Validate Power: d2.1

December 25, 2021

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

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

Default parameters:

- M = 3
- J = 20
- rho: $\rho = 0.5$
- MDES = 0.125, 0.125, 0.125
- R2.1: $R_1^2 = 0.1, 0.1, 0.1$
- ICC: $\text{ICC}_2 = 0.2, 0.2, 0.2$

Parameters by model type:

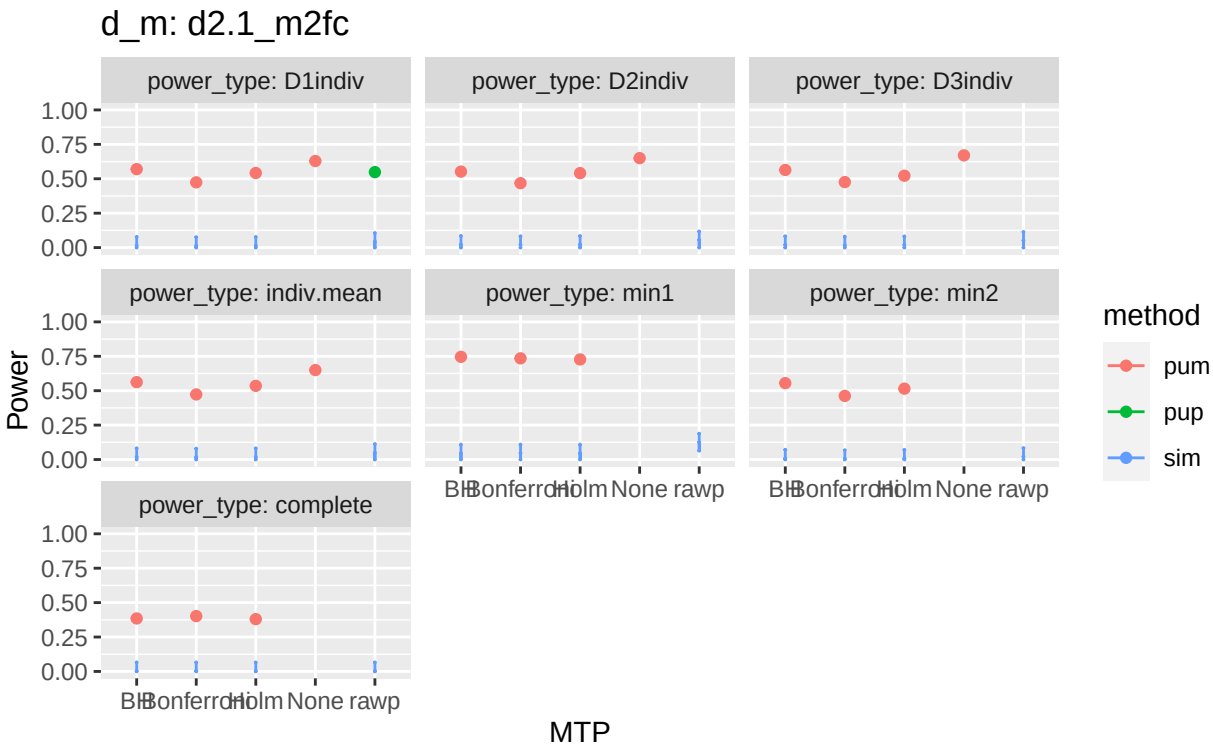
- Omega: $\omega_2 = 0$ for constant effects, $\omega_2 = 0.1, 0.1, 0.1$ for fixed and random

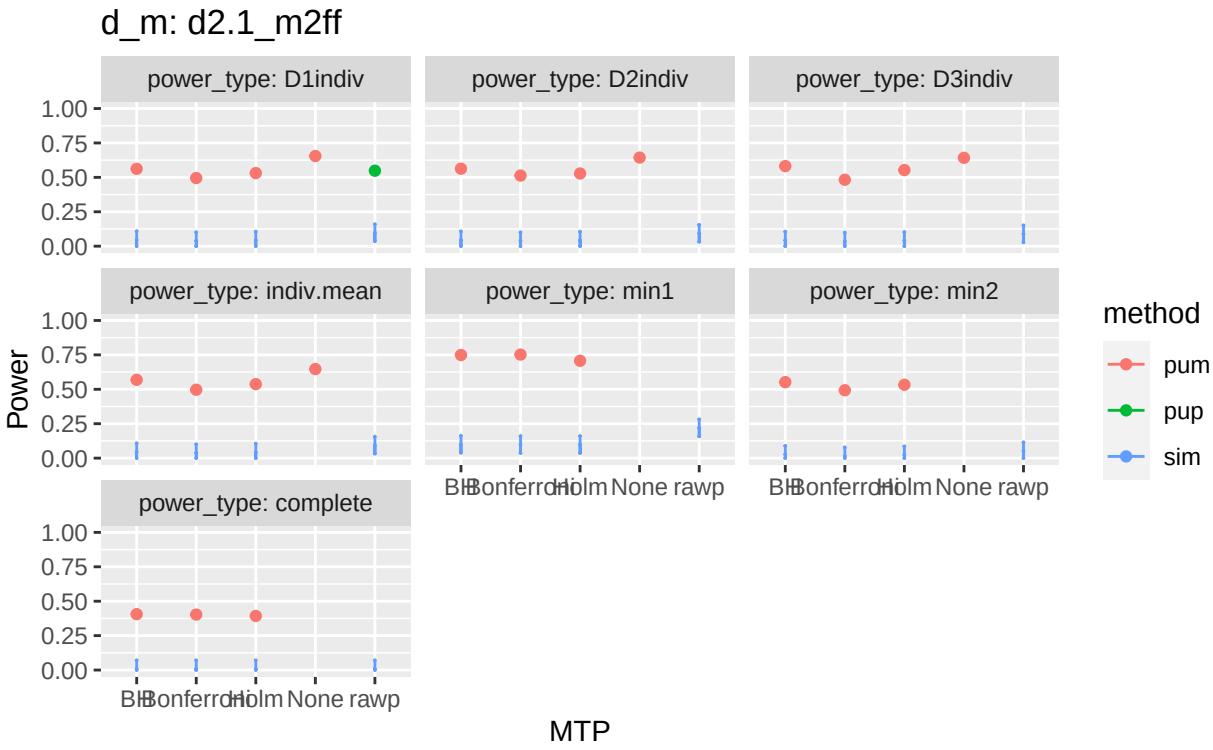
Assumptions:

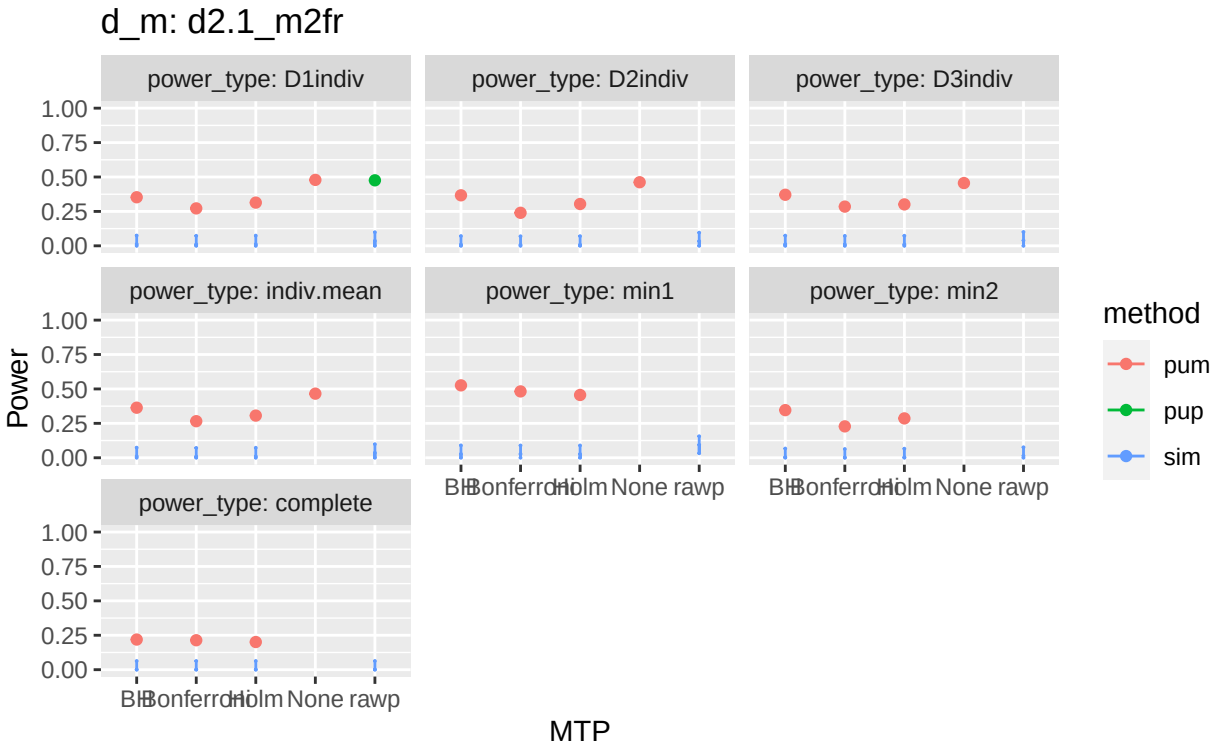
- Two-level design: $\text{ICC}_3 = 0$, $\omega_3 = 0$, $K = 1$

