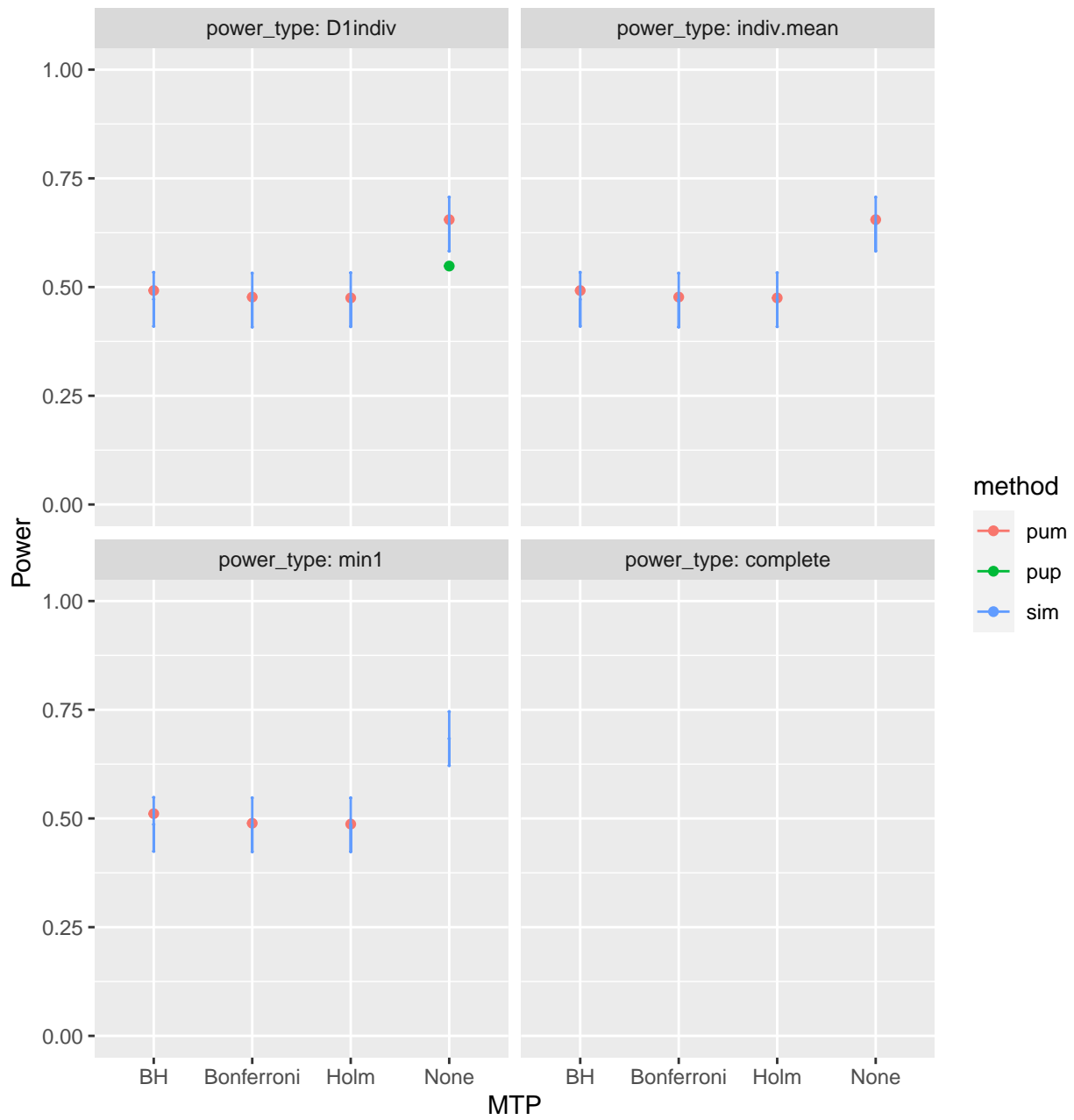
$\rho = 0.8$



Varying true positives

MDES = 0.125, 0, 0

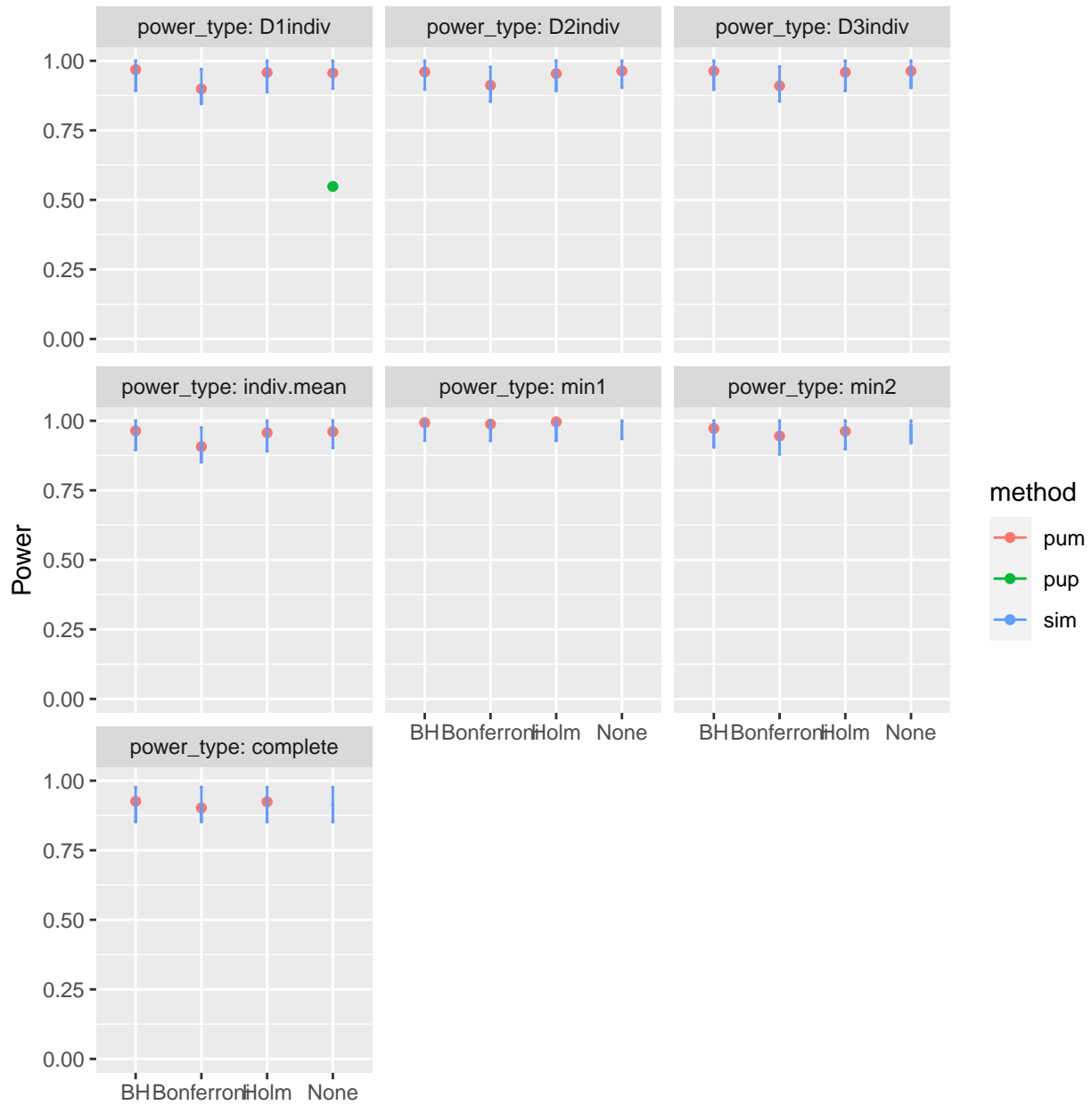
d_m: d2.1_m2fc



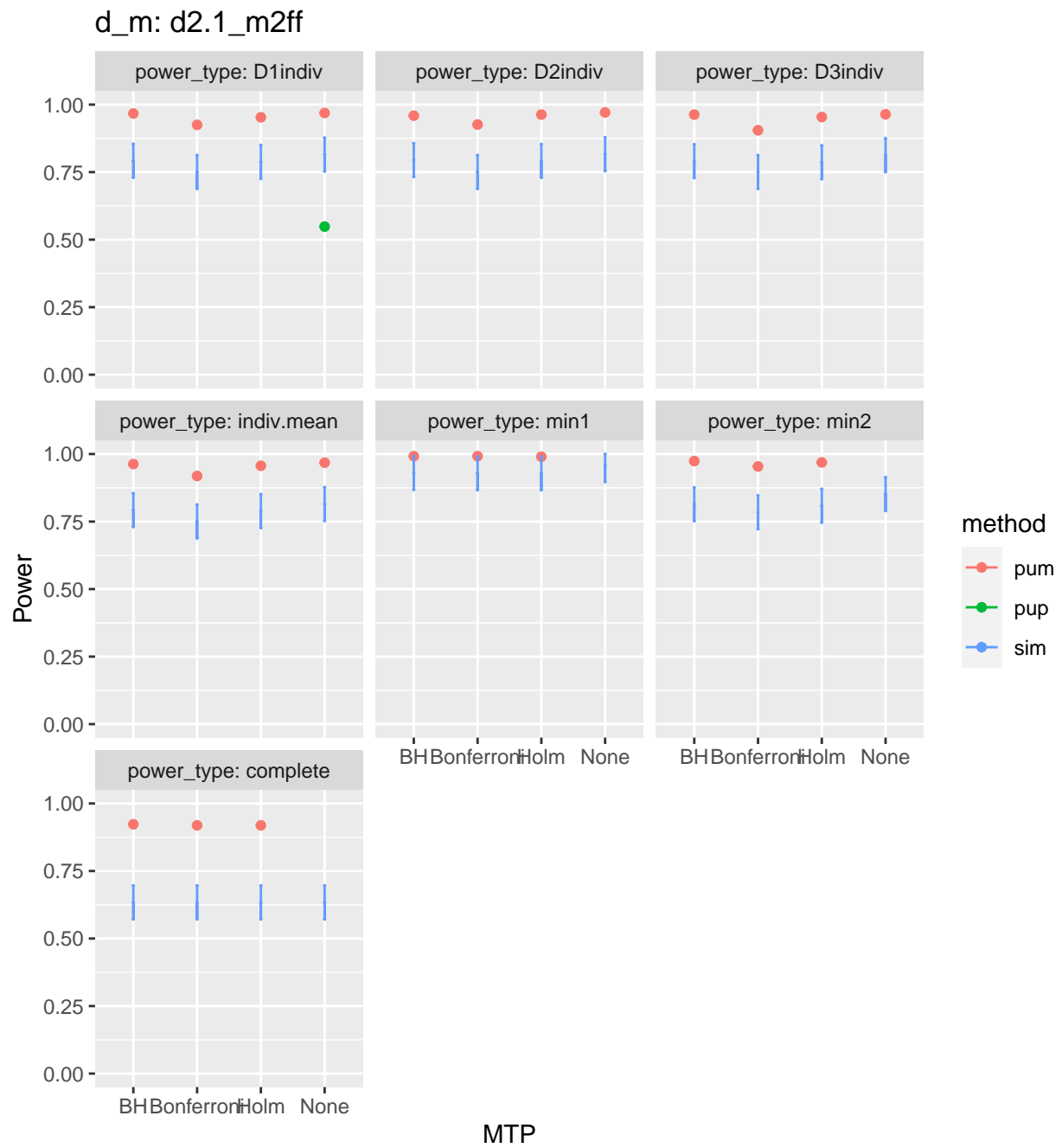
Varying ICC

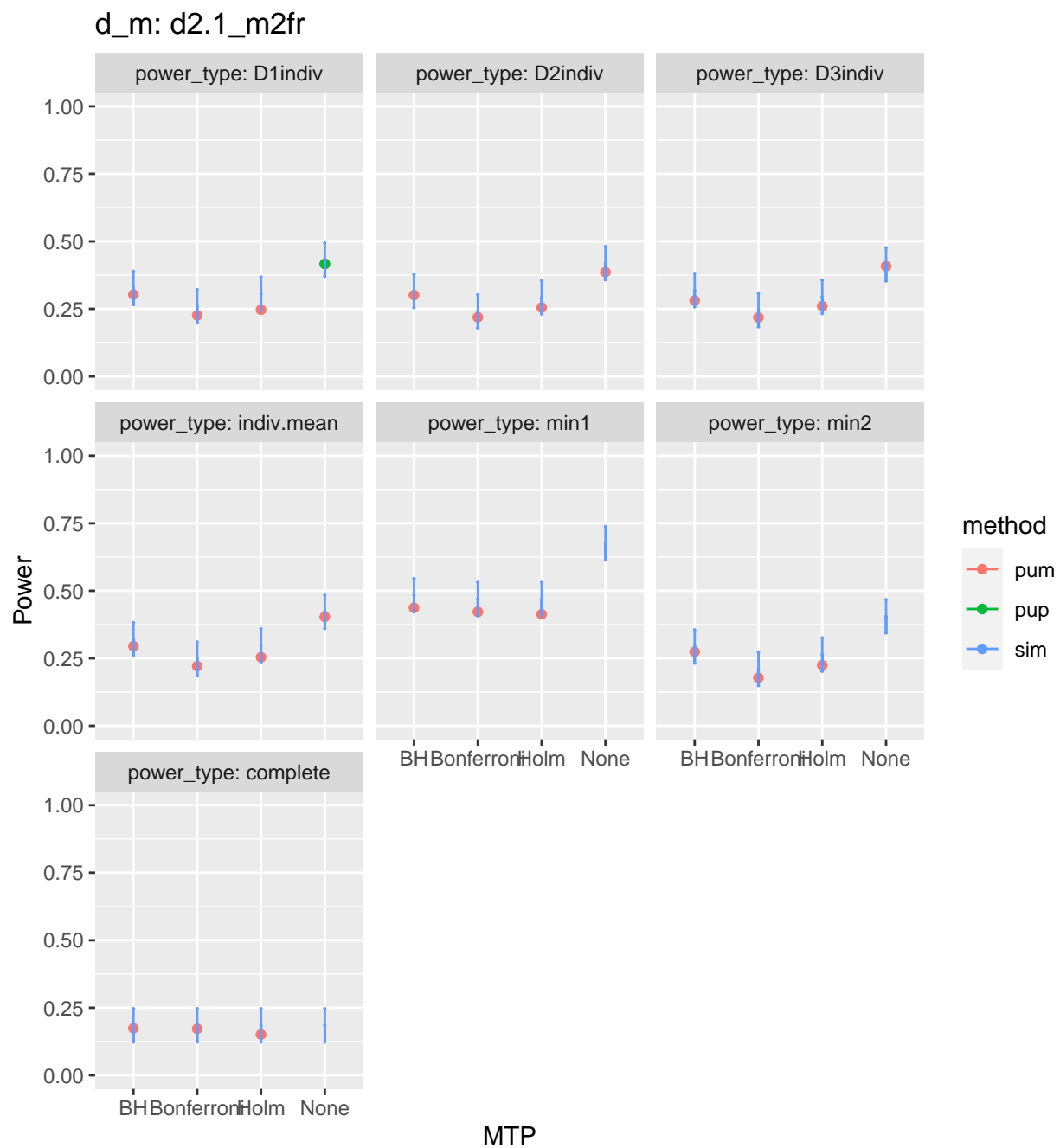
$ICC_2 = 0.7, 0.7, 0.7$

d_m: d2.1_m2fc

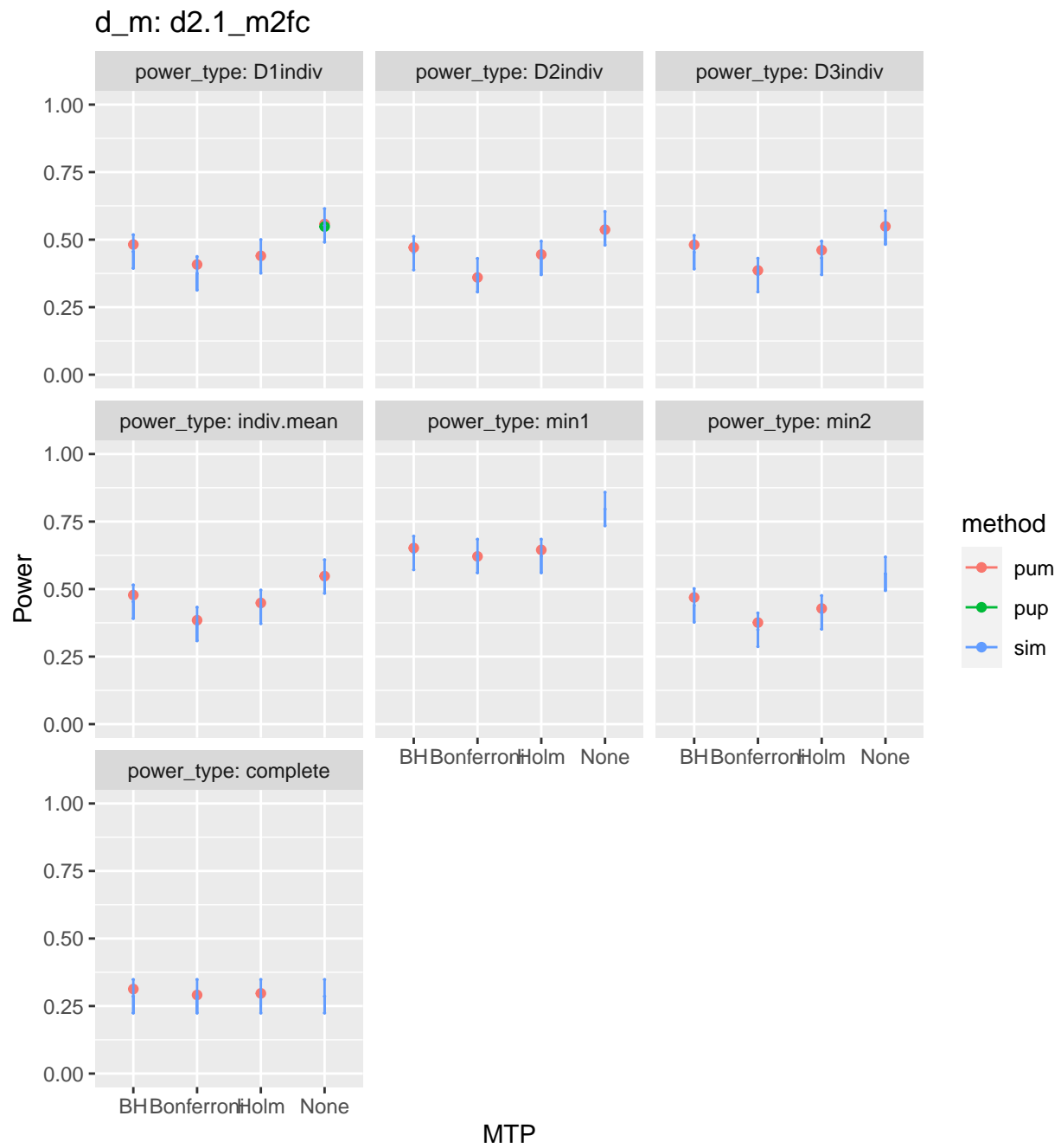


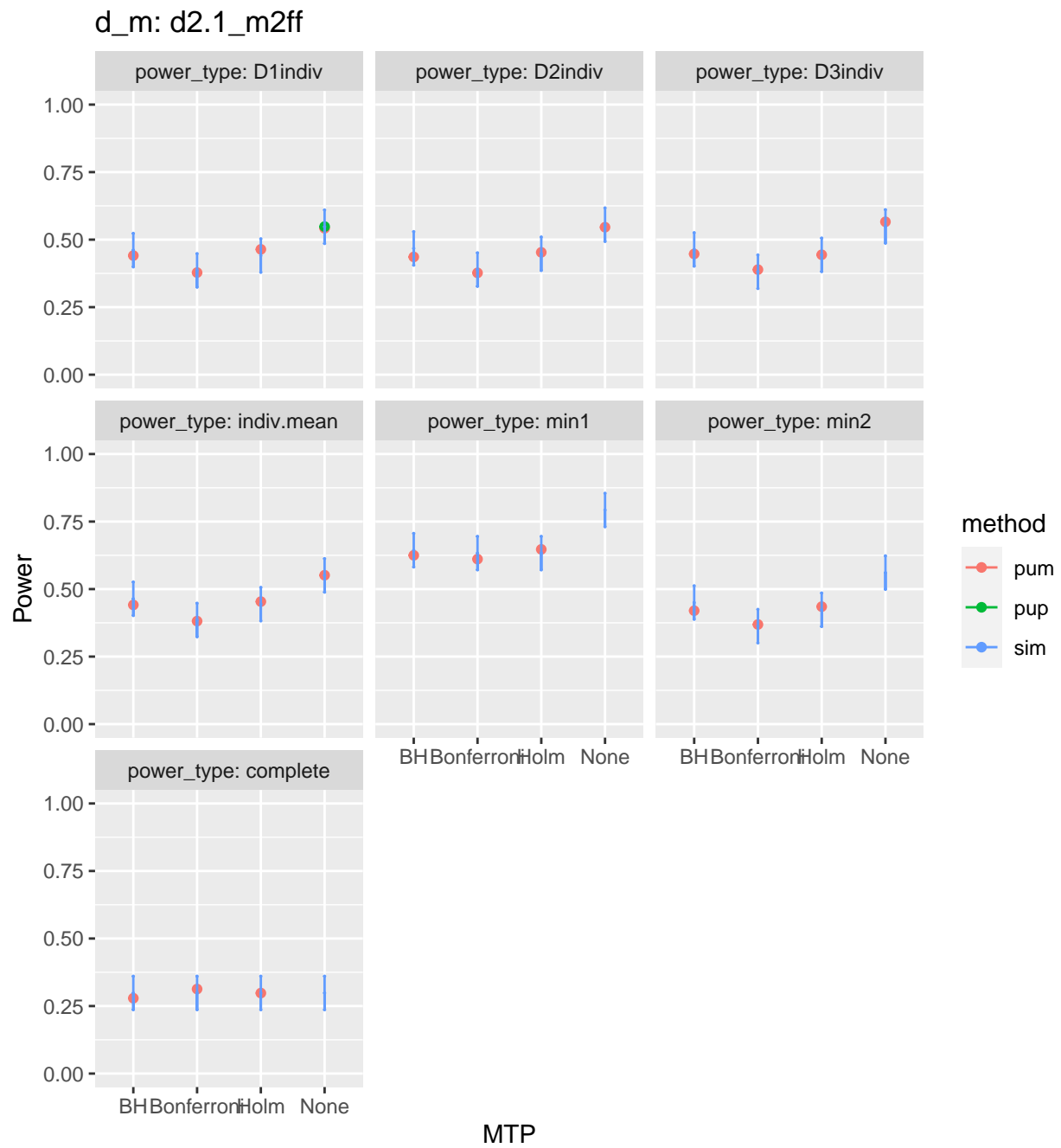
MTP

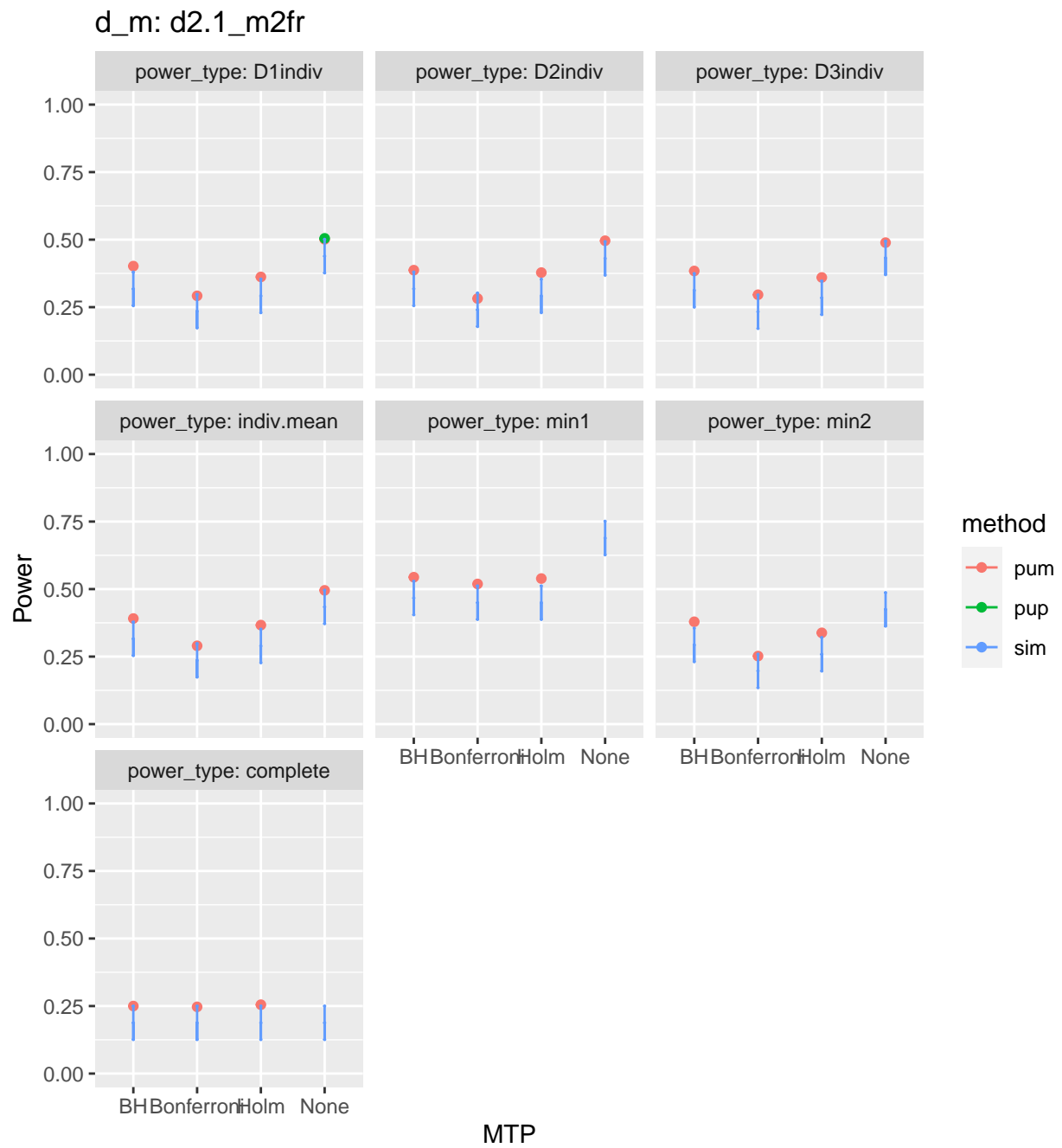




ICC₂ = 0, 0, 0



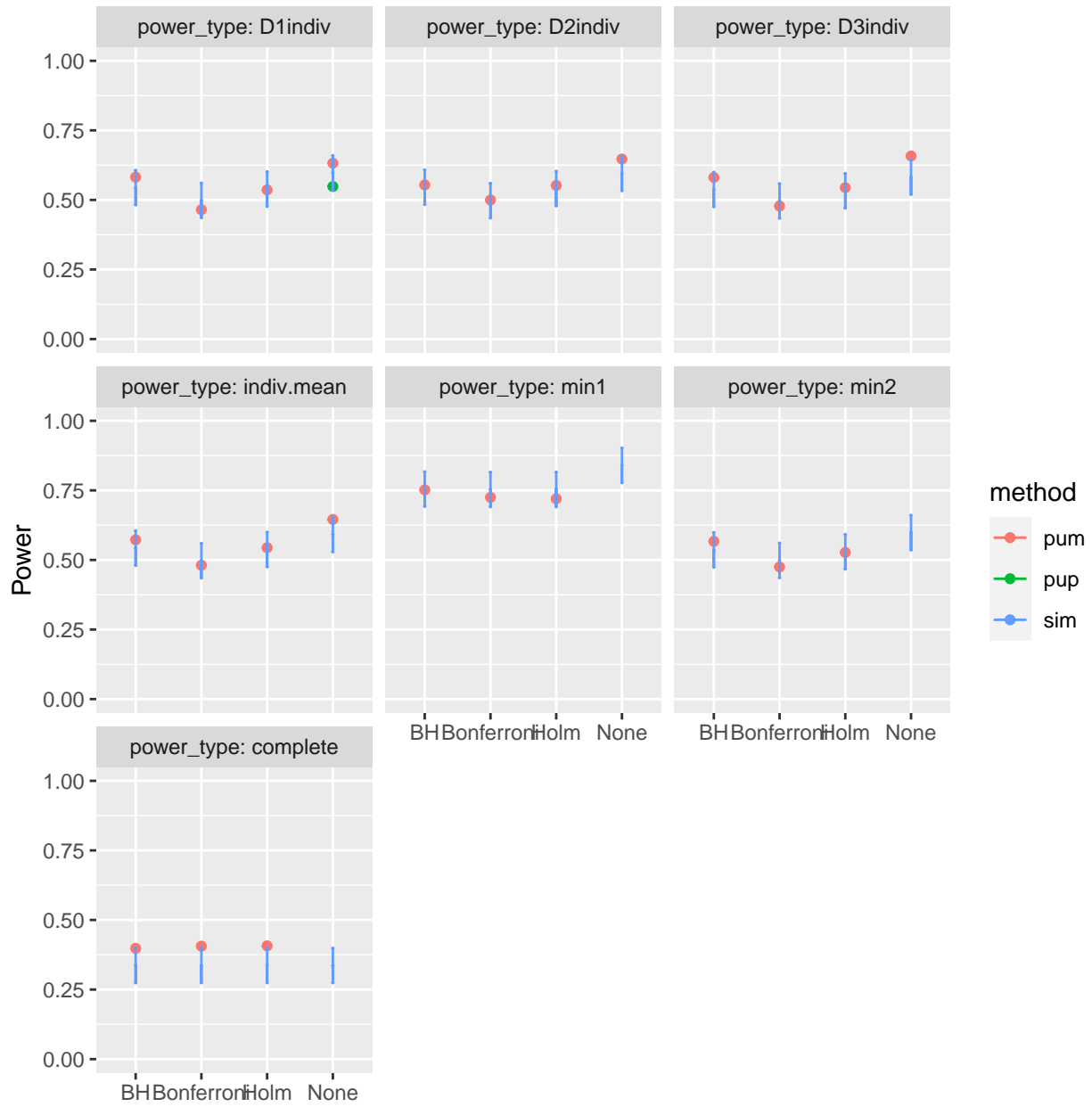




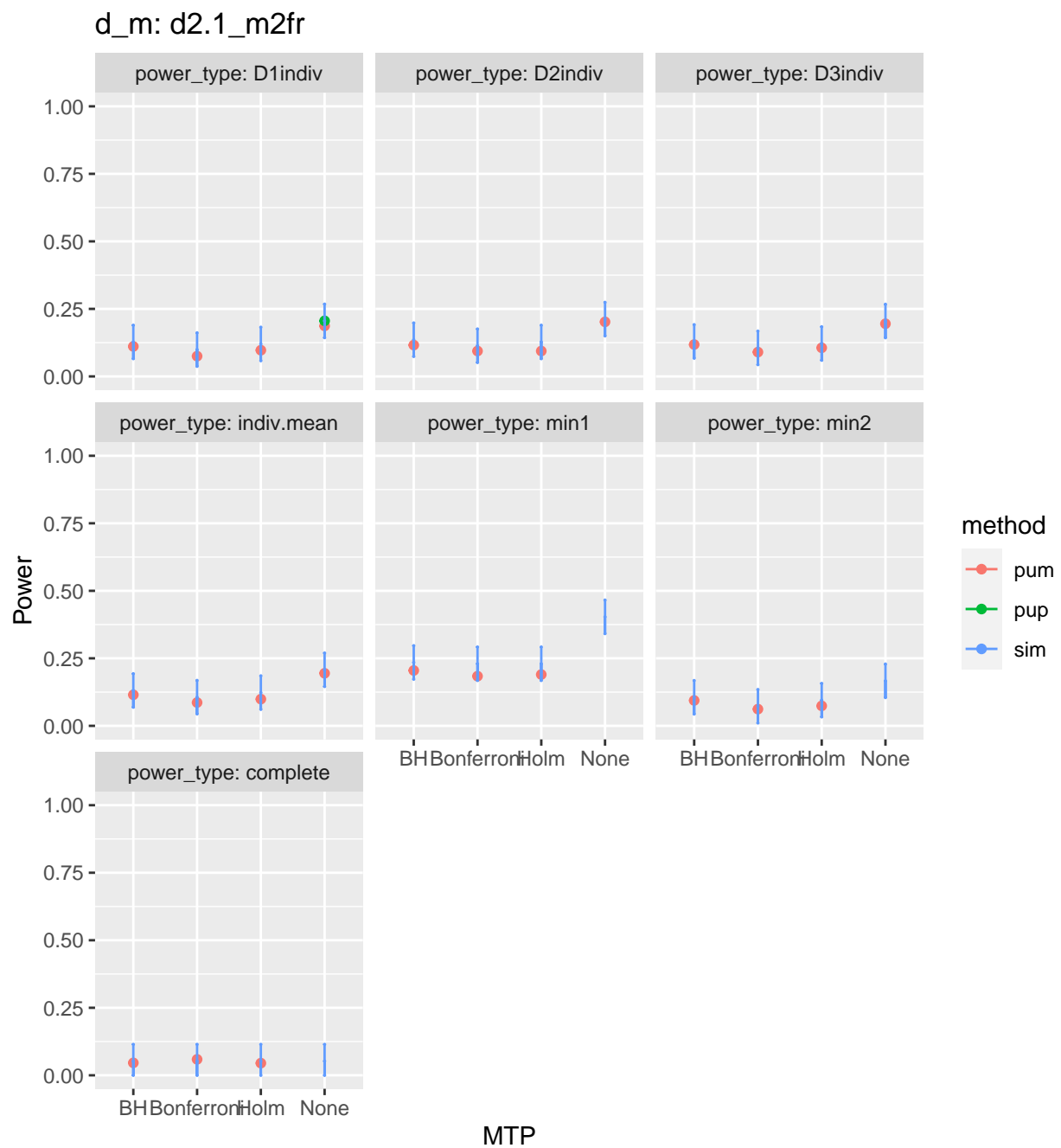
Varying Omega

$\omega_2 = 0.8, 0.8, 0.8$

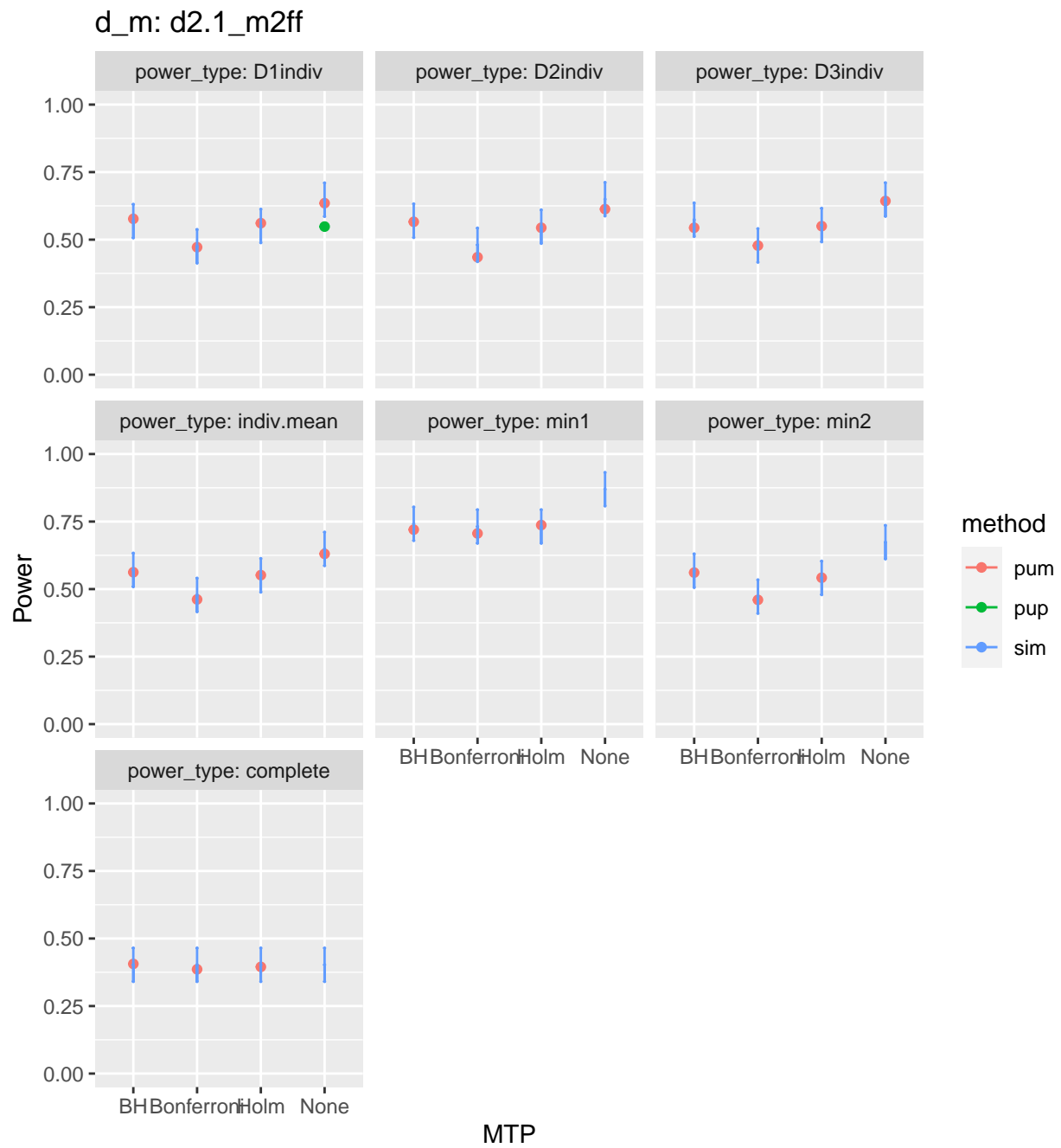
