

24 hours opioid consumption

Boohwi Hong

Package install

Data Preparation

```
n
```

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## [1] 1251
```

Model Fitting

Results of Model

```
##      Length      Class      Mode
##      21 character character

## Number of studies: k = 17
## Number of treatments: n = 5
## Number of pairwise comparisons: m = 21
## 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      -8.7057 [-11.3509;  -6.0604] -6.45 < 0.0001
## INB       -9.5507 [-13.2133;  -5.8881] -5.11 < 0.0001
## SPB       -5.9169 [ -9.3547;  -2.4791] -3.37  0.0007
## TPVB     -13.1658 [-16.2130; -10.1187] -8.47 < 0.0001
##
## Quantifying heterogeneity / inconsistency:
## tau^2 = 8.3927; tau = 2.8970; I^2 = 86.9% [80.3%; 91.3%]
##
## Tests of heterogeneity (within designs) and inconsistency (between designs):
##           Q d.f.  p-value
## Total           114.49   15 < 0.0001
## Within designs   79.01    9 < 0.0001
## Between designs  35.48    6 < 0.0001
```

```

## Original data (with adjusted standard errors for multi-arm studies):
##
##          treat1 treat2      TE      seTE seTE.adj narms multiarm
## Liu,2021   Control  ESPB   5.1500  0.7804   0.7804    2
## Hu,2021    Control  TPVB   9.1000  0.2633   0.2633    2
## Zhao,2020   ESPB   TPVB   2.7000  1.5567   1.5567    2
## Yao,2020    Control  ESPB   9.0000  0.4518   0.4518    2
## Turhan,2020 ESPB   TPVB   3.9600  0.7841   0.9732    3      *
## Turhan,2020 INB   TPVB   1.2400  0.6438   0.7151    3      *
## Turhan,2020 ESPB   INB   2.7200  0.8188   1.1138    3      *
## Lee, 2020   INB    SPB   -1.5000  4.4681   4.4681    2
## Finnerty,2020 ESPB   SPB  -10.0000  8.4004   8.4004    2
## Ciftci, 2019 Control  ESPB  11.6000  0.7853   0.7853    2
## Cheng,2020  Control  SPB   2.6500  1.7833   1.7833    2
## Gaballah,2019 ESPB   SPB  -5.9000  2.0789   2.0789    2
## Wu, 2018    INB    TPVB   4.0500  1.1173   1.1173    2
## Okmen,2018  Control  SPB   9.7000  1.8385   1.8385    2
## Kim, 2018   Control  SPB  10.2000  3.3050   3.3050    2
## Ahmed,2017  Control  INB   7.0000  3.7184   3.7184    2
## Kaya,2006   Control  TPVB  19.0000  2.0463   2.0463    2
## Vogt,2005   Control  TPVB  -1.0000 12.2225  12.2225    2
## Chen,2020   INB    TPVB   6.4000  1.6873   1.8741    3      *
## Chen,2020   ESPB   INB   2.8000  2.1432   3.1899    3      *
## Chen,2020   ESPB   TPVB   9.2000  1.8940   2.2048    3      *
##
## Number of treatment arms (by study):
##          narms
## Liu,2021      2
## Hu,2021       2
## Zhao,2020     2
## Yao,2020      2
## Turhan,2020   3
## Lee, 2020     2
## Finnerty,2020 2
## Ciftci, 2019  2
## Cheng,2020    2
## Gaballah,2019 2
## Wu, 2018     2
## Okmen,2018   2
## Kim, 2018    2
## Ahmed,2017   2
## Kaya,2006    2
## Vogt,2005    2
## Chen,2020    3
##
## Results (random effects model):
##
##          treat1 treat2      MD      95%-CI
## Liu,2021   Control  ESPB  8.7057 [ 6.0604; 11.3509]
## Hu,2021    Control  TPVB 13.1658 [10.1187; 16.2130]
## Zhao,2020   ESPB   TPVB  4.4602 [ 1.5281;  7.3923]
## Yao,2020    Control  ESPB  8.7057 [ 6.0604; 11.3509]
## Turhan,2020 ESPB   TPVB  4.4602 [ 1.5281;  7.3923]
## Turhan,2020 INB    TPVB  3.6152 [ 0.4270;  6.8034]

```

