

Early postoperative period pain score

Boohwi Hong

Package install

Data Preparation

Model Fitting

Results of Model

```
##      Length      Class      Mode
##           34 character character

## Original data (with adjusted standard errors for multi-arm studies):
##
##              treat1 treat2      TE  seTE seTE.adj narms multiarm
## Ahiskalioglu,2018 Control  TLIP  2.8000 0.7159  1.3289    2
## Ammar,2018        Control  TLIP  2.3000 0.2438  1.1458    2
## Asar,2022         Control  ESPB  0.6000 0.3707  1.1793    2
## Chen, 2019        Control  TLIP  0.0000 0.1291  1.1270    2
## Ciftci,2020       Control  ESPB  1.7000 0.5115  1.4211    3      *
## Ciftci,2020       ESPB    TLIP -1.0000 0.8266  1.7931    3      *
## Ciftci,2020       Control  TLIP  0.7000 0.7696  1.6885    3      *
## Ekinici,2020      TLIP    WI  -2.4000 0.2614  1.1497    2
## Eltaher,2021     Control  TLIP  1.8000 0.2739  1.1526    2
## Ersayli,2006     Control  WI   1.3000 0.6377  1.2884    2
## Eskin,2020       Control  ESPB  2.5000 0.2802  1.1541    2
## Esmail,2008      Control  WI  -0.6000 0.3965  1.1877    2
## Finnerty,2021   Control  ESPB  2.0000 0.5164  1.2329    2
## Ghamry,2019     Control  ESPB  4.5000 0.1722  1.1327    2
## Goel,2021        Control  ESPB  0.3000 0.1839  1.1346    2
## Jin,2021         Control  ESPB  2.2000 0.0576  1.1210    2
## Kraiwattanapong,2020 Control  WI   2.4000 0.5571  1.2505    2
## Milligan,1993   Control  WI   1.1000 0.6069  1.2735    2
## Mirzai,2002     Control  WI   1.1000 0.5596  1.2516    2
## Mohta,2019      Control  WI   2.8000 0.4507  1.2069    2
## Ozmen,2019     Control  TLIP  1.6000 0.0354  1.1201    2
## Ozyilmaz,2012   Control  WI   0.8000 0.0806  1.1225    2
## Singh, 2020     Control  ESPB  1.4000 0.5657  1.2544    2
## Wahdan,2021     Control  ESPB  0.4000 0.2032  1.1378    2
## Wang,2021       Control  ESPB  0.4000 0.0996  1.3761    3      *
## Wang,2021       ESPB    TLIP  1.9000 0.1120  1.3790    3      *
## Wang,2021       Control  TLIP  2.3000 0.0996  1.3761    3      *
```

```

## Yayik,2020          Control  ESPB  2.4000  0.2595  1.1492  2
## Yesiltas,2021      Control  ESPB  1.5000  0.3485  1.1725  2
## Yorukoglu,2005     Control  WI    0.0000  1.0124  1.5094  2
## Yorukoglu,2021     Control  ESPB -0.1000  0.6952  1.3178  2
## Yu,2021             Control  ESPB  1.0000  0.2372  1.1444  2
## Zhang Q,2021       Control  ESPB  1.5000  0.3759  1.1810  2
## Zhu,2021           Control  ESPB  1.0000  0.2530  1.1478  2
##
## Number of treatment arms (by study):
##          narms
## Ahiskalioglu,2018      2
## Ammar,2018             2
## Asar,2022              2
## Chen, 2019             2
## Ciftci,2020           3
## Ekinici,2020          2
## Eltaher,2021          2
## Ersayli,2006          2
## Eskin,2020            2
## Esmail,2008           2
## Finnerty,2021         2
## Ghamry,2019           2
## Goel,2021             2
## Jin,2021              2
## Kraiwattanapong,2020  2
## Milligan,1993         2
## Mirzai,2002           2
## Mohta,2019            2
## Ozmen,2019           2
## Ozyilmaz,2012        2
## Singh, 2020           2
## Wahdan,2021           2
## Wang,2021             3
## Yayik,2020            2
## Yesiltas,2021         2
## Yorukoglu,2005        2
## Yorukoglu,2021        2
## Yu,2021               2
## Zhang Q,2021          2
## Zhu,2021              2
##
## Results (random effects model):
##
##          treat1 treat2      MD      95%-CI
## Ahiskalioglu,2018 Control  TLIP  1.9339 [ 1.1325; 2.7352]
## Ammar,2018          Control  TLIP  1.9339 [ 1.1325; 2.7352]
## Asar,2022           Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Chen, 2019          Control  TLIP  1.9339 [ 1.1325; 2.7352]
## Ciftci,2020         Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Ciftci,2020         ESPB    TLIP  0.4609 [-0.4744; 1.3963]
## Ciftci,2020         Control  TLIP  1.9339 [ 1.1325; 2.7352]
## Ekinici,2020        TLIP    WI  -1.0025 [-2.0706; 0.0655]
## Eltaher,2021        Control  TLIP  1.9339 [ 1.1325; 2.7352]
## Ersayli,2006        Control  WI   0.9313 [ 0.1166; 1.7461]

