

# Pain score at postoperative middle (6 to 18 hours) period

Boohwi Hong

## Package install

## Data Preparation

## Model Fitting

## Results of Model

```
##      Length      Class      Mode
##           22 character character

## Number of studies: k = 16
## Number of treatments: n = 5
## Number of pairwise comparisons: m = 22
## Number of designs: d = 9
##
## Random effects model
##
## Treatment estimate (sm = 'MD', comparison: other treatments vs 'Control'):
##           MD           95%-CI      z p-value
## Control      .             .             .
## ESPB    -1.2803 [-1.9662; -0.5944] -3.66 0.0003
## INB     -0.9332 [-1.7789; -0.0875] -2.16 0.0306
## SPB     -0.7837 [-1.6420;  0.0746] -1.79 0.0735
## TPVB    -1.3013 [-2.0691; -0.5336] -3.32 0.0009
##
## Quantifying heterogeneity / inconsistency:
## tau^2 = 0.6796; tau = 0.8244; I^2 = 92.6% [89.5%; 94.7%]
##
## Tests of heterogeneity (within designs) and inconsistency (between designs):
##           Q d.f.  p-value
## Total           201.38  15 < 0.0001
## Within designs   66.23   8 < 0.0001
## Between designs 135.15   7 < 0.0001

## Original data (with adjusted standard errors for multi-arm studies):
##
##           treat1 treat2      TE  seTE seTE.adj narms multiarm
## Liu,2021    Control  ESPB  1.3000 0.1265  0.1265    2
## Hu,2021     Control  TPVB  0.9000 0.1329  0.1329    2
```

Study	Control	Treatment	MD	95%-CI	CI	Significance	
Yao,2020	Control	ESPB	1.0000	0.1848	0.1848	2	
Viti,2020	Control	SPB	1.9000	0.6095	0.6095	2	
Turhan,2020	ESPB	TPVB	1.4000	0.7653	1.0262	3	*
Turhan,2020	INB	TPVB	0.4000	0.5460	0.5913	3	*
Turhan,2020	ESPB	INB	1.0000	0.7573	0.9850	3	*
Lee, 2020	INB	SPB	0.0000	0.2359	0.2359	2	
Kim, 2020	INB	SPB	0.1000	0.5250	0.5250	2	
Finnerty,2020	ESPB	SPB	-0.2000	0.7746	0.7746	2	
Ciftci,2020	ESPB	TPVB	-0.2000	0.2229	0.2569	3	*
Ciftci,2020	Control	TPVB	2.5000	0.2582	0.3670	3	*
Ciftci,2020	Control	ESPB	2.7000	0.2229	0.2569	3	*
Ciftci, 2019	Control	ESPB	3.0000	0.2714	0.2714	2	
Gaballah,2019	ESPB	SPB	0.2000	0.1169	0.1169	2	
Wu, 2018	INB	TPVB	0.2000	0.1231	0.1231	2	
Okmen,2018	Control	SPB	-1.3000	0.2729	0.2729	2	
Ahmed,2017	Control	INB	0.4000	0.1169	0.1169	2	
Kaya,2006	Control	TPVB	0.3000	0.3623	0.3623	2	
Chen,2020	INB	TPVB	0.4000	0.3651	0.3810	3	*
Chen,2020	ESPB	INB	0.3000	0.5888	1.1431	3	*
Chen,2020	ESPB	TPVB	0.7000	0.5164	0.5715	3	*

##  
## Number of treatment arms (by study):

Study	narms
Liu,2021	2
Hu,2021	2
Yao,2020	2
Viti,2020	2
Turhan,2020	3
Lee, 2020	2
Kim, 2020	2
Finnerty,2020	2
Ciftci,2020	3
Ciftci, 2019	2
Gaballah,2019	2
Wu, 2018	2
Okmen,2018	2
Ahmed,2017	2
Kaya,2006	2
Chen,2020	3

