

Power Validation

MDES validation

Sample size validation

# Validate Power: blocked\_i1\_2cfr

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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:  $\rho = 0.5$
- ATE ES = 0.125, 0.125, 0.125
- R2.1:  $R_1^2 = 0.1, 0.1, 0.1$

Parameters by model type:

- Omega:  $\omega_2 = 0$  for constant effects,  $\omega_2 = 0.1$  for fixed and random
- ICC:  $ICC_2 = 0$  for constant and fixed effects,  $ICC_2 = 0.2, 0.2, 0.2$  for random effects

Assumptions:

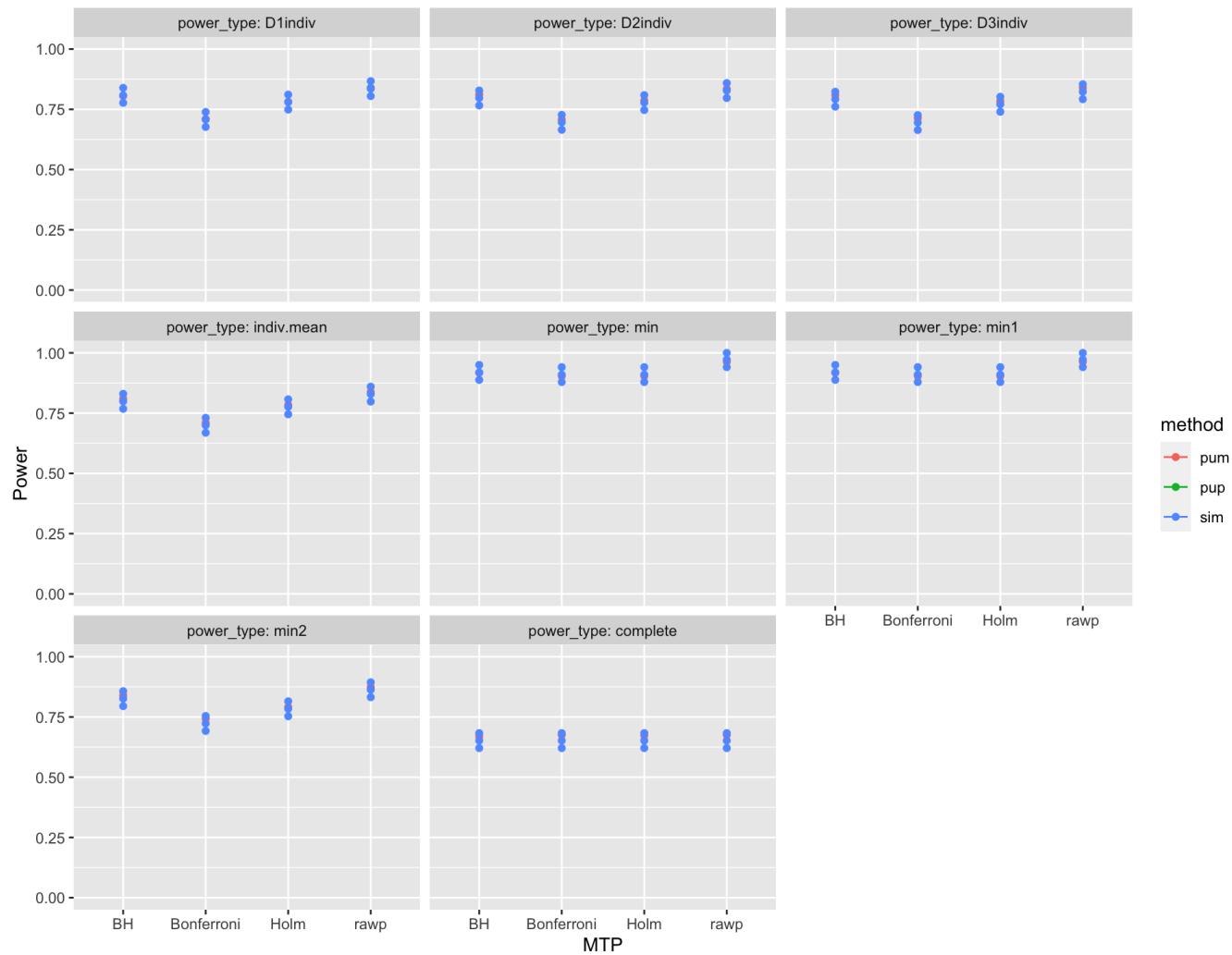
- Two-level design:  $ICC_3 = 0, \omega_3 = 0, K = 1$

