STM analysis covid

```
library(jsonlite)
library(stm)
```

```
## stm v1.3.6 successfully loaded. See ?stm for help.
##  Papers, resources, and other materials at structuraltopicmodel.com
```

```
library(quanteda)
```

```
## Package version: 3.3.0
## Unicode version: 14.0
## ICU version: 70.1
```

```
## Parallel computing: 8 of 8 threads used.
```

```
## See https://quanteda.io for tutorials and examples.
```

```
library(spacyr)
library(stringr)
library(wordcloud)
```

```
## Loading required package: RColorBrewer
```

```
library(ggplot2)
```

Cleaning up gender/COVID-19 labels

```r
gender_func <- function(gender_label){
  if(gender_label == "woman"){
    return("Female")
  } else if(gender_label == "man") {
    return("Male")
  } else {
    return("other")
  }
}

covid_func <- function(covid_label){
  if(covid_label == 2020 || covid_label == 2021 ){
    return(TRUE)
  } else{
    return(FALSE)
  }
}
```

```r
survey_meta <- read.csv("/Users/shinkamori/Documents/Research/non_covid_and_covid.csv")
survey_meta$gender <- sapply(survey_meta$gender, gender_func)
survey_meta$pandemic <- sapply(survey_meta$Year, covid_func)
```

```
summary((survey_meta))
```

```
##        X              gender              race              tok
##  Min.   :   0.0   Length:3120        Length:3120        Min.   : 55.33
##  1st Qu.:  45.0   Class :character   Class :character   1st Qu.: 70.06
##  Median : 102.0   Mode  :character   Mode  :character   Median : 87.27
##  Mean   : 362.6                                         Mean   : 86.51
##  3rd Qu.: 659.2                                         3rd Qu.: 96.78
##  Max.   :1439.0                                         Max.   :131.80
##    total.tok           text              reason             prompt
##  Min.   :27.00   Length:3120        Length:3120        Length:3120
##  1st Qu.:32.00   Class :character   Class :character   Class :character
##  Median :34.00   Mode  :character   Mode  :character   Mode  :character
##  Mean   :33.63
##  3rd Qu.:37.00
##  Max.   :39.00
##       Year         pandemic
##  Min.   :   0   Mode :logical
##  1st Qu.:   0   FALSE:1440
##  Median :2020   TRUE :1680
##  Mean   :1088
##  3rd Qu.:2021
##  Max.   :2021
```

Preprocessing the data

- stemming, lowercase, remove punctuation and stopwords
- meta = metadata(gender, race, pandemic)

```
processed <- textProcessor(survey_meta$text, metadata=survey_meta[, c( "gender", "race", "pandemic")])
```

```
## Building corpus...
## Converting to Lower Case...
## Removing punctuation...
## Removing stopwords...
## Removing numbers...
## Stemming...
## Creating Output...
```

```
out <- prepDocuments(processed$documents, processed$vocab, processed$meta)
```

```
## Removing 553 of 1868 terms (553 of 86748 tokens) due to frequency
## Your corpus now has 3120 documents, 1315 terms and 86195 tokens.
```

```
temp_text <- survey_meta[-processed$docs.removed,]
```