##  
## Results (random effects model):

Study	treat1	treat2	MD	95%-CI
Liu,2021	Control	ESPB	1.2803	[ 0.5944; 1.9662]
Hu,2021	Control	TPVB	1.3013	[ 0.5336; 2.0691]
Yao,2020	Control	ESPB	1.2803	[ 0.5944; 1.9662]
Viti,2020	Control	SPB	0.7837	[-0.0746; 1.6420]
Turhan,2020	ESPB	TPVB	0.0211	[-0.8101; 0.8523]
Turhan,2020	INB	TPVB	0.3681	[-0.4678; 1.2041]
Turhan,2020	ESPB	INB	-0.3471	[-1.2327; 0.5385]
Lee, 2020	INB	SPB	-0.1495	[-1.0574; 0.7584]
Kim, 2020	INB	SPB	-0.1495	[-1.0574; 0.7584]
Finnerty,2020	ESPB	SPB	-0.4966	[-1.3709; 0.3777]
Ciftci,2020	ESPB	TPVB	0.0211	[-0.8101; 0.8523]

```

## Ciftci,2020 Control TPVB 1.3013 [ 0.5336; 2.0691]
## Ciftci,2020 Control ESPB 1.2803 [ 0.5944; 1.9662]
## Ciftci, 2019 Control ESPB 1.2803 [ 0.5944; 1.9662]
## Gaballah,2019 ESPB SPB -0.4966 [-1.3709; 0.3777]
## Wu, 2018 INB TPVB 0.3681 [-0.4678; 1.2041]
## Okmen,2018 Control SPB 0.7837 [-0.0746; 1.6420]
## Ahmed,2017 Control INB 0.9332 [ 0.0875; 1.7789]
## Kaya,2006 Control TPVB 1.3013 [ 0.5336; 2.0691]
## Chen,2020 INB TPVB 0.3681 [-0.4678; 1.2041]
## Chen,2020 ESPB INB -0.3471 [-1.2327; 0.5385]
## Chen,2020 ESPB TPVB 0.0211 [-0.8101; 0.8523]
##
## Number of studies: k = 16
## Number of treatments: n = 5
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##
## Random effects model
##
## Treatment estimate (sm = 'MD', comparison: other treatments vs 'Control'):
## MD 95%-CI z p-value
## Control . . . .
## ESPB -1.2803 [-1.9662; -0.5944] -3.66 0.0003
## INB -0.9332 [-1.7789; -0.0875] -2.16 0.0306
## SPB -0.7837 [-1.6420; 0.0746] -1.79 0.0735
## TPVB -1.3013 [-2.0691; -0.5336] -3.32 0.0009
##
## Quantifying heterogeneity / inconsistency:
## tau^2 = 0.6796; tau = 0.8244; I^2 = 92.6% [89.5%; 94.7%]
##
## Tests of heterogeneity (within designs) and inconsistency (between designs):
## Q d.f. p-value
## Total 201.38 15 < 0.0001
## Within designs 66.23 8 < 0.0001
## Between designs 135.15 7 < 0.0001
##
## Q statistics to assess homogeneity / consistency
##
## Q df p-value
## Total 201.38 15 < 0.0001
## Within designs 66.23 8 < 0.0001
## Between designs 135.15 7 < 0.0001
##
## Design-specific decomposition of within-designs Q statistic
##
## Design Q df p-value
## Control vs ESPB 39.93 2 < 0.0001
## Control vs SPB 22.96 1 < 0.0001
## Control vs TPVB 2.42 1 0.1200
## ESPB vs SPB 0.26 1 0.6096
## INB vs SPB 0.03 1 0.8621
## ESPB vs INB vs TPVB 0.63 2 0.7292
##
## Between-designs Q statistic after detaching of single designs

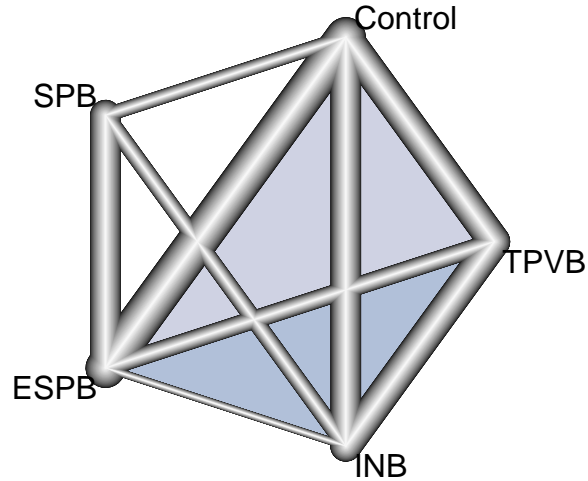
```

```

##
##      Detached design      Q df  p-value
##      Control vs ESPB 123.32  6 < 0.0001
##      Control vs INB 125.87  6 < 0.0001
##      Control vs SPB  74.90  6 < 0.0001
##      Control vs TPVB 132.66  6 < 0.0001
##      ESPB vs SPB   76.03  6 < 0.0001
##      INB vs SPB   131.94  6 < 0.0001
##      INB vs TPVB  132.62  6 < 0.0001
##      Control vs ESPB vs TPVB  80.22  5 < 0.0001
##      ESPB vs INB vs TPVB 126.40  5 < 0.0001
##
## Q statistic to assess consistency under the assumption of
## a full design-by-treatment interaction random effects model
##
##      Q df p-value tau.within tau2.within
## Between designs 10.56  7  0.1591    0.7947    0.6316