```

## Turhan,2020      ESPB      INB  0.8450 [-2.6271;  4.3171]
## Lee, 2020        INB      SPB -3.6337 [-8.1443;  0.8769]
## Finnerty,2020   ESPB      SPB -2.7887 [-6.5727;  0.9953]
## Ciftci, 2019    Control  ESPB  8.7057 [ 6.0604; 11.3509]
## Cheng,2020      Control  SPB  5.9169 [ 2.4791;  9.3547]
## Gaballah,2019   ESPB      SPB -2.7887 [-6.5727;  0.9953]
## Wu, 2018         INB      TPVB 3.6152 [ 0.4270;  6.8034]
## Okmen,2018      Control  SPB  5.9169 [ 2.4791;  9.3547]
## Kim, 2018        Control  SPB  5.9169 [ 2.4791;  9.3547]
## Ahmed,2017      Control  INB  9.5507 [ 5.8881; 13.2133]
## Kaya,2006        Control  TPVB 13.1658 [10.1187; 16.2130]
## Vogt,2005        Control  TPVB 13.1658 [10.1187; 16.2130]
## Chen,2020        INB      TPVB 3.6152 [ 0.4270;  6.8034]
## Chen,2020        ESPB      INB  0.8450 [-2.6271;  4.3171]
## Chen,2020        ESPB      TPVB 4.4602 [ 1.5281;  7.3923]
##
## Number of studies: k = 17
## Number of treatments: n = 5
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## Random effects model
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## Control      .           .           .      .
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## INB       -9.5507 [-13.2133;  -5.8881] -5.11 < 0.0001
## SPB       -5.9169 [ -9.3547;  -2.4791] -3.37  0.0007
## TPVB     -13.1658 [-16.2130; -10.1187] -8.47 < 0.0001
##
## Quantifying heterogeneity / inconsistency:
## tau^2 = 8.3927; tau = 2.8970; I^2 = 86.9% [80.3%; 91.3%]
##
## Tests of heterogeneity (within designs) and inconsistency (between designs):
##
##           Q  d.f.  p-value
## Total           114.49  15 < 0.0001
## Within designs   79.01   9 < 0.0001
## Between designs  35.48   6 < 0.0001
##
## Q statistics to assess homogeneity / consistency
##
##           Q  df  p-value
## Total           114.49 15 < 0.0001
## Within designs   79.01  9 < 0.0001
## Between designs  35.48  6 < 0.0001
##
## Design-specific decomposition of within-designs Q statistic
##
##           Design      Q  df  p-value
## Control vs ESPB  34.76  2 < 0.0001
## Control vs SPB   8.94  2  0.0115
## Control vs TPVB 23.73  2 < 0.0001
## ESPB vs SPB     0.22  1  0.6357