Fitting model

We use 25 topics(K = 25) with the covariates gender, race and pandemic

```
model_depression <- stm::stm(
  documents = out$documents,
  K = 25,
  prevalence =~ gender + race + pandemic,
  data=out$meta,
```

```
  vocab = out$vocab,
  max.em.its=75
)
```

```
## Beginning Spectral Initialization
##    Calculating the gram matrix...
##    Finding anchor words...
##        ........................
##    Recovering initialization...
##        ............
## Initialization complete.
## ...................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 1 (approx. per word bound = -5.114)
## ...................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 2 (approx. per word bound = -4.957, relative change = 3.064e-02)
## ...................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 3 (approx. per word bound = -4.913, relative change = 8.891e-03)
## ...................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 4 (approx. per word bound = -4.895, relative change = 3.656e-03)
## ...................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 5 (approx. per word bound = -4.886, relative change = 1.790e-03)
## Topic 1: feel, like, dont, just, life
##  Topic 2: tire, just, keep, time, water
##  Topic 3: feel, like, enough, good, depress
##  Topic 4: job, stress, work, sourc, life
##  Topic 5: constant, feel, like, fight, live
##  Topic 6: feel, stress, world, like, worri
##  Topic 7: struggl, find, job, feel, ive
##  Topic 8: worri, pandem, stress, health, life
##  Topic 9: just, feel, realli, cant, seem
##  Topic 10: stress, constant, polic, sourc, live
##  Topic 11: day, everi, new, like, someth
##  Topic 12: like, stress, feel, world, say
##  Topic 13: feel, like, realli, think, pressur
##  Topic 14: racism, stress, discrimin, sourc, like
##  Topic 15: feel, like, black, just, cant
##  Topic 16: ive, feel, tough, live, year
##  Topic 17: one, mani, will, main, famili
##  Topic 18: worri, stress, current, futur, sourc
##  Topic 19: can, stress, deal, lot, thing
##  Topic 20: depress, feel, caus, thing, state
##  Topic 21: realli, feel, right, now, just
##  Topic 22: feel, make, thing, like, depress
##  Topic 23: stress, pressur, alway, feel, like
```

```
##  Topic 24: feel, know, realli, dont, get
##  Topic 25: feel, like, realli, hard, just
## ......................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 6 (approx. per word bound = -4.881, relative change = 1.034e-03)
## ......................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 7 (approx. per word bound = -4.878, relative change = 6.686e-04)
## ......................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 8 (approx. per word bound = -4.876, relative change = 5.003e-04)
## ......................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 9 (approx. per word bound = -4.874, relative change = 3.694e-04)
## ......................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 10 (approx. per word bound = -4.872, relative change = 2.886e-04)
## Topic 1: feel, like, dont, life, just
##  Topic 2: tire, just, keep, time, water
##  Topic 3: feel, like, enough, good, depress
##  Topic 4: job, stress, work, sourc, life
##  Topic 5: constant, feel, like, fight, woman
##  Topic 6: world, feel, stress, like, futur
##  Topic 7: struggl, find, job, feel, ive
##  Topic 8: worri, pandem, stress, health, life
##  Topic 9: just, feel, cant, realli, seem
##  Topic 10: stress, polic, live, constant, sourc
##  Topic 11: day, everi, someth, there, seem
##  Topic 12: like, stress, say, feel, lot
##  Topic 13: feel, like, expect, asian, realli
##  Topic 14: racism, discrimin, stress, sourc, life
##  Topic 15: feel, like, black, see, hard
##  Topic 16: ive, live, tough, year, hard
##  Topic 17: one, will, mani, safeti, love
##  Topic 18: worri, current, stress, futur, sourc
##  Topic 19: can, stress, deal, lot, thing
##  Topic 20: depress, feel, caus, thing, sure
##  Topic 21: realli, right, now, just, feel
##  Topic 22: feel, make, thing, like, depress
##  Topic 23: alway, pressur, stress, feel, like
##  Topic 24: feel, know, get, tough, thing
##  Topic 25: feel, realli, like, hard, stress
## ......................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 11 (approx. per word bound = -4.871, relative change = 2.017e-04)
## ......................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
```

```
## Completing Iteration 12 (approx. per word bound = -4.870, relative change = 1.717e-04)
## ..............................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 13 (approx. per word bound = -4.870, relative change = 1.444e-04)
## ..............................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 14 (approx. per word bound = -4.869, relative change = 1.190e-04)
## ..............................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 15 (approx. per word bound = -4.869, relative change = 1.059e-04)
## Topic 1: feel, like, dont, life, stuck
##  Topic 2: tire, just, keep, time, water
##  Topic 3: feel, like, enough, good, depress
##  Topic 4: job, stress, work, sourc, life
##  Topic 5: constant, feel, like, take, mental
##  Topic 6: world, stress, feel, futur, hard
##  Topic 7: struggl, job, find, end, ive
##  Topic 8: worri, pandem, stress, life, also
##  Topic 9: just, cant, feel, seem, everyth
##  Topic 10: stress, polic, live, constant, sourc
##  Topic 11: day, everi, someth, there, seem
##  Topic 12: like, stress, say, feel, current
##  Topic 13: feel, asian, expect, pressur, like
##  Topic 14: racism, discrimin, stress, life, sourc
##  Topic 15: like, feel, black, see, america
##  Topic 16: live, hispan, ive, tough, year
##  Topic 17: one, will, safeti, mani, love
##  Topic 18: worri, current, futur, stress, state
##  Topic 19: can, stress, deal, lot, overwhelm
##  Topic 20: depress, feel, caus, sure, think
##  Topic 21: realli, right, now, just, feel
##  Topic 22: feel, make, thing, like, depress
##  Topic 23: alway, pressur, stress, feel, like
##  Topic 24: feel, know, thing, tough, get
##  Topic 25: feel, hard, realli, stress, like
## ..............................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 16 (approx. per word bound = -4.868, relative change = 1.022e-04)
## ..............................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 17 (approx. per word bound = -4.868, relative change = 1.110e-04)
## ..............................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 18 (approx. per word bound = -4.867, relative change = 9.279e-05)
## ..............................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 19 (approx. per word bound = -4.867, relative change = 7.738e-05)
```

```
## ......................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 20 (approx. per word bound = -4.866, relative change = 6.835e-05)
## Topic 1: feel, like, dont, life, stuck
##  Topic 2: tire, just, keep, time, water
##  Topic 3: feel, like, enough, good, depress
##  Topic 4: job, stress, work, sourc, life
##  Topic 5: constant, feel, like, take, health
##  Topic 6: world, stress, feel, futur, hard
##  Topic 7: struggl, job, find, end, make
##  Topic 8: pandem, worri, stress, also, life
##  Topic 9: just, cant, feel, seem, everyth
##  Topic 10: stress, live, polic, constant, sourc
##  Topic 11: day, everi, someth, there, seem
##  Topic 12: like, stress, feel, current, say
##  Topic 13: asian, feel, expect, pressur, succeed
##  Topic 14: racism, discrimin, alway, life, stress
##  Topic 15: black, like, feel, see, america
##  Topic 16: hispan, live, tough, ive, year
##  Topic 17: one, will, worri, safeti, famili
##  Topic 18: worri, futur, current, stress, state
##  Topic 19: can, stress, deal, lot, overwhelm
##  Topic 20: depress, sure, feel, caus, think
##  Topic 21: realli, right, now, just, feel
##  Topic 22: feel, make, thing, like, depress
##  Topic 23: alway, stress, pressur, feel, like
##  Topic 24: feel, thing, know, tough, get
##  Topic 25: feel, hard, work, main, stress
## ......................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 21 (approx. per word bound = -4.866, relative change = 6.472e-05)
## ......................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 22 (approx. per word bound = -4.866, relative change = 6.091e-05)
## ......................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 23 (approx. per word bound = -4.866, relative change = 5.404e-05)
## ......................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 24 (approx. per word bound = -4.865, relative change = 5.540e-05)
## ......................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 25 (approx. per word bound = -4.865, relative change = 5.577e-05)
## Topic 1: feel, like, dont, life, stuck
##  Topic 2: tire, just, keep, time, water
##  Topic 3: feel, like, enough, good, depress
##  Topic 4: job, stress, work, sourc, life
##  Topic 5: constant, feel, take, health, like
```

```
##  Topic 6: world, stress, feel, hard, futur
##  Topic 7: struggl, job, find, make, end
##  Topic 8: pandem, worri, stress, also, life
##  Topic 9: just, cant, feel, seem, everyth
##  Topic 10: stress, live, sourc, polic, constant
##  Topic 11: day, everi, there, someth, seem
##  Topic 12: like, stress, feel, current, climat
##  Topic 13: asian, feel, expect, succeed, pressur
##  Topic 14: racism, discrimin, alway, life, sourc
##  Topic 15: black, like, feel, see, america
##  Topic 16: hispan, live, tough, man, year
##  Topic 17: one, worri, will, famili, abl
##  Topic 18: worri, futur, current, stress, state
##  Topic 19: can, stress, deal, lot, overwhelm
##  Topic 20: sure, depress, feel, caus, think
##  Topic 21: realli, right, now, just, feel
##  Topic 22: feel, make, thing, like, depress
##  Topic 23: alway, feel, like, pressur, stress
##  Topic 24: thing, feel, like, know, get
##  Topic 25: work, stress, main, feel, hard
## .................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 26 (approx. per word bound = -4.865, relative change = 5.994e-05)
## .................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 27 (approx. per word bound = -4.864, relative change = 5.731e-05)
## .................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 28 (approx. per word bound = -4.864, relative change = 3.661e-05)
## .................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 29 (approx. per word bound = -4.864, relative change = 7.328e-05)
## .................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 30 (approx. per word bound = -4.864, relative change = 5.767e-05)
## Topic 1: feel, like, dont, life, stuck
##  Topic 2: tire, just, keep, time, tri
##  Topic 3: feel, like, enough, good, depress
##  Topic 4: job, stress, work, sourc, life
##  Topic 5: constant, feel, take, health, like
##  Topic 6: world, stress, feel, hard, futur
##  Topic 7: struggl, job, find, make, end
##  Topic 8: pandem, worri, stress, also, life
##  Topic 9: cant, just, feel, seem, everyth
##  Topic 10: stress, live, sourc, polic, constant
##  Topic 11: day, everi, there, someth, seem
##  Topic 12: like, stress, climat, current, feel
##  Topic 13: asian, expect, succeed, feel, pressur
##  Topic 14: racism, discrimin, alway, life, sourc
```

```
##  Topic 15: black, like, feel, see, america
##  Topic 16: hispan, live, tough, man, year
##  Topic 17: worri, one, will, famili, abl
##  Topic 18: worri, futur, current, state, stress
##  Topic 19: can, stress, deal, lot, person
##  Topic 20: sure, depress, feel, caus, think
##  Topic 21: realli, right, now, just, feel
##  Topic 22: feel, make, thing, like, depress
##  Topic 23: alway, feel, like, pressur, stress
##  Topic 24: thing, feel, like, know, get
##  Topic 25: work, stress, main, feel, realli
## ....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 31 (approx. per word bound = -4.863, relative change = 6.494e-05)
## ....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 32 (approx. per word bound = -4.863, relative change = 6.135e-05)
## ....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 33 (approx. per word bound = -4.863, relative change = 4.867e-05)
## ....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 34 (approx. per word bound = -4.863, relative change = 4.782e-05)
## ....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 35 (approx. per word bound = -4.862, relative change = 5.320e-05)
## Topic 1: feel, like, dont, life, stuck
##  Topic 2: tire, just, keep, time, tri
##  Topic 3: feel, like, enough, good, depress
##  Topic 4: job, stress, work, sourc, life
##  Topic 5: constant, feel, take, health, like
##  Topic 6: world, stress, feel, hard, futur
##  Topic 7: struggl, job, find, make, end
##  Topic 8: pandem, worri, stress, also, life
##  Topic 9: cant, just, feel, seem, everyth
##  Topic 10: stress, live, sourc, polic, constant
##  Topic 11: day, everi, there, someth, seem
##  Topic 12: like, climat, stress, current, feel
##  Topic 13: asian, expect, succeed, pressur, feel
##  Topic 14: racism, discrimin, alway, life, like
##  Topic 15: black, feel, like, see, america
##  Topic 16: hispan, live, tough, man, year
##  Topic 17: worri, will, one, famili, abl
##  Topic 18: worri, futur, current, state, stress
##  Topic 19: can, stress, deal, lot, person
##  Topic 20: sure, depress, feel, caus, think
##  Topic 21: realli, right, just, now, feel
##  Topic 22: feel, thing, make, like, depress
##  Topic 23: alway, feel, like, pressur, time
```

```
##  Topic 24: thing, feel, like, know, get
##  Topic 25: work, stress, main, job, realli
## ...................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 36 (approx. per word bound = -4.862, relative change = 5.977e-05)
## ...................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 37 (approx. per word bound = -4.862, relative change = 6.387e-05)
## ...................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 38 (approx. per word bound = -4.861, relative change = 6.662e-05)
## ...................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 39 (approx. per word bound = -4.861, relative change = 6.072e-05)
## ...................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 40 (approx. per word bound = -4.861, relative change = 4.997e-05)
## Topic 1: feel, like, dont, life, stuck
##  Topic 2: tire, just, keep, time, tri
##  Topic 3: feel, like, enough, good, depress
##  Topic 4: job, stress, work, sourc, life
##  Topic 5: constant, feel, take, health, like
##  Topic 6: world, stress, feel, hard, futur
##  Topic 7: struggl, job, find, make, end
##  Topic 8: pandem, worri, stress, also, life
##  Topic 9: cant, just, feel, seem, everyth
##  Topic 10: stress, live, sourc, polic, constant
##  Topic 11: day, everi, there, someth, seem
##  Topic 12: like, climat, stress, current, feel
##  Topic 13: asian, succeed, expect, pressur, feel
##  Topic 14: racism, discrimin, alway, life, like
##  Topic 15: black, feel, like, see, man
##  Topic 16: hispan, live, tough, man, year
##  Topic 17: worri, famili, will, one, abl
##  Topic 18: worri, futur, current, state, stress
##  Topic 19: can, stress, deal, lot, person
##  Topic 20: sure, depress, feel, caus, think
##  Topic 21: realli, right, just, now, feel
##  Topic 22: feel, thing, make, like, depress
##  Topic 23: alway, feel, like, pressur, time
##  Topic 24: thing, like, feel, know, get
##  Topic 25: work, stress, main, job, realli
## ...................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 41 (approx. per word bound = -4.861, relative change = 4.454e-05)
## ...................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
```

```
## Completing Iteration 42 (approx. per word bound = -4.860, relative change = 4.089e-05)
## ..................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 43 (approx. per word bound = -4.860, relative change = 3.820e-05)
## ..................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 44 (approx. per word bound = -4.860, relative change = 3.479e-05)
## ..................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 45 (approx. per word bound = -4.860, relative change = 3.284e-05)
## Topic 1: feel, like, dont, life, stuck
##  Topic 2: tire, just, keep, time, tri
##  Topic 3: feel, like, enough, good, depress
##  Topic 4: job, stress, work, sourc, life
##  Topic 5: constant, feel, take, health, like
##  Topic 6: stress, world, feel, hard, futur
##  Topic 7: struggl, job, find, make, end
##  Topic 8: pandem, worri, stress, also, life
##  Topic 9: cant, just, feel, seem, everyth
##  Topic 10: stress, live, sourc, constant, polic
##  Topic 11: day, there, everi, seem, someth
##  Topic 12: like, climat, stress, current, feel
##  Topic 13: asian, succeed, expect, pressur, feel
##  Topic 14: racism, discrimin, alway, life, like
##  Topic 15: black, feel, like, see, man
##  Topic 16: hispan, live, tough, year, man
##  Topic 17: worri, famili, will, one, abl
##  Topic 18: worri, futur, current, state, stress
##  Topic 19: can, stress, deal, lot, person
##  Topic 20: sure, depress, feel, caus, think
##  Topic 21: realli, right, just, now, feel
##  Topic 22: feel, thing, make, like, depress
##  Topic 23: alway, feel, like, pressur, time
##  Topic 24: thing, like, feel, know, get
##  Topic 25: work, stress, job, main, realli
## ..................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 46 (approx. per word bound = -4.860, relative change = 3.366e-05)
## ..................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 47 (approx. per word bound = -4.860, relative change = 3.272e-05)
## ..................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 48 (approx. per word bound = -4.859, relative change = 3.044e-05)
## ..................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 49 (approx. per word bound = -4.859, relative change = 3.056e-05)
```

```
## ...............................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 50 (approx. per word bound = -4.859, relative change = 2.945e-05)
## Topic 1: feel, like, dont, life, stuck
##  Topic 2: tire, just, keep, time, tri
##  Topic 3: feel, like, enough, good, depress
##  Topic 4: job, stress, work, sourc, life
##  Topic 5: constant, feel, take, health, like
##  Topic 6: stress, world, feel, futur, hard
##  Topic 7: struggl, job, find, make, end
##  Topic 8: pandem, worri, stress, also, life
##  Topic 9: cant, just, feel, seem, everyth
##  Topic 10: stress, sourc, live, constant, polic
##  Topic 11: day, there, everi, seem, someth
##  Topic 12: like, climat, stress, current, feel
##  Topic 13: asian, succeed, expect, pressur, school
##  Topic 14: racism, discrimin, alway, life, like
##  Topic 15: black, feel, like, see, man
##  Topic 16: hispan, live, tough, year, man
##  Topic 17: worri, famili, will, abl, one
##  Topic 18: worri, futur, current, state, stress
##  Topic 19: can, stress, deal, lot, person
##  Topic 20: sure, depress, feel, caus, think
##  Topic 21: realli, right, just, now, feel
##  Topic 22: feel, thing, make, like, depress
##  Topic 23: alway, feel, like, pressur, time
##  Topic 24: thing, like, feel, know, world
##  Topic 25: work, stress, job, main, realli
## ...............................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 51 (approx. per word bound = -4.859, relative change = 2.903e-05)
## ...............................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 52 (approx. per word bound = -4.859, relative change = 3.047e-05)
## ...............................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 53 (approx. per word bound = -4.859, relative change = 2.899e-05)
## ...............................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 54 (approx. per word bound = -4.859, relative change = 2.538e-05)
## ...............................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 55 (approx. per word bound = -4.859, relative change = 2.440e-05)
## Topic 1: feel, like, dont, life, stuck
##  Topic 2: tire, just, keep, time, tri
##  Topic 3: feel, like, enough, good, depress
##  Topic 4: job, stress, work, sourc, life
##  Topic 5: constant, feel, take, health, like
```

```
##  Topic 6: stress, world, feel, futur, hard
##  Topic 7: struggl, job, find, make, end
##  Topic 8: pandem, worri, stress, also, life
##  Topic 9: cant, just, feel, seem, everyth
##  Topic 10: stress, sourc, live, constant, polic
##  Topic 11: day, there, everi, seem, someth
##  Topic 12: like, climat, stress, current, feel
##  Topic 13: asian, succeed, expect, pressur, school
##  Topic 14: racism, discrimin, alway, like, life
##  Topic 15: black, feel, like, see, man
##  Topic 16: hispan, live, tough, year, man
##  Topic 17: worri, famili, will, abl, one
##  Topic 18: worri, current, futur, state, stress
##  Topic 19: can, stress, deal, lot, person
##  Topic 20: sure, depress, feel, think, caus
##  Topic 21: realli, just, right, now, feel
##  Topic 22: feel, thing, make, like, depress
##  Topic 23: alway, feel, like, time, pressur
##  Topic 24: thing, like, feel, know, world
##  Topic 25: work, stress, job, main, life
## .....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 56 (approx. per word bound = -4.858, relative change = 2.318e-05)
## .....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 57 (approx. per word bound = -4.858, relative change = 2.297e-05)
## .....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 58 (approx. per word bound = -4.858, relative change = 2.138e-05)
## .....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 59 (approx. per word bound = -4.858, relative change = 1.685e-05)
## .....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 60 (approx. per word bound = -4.858, relative change = 1.818e-05)
## Topic 1: feel, like, dont, life, stuck
##  Topic 2: tire, just, keep, time, tri
##  Topic 3: feel, like, enough, good, depress
##  Topic 4: job, stress, work, sourc, life
##  Topic 5: constant, feel, take, health, like
##  Topic 6: stress, world, feel, futur, hard
##  Topic 7: job, struggl, find, make, end
##  Topic 8: pandem, worri, stress, also, life
##  Topic 9: cant, just, feel, seem, everyth
##  Topic 10: stress, sourc, live, constant, polic
##  Topic 11: day, there, everi, seem, someth
##  Topic 12: like, climat, stress, current, polit
##  Topic 13: asian, succeed, expect, pressur, school
##  Topic 14: racism, discrimin, alway, like, hard
```

```
##  Topic 15: black, feel, like, see, man
##  Topic 16: hispan, live, tough, year, man
##  Topic 17: worri, famili, will, abl, one
##  Topic 18: worri, current, futur, state, stress
##  Topic 19: can, stress, deal, lot, person
##  Topic 20: sure, depress, feel, think, caus
##  Topic 21: realli, just, right, now, feel
##  Topic 22: feel, thing, make, like, depress
##  Topic 23: alway, feel, like, time, pressur
##  Topic 24: thing, like, feel, know, world
##  Topic 25: work, stress, job, main, life
## ................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 61 (approx. per word bound = -4.858, relative change = 1.721e-05)
## ................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 62 (approx. per word bound = -4.858, relative change = 1.469e-05)
## ................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 63 (approx. per word bound = -4.858, relative change = 1.401e-05)
## ................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 64 (approx. per word bound = -4.858, relative change = 1.456e-05)
## ................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 65 (approx. per word bound = -4.858, relative change = 1.491e-05)
## Topic 1: feel, like, dont, life, know
##  Topic 2: tire, just, keep, like, time
##  Topic 3: feel, like, enough, good, depress
##  Topic 4: job, stress, work, sourc, life
##  Topic 5: constant, feel, take, health, like
##  Topic 6: stress, world, feel, futur, hard
##  Topic 7: job, struggl, find, make, end
##  Topic 8: pandem, worri, stress, also, life
##  Topic 9: cant, just, feel, seem, everyth
##  Topic 10: stress, sourc, live, constant, polic
##  Topic 11: day, there, everi, seem, someth
##  Topic 12: like, climat, stress, current, polit
##  Topic 13: asian, succeed, expect, pressur, school
##  Topic 14: racism, discrimin, alway, like, hard
##  Topic 15: black, feel, like, see, man
##  Topic 16: hispan, live, year, tough, man
##  Topic 17: worri, famili, will, abl, whether
##  Topic 18: worri, current, state, futur, stress
##  Topic 19: can, stress, deal, lot, person
##  Topic 20: sure, depress, feel, think, caus
##  Topic 21: realli, just, right, now, feel
##  Topic 22: feel, thing, make, depress, like
##  Topic 23: alway, feel, like, time, pressur
```

```
## Topic 24: thing, like, feel, know, world
## Topic 25: work, stress, job, main, life
## ....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 66 (approx. per word bound = -4.858, relative change = 1.536e-05)
## ....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 67 (approx. per word bound = -4.857, relative change = 1.679e-05)
## ....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 68 (approx. per word bound = -4.857, relative change = 1.790e-05)
## ....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 69 (approx. per word bound = -4.857, relative change = 1.873e-05)
## ....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 70 (approx. per word bound = -4.857, relative change = 1.964e-05)
## Topic 1: feel, like, dont, life, know
## Topic 2: tire, just, keep, like, time
## Topic 3: feel, like, enough, good, depress
## Topic 4: job, stress, work, sourc, life
## Topic 5: constant, feel, take, health, like
## Topic 6: stress, world, feel, futur, hard
## Topic 7: job, struggl, find, make, end
## Topic 8: pandem, worri, stress, also, life
## Topic 9: cant, just, feel, seem, everyth
## Topic 10: stress, sourc, live, constant, polic
## Topic 11: day, there, everi, seem, someth
## Topic 12: like, climat, stress, current, polit
## Topic 13: asian, succeed, expect, pressur, school
## Topic 14: racism, discrimin, alway, like, hard
## Topic 15: black, feel, like, see, man
## Topic 16: hispan, live, year, tough, man
## Topic 17: worri, famili, abl, will, whether
## Topic 18: worri, current, state, futur, stress
## Topic 19: can, stress, deal, lot, person
## Topic 20: sure, depress, feel, think, caus
## Topic 21: realli, just, right, now, feel
## Topic 22: feel, thing, make, depress, like
## Topic 23: alway, feel, like, time, pressur
## Topic 24: thing, like, feel, know, world
## Topic 25: work, stress, job, main, life
## ....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 71 (approx. per word bound = -4.857, relative change = 1.911e-05)
## ....................................................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
```

```
## Completing Iteration 72 (approx. per word bound = -4.857, relative change = 1.907e-05)
## ...............................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 73 (approx. per word bound = -4.857, relative change = 1.832e-05)
## ...............................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Completing Iteration 74 (approx. per word bound = -4.857, relative change = 1.916e-05)
## ...............................................................................
## Completed E-Step (1 seconds).
## Completed M-Step.
## Model Terminated Before Convergence Reached
```