```

```

## Eskin,2020          Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Esmail,2008        Control    WI  0.9313 [ 0.1166; 1.7461]
## Finnerty,2021     Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Ghamry,2019       Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Goel,2021         Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Jin,2021          Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Kraiwattanapong,2020 Control    WI  0.9313 [ 0.1166; 1.7461]
## Milligan,1993     Control    WI  0.9313 [ 0.1166; 1.7461]
## Mirzai,2002       Control    WI  0.9313 [ 0.1166; 1.7461]
## Mohta,2019        Control    WI  0.9313 [ 0.1166; 1.7461]
## Ozmen,2019       Control  TLIP  1.9339 [ 1.1325; 2.7352]
## Ozyilmaz,2012    Control    WI  0.9313 [ 0.1166; 1.7461]
## Singh, 2020       Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Wahdan,2021      Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Wang,2021         Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Wang,2021         ESPB    TLIP  0.4609 [-0.4744; 1.3963]
## Wang,2021         Control  TLIP  1.9339 [ 1.1325; 2.7352]
## Yayik,2020       Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Yesiltas,2021    Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Yorukoglu,2005   Control    WI  0.9313 [ 0.1166; 1.7461]
## Yorukoglu,2021   Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Yu,2021          Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Zhang Q,2021     Control  ESPB  1.4730 [ 0.9056; 2.0404]
## Zhu,2021         Control  ESPB  1.4730 [ 0.9056; 2.0404]
##
## Number of studies: k = 30
## Number of pairwise comparisons: m = 34
## Number of treatments: n = 4
## Number of designs: d = 5
##
## Random effects model
##
## Treatment estimate (sm = 'MD', comparison: other treatments vs 'Control'):
##           MD           95%-CI      z  p-value
## Control      .             .         .         .
## ESPB      -1.4730 [-2.0404; -0.9056] -5.09 < 0.0001
## TLIP      -1.9339 [-2.7352; -1.1325] -4.73 < 0.0001
## WI        -0.9313 [-1.7461; -0.1166] -2.24  0.0251
##
## Quantifying heterogeneity / inconsistency:
## tau^2 = 1.2534; tau = 1.1196; I^2 = 97.3% [96.7%; 97.7%]
##
## Tests of heterogeneity (within designs) and inconsistency (between designs):
##           Q d.f.  p-value
## Total           1057.28  29 < 0.0001
## Within designs    650.63  26 < 0.0001
## Between designs   406.66   3 < 0.0001
##
## Number of studies: k = 30
## Number of pairwise comparisons: m = 34
## Number of treatments: n = 4
## Number of designs: d = 5
##
## Random effects model

```

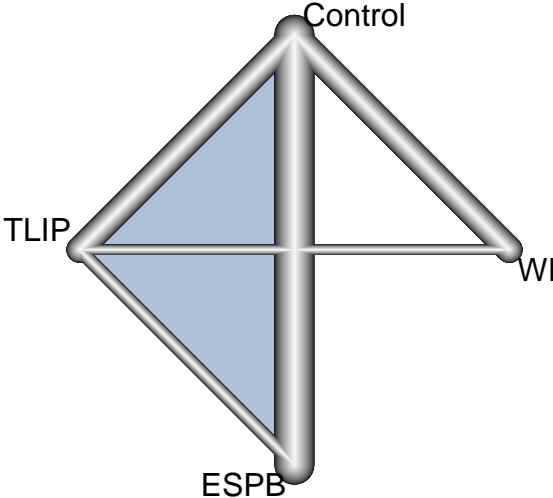
```

##
## Treatment estimate (sm = 'MD', comparison: other treatments vs 'Control'):
##           MD           95%-CI      z  p-value
## Control           .             .      .      .
## ESPB    -1.4730 [-2.0404; -0.9056] -5.09 < 0.0001
## TLIP    -1.9339 [-2.7352; -1.1325] -4.73 < 0.0001
## WI      -0.9313 [-1.7461; -0.1166] -2.24  0.0251
##
## Quantifying heterogeneity / inconsistency:
## tau^2 = 1.2534; tau = 1.1196; I^2 = 97.3% [96.7%; 97.7%]
##
## Tests of heterogeneity (within designs) and inconsistency (between designs):
##           Q d.f.  p-value
## Total           1057.28  29 < 0.0001
## Within designs   650.63  26 < 0.0001
## Between designs  406.66   3 < 0.0001

## Q statistics to assess homogeneity / consistency
##
##           Q df  p-value
## Total           1057.28  29 < 0.0001
## Within designs   650.63  26 < 0.0001
## Between designs  406.66   3 < 0.0001
##
## Design-specific decomposition of within-designs Q statistic
##
##           Design      Q df  p-value
## Control vs ESPB  437.30  13 < 0.0001
## Control vs TLIP  158.15   4 < 0.0001
## Control vs WI   41.79   7 < 0.0001
## Control vs ESPB vs TLIP  13.38  2  0.0012
##
## Between-designs Q statistic after detaching of single designs
##
##           Detached design      Q df  p-value
## Control vs ESPB   91.89  2 < 0.0001
## Control vs TLIP  216.04  2 < 0.0001
## Control vs WI   372.82  2 < 0.0001
## TLIP vs WI     372.82  2 < 0.0001
## Control vs ESPB vs TLIP  40.12  1 < 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 2.52  3  0.4725  1.1076  1.2267