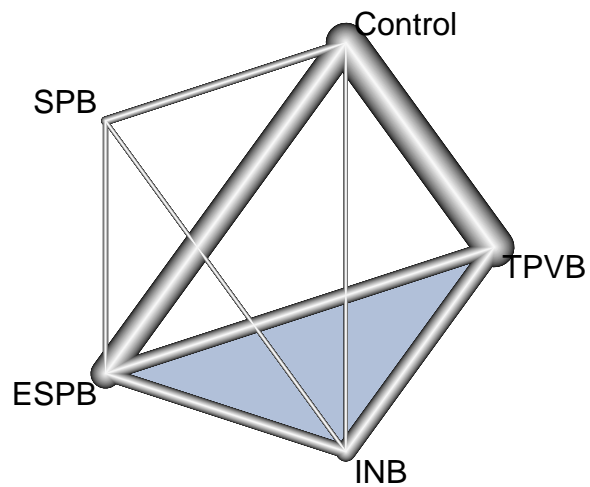
```

```

## ESPB vs INB vs TPVB 11.36 2 0.0034
##
## Between-designs Q statistic after detaching of single designs
##
## Detached design      Q df  p-value
## Control vs ESPB 15.36 5 0.0089
## Control vs INB 35.40 5 < 0.0001
## Control vs SPB 32.19 5 < 0.0001
## Control vs TPVB 9.18 5 0.1022
## ESPB vs SPB 31.28 5 < 0.0001
## ESPB vs TPVB 35.04 5 < 0.0001
## INB vs SPB 35.42 5 < 0.0001
## INB vs TPVB 29.90 5 < 0.0001
## ESPB vs INB vs TPVB 5.15 4 0.2725
##
## 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 2.80 6 0.8331 3.2762 10.7333

```

Network Graph



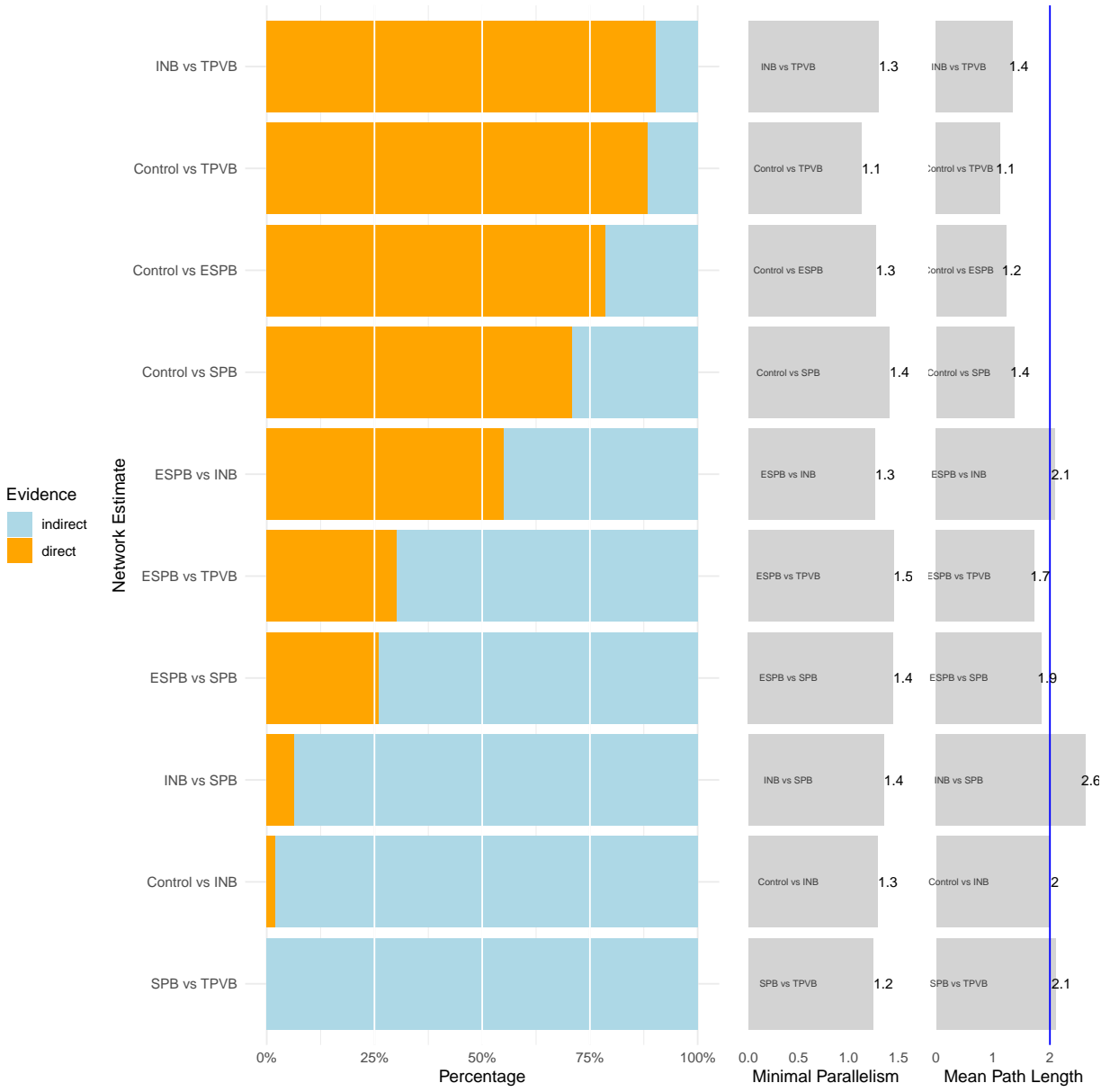
Visualizing Direct and Indirect Evidence

Extensive documentation for the dmetar package can be found at:
www.bookdown.org/MathiasHarrer/Doing_Meta_Analysis_in_R/

Direct Evidence Proportion for each Network Estimate