```

## Network Graph



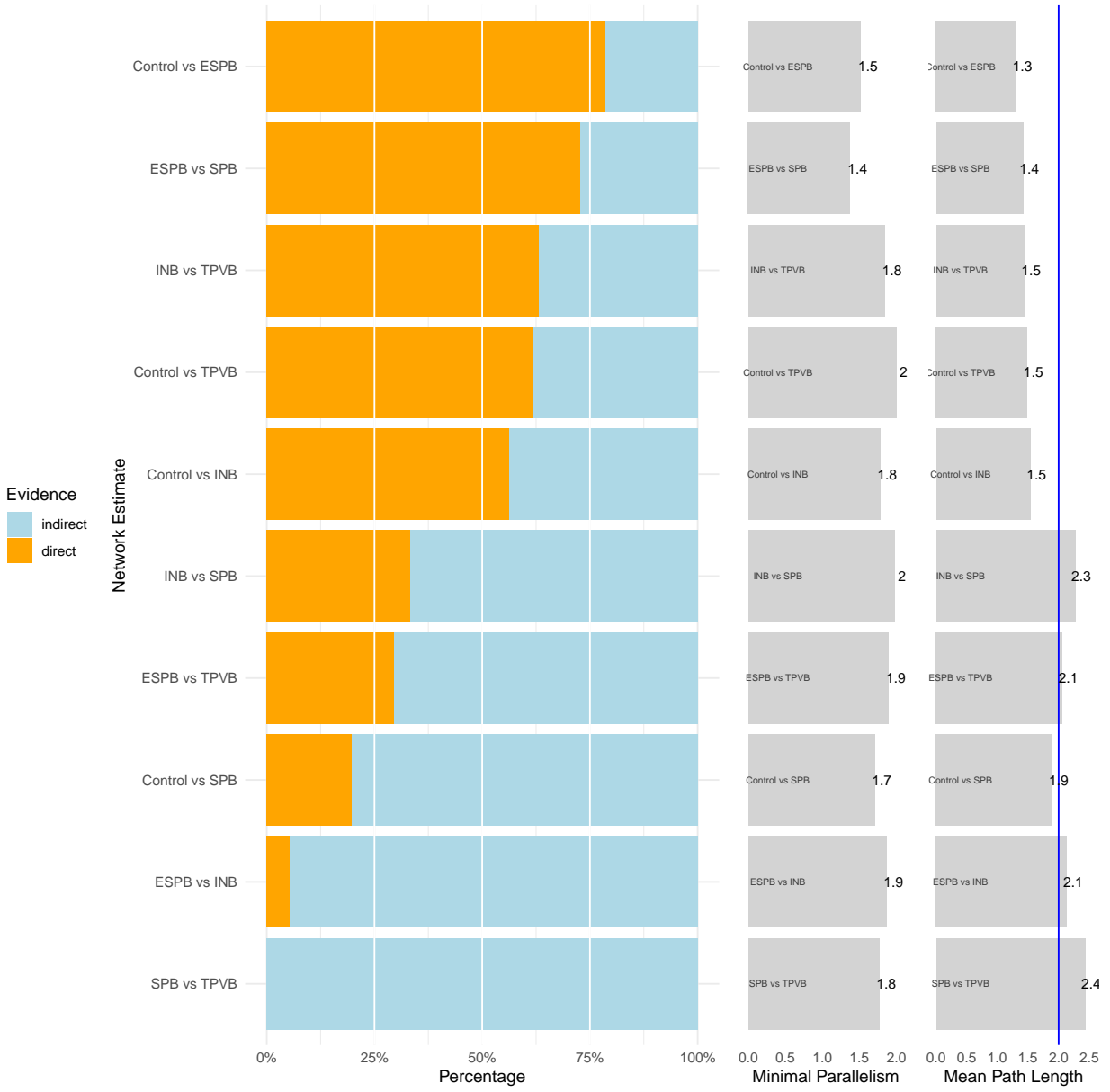
## Visualizing Direct and Indirect Evidence