## Power Validation

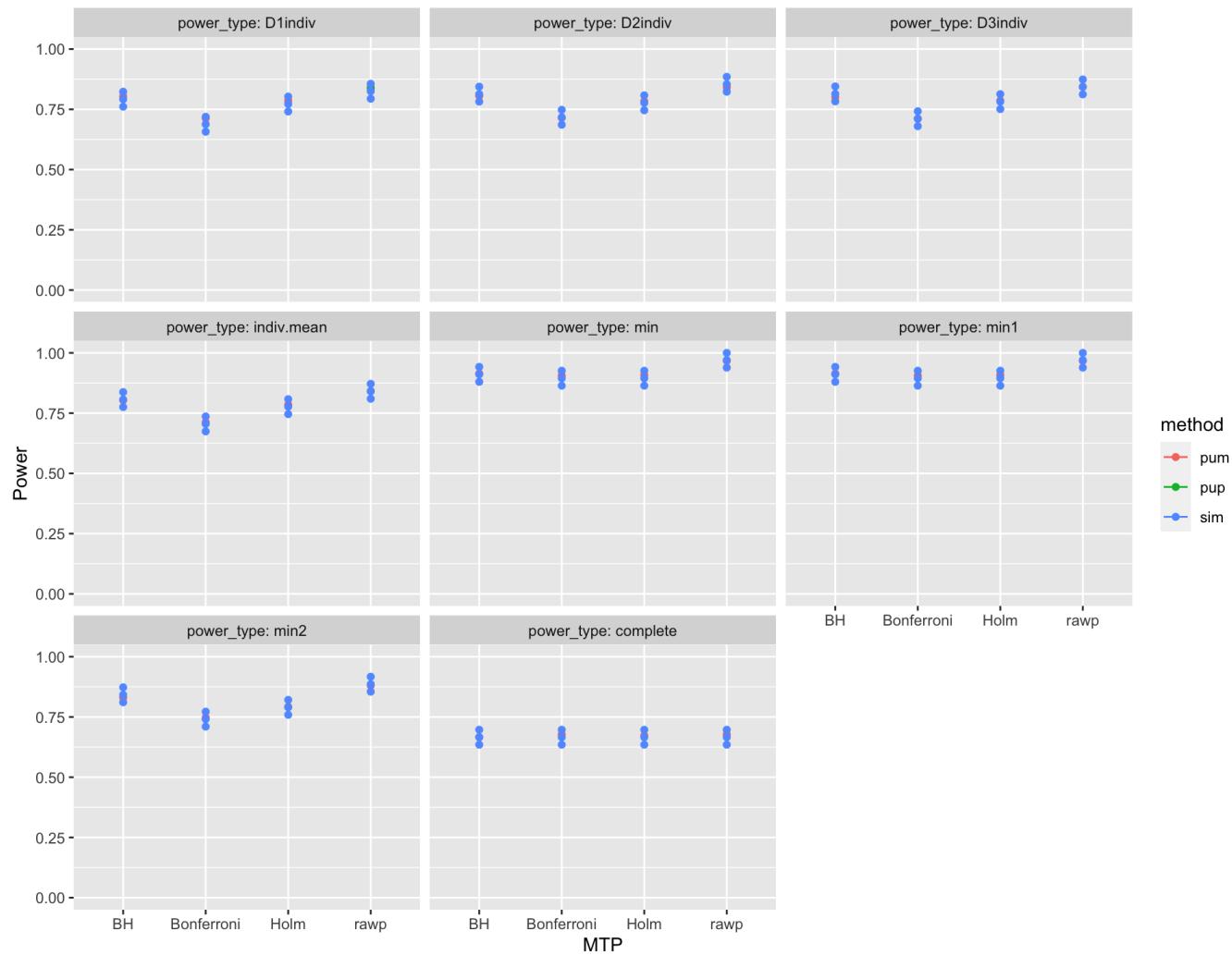
## Varying school size

$\bar{n} = 100$

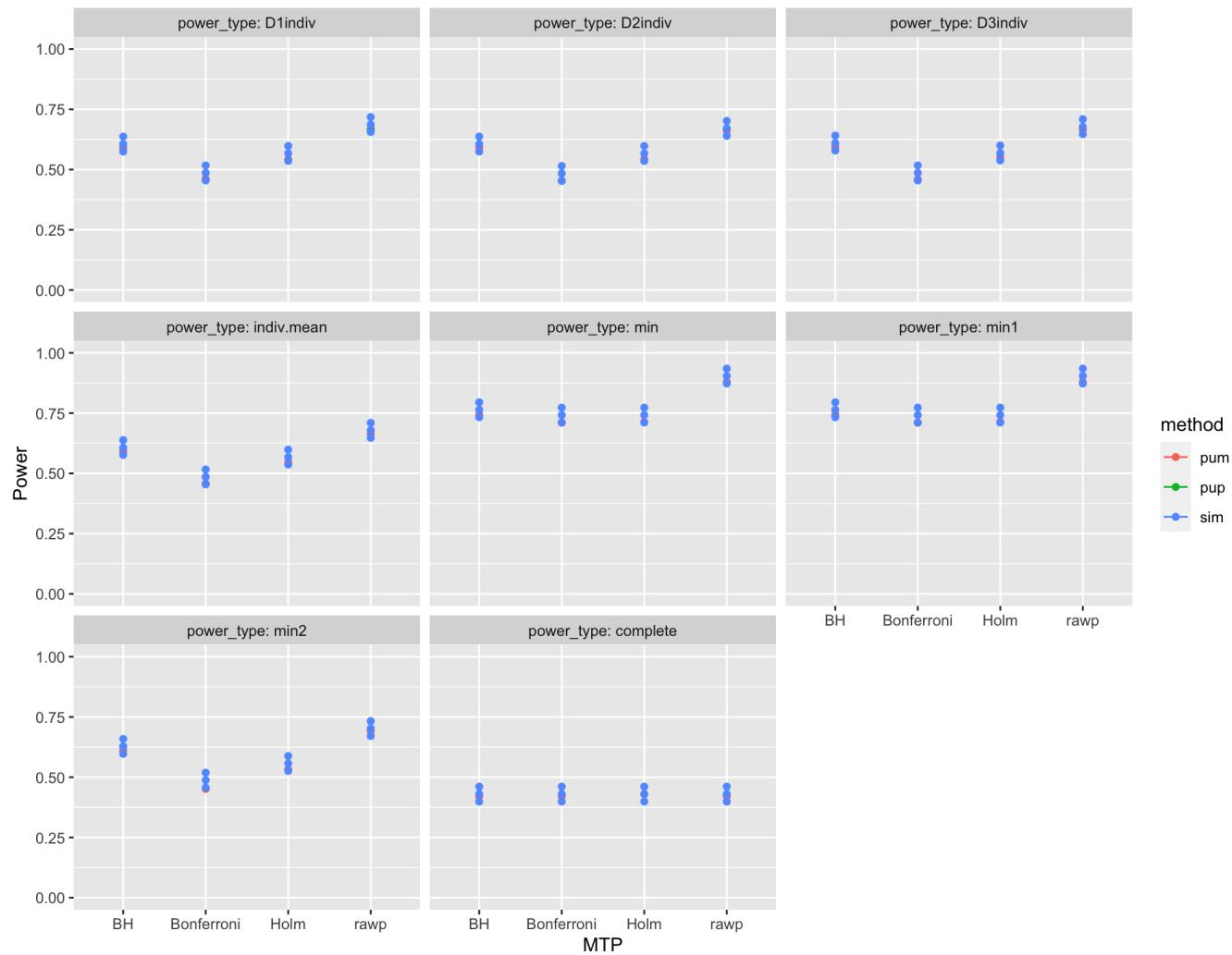
## Design: blocked\_i1\_2cfr



## Design: blocked\_i1\_2f

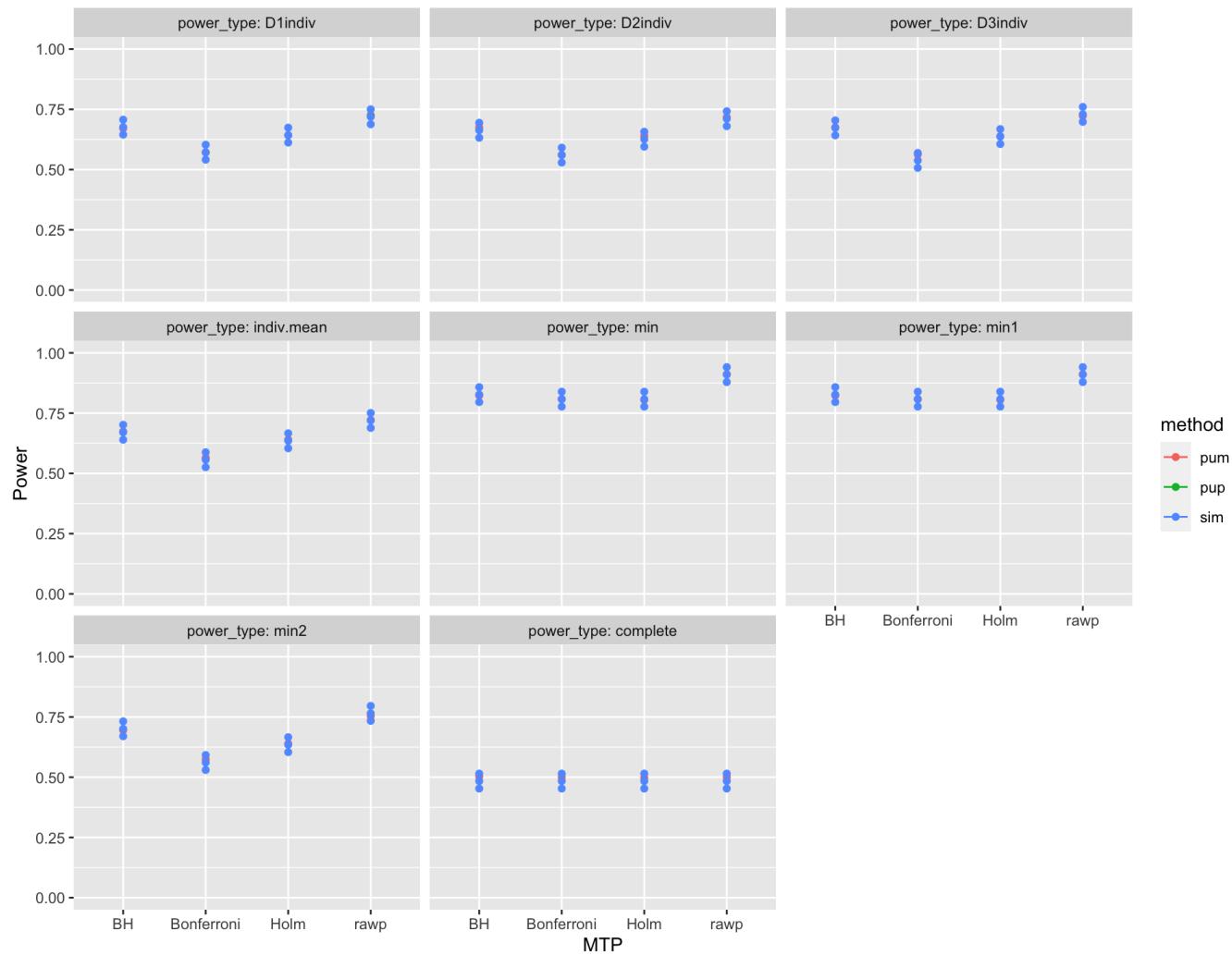


## Design: blocked\_i1\_2r

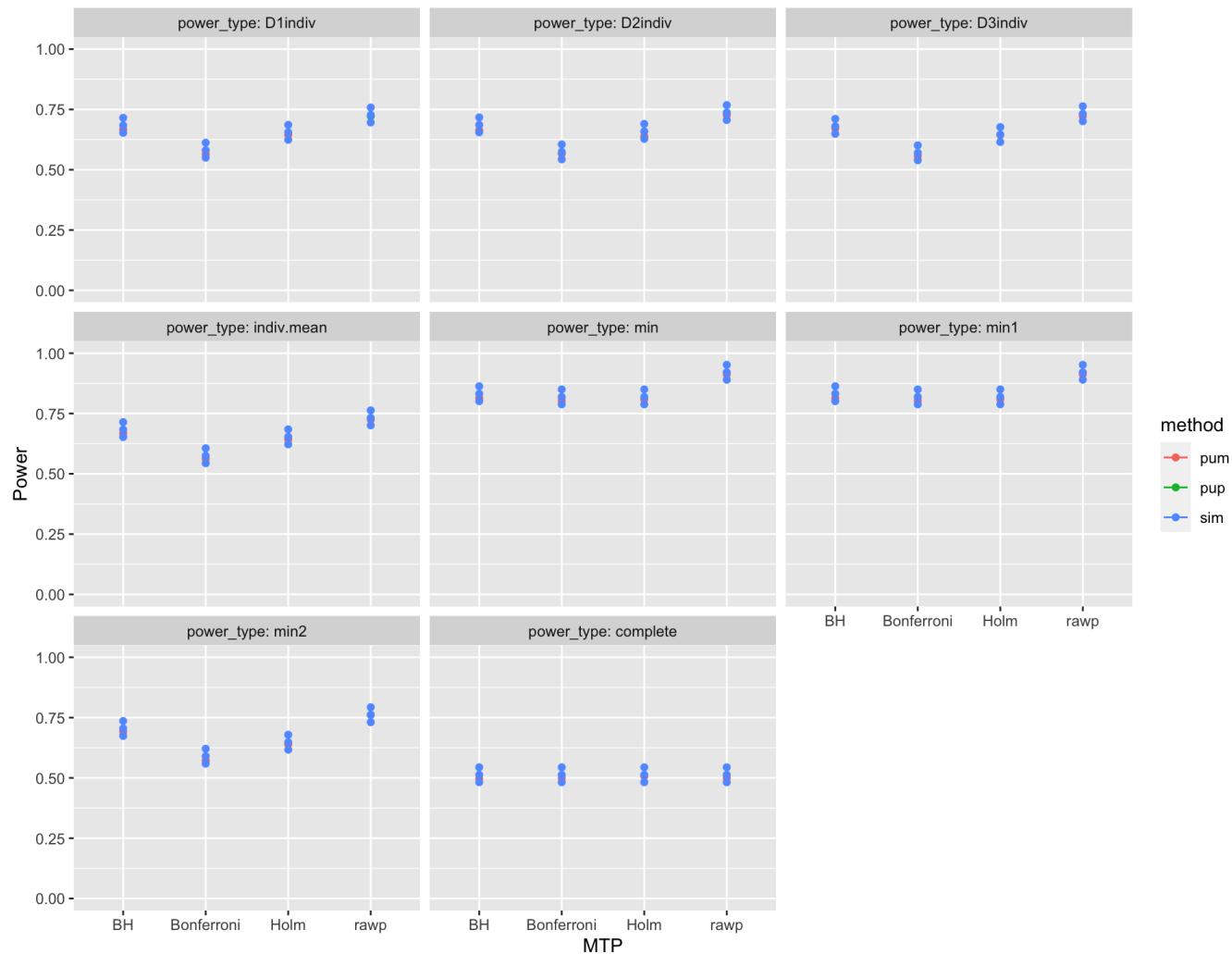


$$\bar{n} = 75$$

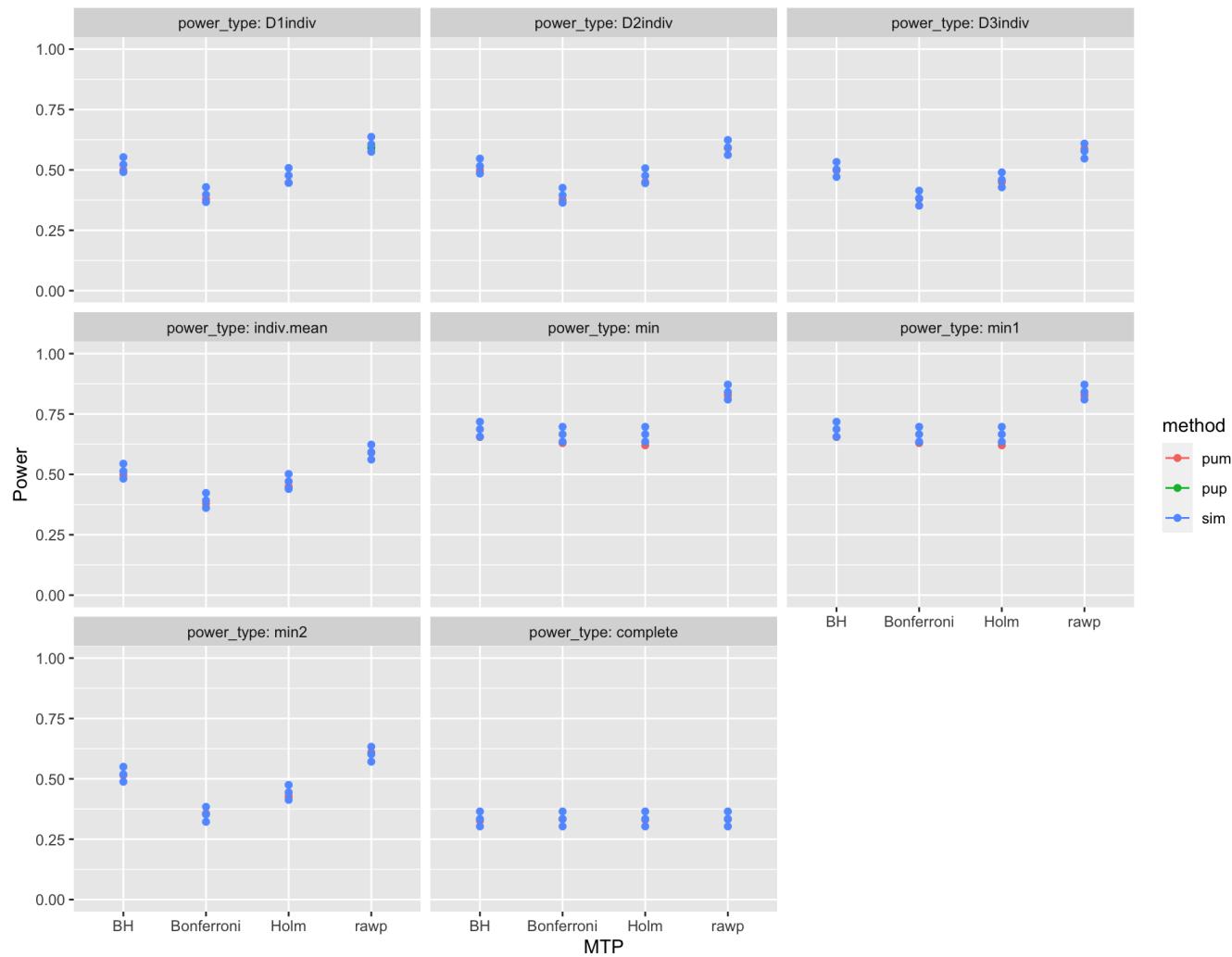