Power Validation

Base case

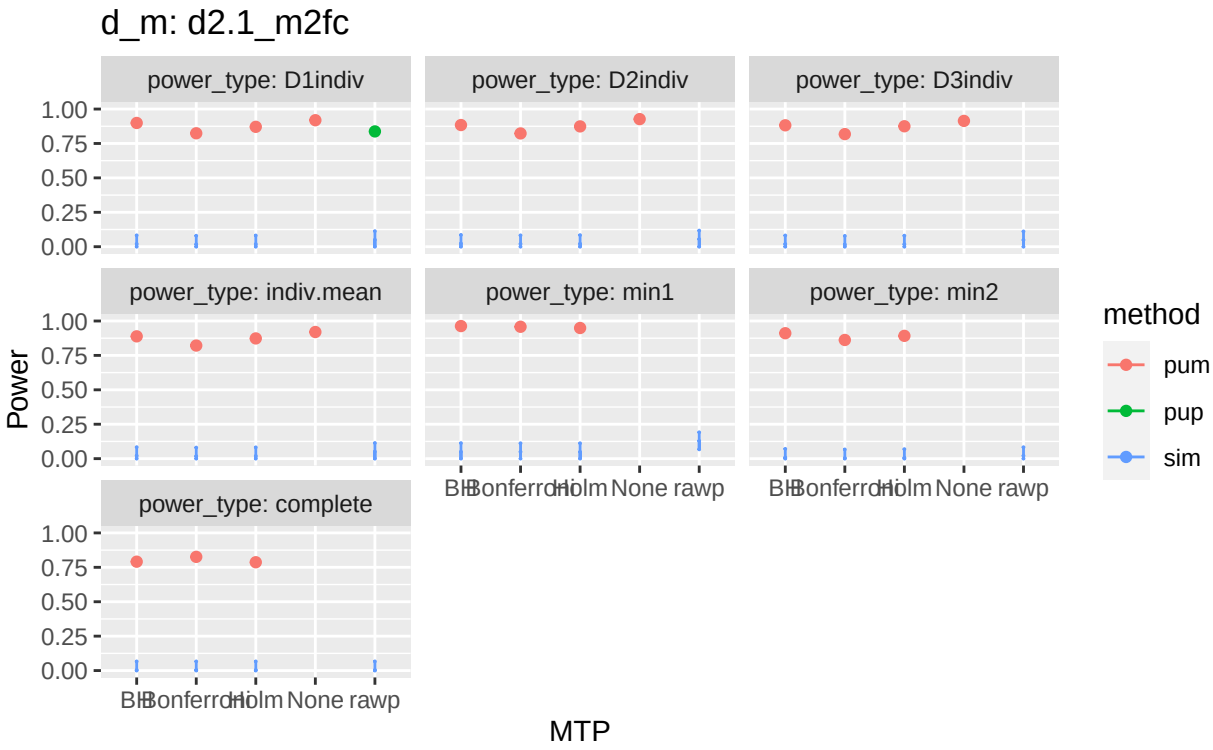


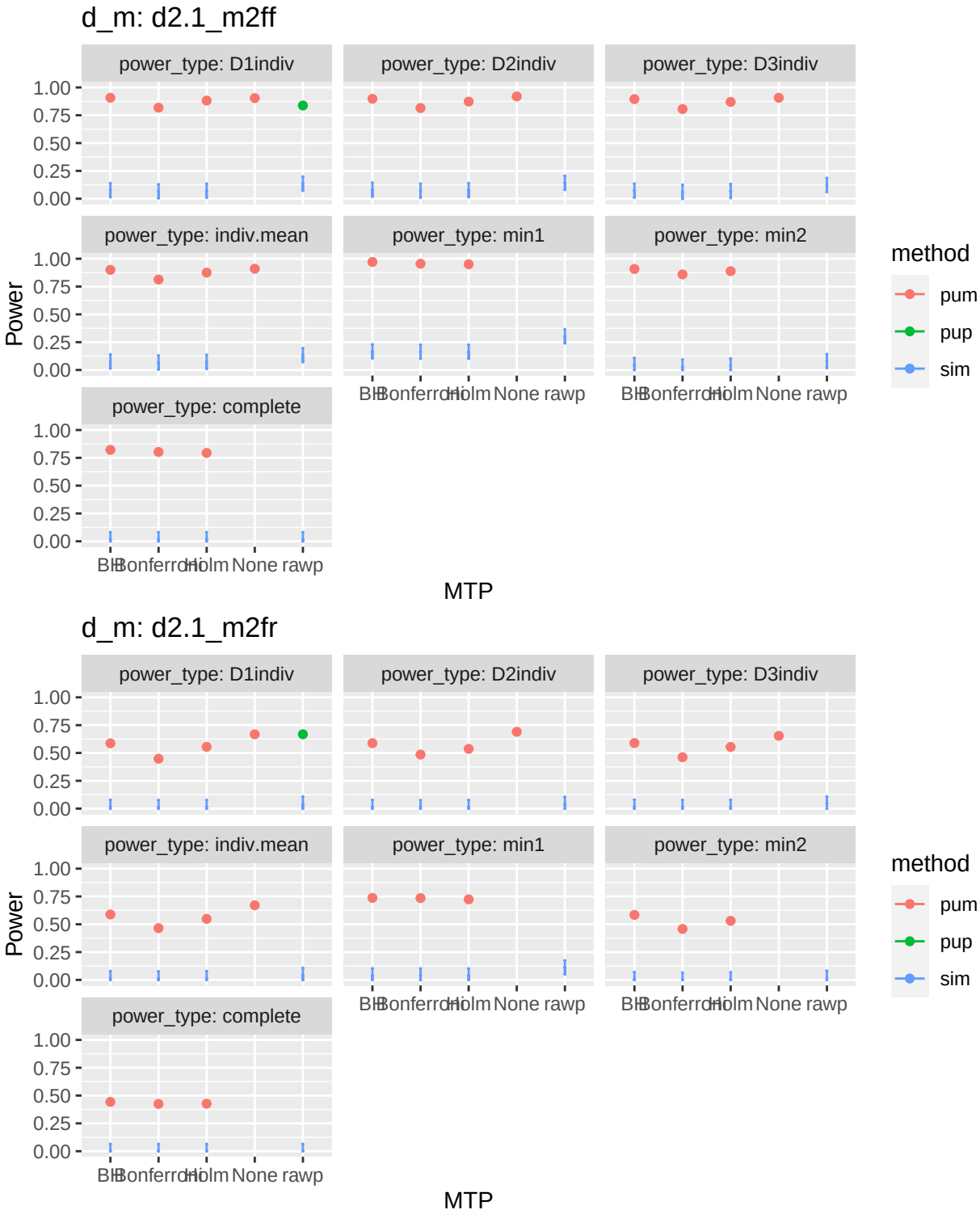




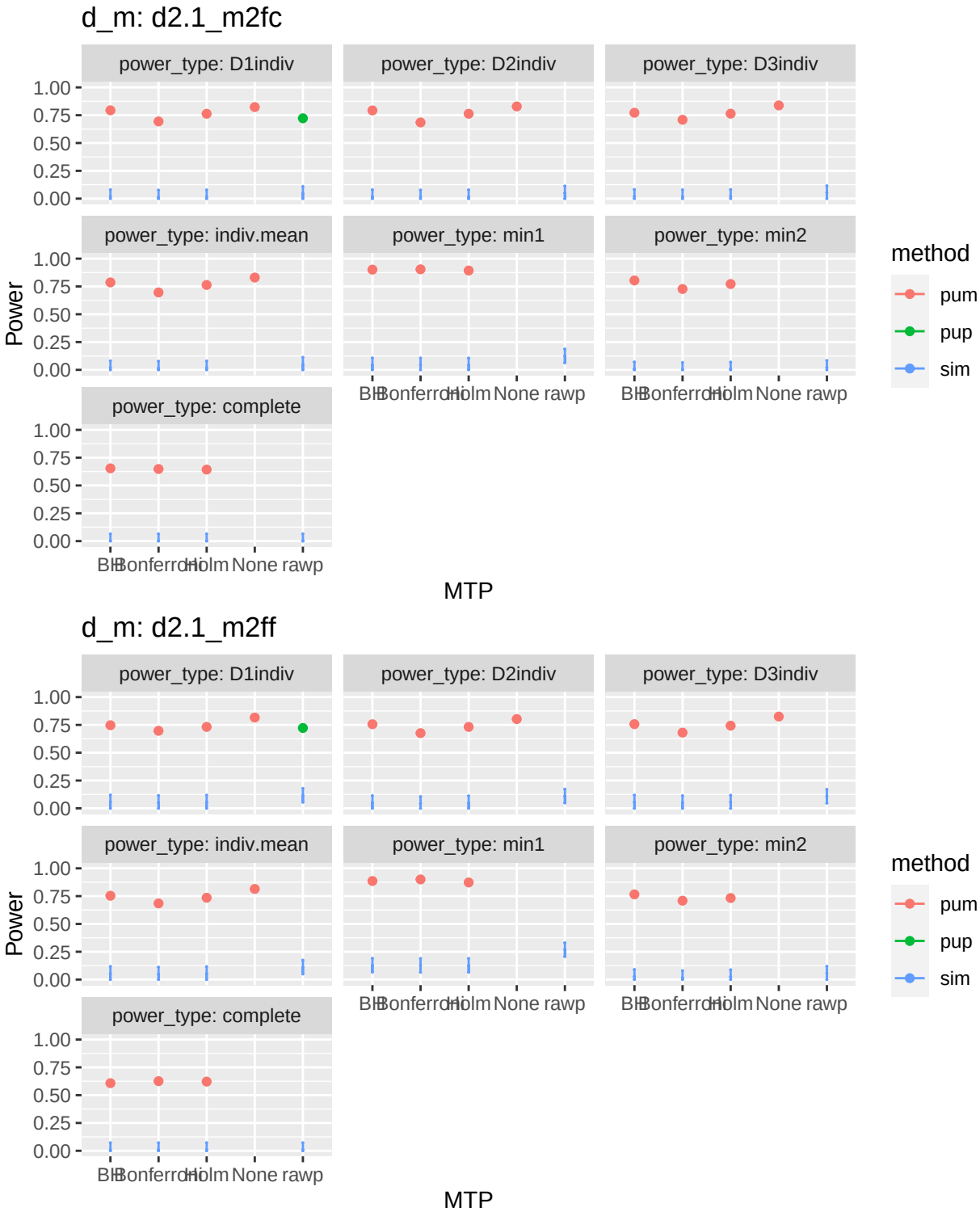
Varying school size

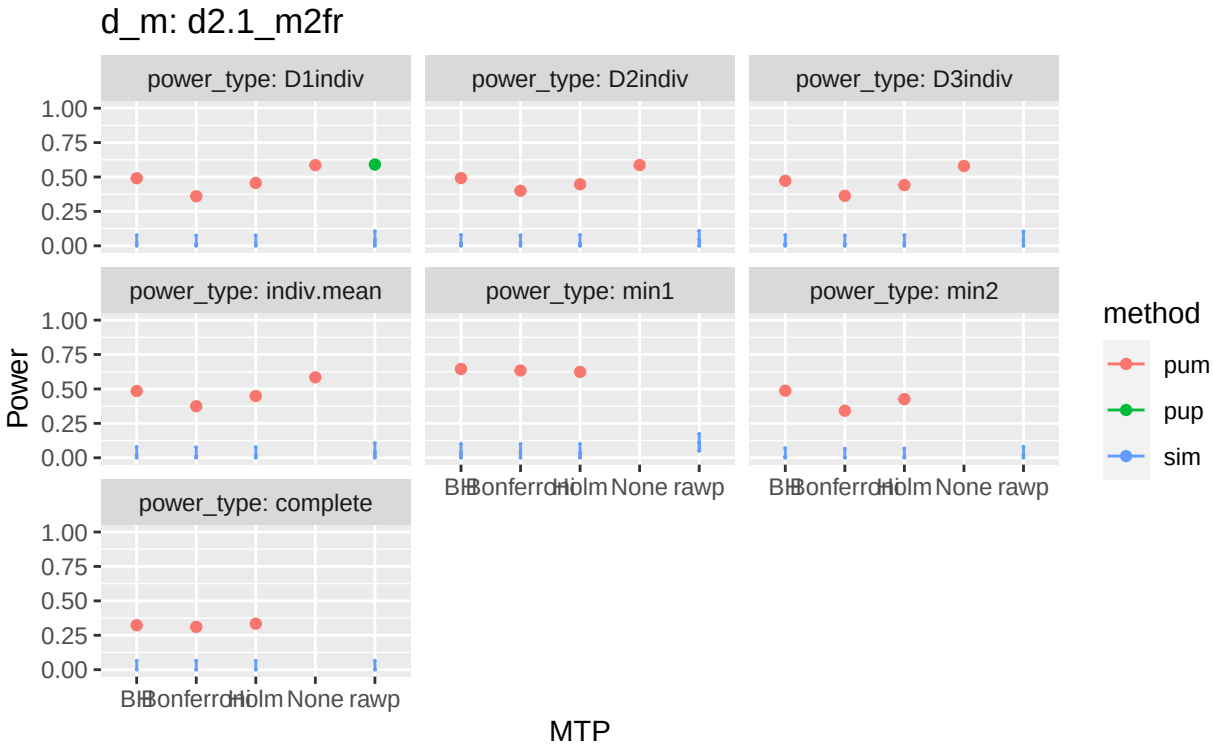
$\bar{n} = 100$




d_m: d2.1_m2ff
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
rawp
MTP
method
pum
pup
sim