## Extensive documentation for the dmetar package can be found at:  
## [www.bookdown.org/MathiasHarrer/Doing\\_Meta\\_Analysis\\_in\\_R/](http://www.bookdown.org/MathiasHarrer/Doing_Meta_Analysis_in_R/)

## Direct Evidence Proportion for each Network Estimate

```
## -----  
##           Direct Indirect meanpath  minpar  
## Control vs ESPB 0.7857  0.2143 1.311391 1.515867  
## ESPB vs SPB    0.7275  0.2725 1.423145 1.374504  
## INB vs TPVB    0.6322  0.3678 1.450622 1.842207  
## Control vs TPVB 0.6180  0.3820 1.488395 1.995936  
## Control vs INB  0.5631  0.4369 1.537947 1.775814  
## INB vs SPB     0.3332  0.6668 2.270971 1.976511  
## ESPB vs TPVB   0.2959  0.7041 2.058053 1.893989  
## Control vs SPB 0.1971  0.8029 1.900999 1.702822  
## ESPB vs INB    0.0538  0.9462 2.136548 1.862233  
## SPB vs TPVB    0.0000  1.0000 2.432520 1.765417
```

Direct evidence proportion for each network estimate (fixed-effect model)



## Effect Estimate Table

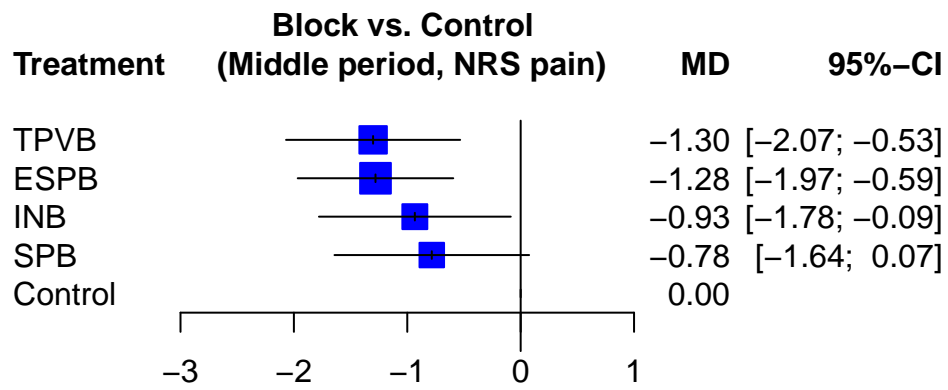
```
##           Control ESPB   INB   SPB  TPVB
## Control      NA 1.28  0.933  0.784 1.301
## ESPB         NA  NA -0.347 -0.497 0.021
## INB          NA  NA   NA -0.150 0.368
## SPB          NA  NA   NA   NA 0.518
## TPVB         NA  NA   NA   NA   NA
```