d_m: d2.1_m2ff

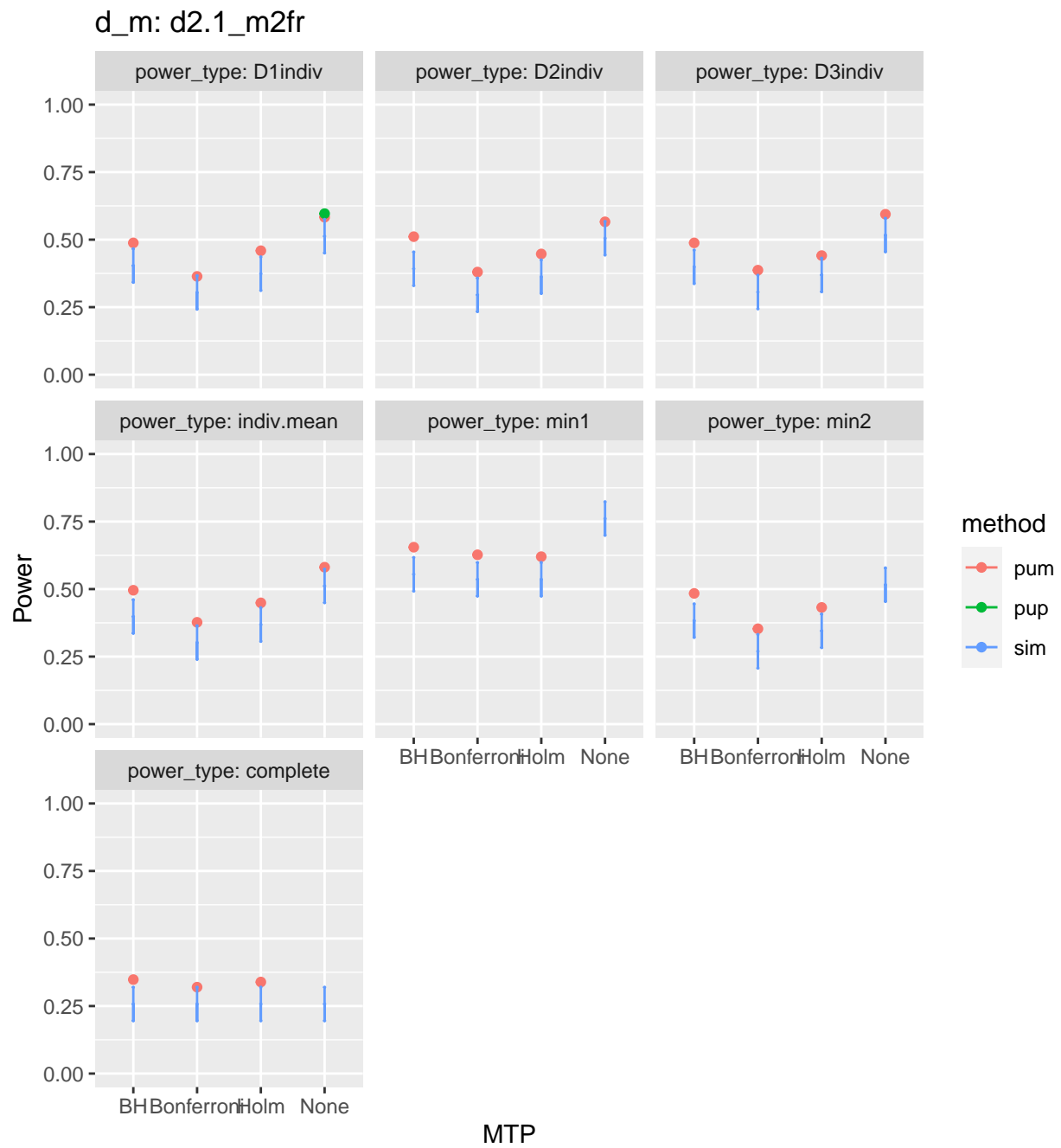


MTP



$\omega_2 = 0, 0, 0$

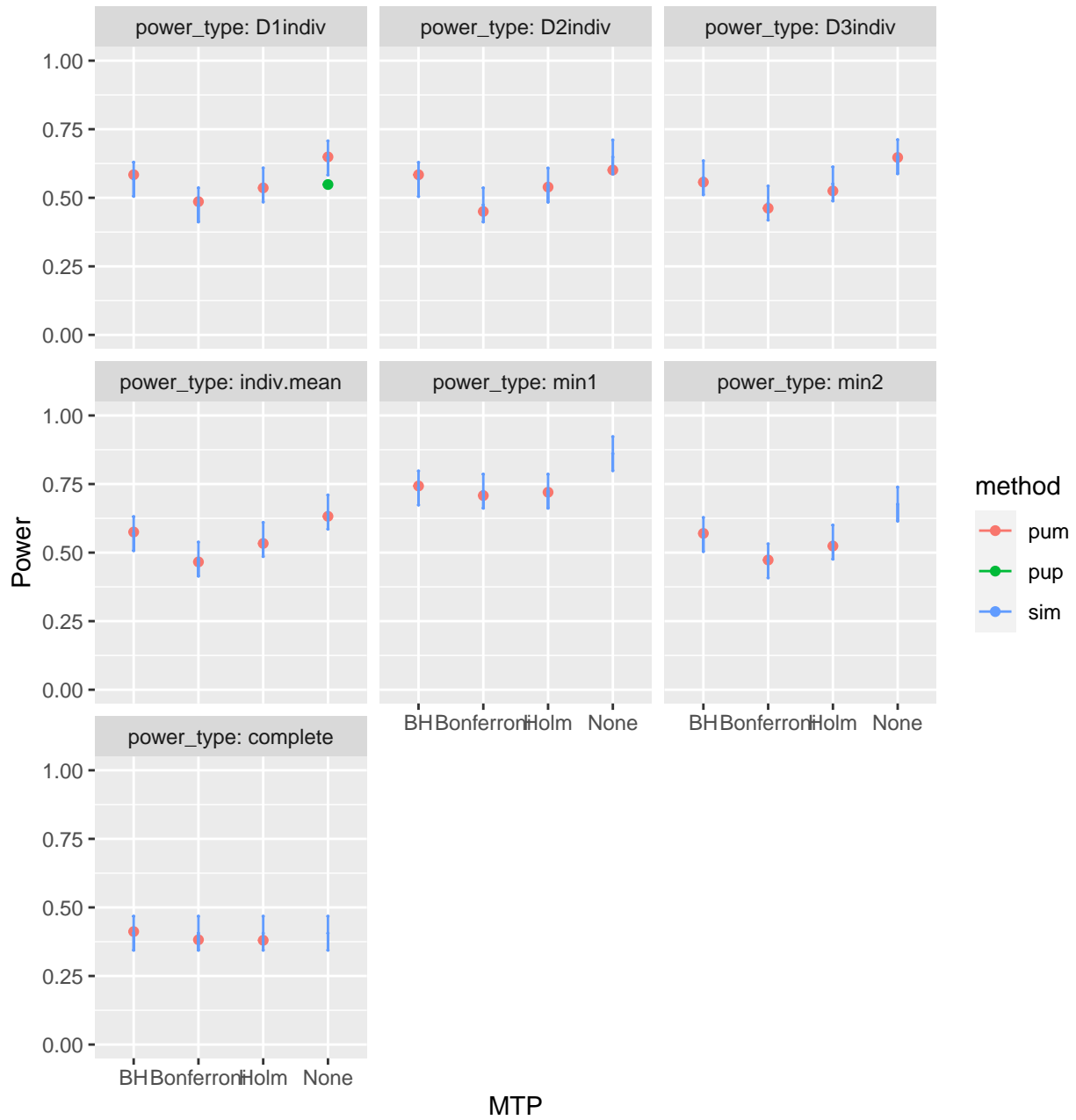


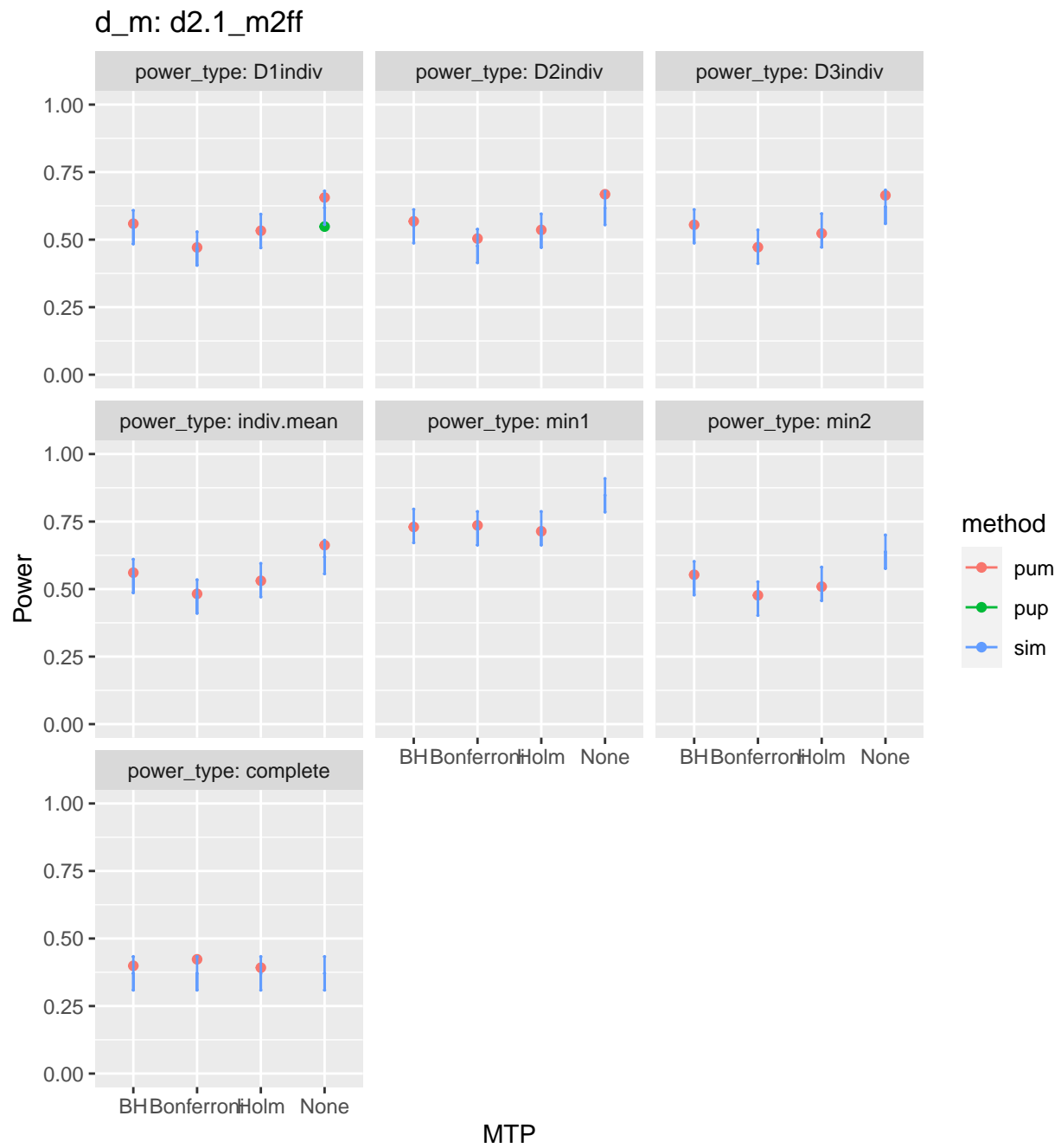


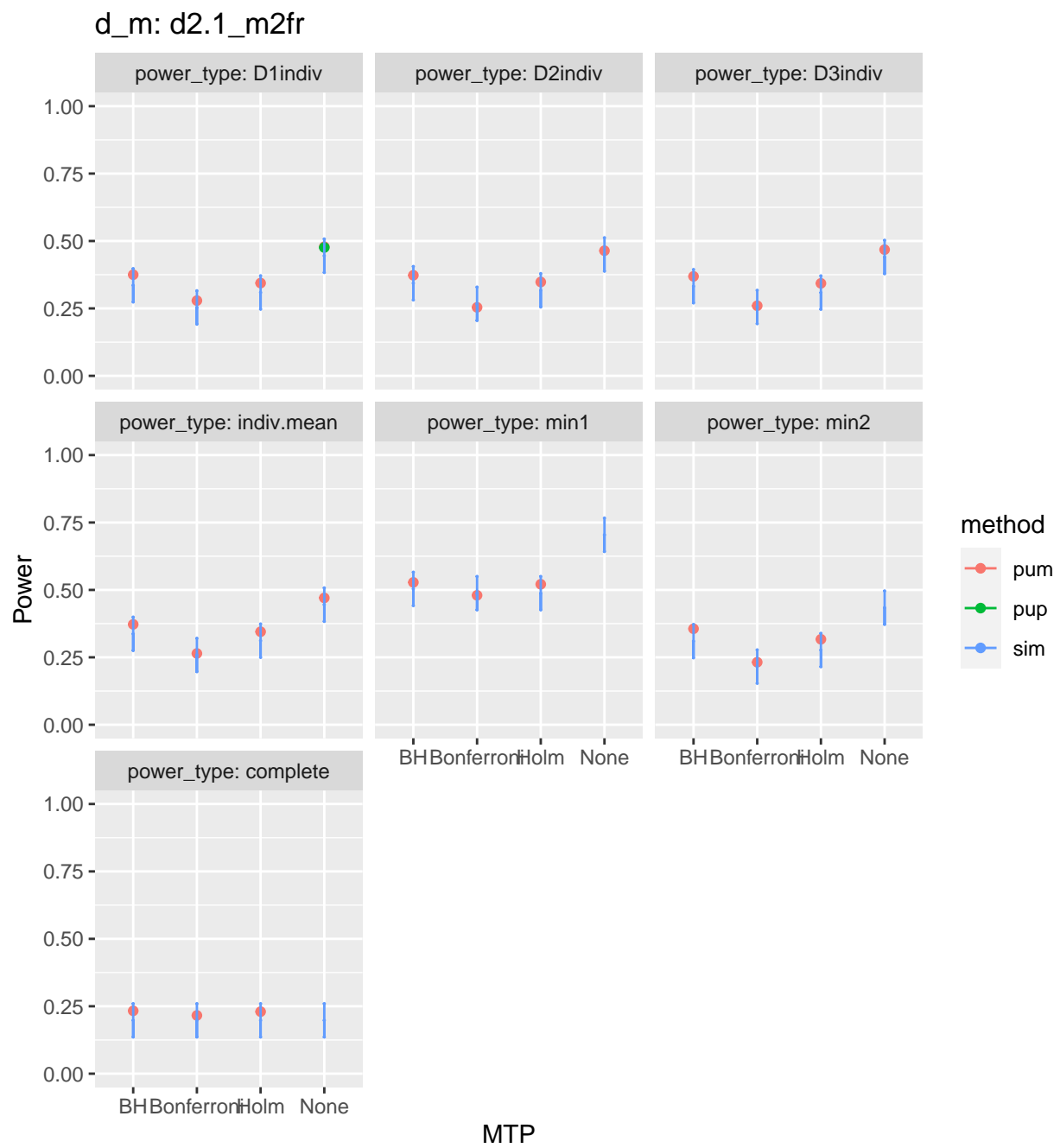
Kappa

$\kappa = 0.4$

d_m: d2.1_m2fc







MDES validation

```
##
##
## +-----+-----+-----+-----+
## |      MTP      | Adjusted MDES | D1indiv Power | Target MDES |
## +=====+=====+=====+=====+
## | Bonferroni |      0.127     |      0.486     |      0.125     |
## +-----+-----+-----+-----+
## |      BH      |      0.127     |      0.579     |      0.125     |
## +-----+-----+-----+-----+
## |      