d_m: d2.1_m2fr
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
rawp
MTP
method
pum
pup
sim

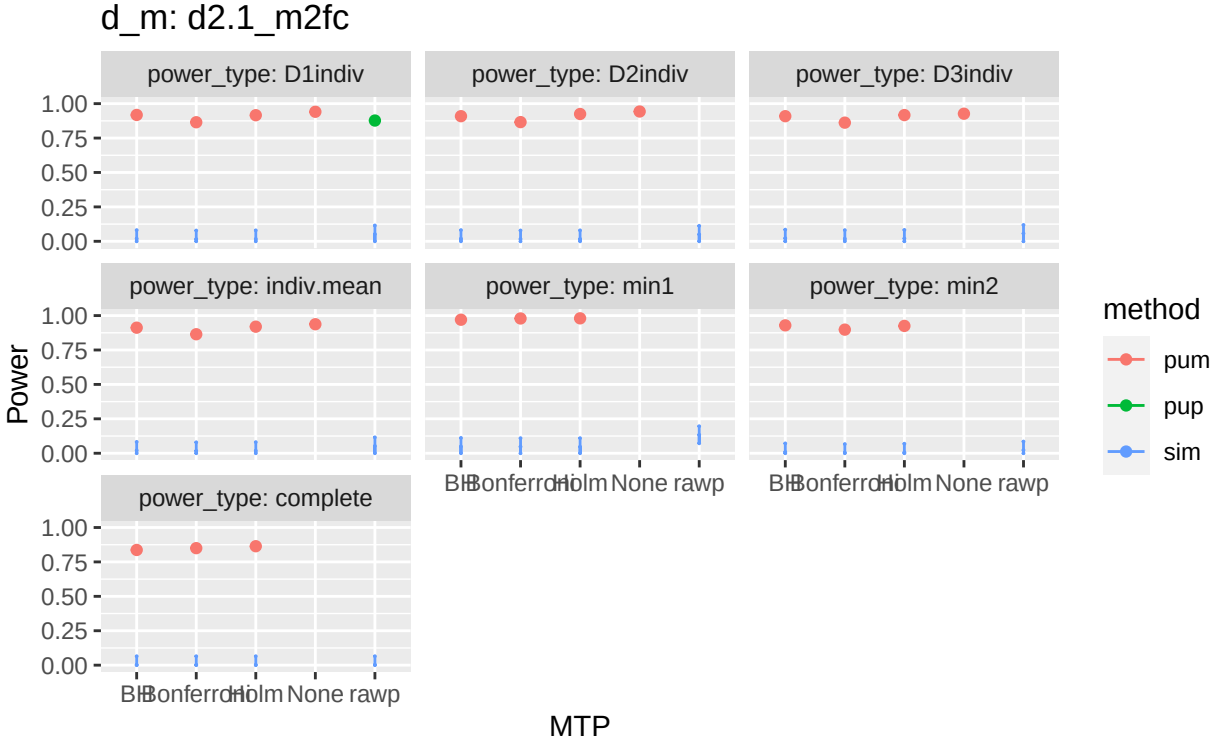
$\bar{n} = 75$


d_m: d2.1_m2fc
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
rawp
MTP
method
pum
pup
sim
d_m: d2.1_m2ff
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
rawp
MTP
method
pum
pup
sim