```

Network Graph

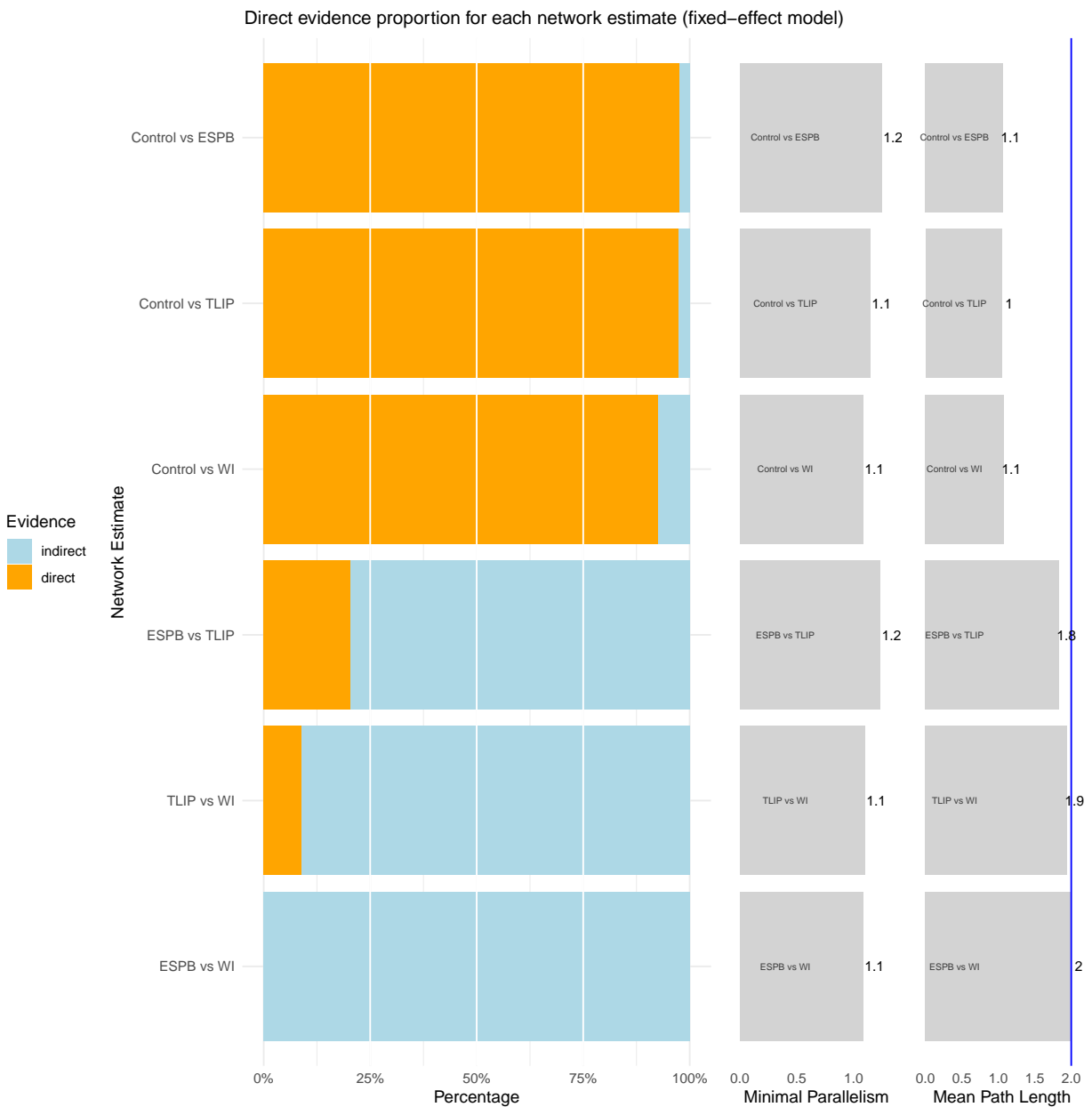


Visualizing Direct and Indirect Evidence

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
## Control vs ESPB 0.9765  0.0235 1.064988 1.246351
## Control vs TLIP 0.9743  0.0257 1.047301 1.144207
## Control vs WI   0.9249  0.0751 1.077673 1.081176
## ESPB vs TLIP   0.2032  0.7968 1.835471 1.233210
## TLIP vs WI     0.0883  0.9117 1.943137 1.096885
## ESPB vs WI     0.0000  1.0000 2.003424 1.082295
```



Effect Estimate Table

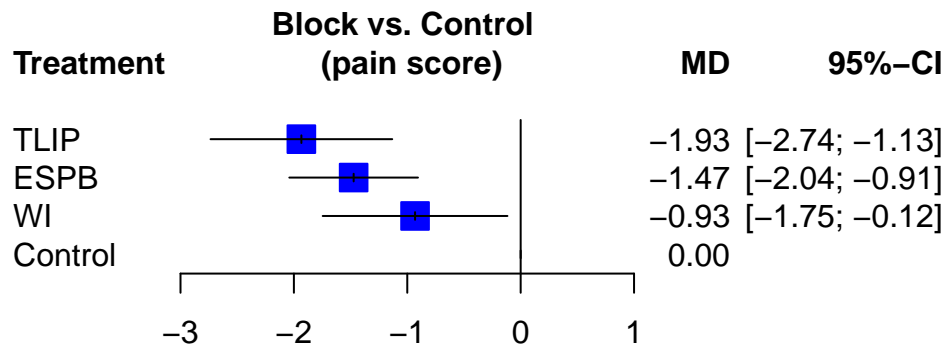
```