```
## -----  
##           Direct Indirect meanpath  minpar  
## INB vs TPVB    0.9026   0.0974 1.353333 1.301195  
## Control vs TPVB 0.8842   0.1158 1.123943 1.130953  
## Control vs ESPB 0.7853   0.2147 1.229702 1.273376  
## Control vs SPB  0.7088   0.2912 1.374581 1.410916  
## ESPB vs INB    0.5505   0.4495 2.096137 1.265834  
## ESPB vs TPVB   0.3012   0.6988 1.730761 1.450224  
## ESPB vs SPB    0.2592   0.7408 1.854188 1.447132  
## INB vs SPB     0.0628   0.9372 2.625865 1.354741  
## Control vs INB  0.0209   0.9791 1.988177 1.294180  
## SPB vs TPVB    0.0000   1.0000 2.099828 1.248643
```

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



Effect Estimate Table

```

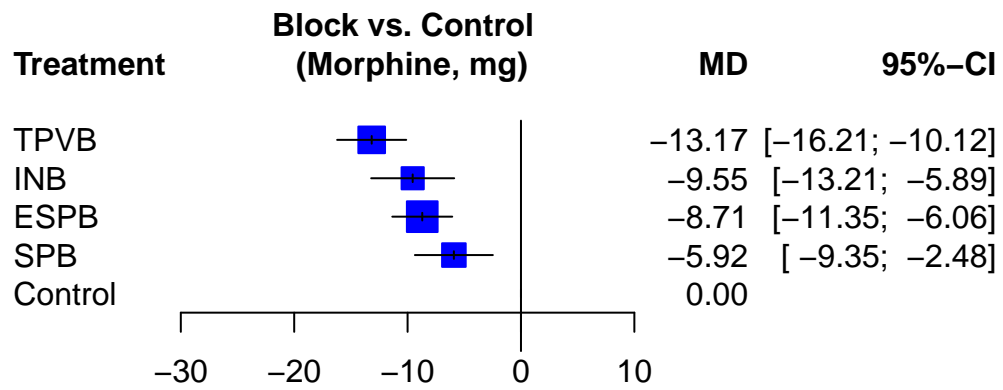
##           Control  ESPB  INB  SPB  TPVB
## Control      NA 8.706 9.551 5.917 13.166
## ESPB         NA  NA 0.845 -2.789 4.460
## INB          NA  NA  NA -3.634 3.615
## SPB          NA  NA  NA  NA 7.249
## TPVB         NA  NA  NA  NA  NA

## League table (random effects model):
##
##           Control  8.59 ( 5.22; 11.96)  7.00 ( -2.24; 16.24)
## 8.71 ( 6.06; 11.35)           ESPB  2.75 ( -1.78; 7.28)
## 9.55 ( 5.89; 13.21) 0.85 ( -2.63; 4.32)           INB
## 5.92 ( 2.48; 9.35) -2.79 ( -6.57; 1.00) -3.63 ( -8.14; 0.88)
## 13.17 ( 10.12; 16.21) 4.46 ( 1.53; 7.39) 3.62 ( 0.43; 6.80)
##
## 7.09 ( 2.94; 11.24) 12.64 ( 8.30; 16.98)
## -6.47 (-12.95; 0.02) 5.08 ( 1.42; 8.74)
## -1.50 (-11.94; 8.94) 3.69 ( 0.15; 7.23)
##           SPB
## 7.25 ( 3.03; 11.47)           TPVB

```

Ranking and Forest plot