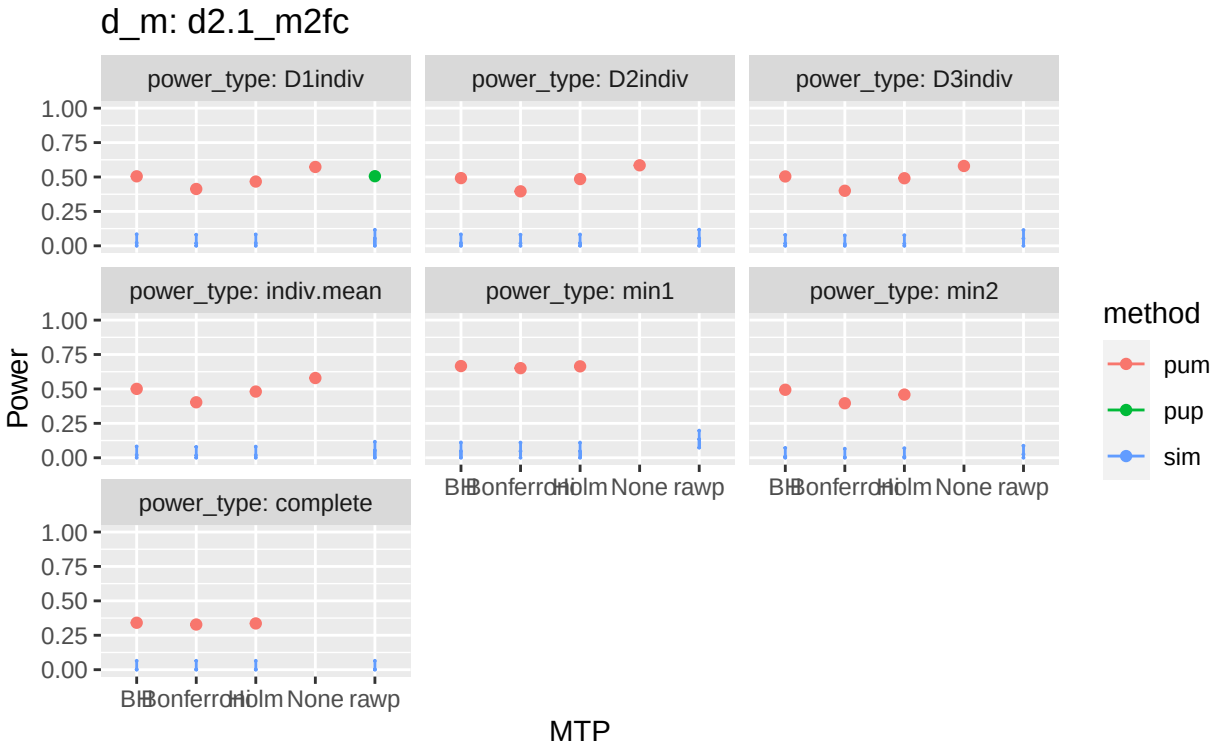


Varying R2

$R_1^2 = 0.6, 0.6, 0.6$

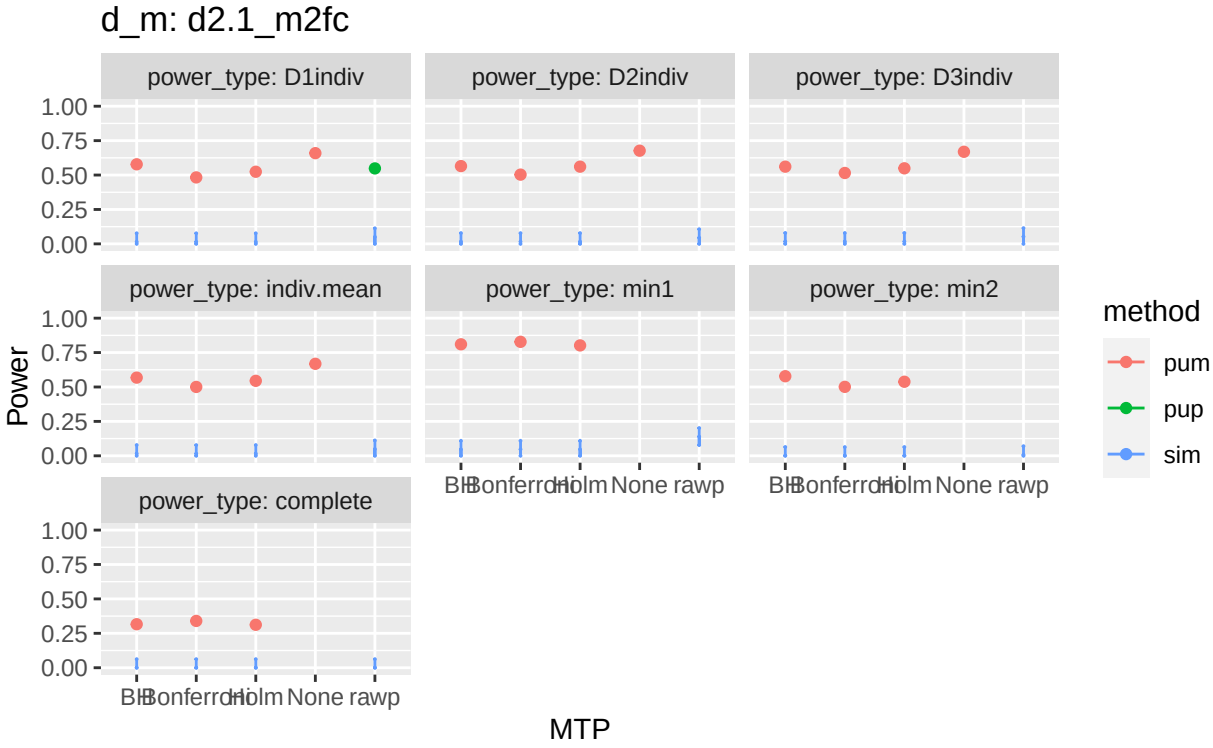


$R_1^2 = 0, 0, 0$

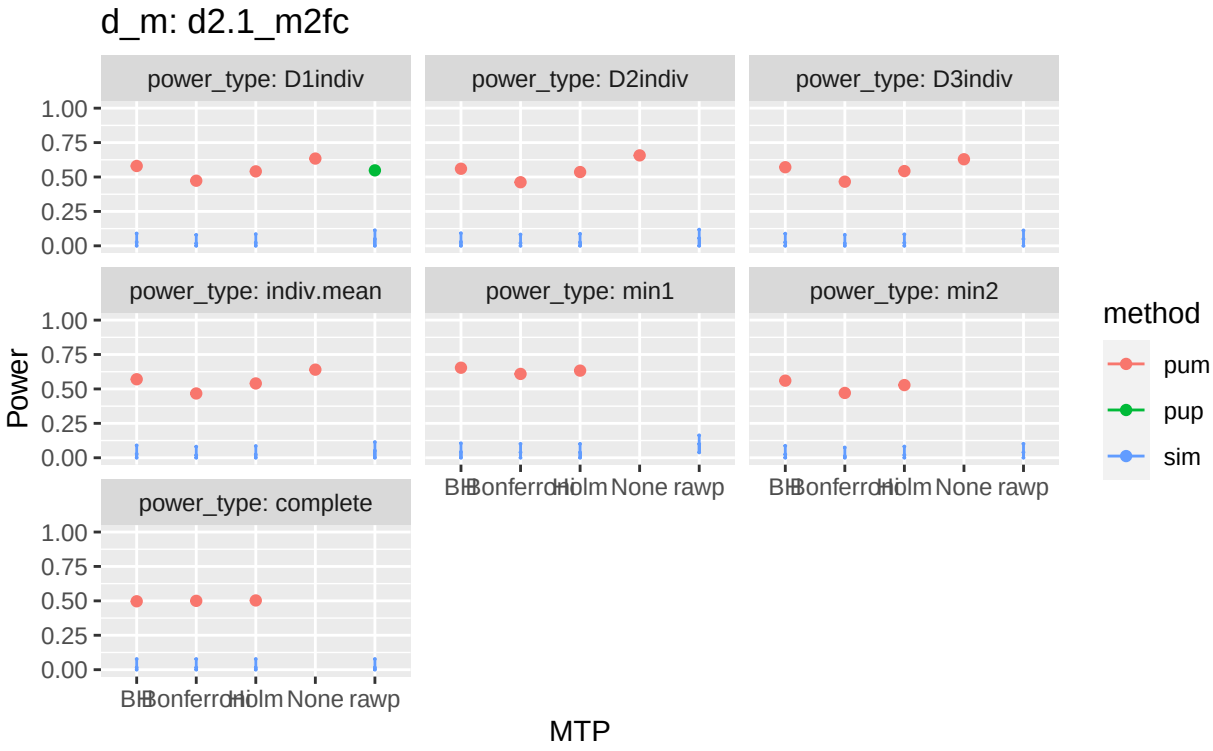


Varying rho

$\rho = 0.2$

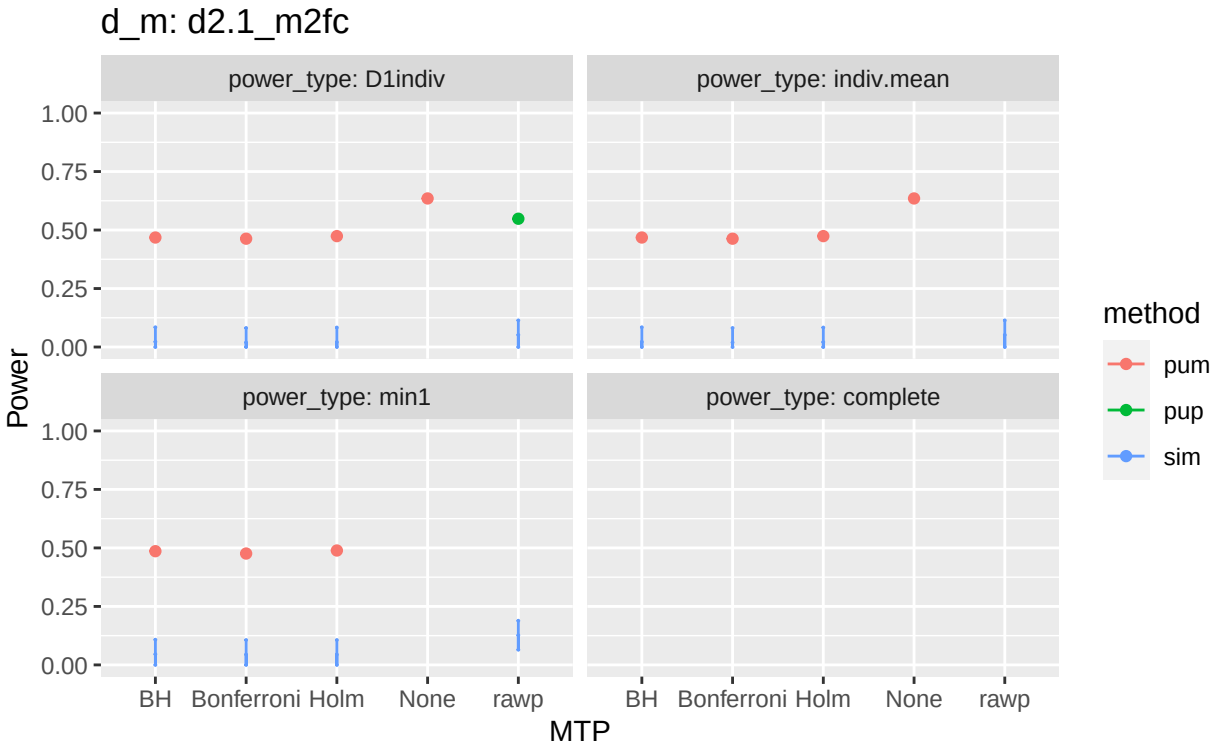


$\rho = 0.8$