##           Control  ESPB  TLIP    WI
## Control          NA  1.473  1.934  0.931
## ESPB             NA    NA  0.461 -0.542
## TLIP             NA    NA    NA -1.003
## WI               NA    NA    NA    NA
```

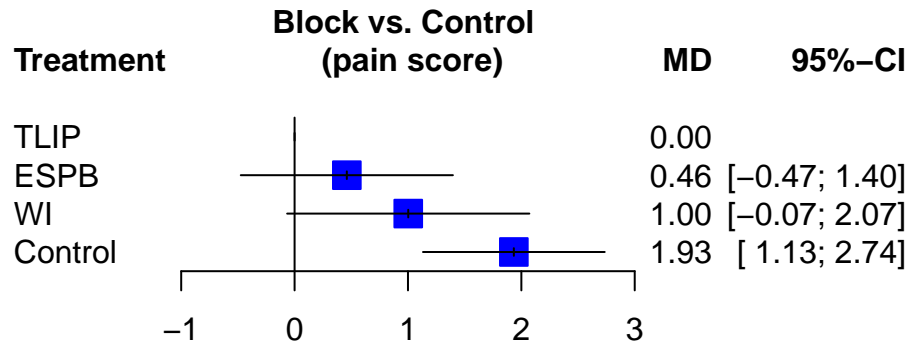
```
## League table (random effects model):
```

```
##
##           Control  1.48 ( 0.90;  2.05)  1.63 ( 0.76;  2.51)
## 1.47 ( 0.91;  2.04)           ESPB  0.75 (-0.96;  2.47)
## 1.93 ( 1.13;  2.74)  0.46 (-0.47;  1.40)           TLIP
## 0.93 ( 0.12;  1.75) -0.54 (-1.53;  0.45) -1.00 (-2.07;  0.07)
##
## 1.14 ( 0.27;  2.00)
##
## -2.40 (-4.65; -0.15)
##           WI
```

Ranking and Forest plot