Holm     |      0.123     |      0.529     |      0.125     |
## +-----+-----+-----+-----+
##
## Table: d2.1_m2fc
##
##
## +-----+-----+-----+-----+
## |      MTP      | Adjusted MDES | D1indiv Power | Target MDES |
## +=====+=====+=====+=====+
## | Bonferroni |      0.125     |      0.471     |      0.125     |
## +-----+-----+-----+-----+
## |      BH      |      0.124     |      0.557     |      0.125     |
## +-----+-----+-----+-----+
## |      Holm     |      0.124     |      0.536     |      0.125     |
## +-----+-----+-----+-----+
##
## Table: d2.1_m2ff
##
##
## +-----+-----+-----+-----+
## |      MTP      | Adjusted MDES | D1indiv Power | Target MDES |
## +=====+=====+=====+=====+
## | Bonferroni |      0.127     |      0.279     |      0.125     |
## +-----+-----+-----+-----+
## |      BH      |      0.128     |      0.367     |      0.125     |
## +-----+-----+-----+-----+
## |      Holm     |      0.129     |      0.346     |      0.125     |
## +-----+-----+-----+-----+
##
## Table: d2.1_m2fr
```

Sample size validation

```
##
##
## +-----+-----+-----+-----+
## |      MTP      | Sample.type | Sample.size | D1indiv.power |
## +=====+=====+=====+=====+
## | Bonferroni |      J      |      21      |      