Printing out the most likely top-30 keywords per topic

```
labelTopics(model_depression, n = 30)
```

```
## Topic 1 Top Words:
##       Highest Prob: feel, like, dont, life, know, stuck, depress, get, just, anyth, live, white, rut
##       FREX: rut, stuck, motion, dont, exist, nowher, white, turn, wheel, passion, purpos, anywher, sp
##       Lift: ambit, nowher, drift, passion, rut, space, grind, motion, male, forev, nice, stuck, whee
##       Score: stuck, dont, rut, motion, know, depress, anyth, purpos, turn, wheel, white, like, earli
## Topic 2 Top Words:
##       Highest Prob: tire, just, keep, like, time, tri, water, hard, one, head, told, strong, much, ma
##       FREX: water, tire, strong, tread, told, head, keep, doesnt, drown, easier, just, give, matter,
##       Lift: built, loud, depriv, endless, pretend, resili, water, saniti, tread, stoic, tire, falter
##       Score: tire, water, just, told, keep, strong, head, tread, built, matter, give, drown, tri, pro
## Topic 3 Top Words:
##       Highest Prob: feel, like, enough, good, depress, never, anyth, ill, compar, success, smart, hap
##       FREX: good, enough, smart, compar, worthi, ill, measur, never, success, amount, deserv, worth,
##       Lift: skinni, thin, attent, handsom, miser, smart, talent, worthi, good, attract, deserv, enoug
##       Score: enough, good, never, smart, depress, compar, like, anyth, feel, ill, success, measur, sk
## Topic 4 Top Words:
##       Highest Prob: job, stress, work, sourc, life, moment, biggest, also, lot, worri, long, hour, er
##       FREX: long, hour, high-pressur, deadlin, perform, environ, moment, biggest, paid, job, work, or
##       Lift: bosss, deadlin, finish, high-pressur, long, scrutini, visa, hour, fast-pac, worklif, worl
##       Score: hour, long, biggest, moment, high-pressur, perform, job, work, environ, sourc, deadlin,
## Topic 5 Top Words:
##       Highest Prob: constant, feel, take, health, mental, like, toll, woman, fight, physic, start, ba
##       FREX: mental, take, physic, health, toll, constant, woman, fight, battl, latina, breakdown, uph
##       Lift: breakdown, flight, physic, mental, demon, take, latina, toll, nervous, health, power, won
##       Score: health, mental, toll, take, constant, fight, physic, woman, battl, uphil, flight, start
## Topic 6 Top Words:
##       Highest Prob: stress, world, feel, futur, hard, life, sourc, everyth, like, worri, uncertainti
##       FREX: next, uncertainti, uncertain, happen, scari, world, everyth, control, futur, chaotic, pos
##       Lift: unravel, grip, limbo, drop, thread, havoc, wreak, uncertain, etc, chaotic, shoe, next, se
##       Score: uncertainti, state, everyth, futur, biggest, next, sourc, happen, world, stress, uncerta
## Topic 7 Top Words:
##       Highest Prob: job, struggl, find, make, end, money, ive, meet, pay, hard, support, financi, bil
##       FREX: end, bill, find, pay, support, money, medic, struggl, bare, kid, luck, food, two, wife, l
##       Lift: construct, evict, interview, luck, march, resum, rock, sink, worker, medic, part-tim, ren
##       Score: struggl, job, find, end, money, ive, pay, meet, bill, financi, resum, make, support, bai
## Topic 8 Top Words:
##       Highest Prob: pandem, worri, stress, also, life, year, sourc, one, health, love, sick, coronavi
```