```
##          P-score
## TLIP      0.9333
## ESPB      0.6753
## WI        0.3871
## Control   0.0042
```

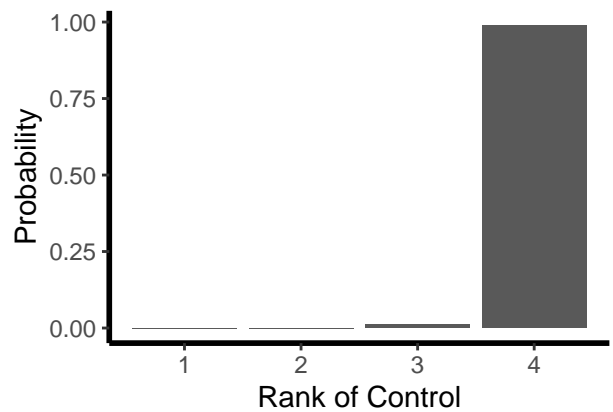
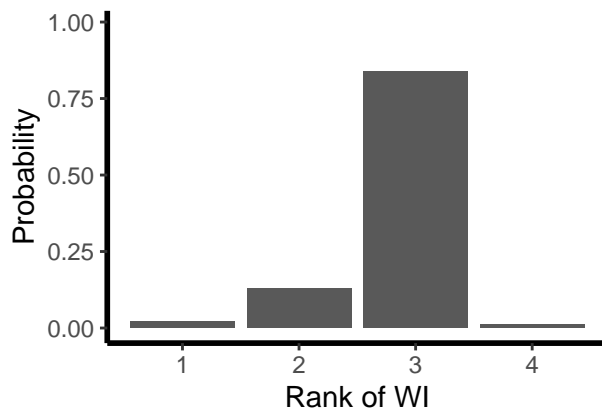
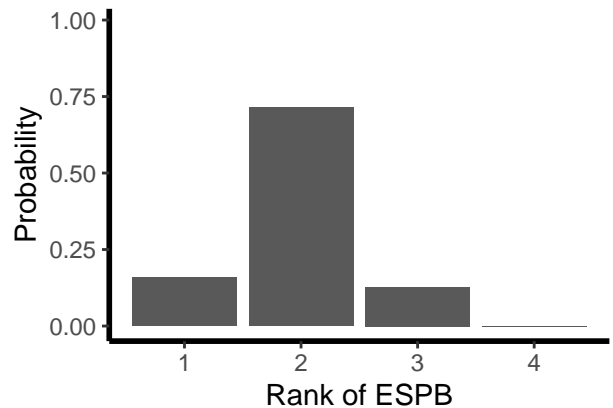
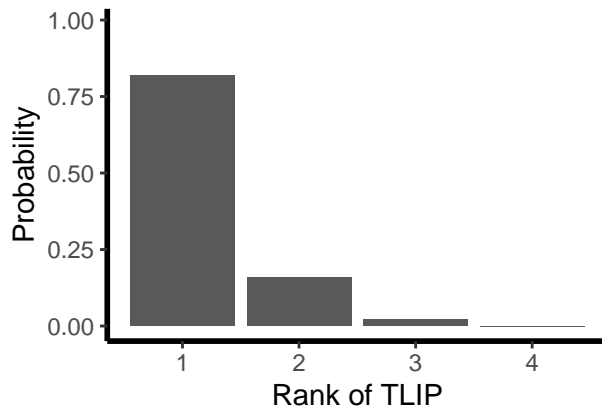


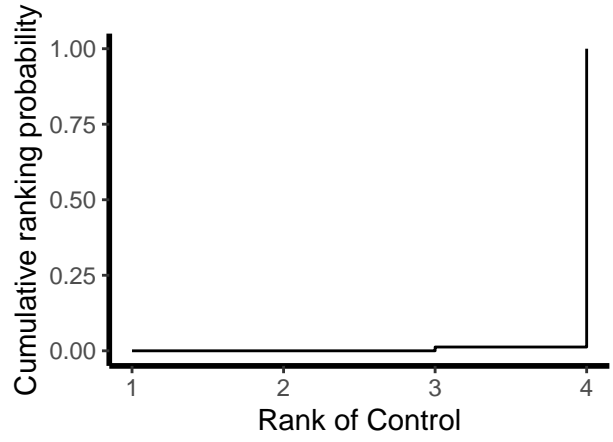