0.486      |
## +-----+-----+-----+-----+
## |      BH      |      J      |      21      |      0.574      |
## +-----+-----+-----+-----+
## |      Holm     |      J      |      NA      |      NA          |
## +-----+-----+-----+-----+
##
## Table: d2.1_m2fc
##
##
## +-----+-----+-----+-----+
## |      MTP      | Sample.type | Sample.size | D1indiv.power |
## +=====+=====+=====+=====+
## | Bonferroni |      nbar    |      52.28   |      0.486      |
## +-----+-----+-----+-----+
## |      BH      |      nbar    |      53      |      0.592      |
## +-----+-----+-----+-----+
## |      Holm     |      nbar    |      50      |      0.54        |
## +-----+-----+-----+-----+
##
## Table: d2.1_m2fc
##
##
## +-----+-----+-----+-----+
## |      MTP      | Sample.type | Sample.size | D1indiv.power |
## +=====+=====+=====+=====+
## | Bonferroni |      J      |      20      |      0.471      |
## +-----+-----+-----+-----+
## |      BH      |      J      |      20      |      0.561      |
## +-----+-----+-----+-----+
## |      Holm     |      J      |      20      |      0.543      |
## +-----+-----+-----+-----+
##
## Table: d2.1_m2ff
##
##
## +-----+-----+-----+-----+
## |      MTP      | Sample.type | Sample.size | D1indiv.power |
## +=====+=====+=====+=====+
## | Bonferroni |      nbar    |      50.66   |      0.471      |
## +-----+-----+-----+-----+
## |      BH      |      nbar    |      50      |      0.554      |
## +-----+-----+-----+-----+
## |      Holm     |      nbar    |      49      |      0.531      |
## +-----+-----+-----+-----+
```

```
##
## Table: d2.1_m2ff
##
##
## +-----+-----+-----+-----+
## |      MTP      | Sample.type | Sample.size | D1indiv.power |
## +=====+=====+=====+=====+
## | Bonferroni |      J      |      21      |      0.279      |
## +-----+-----+-----+-----+
## |      BH      |      J      |      21      |      0.376      |
## +-----+-----+-----+-----+
## |      Holm      |      J      |      22      |      0.344      |
## +-----+-----+-----+-----+
##
## Table: d2.1_m2fr
##
##
## +-----+-----+-----+-----+
## |      MTP      | Sample.type | Sample.size | D1indiv.power |
## +=====+=====+=====+=====+
## | Bonferroni |      J      |      21      |      0.279      |
## +-----+-----+-----+-----+
## |      BH      |      J      |      21      |      0.376      |
## +-----+-----+-----+-----+
## |      Holm      |      J      |      22      |      0.344      |
## +-----+-----+-----+-----+
##
## Table: d2.1_m2fr
```