15

```
##          FREX: pandem, virus, econom, coronavirus, sick, global, upend, contract, covid-, downturn, hit
##          Lift: upend, began, devast, disrupt, downturn, fallout, firsthand, healthcar, long-term, novel
##          Score: pandem, coronavirus, virus, econom, long-term, covid-, sick, contract, health, worri, b
## Topic 9 Top Words:
##          Highest Prob: cant, just, feel, seem, everyth, know, late, help, anyth, everyon, like, break,
##          FREX: cant, shake, help, advic, pointless, dark, seem, everyth, catch, break, word, hopeless,
##          Lift: wisdom, chat, mope, advic, word, pointless, snap, funk, shake, terribl, pile, dark, thanl
##          Score: cant, just, seem, everyth, shake, know, pointless, anyth, advic, late, help, catch, wor
## Topic 10 Top Words:
##          Highest Prob: stress, sourc, live, constant, polic, fear, life, violenc, main, alway, safeti, (
##          FREX: threat, target, walk, victim, fear, polic, awar, violenc, without, system, compound, raci
##          Lift: avoid, hire, threat, walk, author, confront, encount, ever-pres, frisk, harm, hypervigil
##          Score: polic, safeti, threat, fear, kill, awar, victim, black, violenc, brutal, skin, target, v
## Topic 11 Top Words:
##          Highest Prob: day, there, everi, seem, someth, like, new, tri, hard, stay, keep, posit, around
##          FREX: new, day, everi, there, someth, develop, harder, seem, posit, stay, privileg, afloat, op
##          Lift: check, privileg, new, bicker, doom, gloom, guilti, otherwis, tweet, develop, drama, roof
##          Score: day, everi, new, there, seem, someth, develop, stay, posit, harder, news, tri, keep, gu
## Topic 12 Top Words:
##          Highest Prob: like, climat, current, stress, polit, feel, sourc, main, social, say, lot, world
##          FREX: climat, social, polit, tension, say, current, divis, unrest, kind, children, turmoil, in
##          Lift: animos, engag, erupt, evolv, flux, ground, inform, navig, volatil, undoubt, upheav, soci
##          Score: climat, polit, social, current, say, tension, sourc, uncertainti, divis, children, main
## Topic 13 Top Words:
##          Highest Prob: asian, succeed, expect, pressur, school, parent, man, fall, lot, famili, everyon
##          FREX: parent, asian, school, succeed, expect, old, tradit, grade, career, academ, pressur, des
##          Lift: adult, household, son, strict, academ, appear, conform, deeper, theyv, grade, tradit, in
##          Score: asian, succeed, pressur, parent, school, expect, old, tradit, fall, perfect, grade, car
## Topic 14 Top Words:
##          Highest Prob: racism, discrimin, alway, like, hard, life, constant, face, sourc, treat, fight,
##          FREX: discrimin, twice, daili, basi, face, racism, treat, prove, experi, disadvantag, microagg
##          Lift: affirm, assumpt, disadvantag, justifi, limit, lookout, microaggress, overt, sexual, strai
##          Score: discrimin, racism, twice, basi, daili, skin, color, treat, face, black, fight, prove, ji
## Topic 15 Top Words:
##          Highest Prob: black, feel, like, see, man, live, america, peopl, depress, polic, news, world, l
##          FREX: black, stori, see, america, poverti, kill, deck, stack, bad, news, brutal, injustic, pol
##          Lift: imagin, video, anim, deck, dispos, disproportion, higher, rate, scroll, simpl, upsid, vie
##          Score: black, polic, kill, america, stori, brutal, news, man, see, racism, violenc, depress, r
## Topic 16 Top Words:
##          Highest Prob: hispan, live, year, tough, man, feel, famili, countri, back, depress, ive, every
##          FREX: hispan, came, home, back, belong, live, especi, year, unit, ago, tough, miss, man, cultu
##          Lift: homesick, mexico, somewher, accent, although, blog, came, class, destroy, known, rapist,
##          Score: hispan, came, live, man, countri, year, tough, ive, unit, home, america, deport, back, l
## Topic 17 Top Words:
##          Highest Prob: worri, famili, abl, will, whether, also, one, futur, safeti, provid, main, consta
##          FREX: abl, whether, provid, will, famili, worri, safeti, probabl, status, immigr, ill, deport,
##          Lift: detain, status, return, provid, well-, whether, abl, east, question, safeti, probabl, imi
##          Score: worri, safeti, whether, will, abl, famili, provid, futur, immigr, status, probabl, one,
## Topic 18 Top Words:
##          Highest Prob: worri, current, state, futur, stress, life, countri, sourc, polit, also, biggest
##          FREX: administr, situat, countri, current, state, upcom, grow, concern, polici, unit, communit
##          Lift: candid, democraci, erod, vote, administr, agenda, civil, enact, leader, polici, rhetor, s
##          Score: polit, current, state, countri, biggest, moment, worri, futur, administr, economi, situ
## Topic 19 Top Words:
```

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```
##          Highest Prob: can, stress, deal, lot, person, one, overwhelm, thing, mani, anxieti, caus, somet
##          FREX: deal, can, difficult, addit, lead, contribut, manag, person, juggl, work-rel, issu, stres
##          Lift: client, field, proper, superior, disagr, dispar, unstabl, role, oblig, patch, varieti, ac
##          Score: can, deal, issu, stress, often, mani, stressor, caus, lead, person, overwhelm, difficul
## Topic 20 Top Words:
##          Highest Prob: sure, depress, feel, think, caus, what, might, anyon, talk, woman, combin, proble
##          FREX: sure, combin, might, mayb, great, talk, anyon, what, hello, caus, think, problem, therapi
##          Lift: exact, fatigu, hardship, lay, mood, mayb, common, reddit, hello, experienc, combin, thera
##          Score: sure, depress, what, caus, combin, might, think, anyon, talk, earli, problem, great, may
## Topic 21 Top Words:
##          Highest Prob: realli, just, right, now, feel, struggl, late, want, alon, think, lost, hey, know
##          FREX: realli, now, right, share, just, late, struggl, alon, hey, lost, want, stuff, think, toda
##          Lift: solut, stuff, share, realli, now, right, suck, lost, hey, guy, alon, struggl, late, poin
##          Score: realli, now, right, just, struggl, late, hey, share, lost, alon, think, stuff, know, sol
## Topic 22 Top Words:
##          Highest Prob: feel, thing, make, depress, like, well, last, one, also, friend, first, lot, rela
##          FREX: last, second, close, lone, well, first, thing, troubl, make, relationship, final, friend
##          Lift: date, despit, insurmount, third, second, girlfriend, nearbi, escal, self-esteem, troubl,
##          Score: last, second, thing, well, first, lone, depress, close, troubl, relationship, make, fina
## Topic 23 Top Words:
##          Highest Prob: alway, feel, like, time, pressur, constant, stress, perfect, life, make, never, n
##          FREX: perfect, mistak, alway, relax, pressur, time, never, order, achiev, free, second-guess, a
##          Lift: daughter, cowork, excel, game, interpret, reflect, ruin, consequ, second-guess, microscop
##          Score: perfect, pressur, mistak, alway, never, relax, succeed, sourc, time, order, main, stress
## Topic 24 Top Words:
##          Highest Prob: thing, like, feel, know, world, get, dont, better, tough, year, fall, hope, state
##          FREX: hope, apart, better, wors, thing, fall, scare, know, soon, hold, world, get, ever, tough
##          Lift: appetit, tank, gone, rage, four, apart, hope, soon, tragedi, wors, scare, powerless, any
##          Score: apart, thing, better, fall, know, hope, state, dont, world, tough, year, wors, get, hold
## Topic 25 Top Words:
##          Highest Prob: work, stress, job, main, life, sourc, feel, keep, realli, get, start, much, cons
##          FREX: work, offic, restaur, cut, factori, custom, feet, machin, nois, longer, start, today, se
##          Lift: degre, phone, spanish, center, content, faster, feet, machin, nois, patient, pollut, res
##          Score: work, job, offic, factori, stress, main, sourc, start, cut, custom, keep, surround, long
```

Initial labels before removing unclear topics

```
# topic_list = c(
#   "daily stress", "health issues", "family hardships", "serious health issues",
#   "work", "news and social media",
#   "relationships",  "school", "school", "unemployment/loss", "relationships","finances"
# )
topic_list = c("feeling stuck", "staying strong", "comparing to others", "work1", "mental health", "unc
```

Getting `estimateEffects` to get the effect of gender, race and pandemic on the distribution of the topic
content

```
prep_gender <- stm::estimateEffect(~ gender,
                                   model_depression,
                                   meta = survey_meta[, c( "gender", "race", "pandemic")], uncertainty =

prep_eth <- stm::estimateEffect(~ race,
                                model_depression,
                                meta = survey_meta[, c( "gender", "race",  "pandemic")], uncertainty = 
prep_pan <- stm::estimateEffect(~ pandemic,
                                model_depression,
```

```
                              meta = survey_meta[, c( "gender", "race",  "pandemic")], uncertainty = 
```

Finalizing the topic list and removing unclear otpics

```
# topic_list = c(
#   "daily stress", "health issues", "family hardships", "serious health issues",
#   "work", "news and social media",
#   "relationships",  "school", "school", "unemployment/loss", "relationships","finances"
# )
# topic_list = c("--", "--", "--", "work1", "health", "--", "finances", "---", "---", "---", "---", "ne
topic_list = c( "work-fatigue", "health", "finances and unemployment", "stress", "news and social media
topicss = c(4,5,7,11,12,13,18,19,22,25)
```

Results

Here we show the pairwise comparison for each demographic group using the result of `estimateEffects`.

```
make_plot <- function(param, range_val, title, positive_color, negative_color, label1, label2,  arrow_le
means <- param$means
topics <- param$topics
topic <- c(1:length(gender$topics))
cis <- param$cis
labels <- param$labels
# Plot
plot_data <- data.frame(topics = topics, means = unlist(means), lower = sapply(cis, "[[", 1), upper = sa
ylim_range <- range(plot_data$lower, plot_data$upper)
ylim_range[2] <- ylim_range[2] + 0.01
# Create the plot with mean on the x-axis
plot(plot_data$means, plot_data$topics, type = "n", ylab = "", , yaxt = "n", xlab =title,
     xlim = range_val, ylim = c(0, length(topics)+2))

# Add dotted line at x = 0
abline(v = 0, lty = 2)
    it <- length(topics)
    for(i in 1:length(topics)){
      if(means[[i]] >= 0) {
        color = positive_color
      } else {
        color = negative_color
      }
      points(means[[i]], it, pch=16, col = color)
      lines(c(cis[[i]][1],cis[[i]][2]),c(it,it), col = color, lwd=2)
      # axis(2,at=it, labels=stringr::str_wrap(labels[i],width=width),las=1, cex=.25, tick=F, pos=cis[[
      text(means[[i]], it, labels[[i]], pos = 2, offset = text_offset, cex=1.05 )
      it = it-1
    }

  arrow_x <-range_val[1] + arrow_length
  # arrow_y <- mean(topics)
  Y = length(topics)
  # Add arrow
  arrows(range_val[1] + 2*arrow_length, Y+1, range_val[1], Y+1, length = 0.1, col = negative_color, lwd

  arrows(range_val[2] - 2*arrow_length, Y+1,  range_val[2], Y+1, length = 0.1, col = positive_color, lw
```

```
  X1 = (0.01+range_val[1] + 2*arrow_length + range_val[1])/2
  X2 = (range_val[2] - 2*arrow_length + range_val[2]-0.01)/2
  text(X1, Y+1.8, label1, cex = 1)
  text(X2, Y+1.8, label2, cex = 1)
}
```

Assigning colors to categories

```
white <- "red"
asian <- "magenta2"
black <- "green3"
hispanic <- "blue"
men <- "darkorchid"
women <- "orangered"
```