## Design: blocked\_i1\_2cfr



## Design: blocked\_i1\_2f

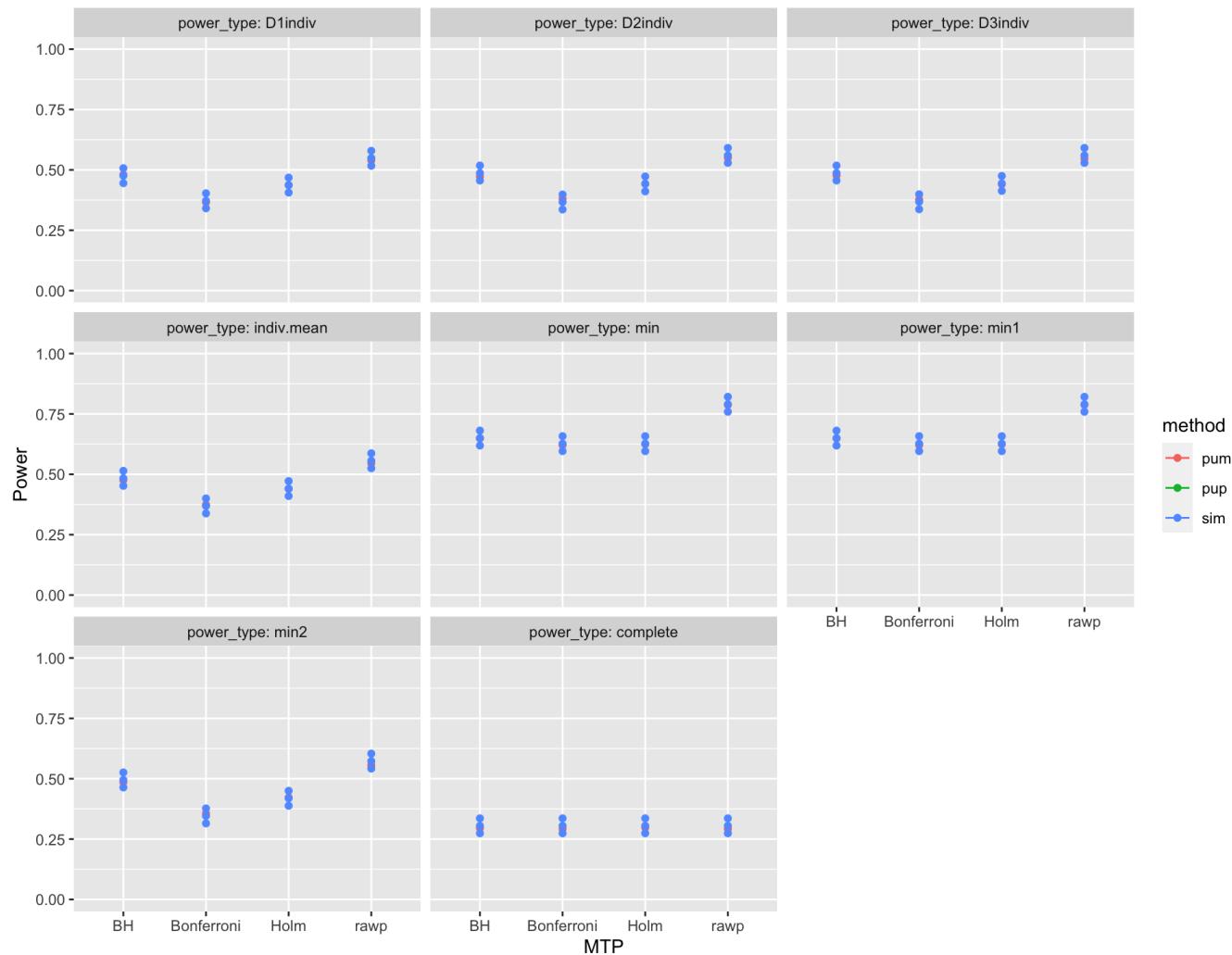


## Design: blocked\_i1\_2r

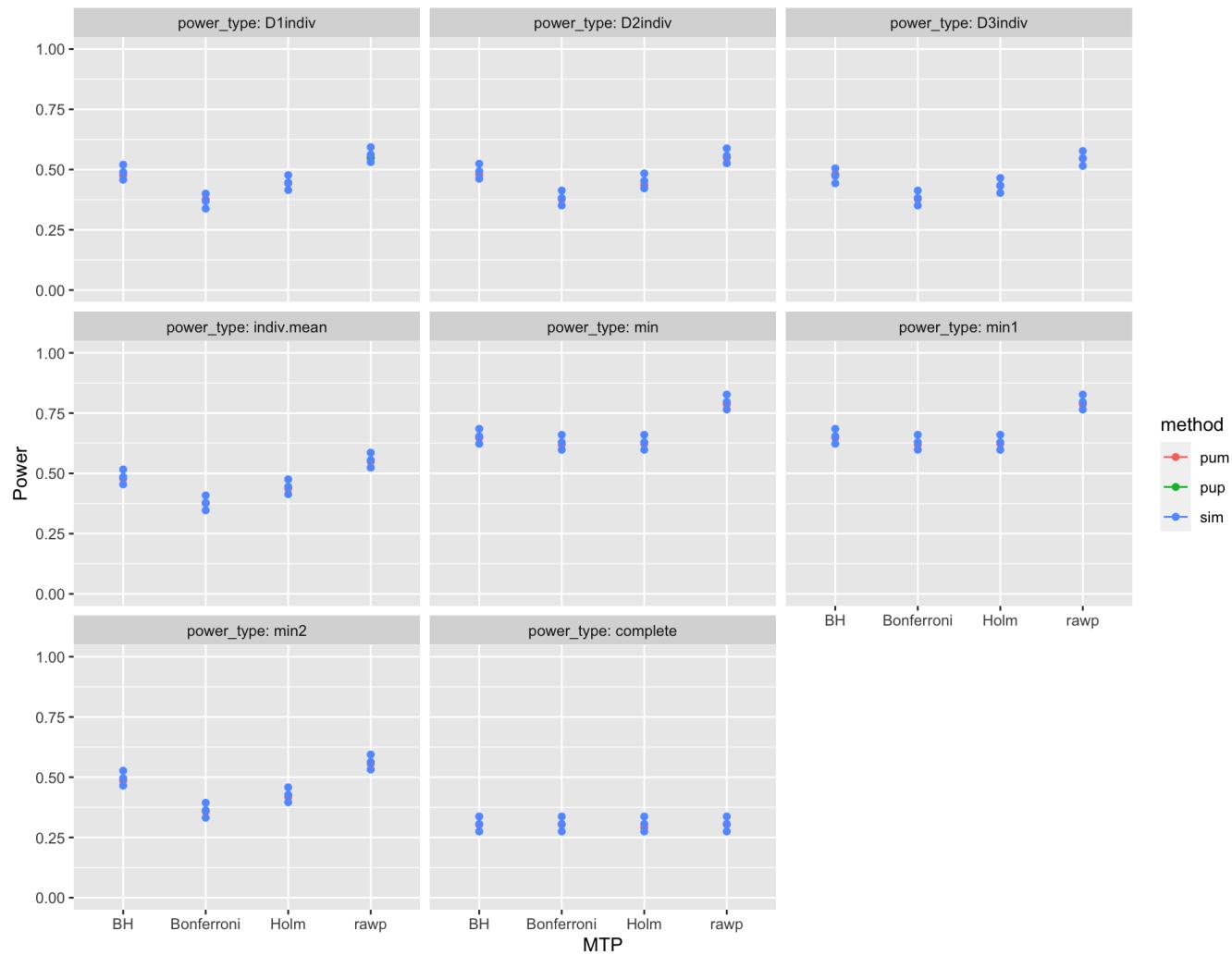


$$\bar{n} = 50$$