Varying true positives

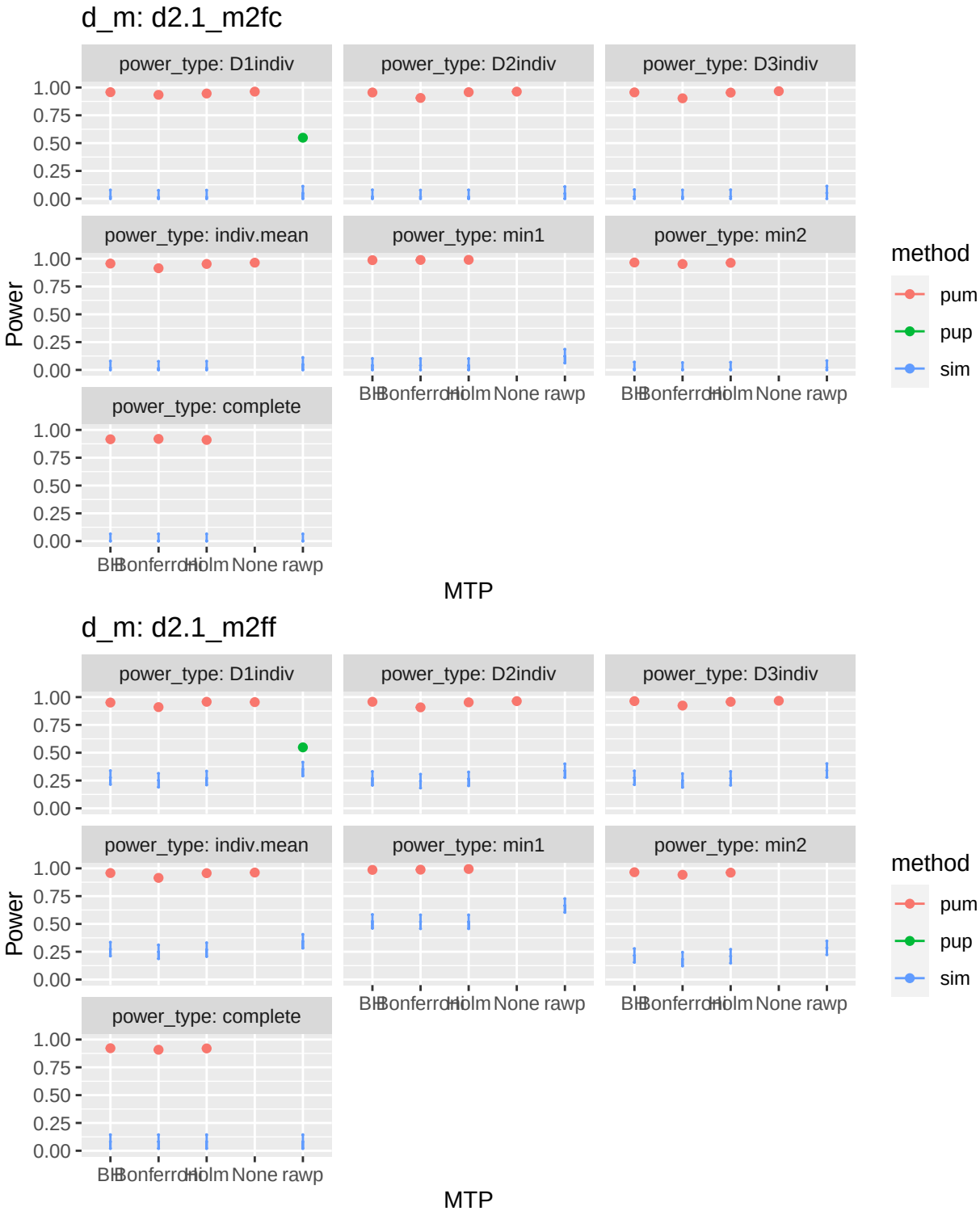
MDES = 0.125, 0, 0

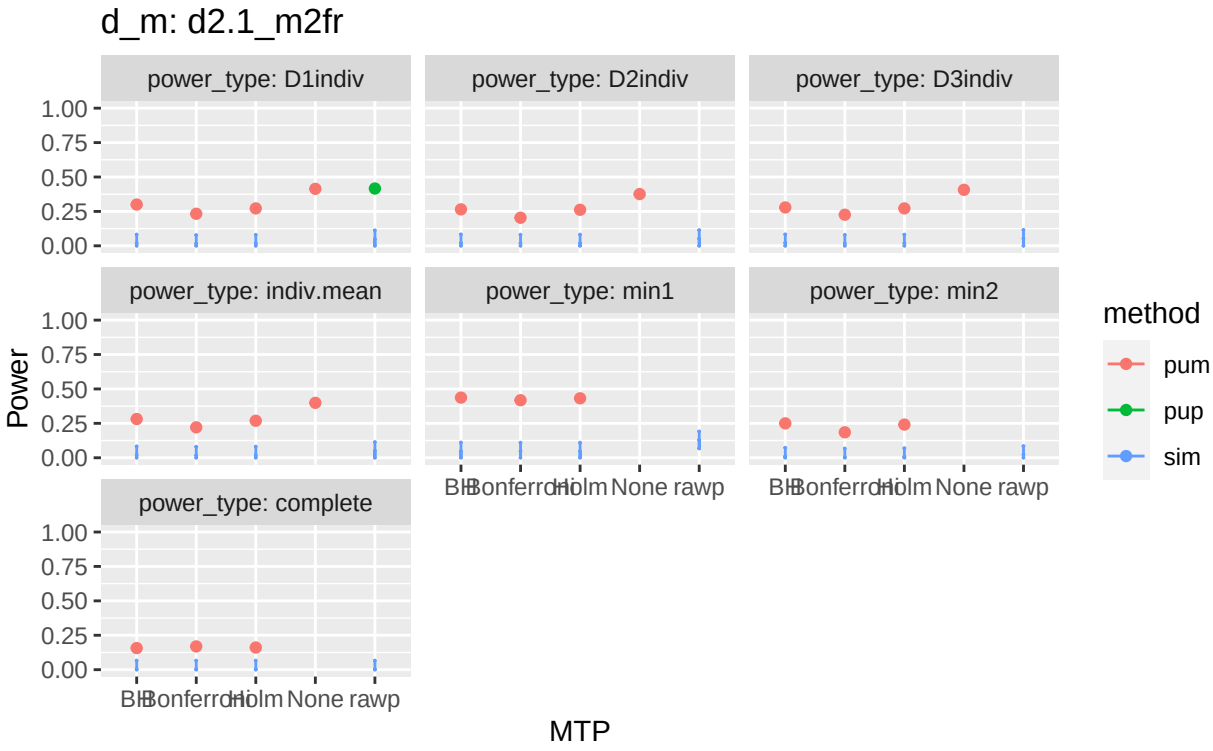


Varying ICC

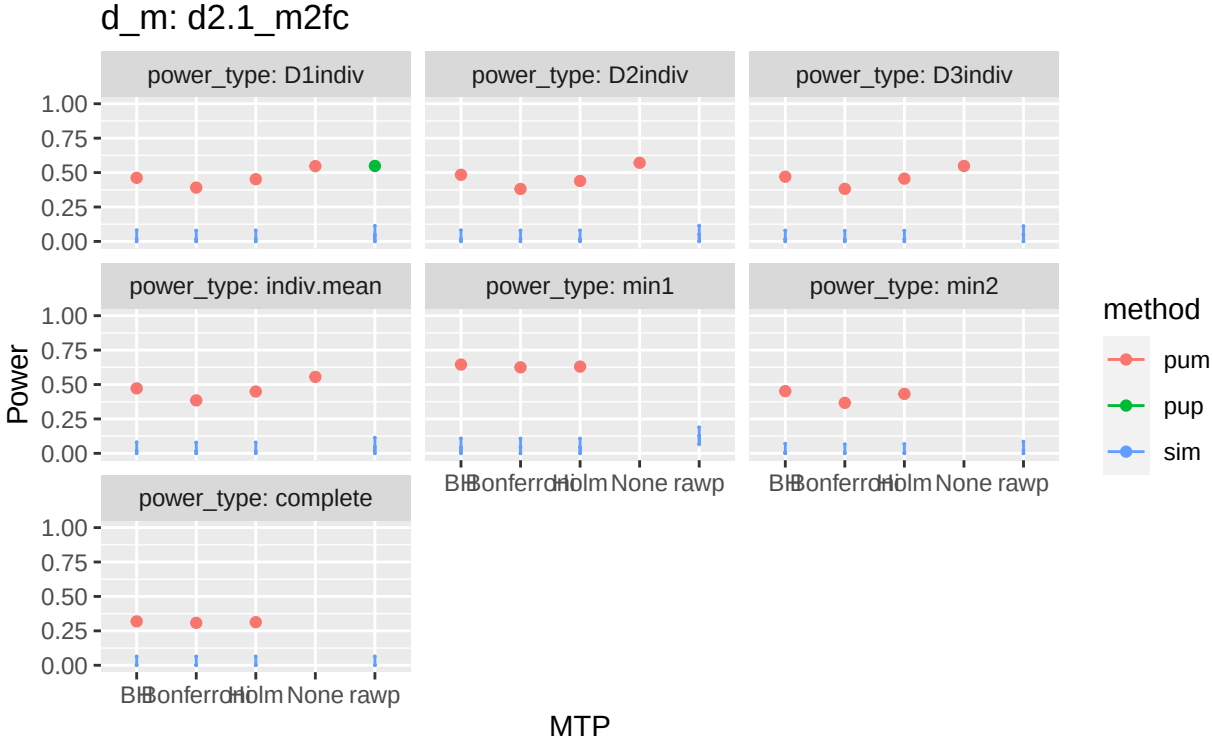
Note: we expect a discrepancy when ICC is not zero between powerup and pump.