```
gender <- plot(prep_gender, covariate = "gender", model = model_depression, method = "difference",
    cov.value1 = "Male", cov.value2 = "Female",
    xlab = "More Female ... More Male",
    labeltype = "custom",
    custom.labels = topic_list,
    xlim = c(-0.05, 0.05),
    main = "Effect of Gender",
    topics =topicss
)
```

Effect of Gender
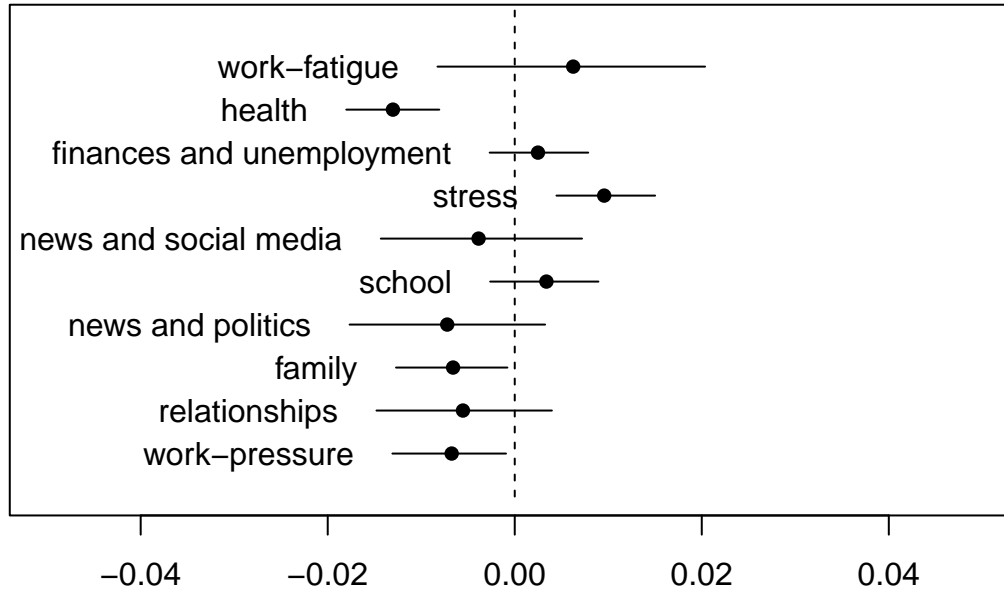
More Female ... More Male

Topics matching with UMD-ODH Here we plot only topics that have a match with topic in UMD-ODH

Gender

Topics on the left implies it is more prevalent for female, topic on the right implies it is more prevalent for male. Color coded by dempgraphic.

```
make_plot(gender, range(-0.04, 0.04),  "",men, women, "More Female", "More Male",  0.01, 4)
```



```
w_b <- plot(prep_eth, covariate = "race", model = model_depression, method = "difference",
    cov.value1 = "white", cov.value2 = "black",
    xlab = "More African American ... More White",
    labeltype = "custom",
    custom.labels = topic_list,
    xlim = c(-0.15, 0.15),
      topics = topicss
    )
```
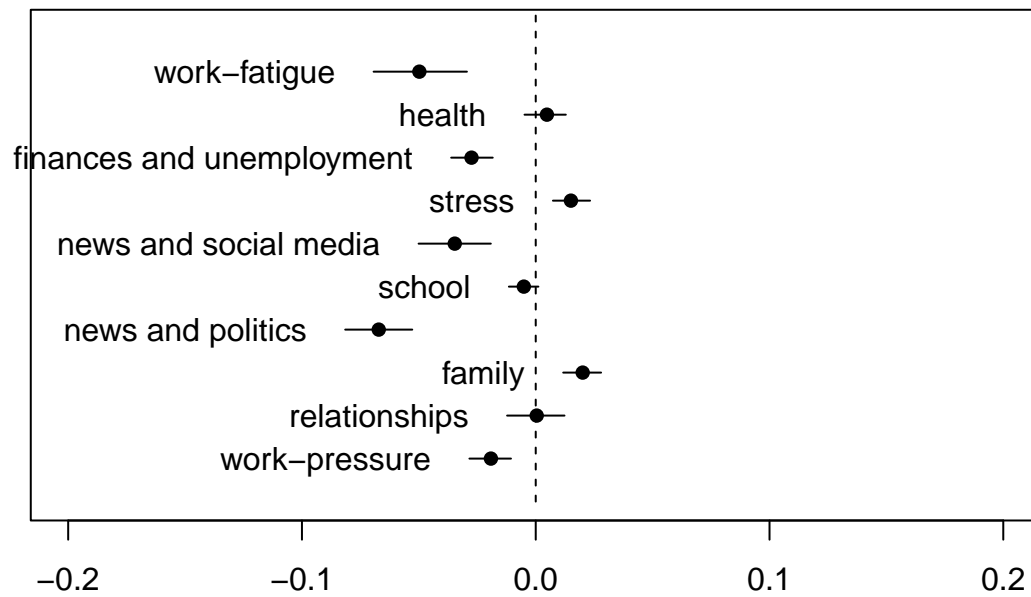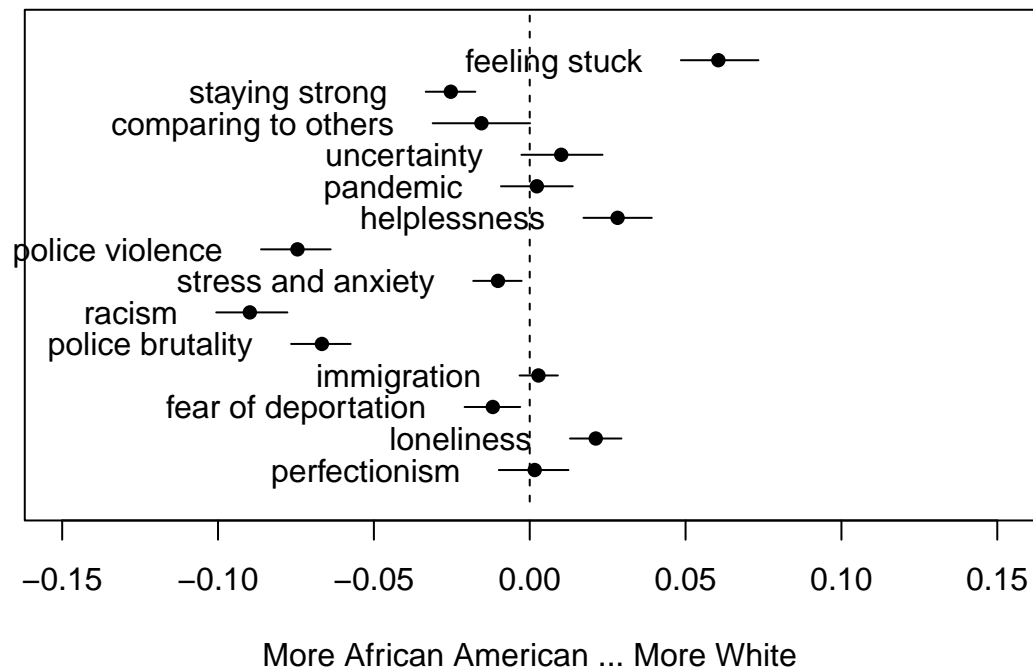

More African American ... More White

```
w_a <- plot(prep_eth, covariate = "race", model = model_depression, method = "difference",
    cov.value1 = "white", cov.value2 = "asian",
```

```
    xlab = "More Asian ... More White",
    labeltype = "custom",

    custom.labels = topic_list,
    xlim = c(-0.15, 0.15),
      topics = topicss
    )
```


More Asian ... More White

```
w_h <- plot(prep_eth, covariate = "race", model = model_depression, method = "difference",
    cov.value1 = "white", cov.value2 = "hispanic",
    xlab = "More Hispanic ... More White",
    labeltype = "custom",

    custom.labels = topic_list,
    xlim = c(-0.15, 0.15),
      topics = topicss
    )
```

More Hispanic ... More White

White vs. Other

We plot comparisons of the White group to all other groups

```
range_val <- range(-0.15, 0.15)
make_plot(w_b, range_val,  "", white, black, "More African American", "More White")
```
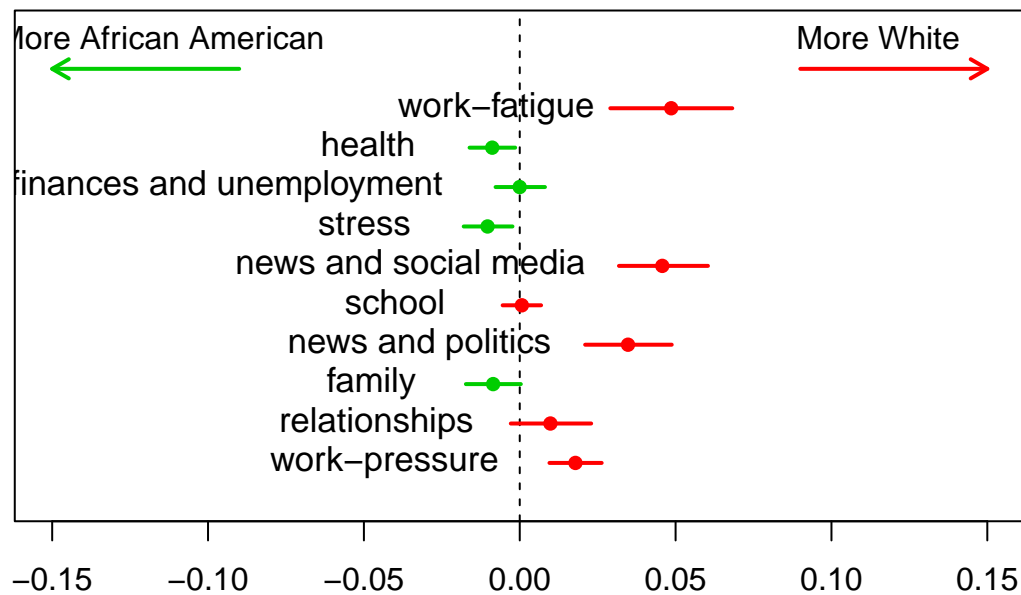