```
##          P-score
## TPVB     0.9963
## INB      0.6598
## ESPB     0.5610
## SPB      0.2829
## Control  0.0001
```

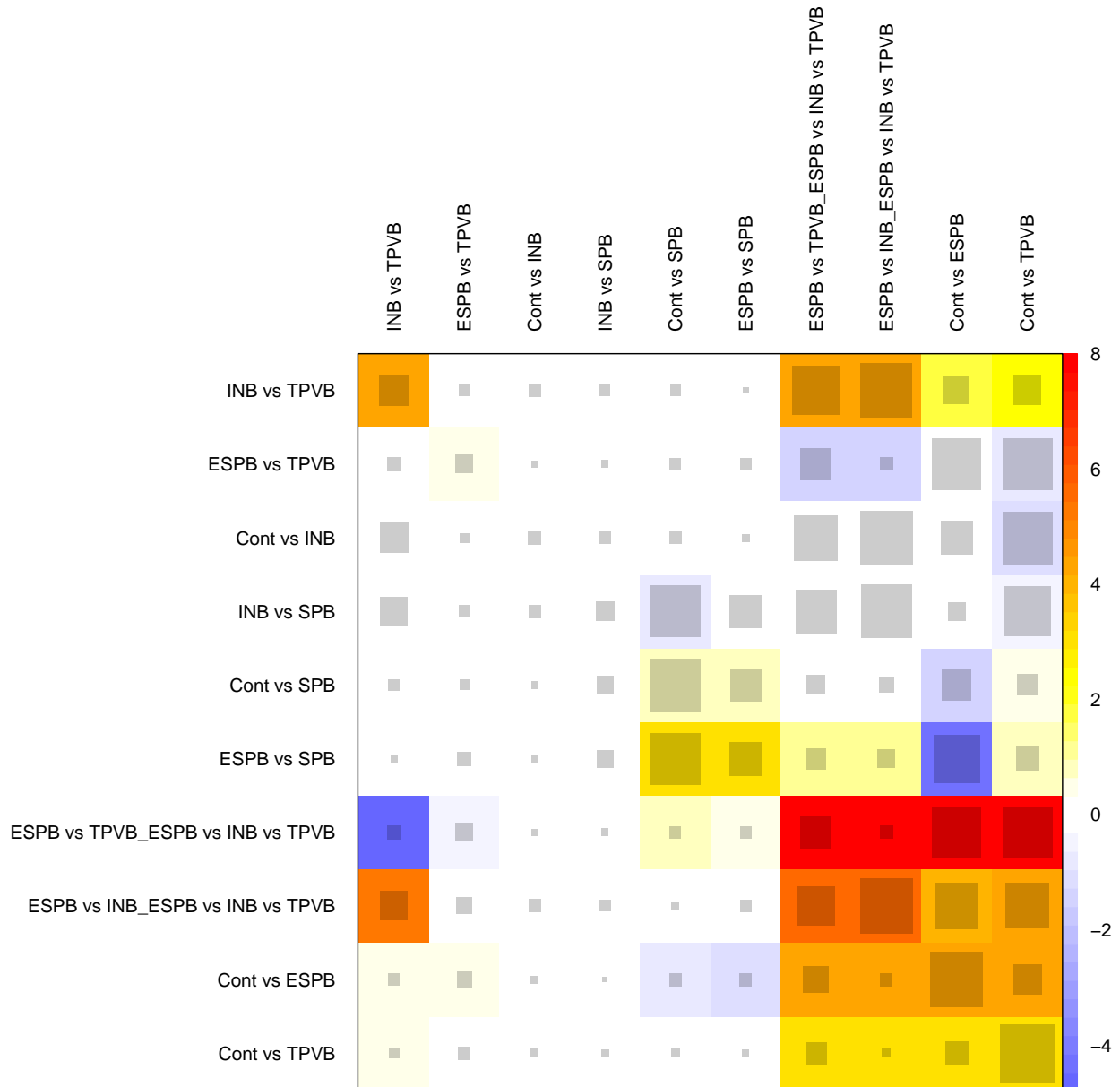


Net Heat Plot for evaluating the validity of the results

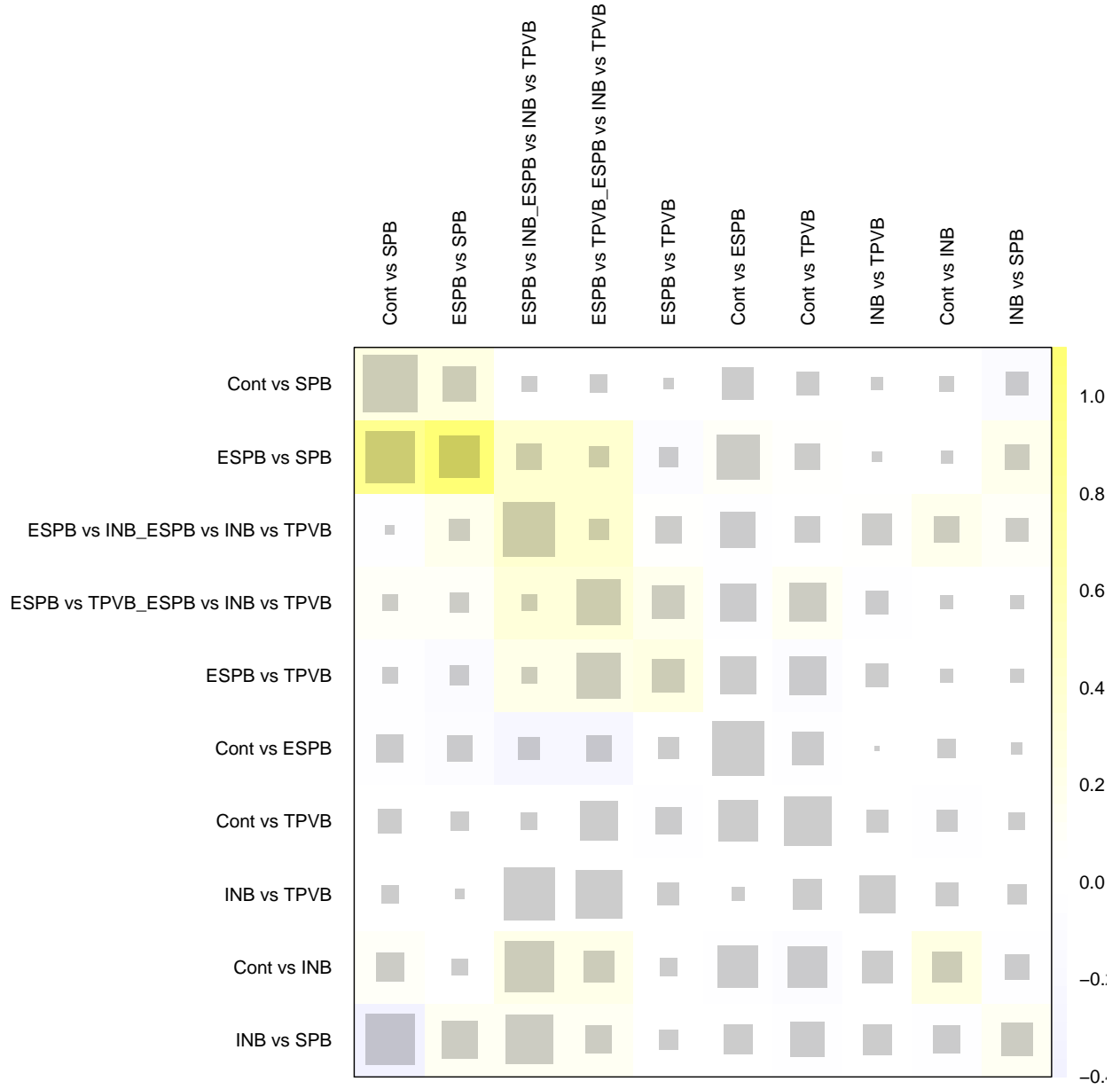
The gray boxes signify how important a treatment comparison is for the estimation of another treatment comparison. The bigger the box, the more important the comparison.