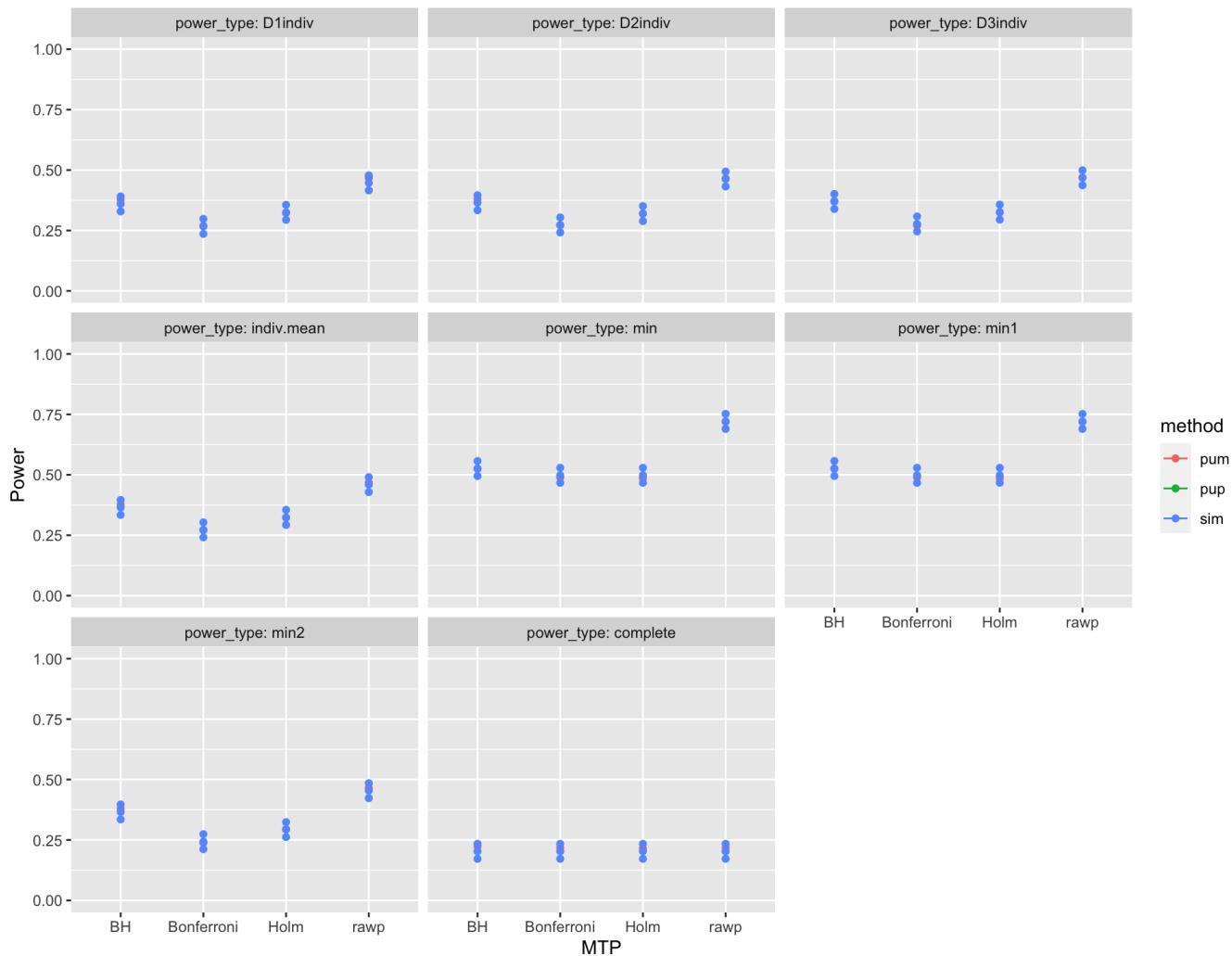
## Design: blocked\_i1\_2c



## Design: blocked\_i1\_2f

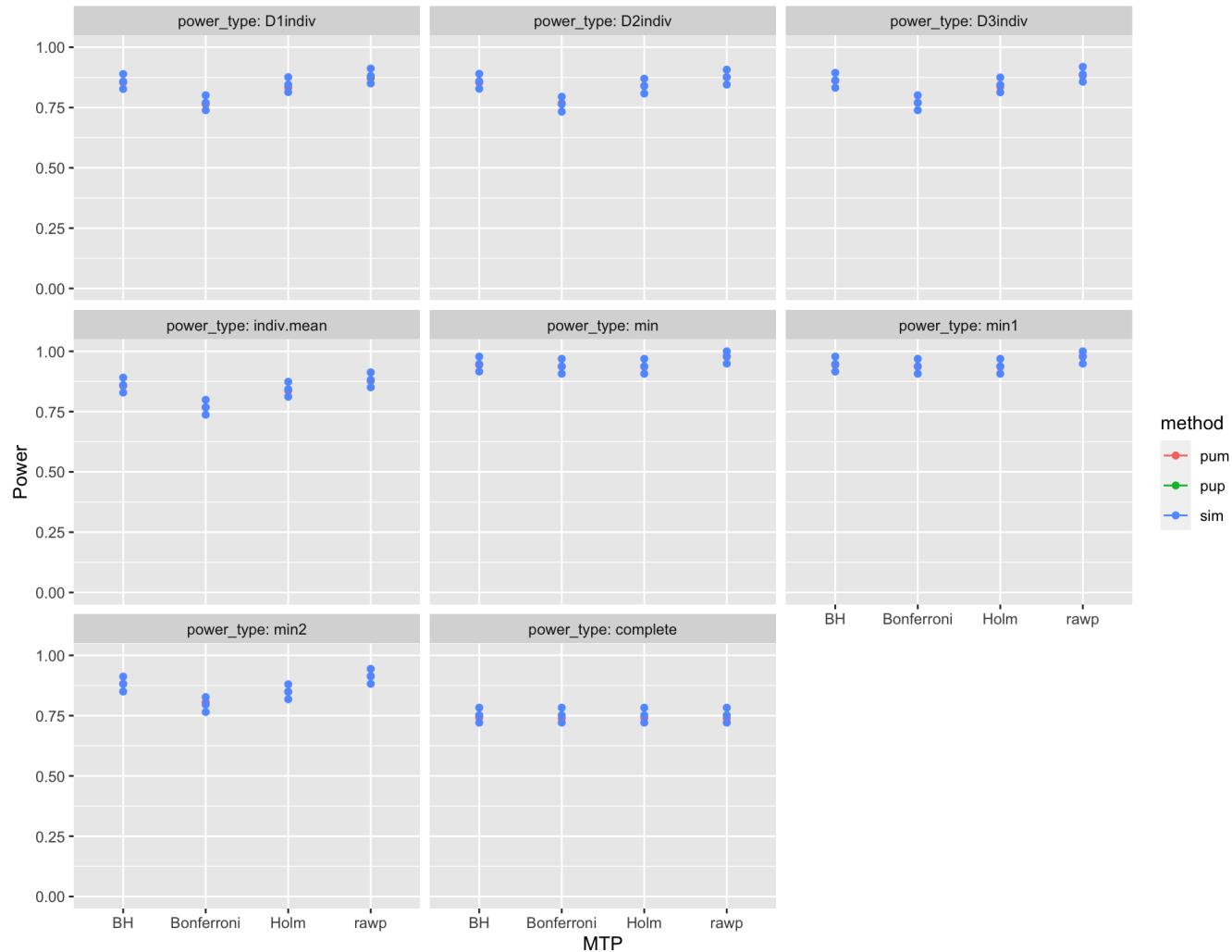


## Design: blocked\_i1\_2r

Varying R<sub>2</sub>