## League table (random effects model):

```
##
##           Control  1.98 ( 1.15;  2.81)  0.40 (-1.23;  2.03)
## 1.28 ( 0.59;  1.97)                    ESPB  0.62 (-0.86;  2.09)
## 0.93 ( 0.09;  1.78) -0.35 (-1.23;  0.54)                    INB
## 0.78 (-0.07;  1.64) -0.50 (-1.37;  0.38) -0.15 (-1.06;  0.76)
## 1.30 ( 0.53;  2.07)  0.02 (-0.81;  0.85)  0.37 (-0.47;  1.20)
##
## 0.04 (-1.26;  1.34) 1.25 ( 0.27;  2.23)
## 0.06 (-1.25;  1.37) 0.49 (-0.60;  1.58)
## 0.04 (-1.22;  1.31) 0.32 (-0.70;  1.34)
##           SPB
## 0.52 (-0.48;  1.52)                    TPVB
```

## Ranking and Forest plot

```
##          P-score
## TPVB     0.7927
## ESPB     0.7815
## INB      0.5066
## SPB      0.4060
## Control  0.0132
```



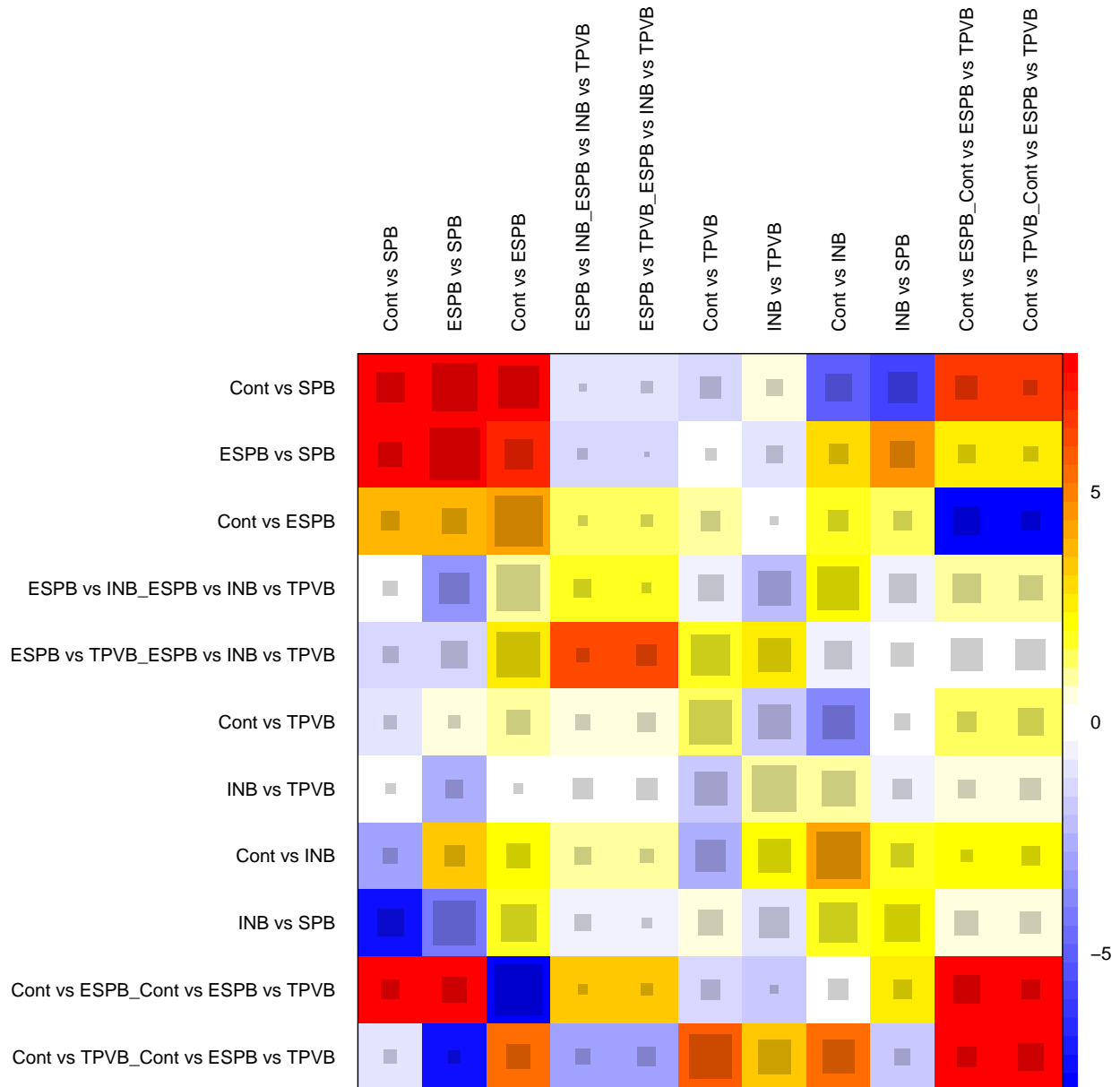


# Net Heat Plot for evaluating the validity of the results

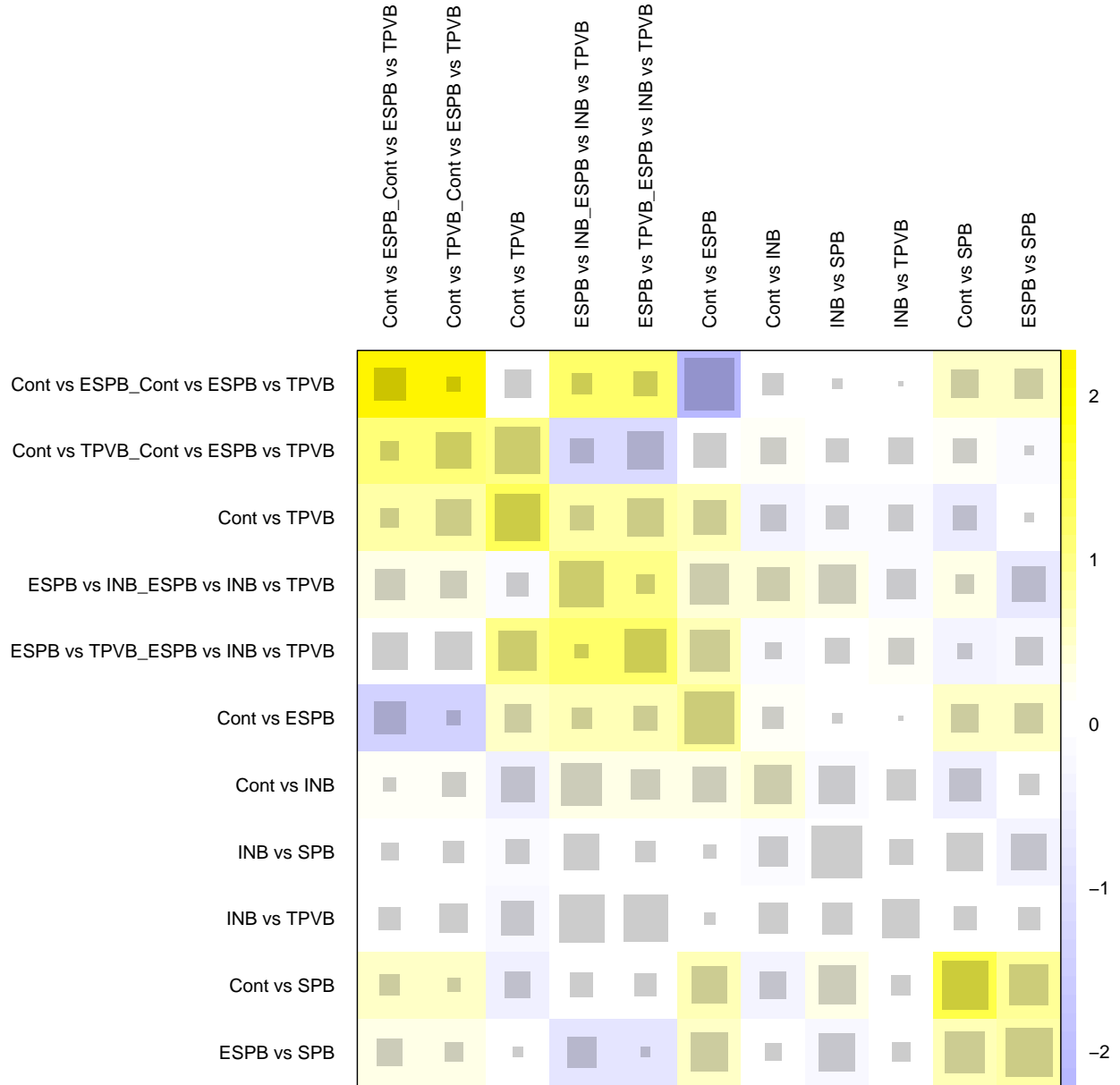
The gray boxes signify how important a treatment comparison is for the estimation of another treatment comparison. The bigger the box, the more important the comparison.