```
make_plot(w_a, range_val,  "",white, asian, "More Asian", "More White")
```
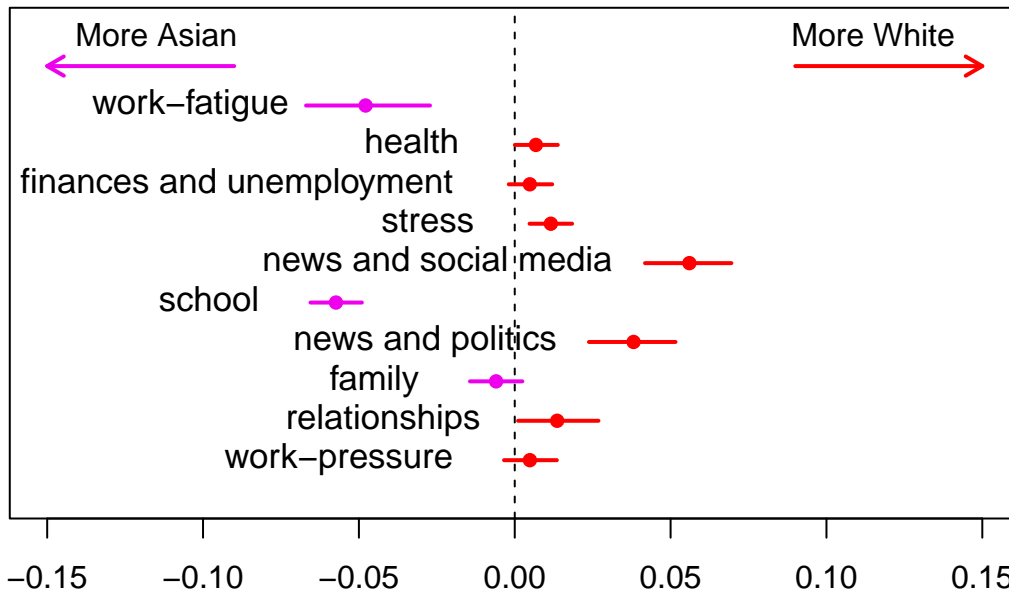
```
make_plot(w_h, range_val,  "",white, hispanic, "More Hispanic", "More White")
```
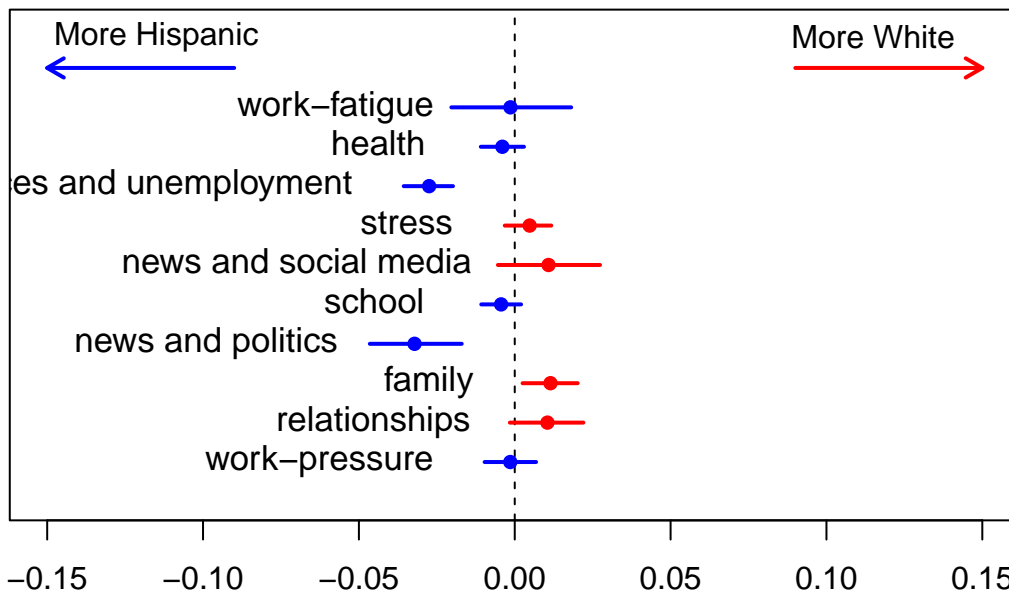

Asian vs. African Americam

```
b_a <- plot(prep_eth, covariate = "race", model = model_depression, method = "difference",
    cov.value1 = "black", cov.value2 = "asian",
    xlab = "More Asian ... More African American",
    labeltype = "custom",
    custom.labels = topic_list,
    xlim = c(-0.15, 0.15),
    topics = topicss
    )
```

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More Asian ... More African American
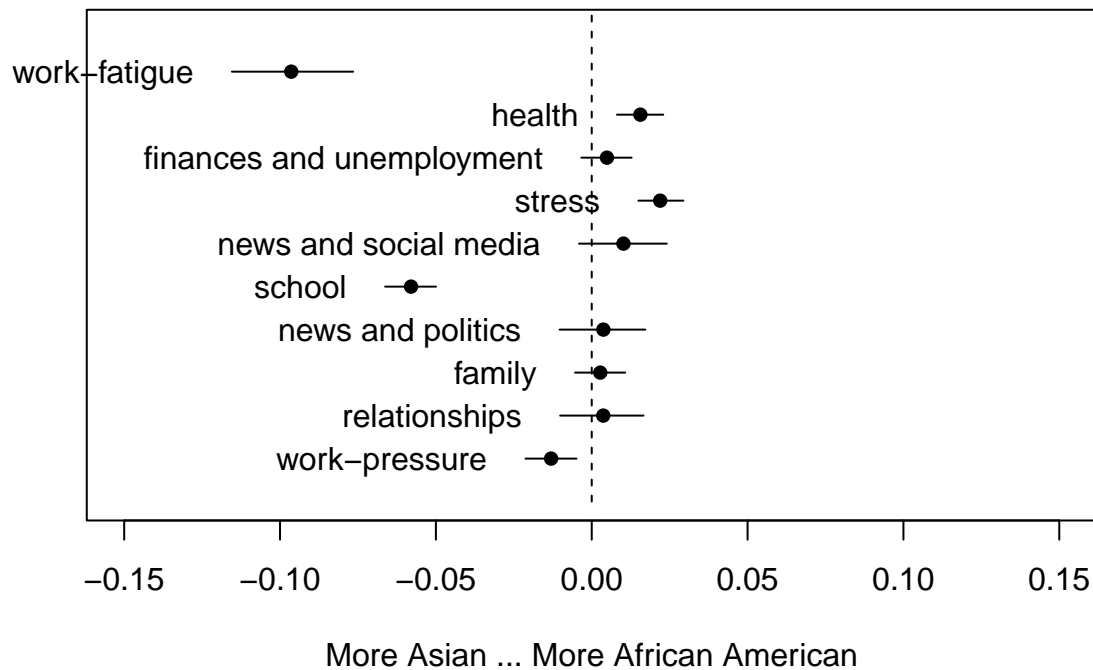
```
make_plot(b_a, range_val,  "", black, asian, "More Asian", "More African American")
```
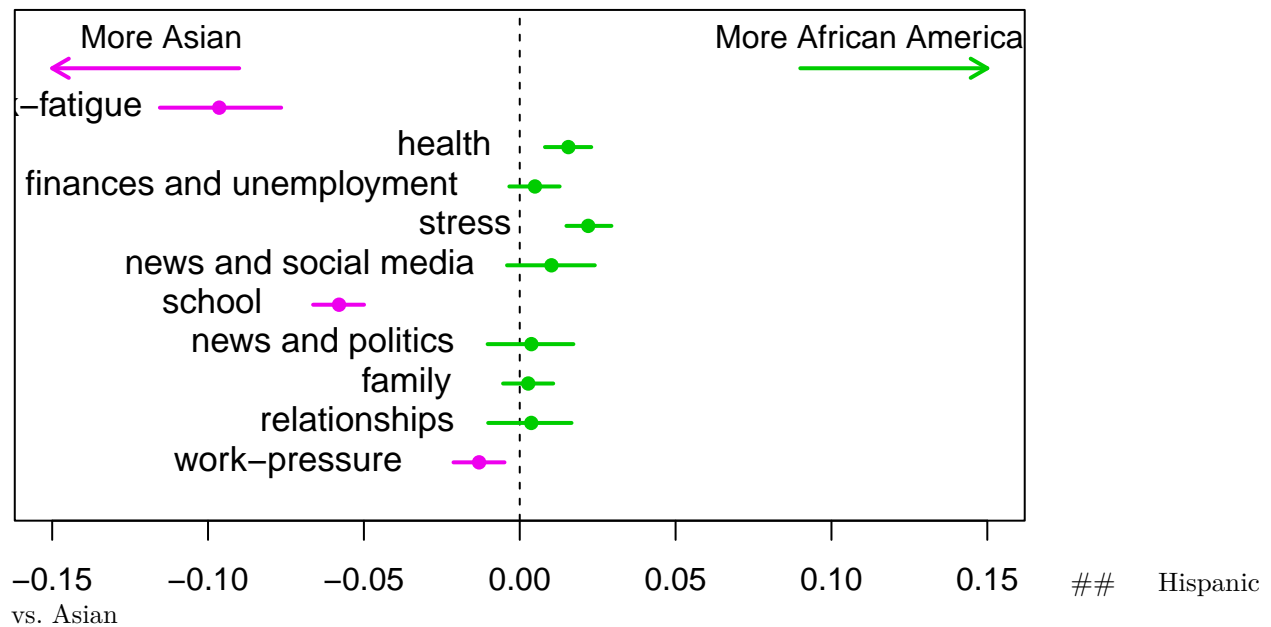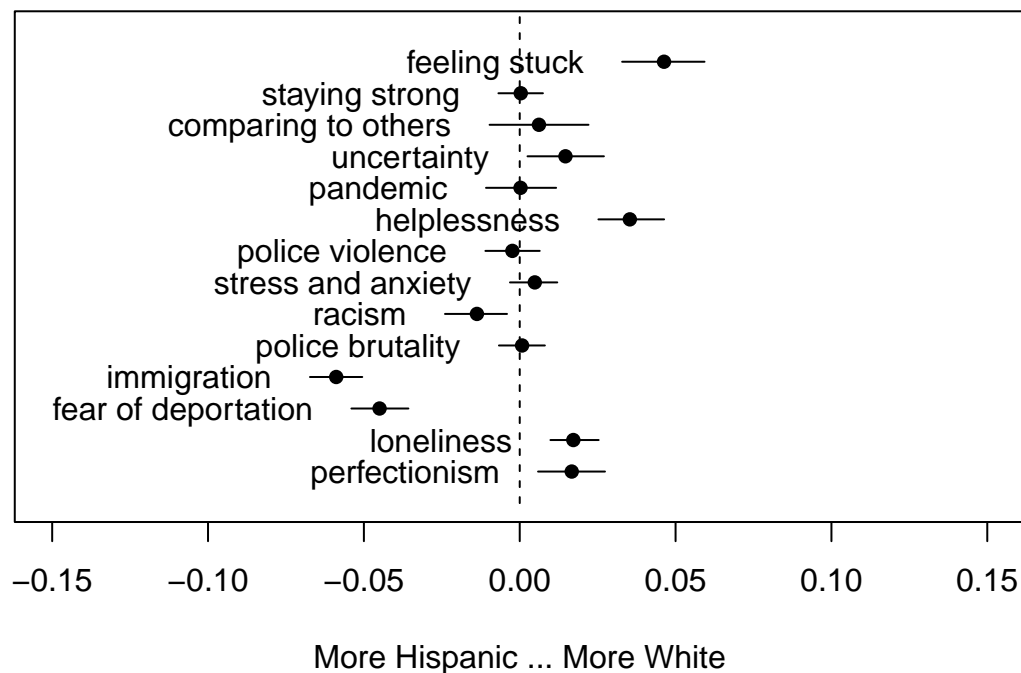

Hispanic vs. Asian