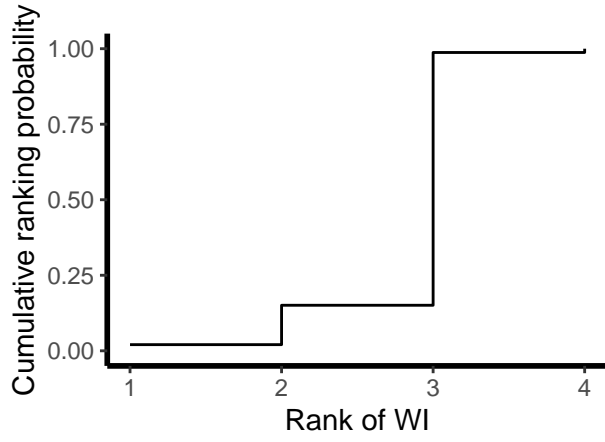
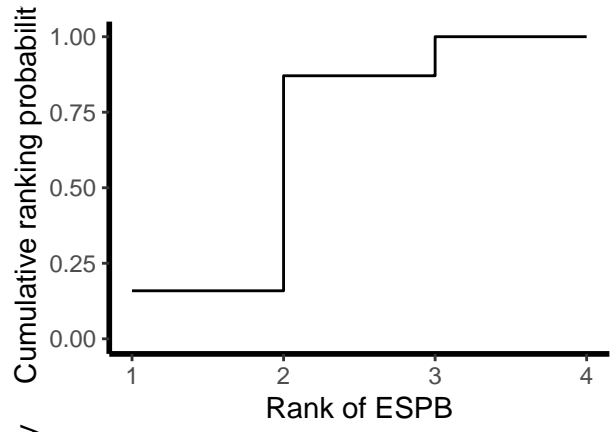
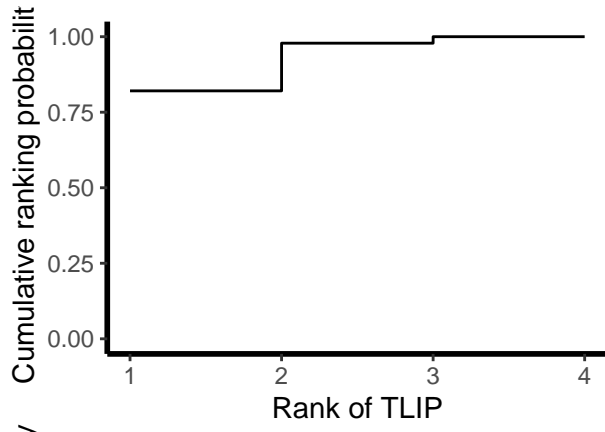


Rankogram by 100,000 simulation

This rankogram function calculates the probabilities of each treatment being at each possible rank and the SUCRAs (Surface Under the Cumulative RAnking curve) in frequentist network meta-analysis.