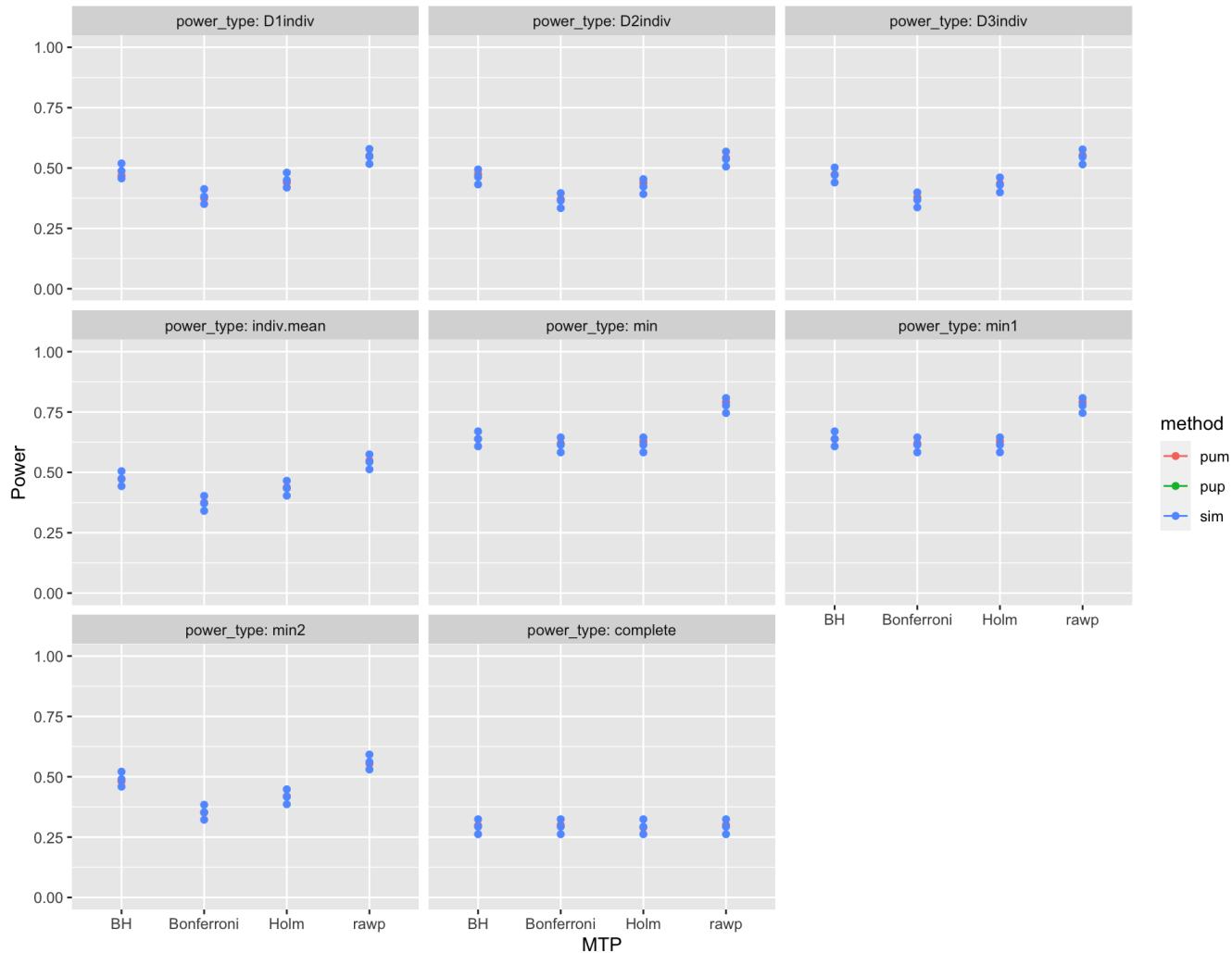
$$R_1^2 = 0.6, 0.6, 0.6$$

## Design: blocked\_i1\_2cfr



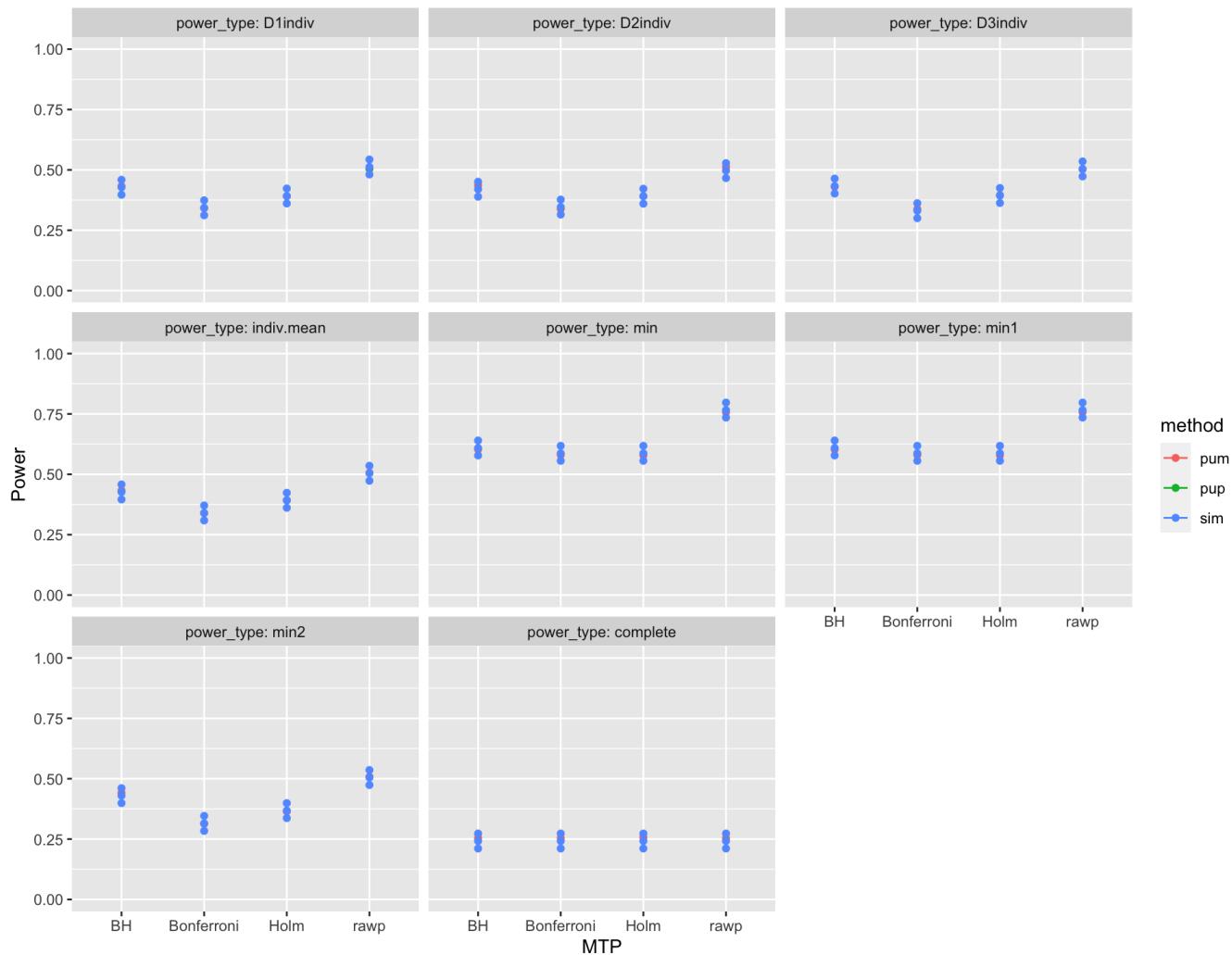
$R_2^2 = 0.6, 0.6, 0.6$  (This should not affect power!)