```
h_a <- plot(prep_eth, covariate = "race", model = model_depression, method = "difference",
    cov.value1 = "hispanic", cov.value2 = "asian",
    xlab = "More Asian ... More Hispanic",
    labeltype = "custom",
    custom.labels = topic_list,
    xlim = c(-0.15, 0.15),
    topics = topicss
    )
```

More Asian ... More Hispanic
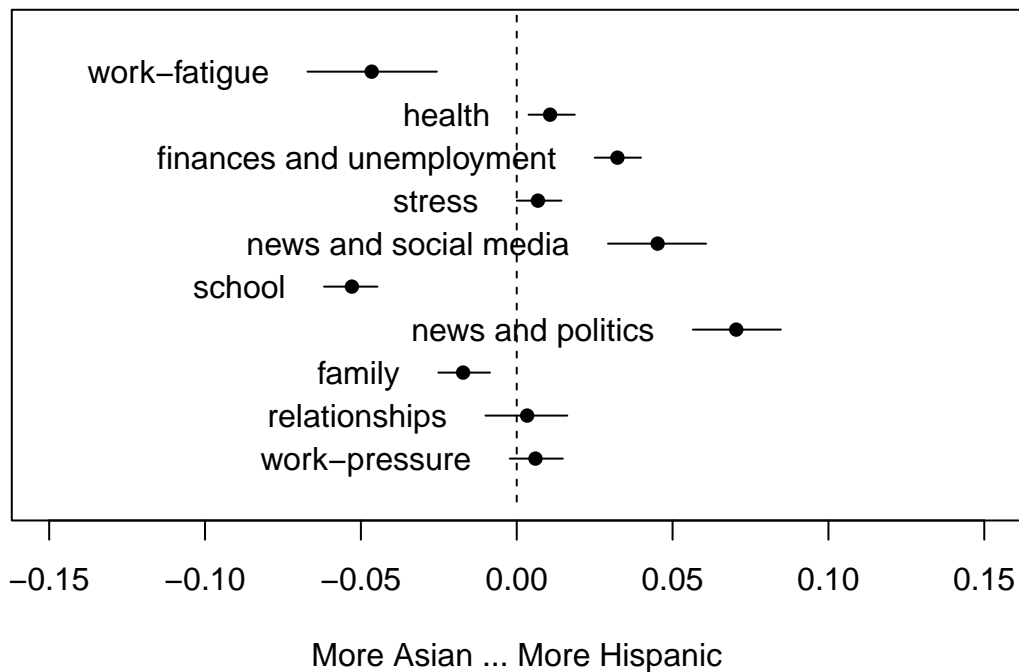
```
make_plot(h_a, range_val,  "",hispanic, asian,  "More Asian", "More Hispanic")
```
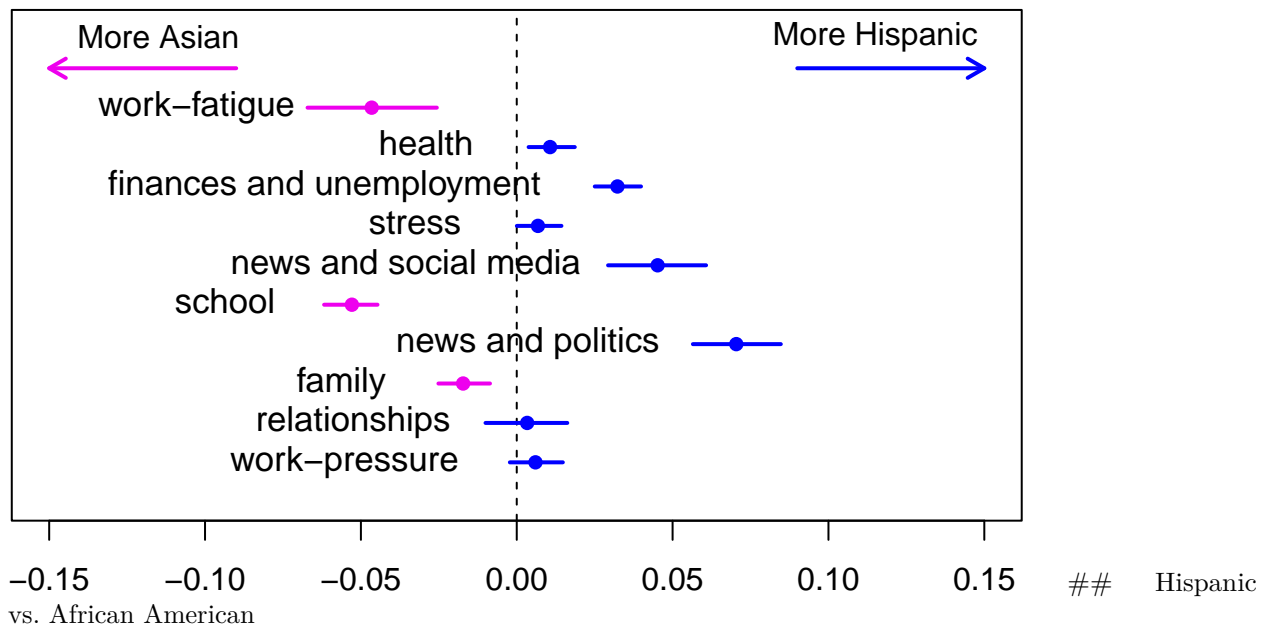

Hispanic vs. African American

```
b_h <- plot(prep_eth, covariate = "race", model = model_depression, method = "difference",
    cov.value1 = "black", cov.value2 = "hispanic",
    xlab = "More Hispanic ... More African American",
    labeltype = "custom",
    custom.labels = topic_list,
    xlim = c(-0.2, 0.2),
    topics = topicss

    )
```
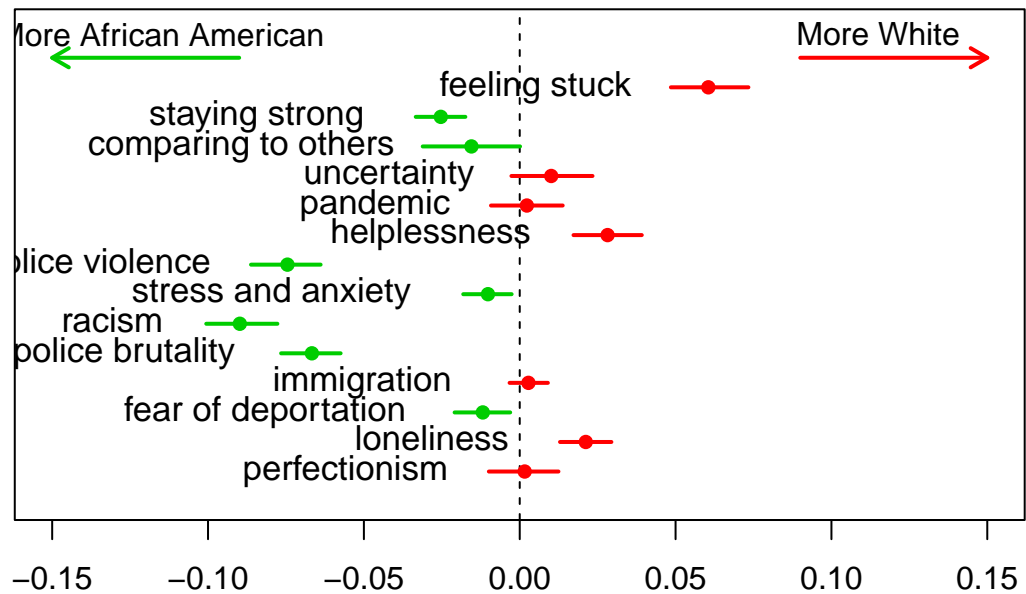
More Hispanic ... More African American

```
make_plot(b_h, range_val,  "",black, hispanic,  "More Hispanic", "More African American")
```
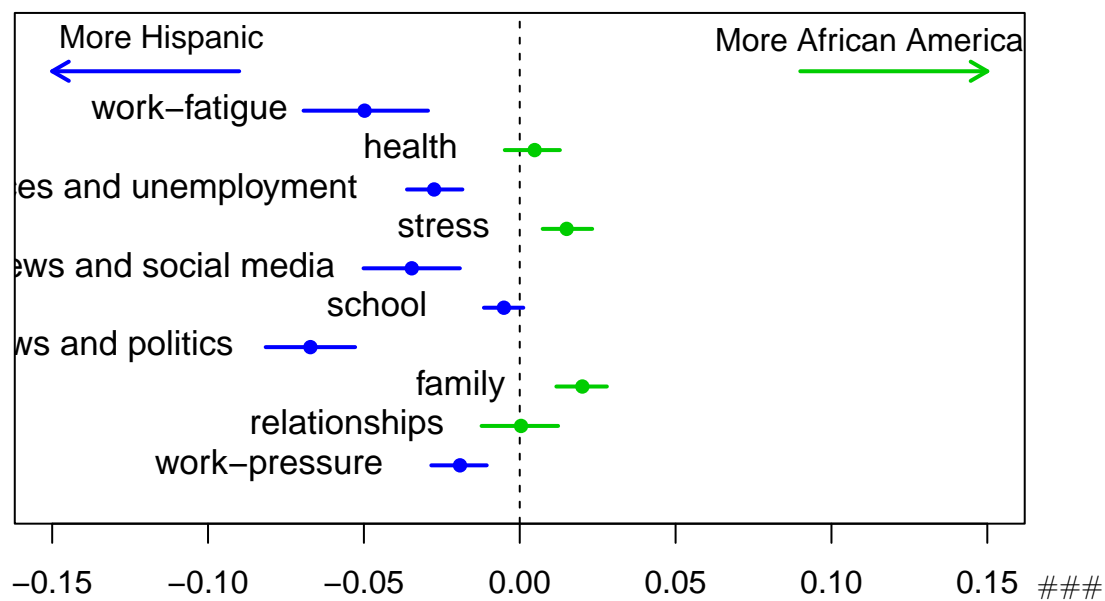


```
# topic_list = c(
#   "daily stress", "health issues", "family hardships", "serious health issues",
#   "work", "news and social media",
#   "relationships",  "school", "school", "unemployment/loss", "relationships","finances"
# )
# topic_list = c("--", "--", "--", "work1", "health", "--", "finances", "---", "---", "---", "---", "ne
topic_list = c( "work1", "health", "finances and unemployment", "news and social media", "school", "new
# topic_idx = c(4,5)

topic_list = c("feeling stuck", "staying strong", "comparing to others", "uncertainty",  "pandemic", "h
topic_idx = c(1,2,3,6,8,9,10,11,14,15,16,17,20,23)
```