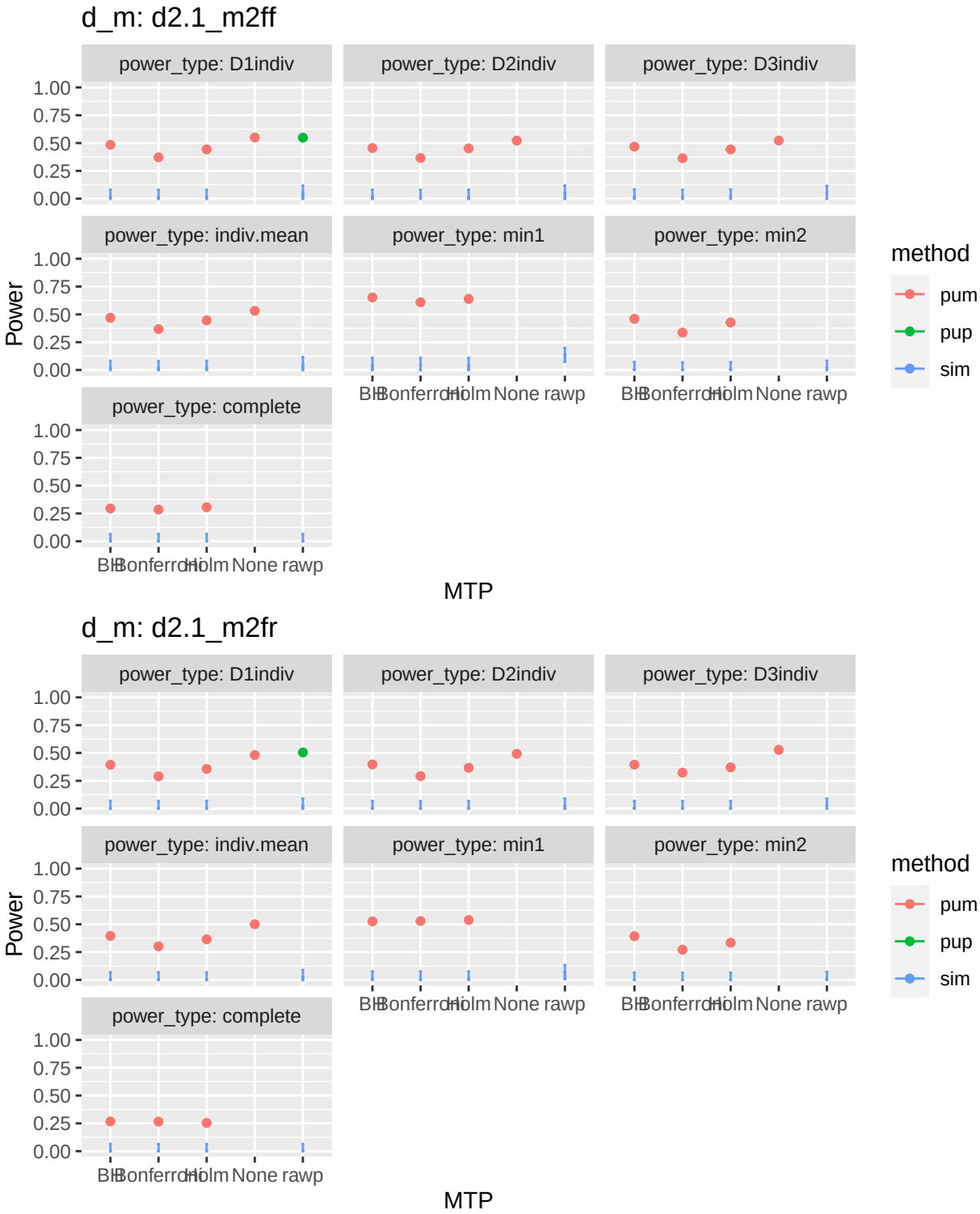
$\text{ICC}_2 = 0.7, 0.7, 0.7$





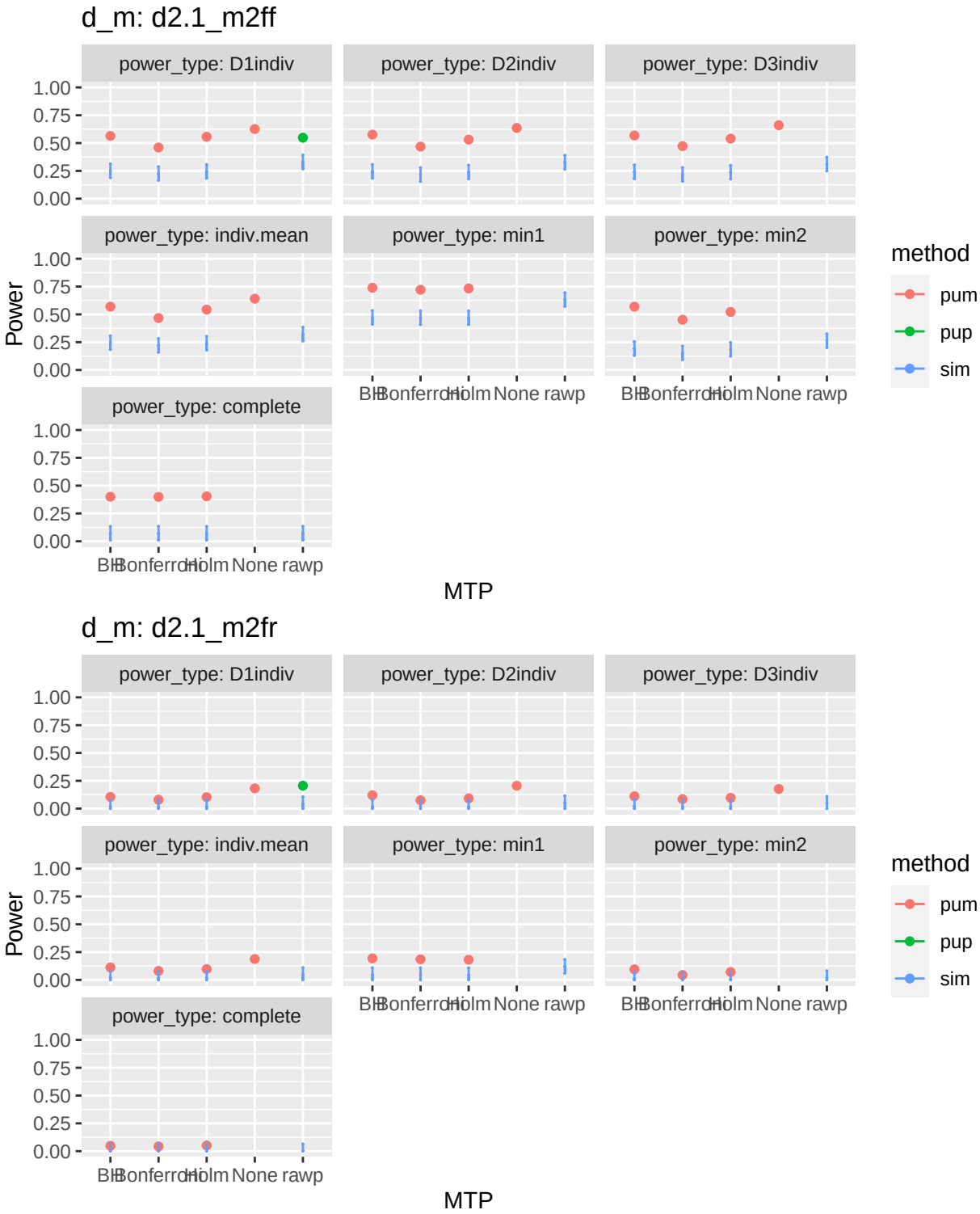
$\text{ICC}_2 = 0,\ 0,\ 0$



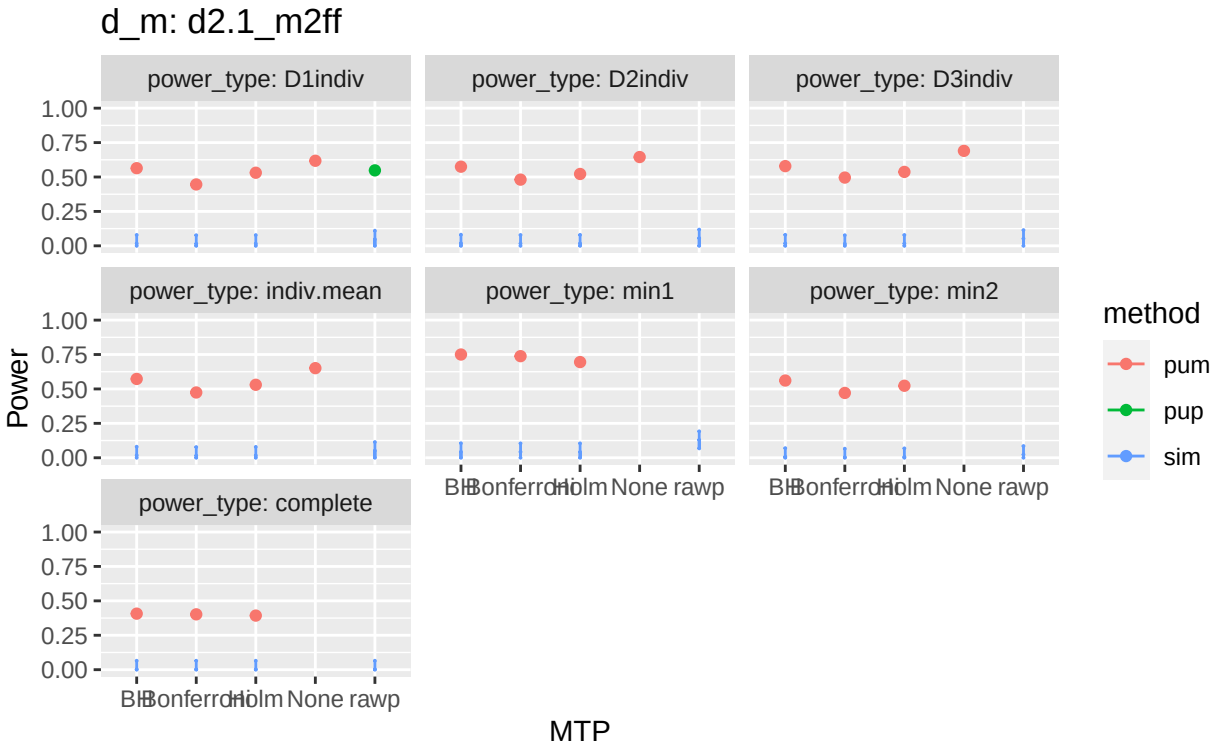


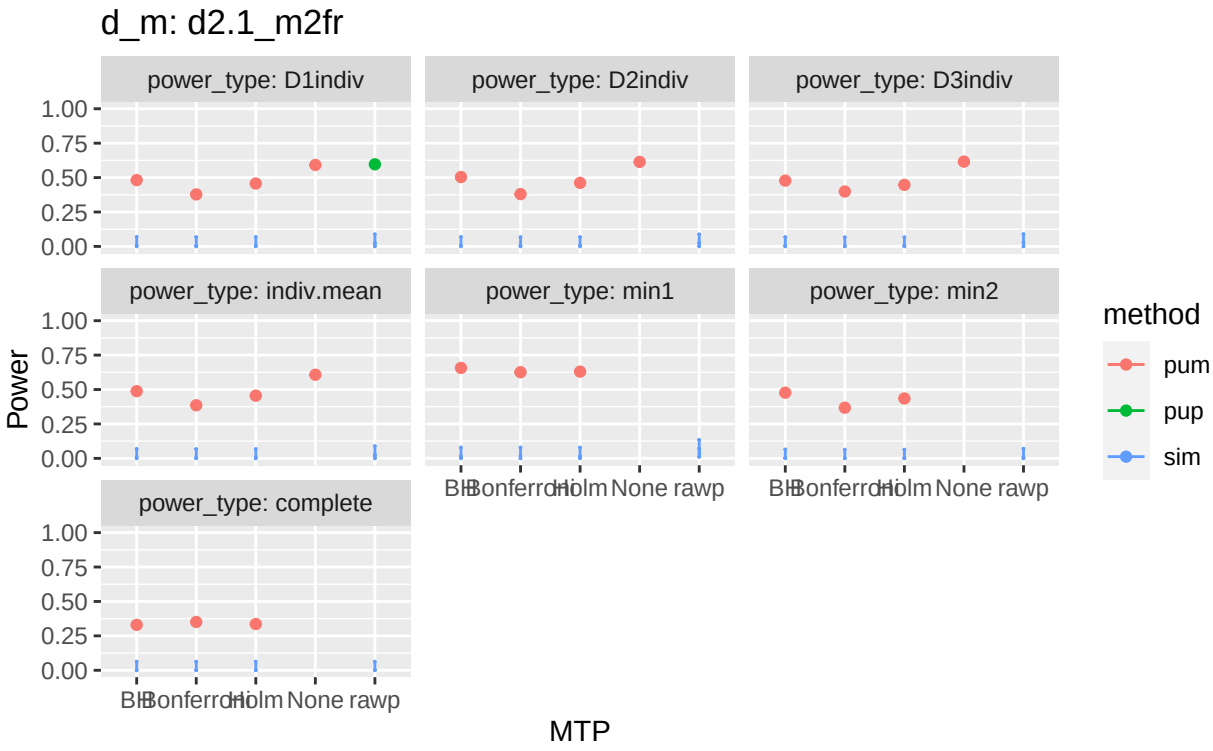
Varying Omega

$\omega_2 = 0.8, 0.8, 0.8$


d_m: d2.1_m2ff
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
rawp
MTP
method
pum
pup
sim
d_m: d2.1_m2fr
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
rawp
MTP
method
pum
pup
sim