## Design: blocked\_i1\_2c



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

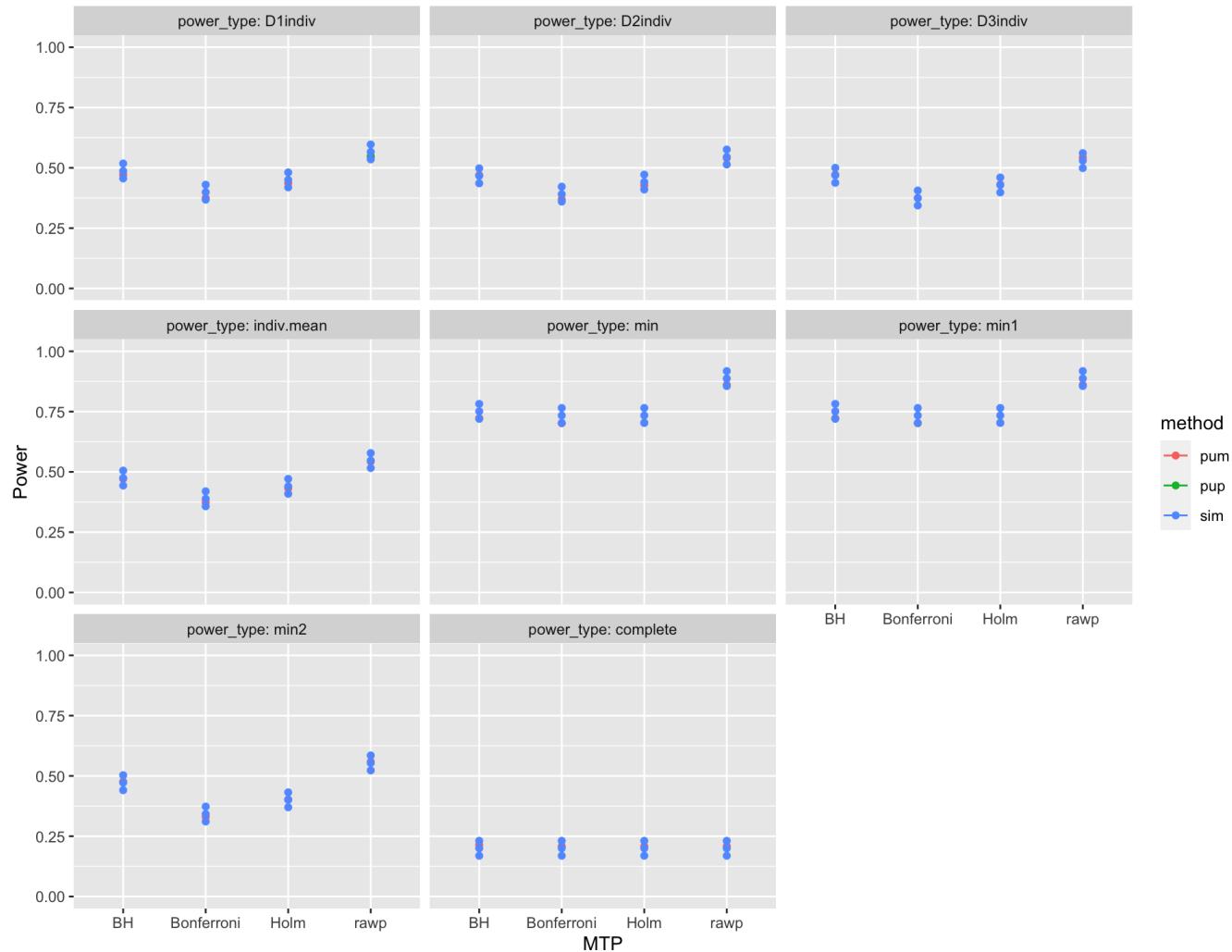
## Design: blocked\_i1\_2c



## Varying rho

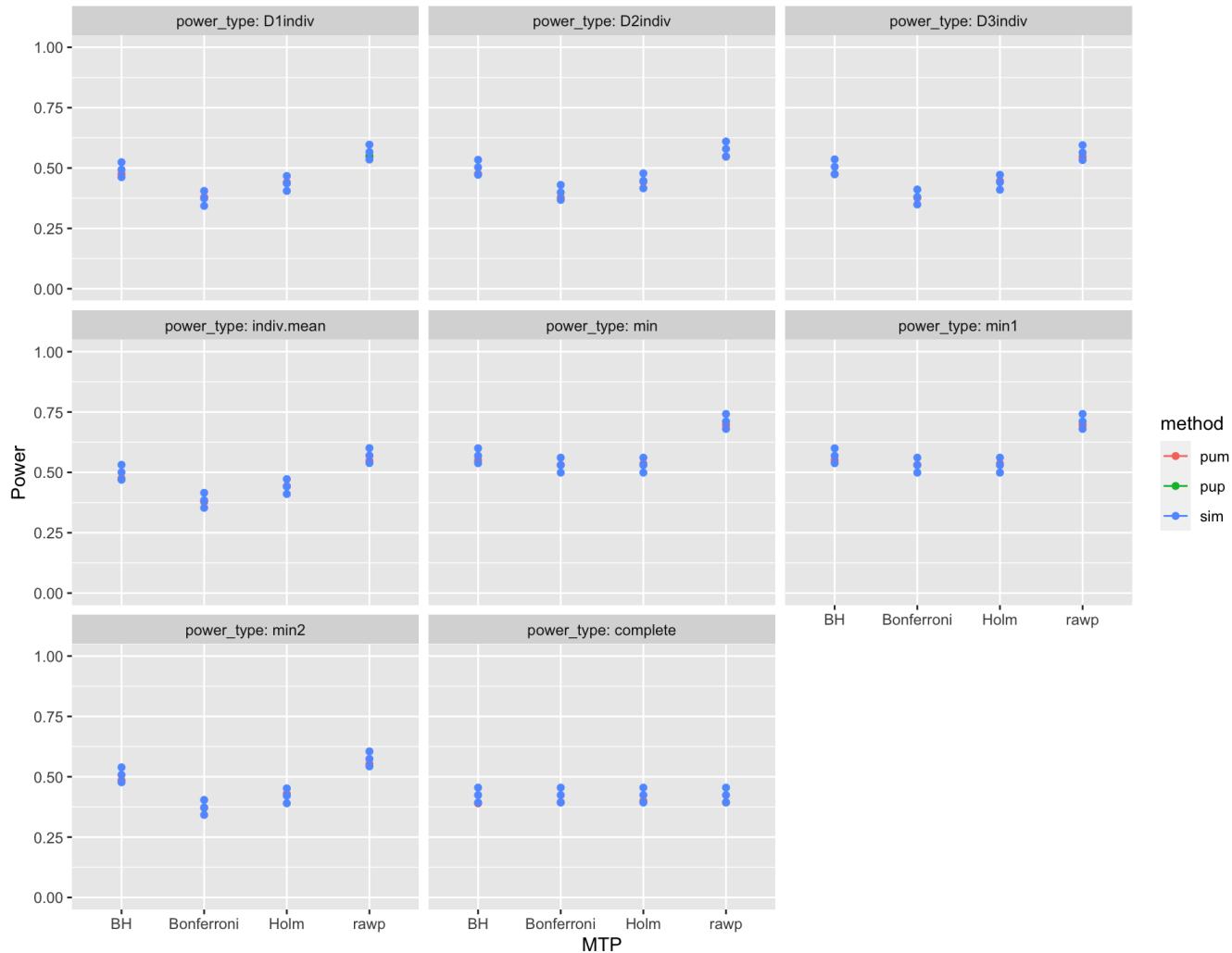
$$\rho = 0.2$$

## Design: blocked\_i1\_2c



$$\rho = 0.8$$

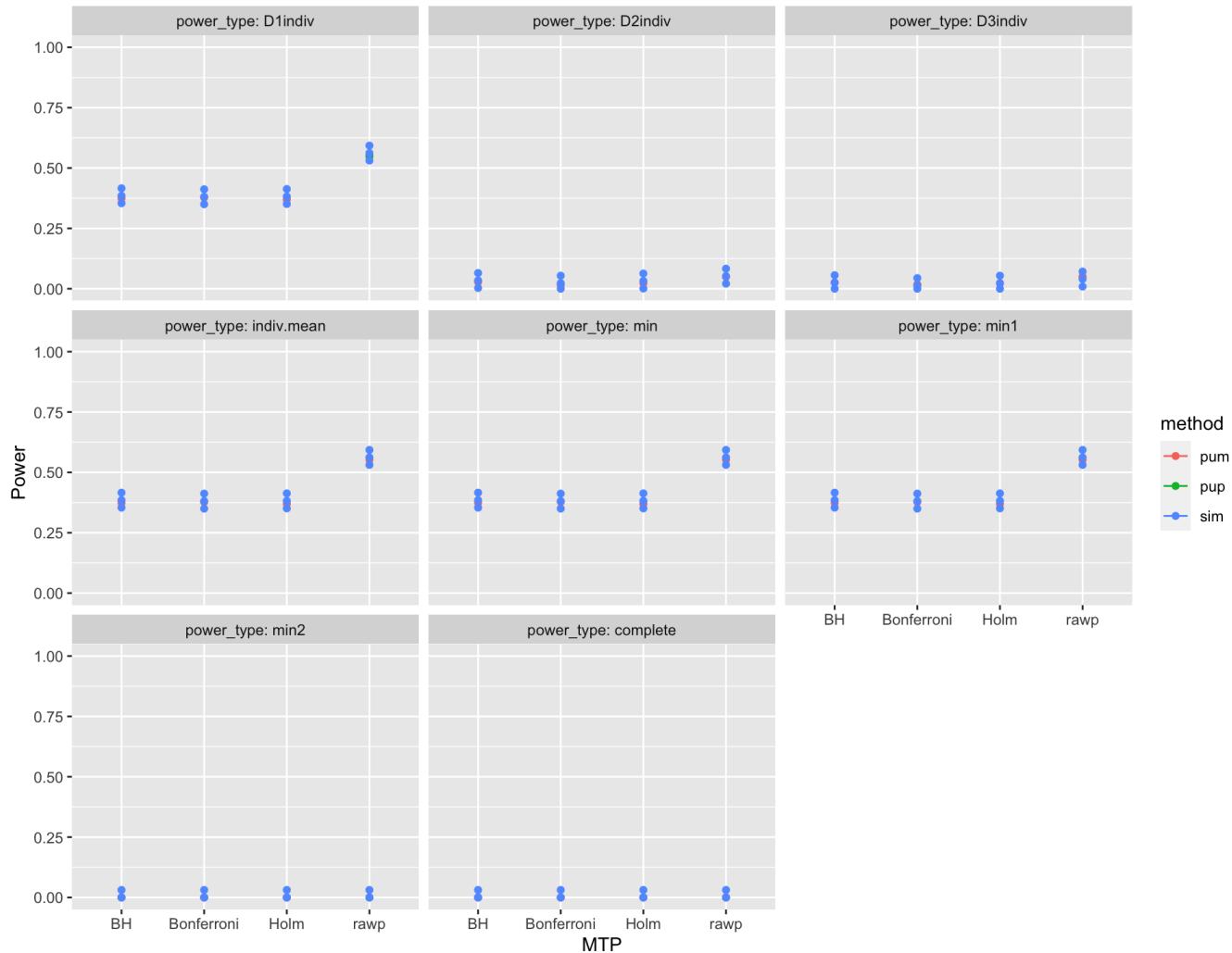
## Design: blocked\_i1\_2c



## Varying true positives

ATE (ES) = 0.125, 0, 0

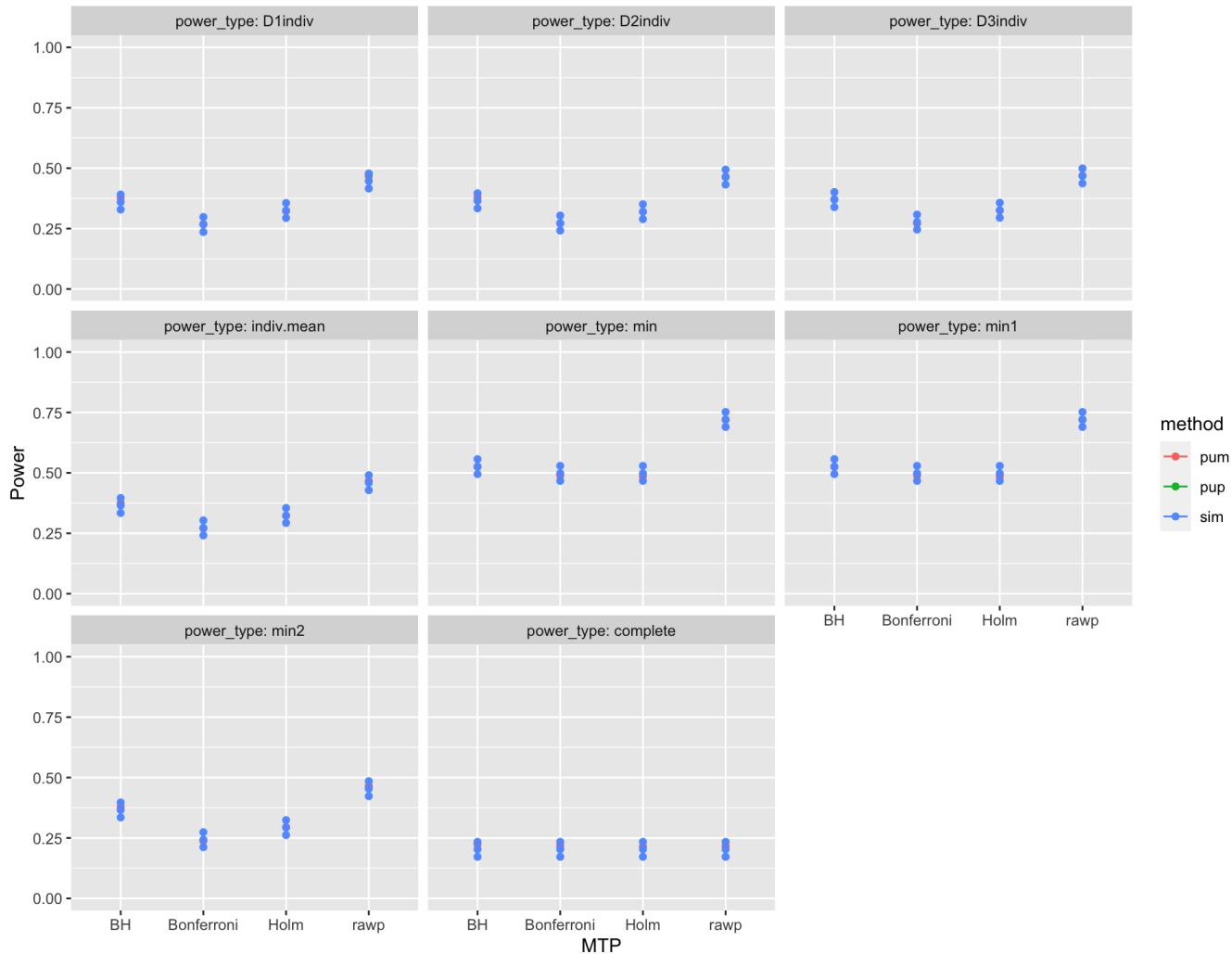
## Design: blocked\_i1\_2c



## Varying ICC

 $ICC_2 = 0.8, 0.8, 0.8$

## Design: blocked\_i1\_2r



## MDES validation

```
##  
##  
## +-----+-----+-----+-----+  
## | MTP | Adjusted MDES | D1indiv Power | Target MDES |  
## +=====+=====+=====+=====+  
## | rawp | 0.124 | 0.539 | 0.125 |  
## +-----+-----+-----+-----+  
## | Bonferroni | 0.123 | 0.366 | 0.125 |  
## +-----+-----+-----+-----+  
## | BH | 0.124 | 0.481 | 0.125 |  
## +-----+-----+-----+-----+  
## | Holm | 0.125 | 0.437 | 0.125 |  
## +-----+-----+-----+-----+  
##  
## Table: blocked_i1_2c
```

```
##
##
## +-----+-----+-----+
## | MTP | Adjusted MDES | min2 Power | Target MDES |
## +=====+=====+=====+=====
## | rawp | 0.126 | 0.556 | 0.125 |
## +-----+-----+-----+
## | Bonferroni | 0.122 | 0.356 | 0.125 |
## +-----+-----+-----+
## | BH | 0.125 | 0.49 | 0.125 |
## +-----+-----+-----+
## | Holm | 0.126 | 0.429 | 0.125 |
## +-----+-----+-----+
##
## Table: blocked_i1_2c
```

```
##
##
## +-----+-----+-----+
## | MTP | Adjusted MDES | D1indiv Power | Target MDES |
## +=====+=====+=====+=====
## | rawp | 0.126 | 0.468 | 0.125 |
## +-----+-----+-----+
## | Bonferroni | 0.125 | 0.269 | 0.125 |
## +-----+-----+-----+
## | BH | 0.125 | 0.375 | 0.125 |
## +-----+-----+-----+
## | Holm | 0.125 | 0.325 | 0.125 |
## +-----+-----+-----+
##
## Table: blocked_i1_2r
```

```
##
##
## +-----+-----+-----+
## | MTP | Adjusted MDES | min2 Power | Target MDES |
## +=====+=====+=====+=====
## | rawp | 0.125 | 0.465 | 0.125 |
## +-----+-----+-----+
## | Bonferroni | 0.119 | 0.238 | 0.125 |
## +-----+-----+-----+
## | BH | 0.126 | 0.383 | 0.125 |
## +-----+-----+-----+
## | Holm | 0.125 | 0.301 | 0.125 |
## +-----+-----+-----+
##
## Table: blocked_i1_2r
```