```
## Rankogram (based on 1e+05 simulations)
##
## Common effects model:
##
##           1      2      3      4
## Control 0.0000 0.0000 0.0000 1.0000
## ESPB    0.4952 0.5048 0.0000 0.0000
## TLIP    0.5048 0.4952 0.0000 0.0000
## WI      0.0000 0.0000 1.0000 0.0000
##
## Random effects model:
##
##           1      2      3      4
## Control 0.0000 0.0000 0.0127 0.9873
## ESPB    0.1598 0.7127 0.1275 0.0000
## TLIP    0.8198 0.1593 0.0209 0.0000
## WI      0.0204 0.1280 0.8389 0.0127
```



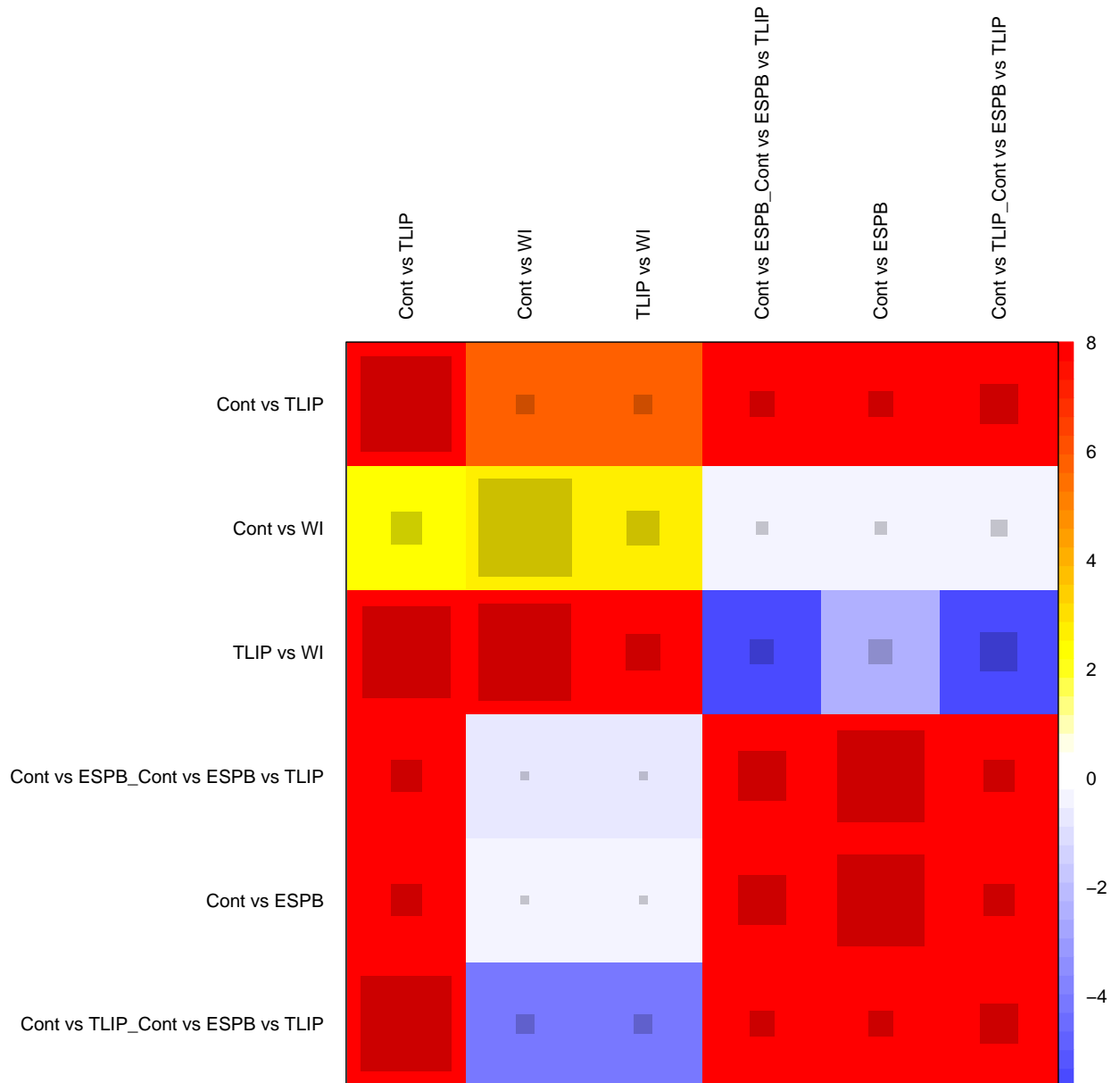


Net Heat Plot for evaluating the validity of the results

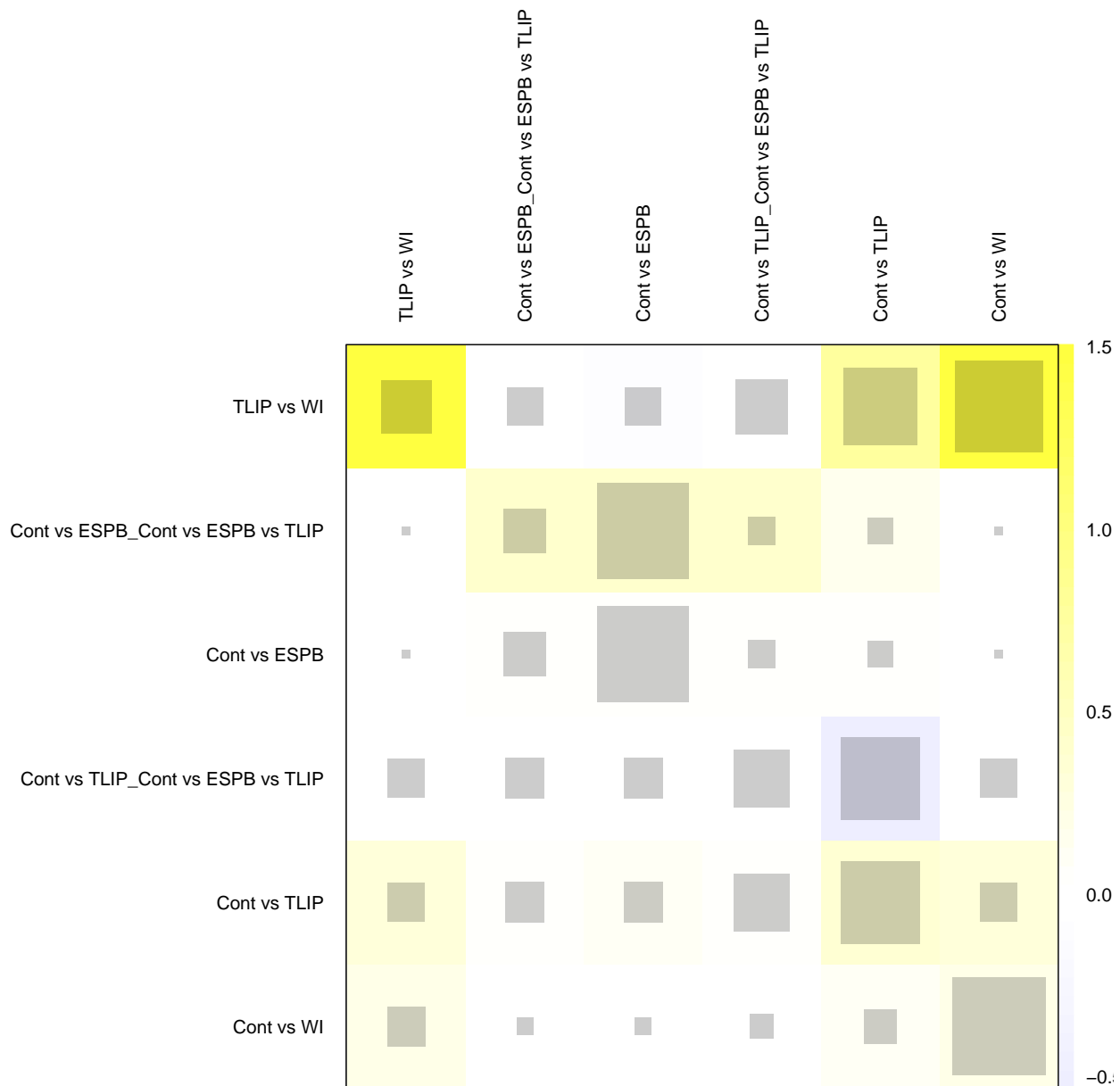
The gray boxes signify how important a treatment comparison is for the estimation of another treatment comparison. The bigger the box, the more important the comparison.