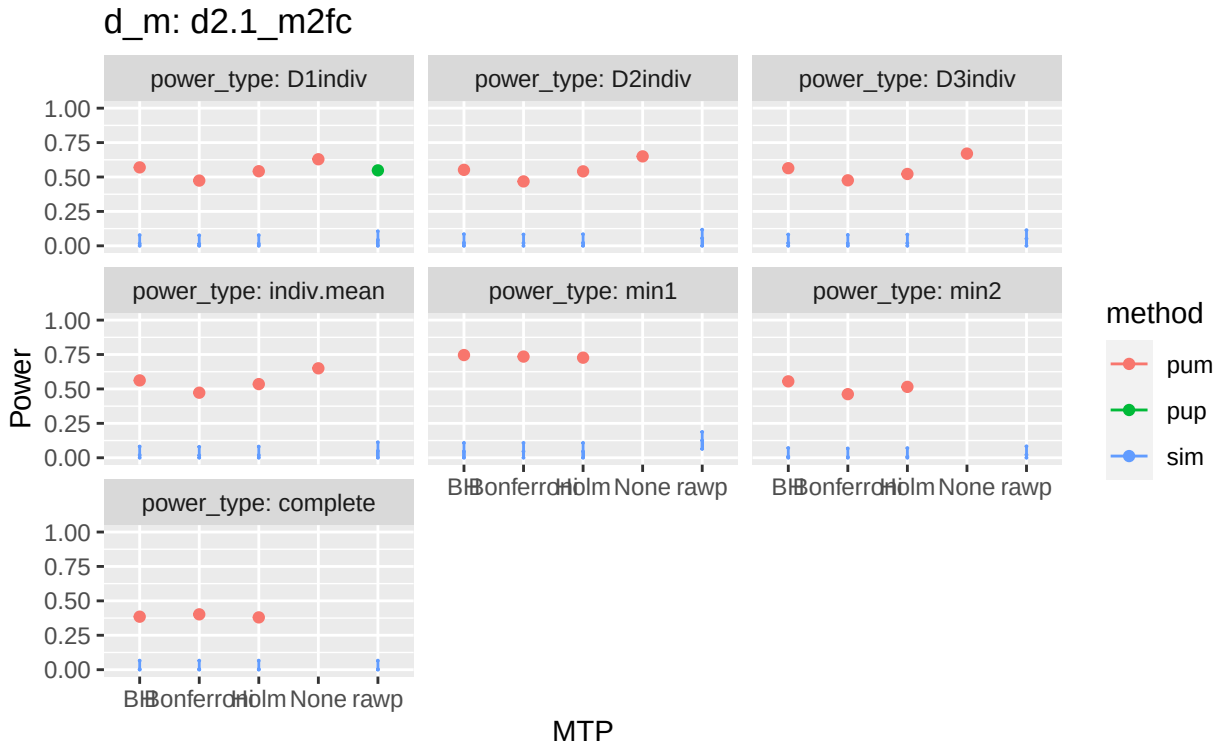
$\omega_2 = 0, 0, 0$

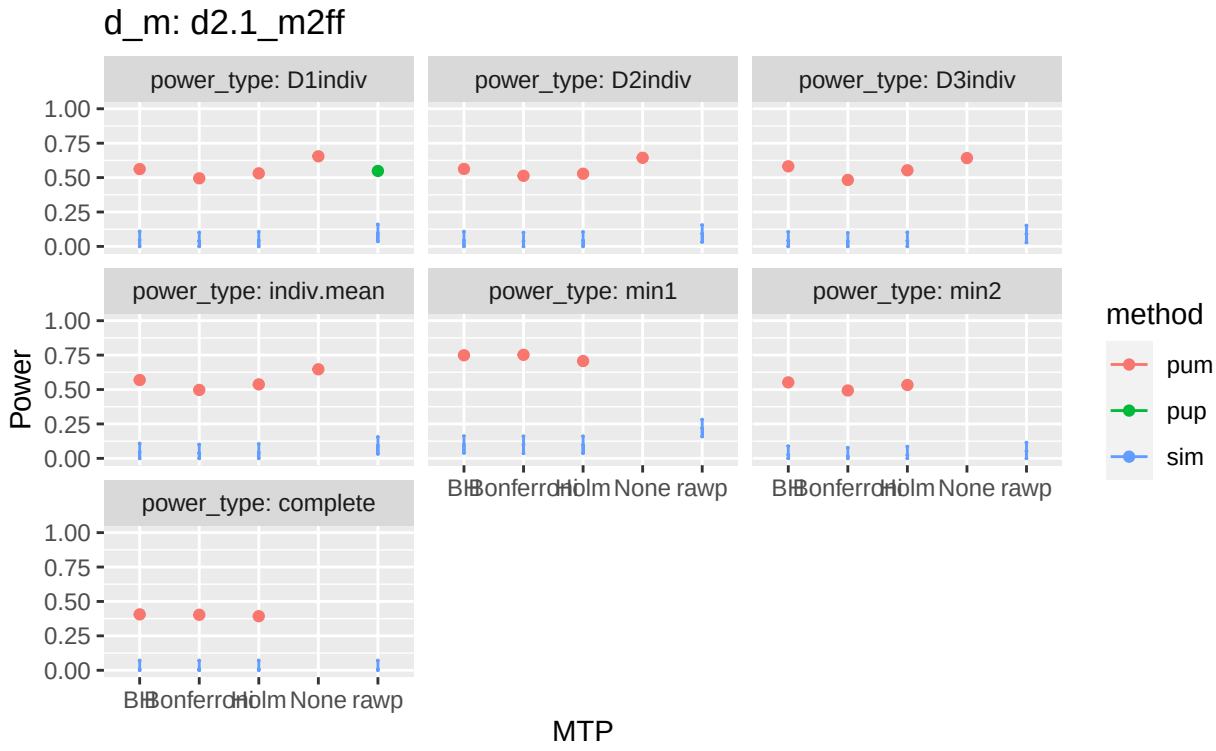


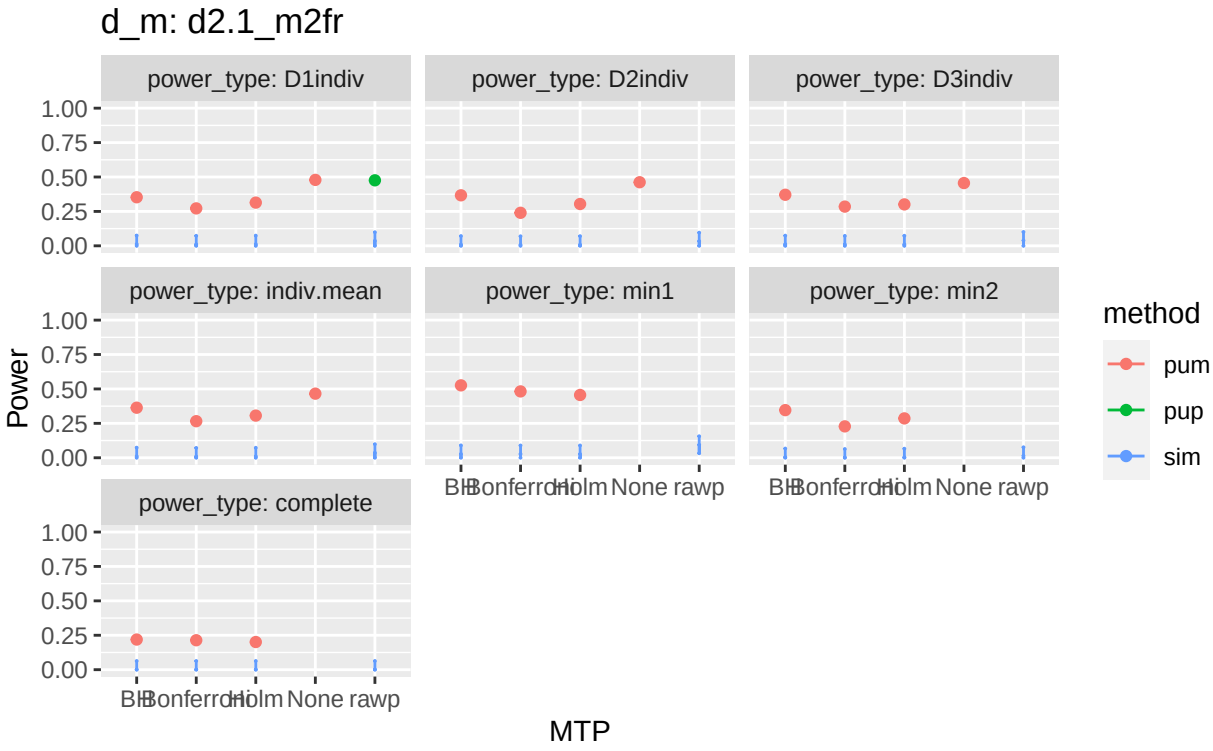


Kappa

$\kappa = 0.4$


d_m: d2.1_m2fc
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
rawp
MTP
method
pum
pup
sim


d_m: d2.1_m2ff
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
rawp
MTP
method
pum
pup
sim



MDES validation

```
##
##
## +------------+---------------+---------------+-------------+
## |    MTP     | Adjusted MDES | D1indiv Power | Target MDES |
## +============+===============+===============+=============+
## | Bonferroni |     0.125     |     0.474     |    0.125    |
## +------------+---------------+---------------+-------------+
## |     BH     |     0.125     |     0.568     |    0.125    |
## +------------+---------------+---------------+-------------+
## |    Holm    |     0.124     |     0.537     |    0.125    |
## +------------+---------------+---------------+-------------+
##
## Table: d2.1_m2fc
```

```
##
##
## +------------+---------------+---------------+-------------+
## |    MTP     | Adjusted MDES | D1indiv Power | Target MDES |
## +============+===============+===============+=============+
## | Bonferroni |     0.128     |     0.495     |    0.125    |
## +------------+---------------+---------------+-------------+
## |     BH     |     0.125     |     0.561     |    0.125    |
## +------------+---------------+---------------+-------------+
## |    Holm    |     0.123     |     0.531     |    0.125    |
## +------------+---------------+---------------+-------------+
##
## Table: d2.1_m2ff
```

```
##
##
## +------------+---------------+---------------+-------------+
## |    MTP     | Adjusted MDES | D1indiv Power | Target MDES |
## +============+===============+===============+=============+
## | Bonferroni |     0.126     |     0.272     |    0.125    |
## +------------+---------------+---------------+-------------+
## |     BH     |     0.125     |     0.354     |    0.125    |
## +------------+---------------+---------------+-------------+
## |    Holm    |     0.124     |     0.317     |    0.125    |
## +------------+---------------+---------------+-------------+
##
## Table: d2.1_m2fr
```

Sample size validation

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |      J      |     20      |     0.474     |
## +------------+-------------+-------------+---------------+
## |     BH     |      J      |     21      |     0.573     |
## +------------+-------------+-------------+---------------+
## |    Holm    |      J      |     21      |     0.549     |
## +------------+-------------+-------------+---------------+
##
## Table: d2.1_m2fc
```

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |    nbar     |    50.98    |     0.474     |
## +------------+-------------+-------------+---------------+
## |     BH     |    nbar     |     51      |     0.57      |
## +------------+-------------+-------------+---------------+
## |    Holm    |    nbar     |     49      |     0.533     |
## +------------+-------------+-------------+---------------+
##
## Table: d2.1_m2fc
```

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |      J      |     21      |     0.495     |
## +------------+-------------+-------------+---------------+
## |     BH     |      J      |     20      |     0.558     |
## +------------+-------------+-------------+---------------+
```

```
## |    Holm    |      J      |     20      |     0.531     |
## +------------+-------------+-------------+---------------+
##
## Table: d2.1_m2ff
```

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |    nbar     |    53.27    |     0.495     |
## +------------+-------------+-------------+---------------+
## |     BH     |    nbar     |     50      |     0.559     |
## +------------+-------------+-------------+---------------+
## |    Holm    |    nbar     |     49      |     0.523     |
## +------------+-------------+-------------+---------------+
##
## Table: d2.1_m2ff
```

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |      J      |     20      |     0.272     |
## +------------+-------------+-------------+---------------+
## |     BH     |      J      |     20      |     0.349     |
## +------------+-------------+-------------+---------------+
## |    Holm    |      J      |     20      |     0.311     |
## +------------+-------------+-------------+---------------+
##
## Table: d2.1_m2fr
```

```
##
##
## +------------+-------------+-------------+---------------+
## |    MTP     | Sample.type | Sample.size | D1indiv.power |
## +============+=============+=============+===============+
## | Bonferroni |      J      |     20      |     0.272     |
## +------------+-------------+-------------+---------------+
## |     BH     |      J      |     20      |     0.349     |
## +------------+-------------+-------------+---------------+
## |    Holm    |      J      |     20      |     0.311     |
## +------------+-------------+-------------+---------------+
##
## Table: d2.1_m2fr
```