The colored backgrounds signify the amount of inconsistency of the design in a row that can be attributed to the design in a column. Field colors can range from a deep red (which indicates strong inconsistency) to blue (which indicates that evidence from this design supports evidence in the row).

## Fixed effect model

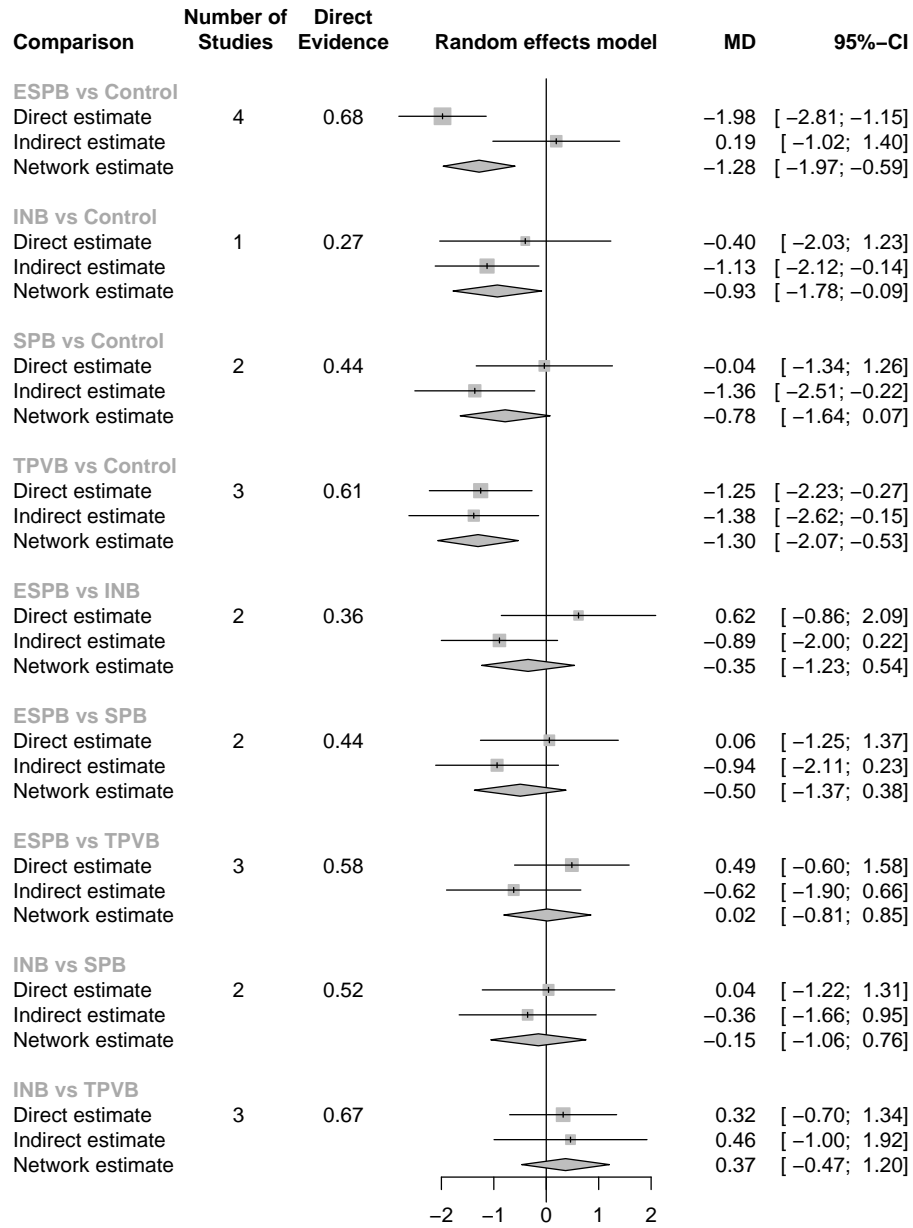


# Random effect model



## Net Splitting to check for consistency

```
## Separate indirect from direct evidence (SIDE) using back-calculation method
##
## Random effects model:
##
##      comparison k prop      nma direct  indir.   Diff      z p-value
## ESPB vs Control 4 0.68 -1.2803 -1.9783  0.1907 -2.1690 -2.90  0.0038
## INB vs Control  1 0.27 -0.9332 -0.4000 -1.1290  0.7290  0.75  0.4540
## SPB vs Control  2 0.44 -0.7837 -0.0368 -1.3628  1.3260  1.50  0.1331
## TPVB vs Control 3 0.61 -1.3013 -1.2504 -1.3827  0.1324  0.16  0.8694
##   ESPB vs INB  2 0.36 -0.3471  0.6152 -0.8927  1.5079  1.60  0.1088
##   ESPB vs SPB  2 0.44 -0.4966  0.0594 -0.9379  0.9974  1.11  0.2668
##   ESPB vs TPVB 3 0.58  0.0211  0.4884 -0.6211  1.1096  1.29  0.1964
##   INB vs SPB  2 0.52 -0.1495  0.0435 -0.3556  0.3991  0.43  0.6668
##   INB vs TPVB 3 0.67  0.3681  0.3220  0.4624 -0.1404 -0.15  0.8771
##   SPB vs TPVB 0   0  0.5176      .  0.5176      .      .
##
## Legend:
## comparison - Treatment comparison
## k          - Number of studies providing direct evidence
## prop       - Direct evidence proportion
## nma        - Estimated treatment effect (MD) in network meta-analysis
## direct     - Estimated treatment effect (MD) derived from direct evidence
## indir.     - Estimated treatment effect (MD) derived from indirect evidence
## Diff       - Difference between direct and indirect treatment estimates
## z          - z-value of test for disagreement (direct versus indirect)
## p-value    - p-value of test for disagreement (direct versus indirect)
```



# Comparison-Adjusted Funnel Plots