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

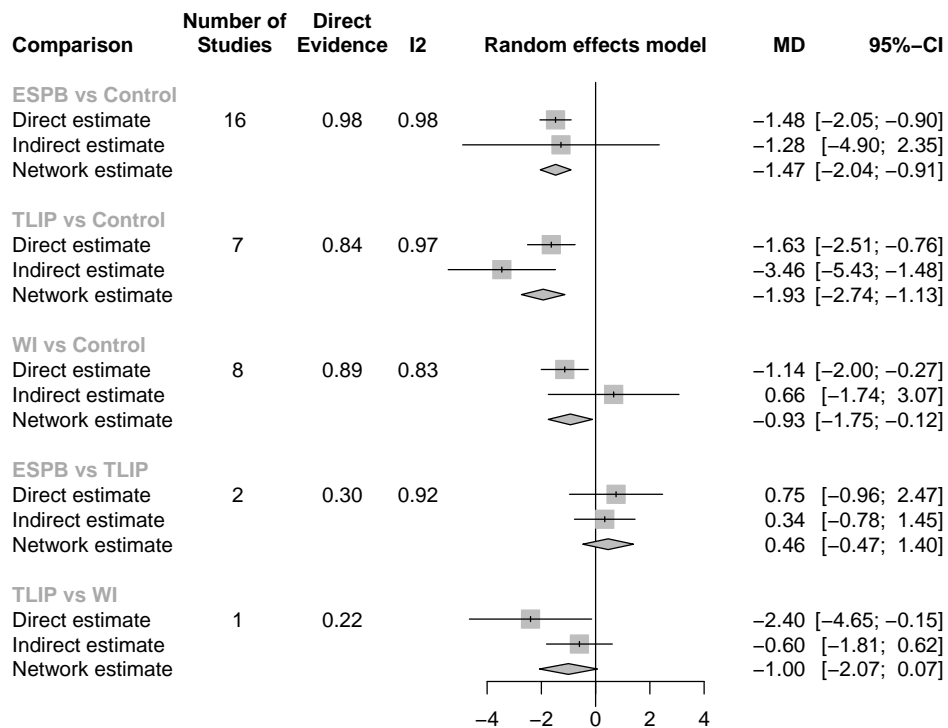


Random effect model



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 16 0.98 -1.4730 -1.4779 -1.2777 -0.2002 -0.11 0.9148
## TLIP vs Control  7 0.84 -1.9339 -1.6340 -3.4580  1.8240  1.65 0.0982
##   WI vs Control  8 0.89 -0.9313 -1.1376  0.6647 -1.8024 -1.38 0.1674
##   ESPB vs TLIP  2 0.30  0.4609  0.7537  0.3369  0.4168  0.40 0.6897
##     ESPB vs WI  0  0 -0.5416      . -0.5416      .      .
##     TLIP vs WI  1 0.22 -1.0025 -2.4000 -0.5976 -1.8024 -1.38 0.1674
##
## 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

Warning: Use argument 'method.bias' instead of 'linreg' (deprecated).