# Sample size validation

```
##  
##  
## +-----+-----+-----+-----+  
## | MTP | Sample type | Sample size | Dlindiv power | Target sample size |  
## +=====+=====+=====+=====+=====+  
## | BH | J | 21 | 0.476 | 20 |  
## +-----+-----+-----+-----+  
## | Holm | J | 20 | 0.435 | 20 |  
## +-----+-----+-----+-----+  
##  
## Table: blocked_i1_2c
```

```
##  
##  
## +-----+-----+-----+-----+  
## | MTP | Sample type | Sample size | min2 power | Target sample size |  
## +=====+=====+=====+=====+=====+  
## | BH | J | 21 | 0.486 | 20 |  
## +-----+-----+-----+-----+  
## | Holm | J | 20 | 0.413 | 20 |  
## +-----+-----+-----+-----+  
##  
## Table: blocked_i1_2c
```

```
##  
##  
## +-----+-----+-----+-----+  
## | MTP | Sample type | Sample size | Dlindiv power | Target sample size |  
## +=====+=====+=====+=====+=====+  
## | BH | J | 20 | 0.475 | 20 |  
## +-----+-----+-----+-----+  
## | Holm | J | 21 | 0.444 | 20 |  
## +-----+-----+-----+-----+  
##  
## Table: blocked_i1_2f
```

```
##  
##  
## +-----+-----+-----+-----+  
## | MTP | Sample type | Sample size | min2 power | Target sample size |  
## +=====+=====+=====+=====+=====+  
## | BH | J | 20 | 0.48 | 20 |  
## +-----+-----+-----+-----+  
## | Holm | J | 21 | 0.421 | 20 |  
## +-----+-----+-----+-----+  
##  
## Table: blocked_i1_2f
```

```
##  
##  
## +-----+-----+-----+-----+  
## | MTP | Sample type | Sample size | Dlindiv power | Target sample size |  
## +=====+=====+=====+=====+=====+  
## | BH | J | 20 | 0.37 | 20 |  
## +-----+-----+-----+-----+  
## | Holm | J | 21 | 0.332 | 20 |  
## +-----+-----+-----+-----+  
##  
## Table: blocked_i1_2r
```

```
##  
##  
## +-----+-----+-----+-----+  
## | MTP | Sample type | Sample size | min2 power | Target sample size |  
## +=====+=====+=====+=====+=====+  
## | BH | J | 21 | 0.389 | 20 |  
## +-----+-----+-----+-----+  
## | Holm | J | 20 | 0.29 | 20 |  
## +-----+-----+-----+-----+  
##  
## Table: blocked_i1_2r
```