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

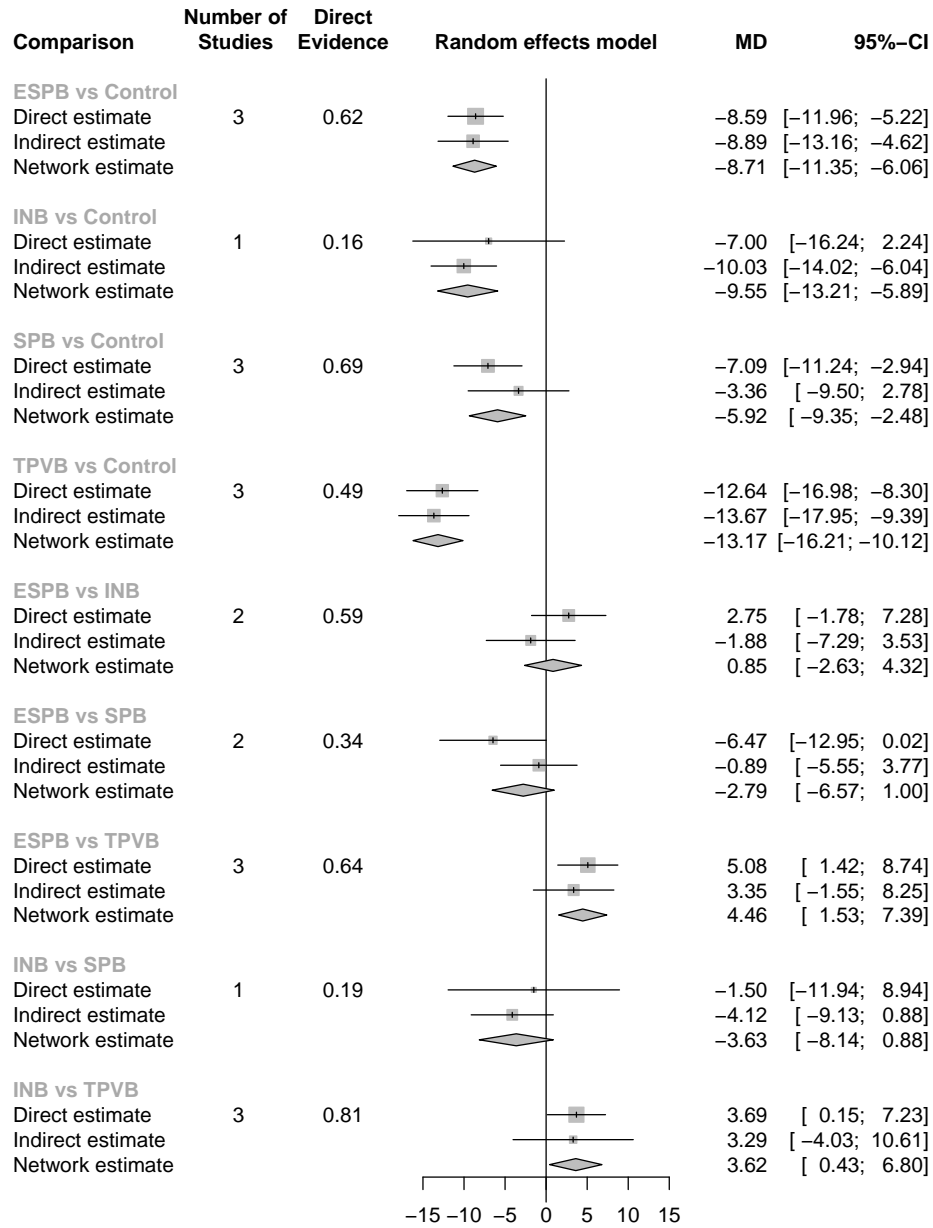


Random effect model



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 3 0.62 -8.7057 -8.5889 -8.8932  0.3043  0.11  0.9127
## INB vs Control  1 0.16 -9.5507 -7.0000 -10.0263  3.0263  0.59  0.5556
## SPB vs Control  3 0.69 -5.9169 -7.0857 -3.3581 -3.7277 -0.99  0.3242
## TPVB vs Control 3 0.49 -13.1658 -12.6438 -13.6736  1.0298  0.33  0.7405
##     ESPB vs INB  2 0.59  0.8450  2.7529 -1.8771  4.6300  1.29  0.1983
##     ESPB vs SPB  2 0.34 -2.7887 -6.4686 -0.8899 -5.5788 -1.37  0.1709
##     ESPB vs TPVB 3 0.64  4.4602  5.0783  3.3508  1.7276  0.55  0.5799
##     INB vs SPB   1 0.19 -3.6337 -1.5000 -4.1238  2.6238  0.44  0.6568
##     INB vs TPVB  3 0.81  3.6152  3.6909  3.2919  0.3990  0.10  0.9234
##     SPB vs TPVB  0  0  7.2489      .    7.2489      .    .    .
##
## 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