```
w_b2 =plot(prep_eth, covariate = "race", model = model_depression, method = "difference",
    cov.value1 = "white", cov.value2 = "black",
    xlab = "More African American ... More White",
    labeltype = "custom",
    custom.labels = topic_list,
    xlim = c(-0.15, 0.15),
      topics = topic_idx
    )
```
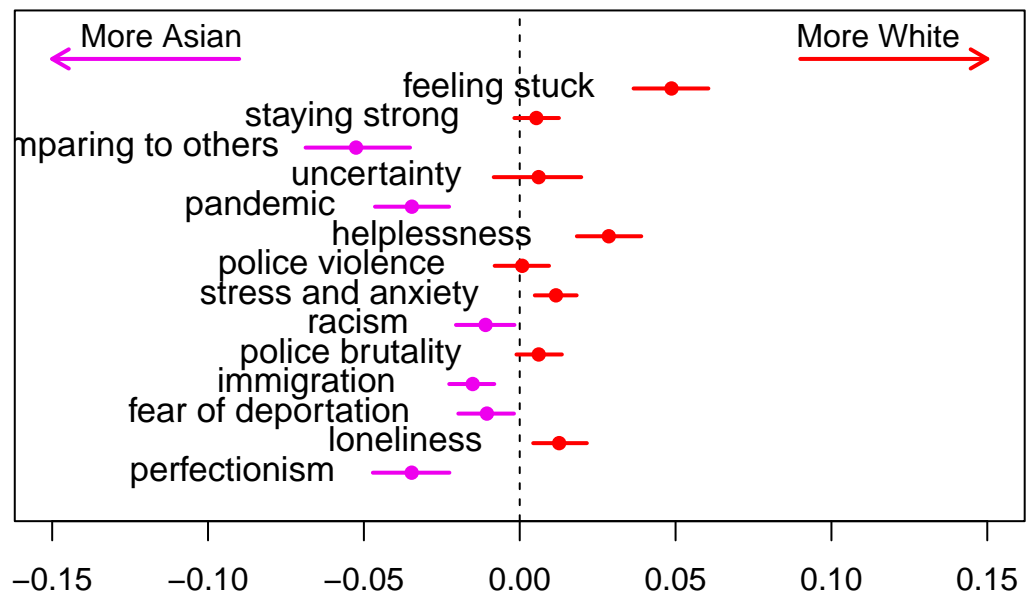

More African American ... More White
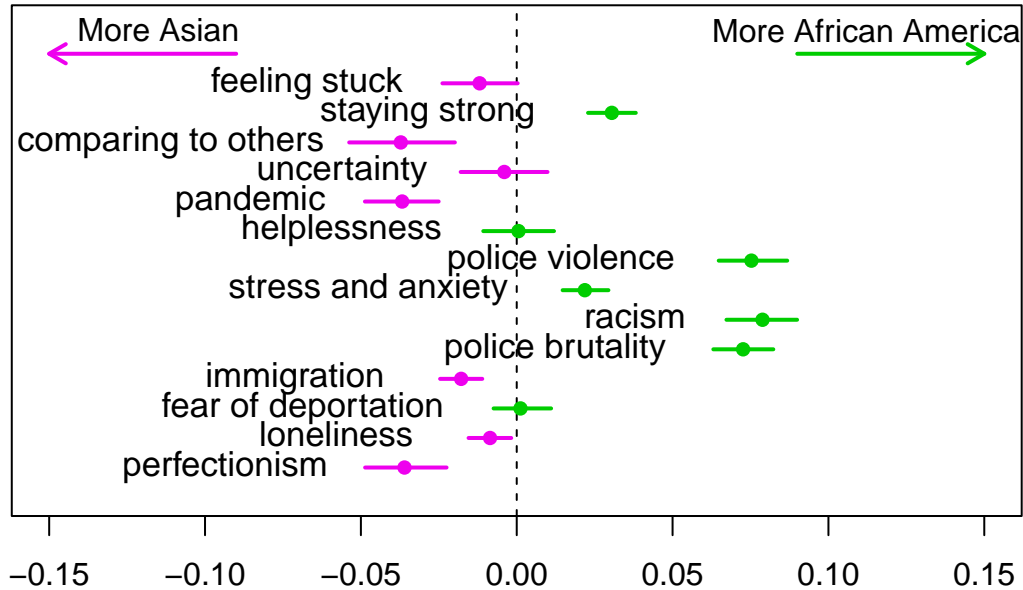
```
w_a2 = plot(prep_eth, covariate = "race", model = model_depression, method = "difference",
    cov.value1 = "white", cov.value2 = "asian",
    xlab = "More Asian ... More White",
    labeltype = "custom",

    custom.labels = topic_list,
    xlim = c(-0.15, 0.15),
      topics = topic_idx
    )
```

More Asian ... More White

```
w_h2 = plot(prep_eth, covariate = "race", model = model_depression, method = "difference",
    cov.value1 = "white", cov.value2 = "hispanic",
    xlab = "More Hispanic ... More White",
    labeltype = "custom",

    custom.labels = topic_list,
    xlim = c(-0.15, 0.15),
      topics = topic_idx
    )
```


More Hispanic ... More White

All other topics

Here we plot topics that do not have a corresponding pair in UMD-ODH

```
make_plot(w_b2, range_val,  "More African American vs. More White", white, black, "More African American
```


More African American vs. More White

```
make_plot(w_a2, range_val,  " More Asian vs. More White",white, asian, "More Asian", "More White", )
```


More Asian vs. More White

```
make_plot(w_h2, range_val,  " More Hispanic vs. More White",white, hispanic, "More Hispanic", "More Whi
```
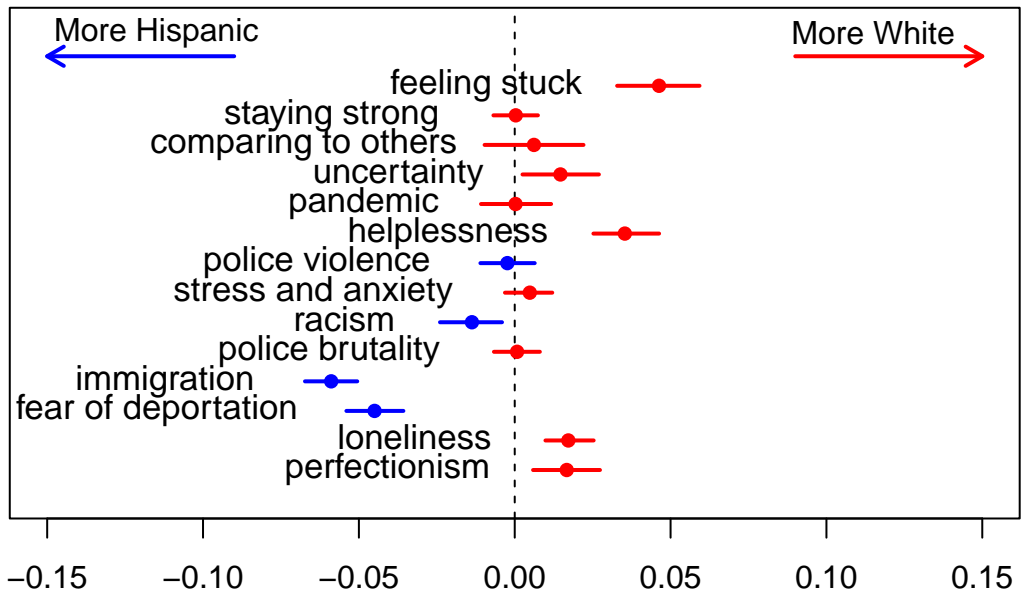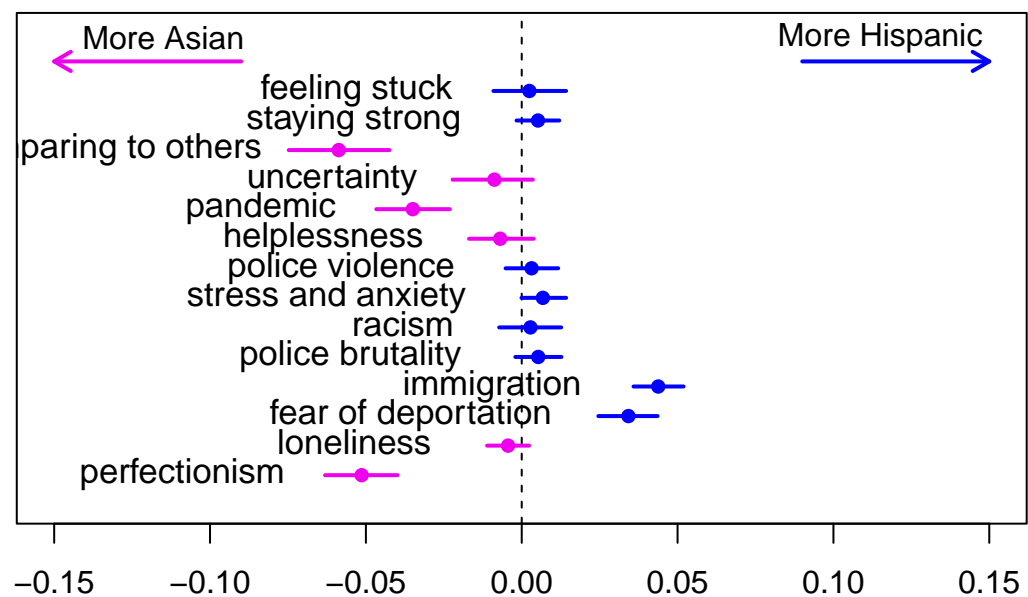
More Hispanic vs. More White

Asian vs. African American

```
a_b2 <- plot(prep_eth, covariate = "race", model = model_depression, method = "difference",
    cov.value1 = "black", cov.value2 = "asian",
    xlab = "More Asian ... More African American",
    labeltype = "custom",
    custom.labels = topic_list,
    xlim = c(-0.15, 0.15),
    topics = topic_idx
    )
```
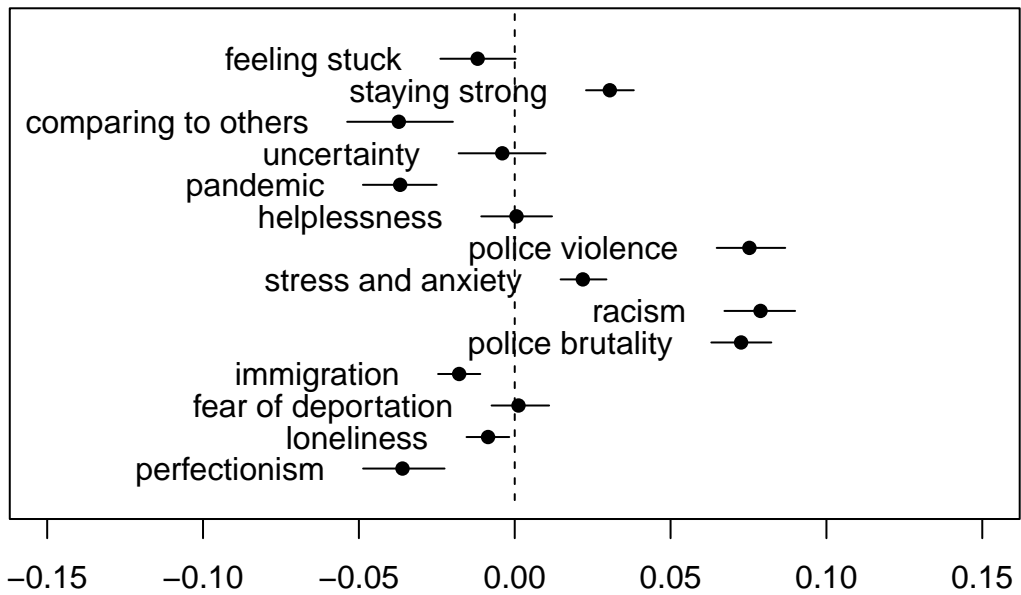

More Asian ... More African American

```
make_plot(a_b2, range_val,  " More Asian vs. More African American",black, asian, "More Asian", "More A
```


More Asian vs. More African American

```
h_a2 <- plot(prep_eth, covariate = "race", model = model_depression, method = "difference",
    cov.value1 = "hispanic", cov.value2 = "asian",
    xlab = "More Asian ... More Hispanic",
    labeltype = "custom",
    custom.labels = topic_list,
    xlim = c(-0.1, 0.1),
    topics = topic_idx
    )
```

More Asian ... More Hispanic
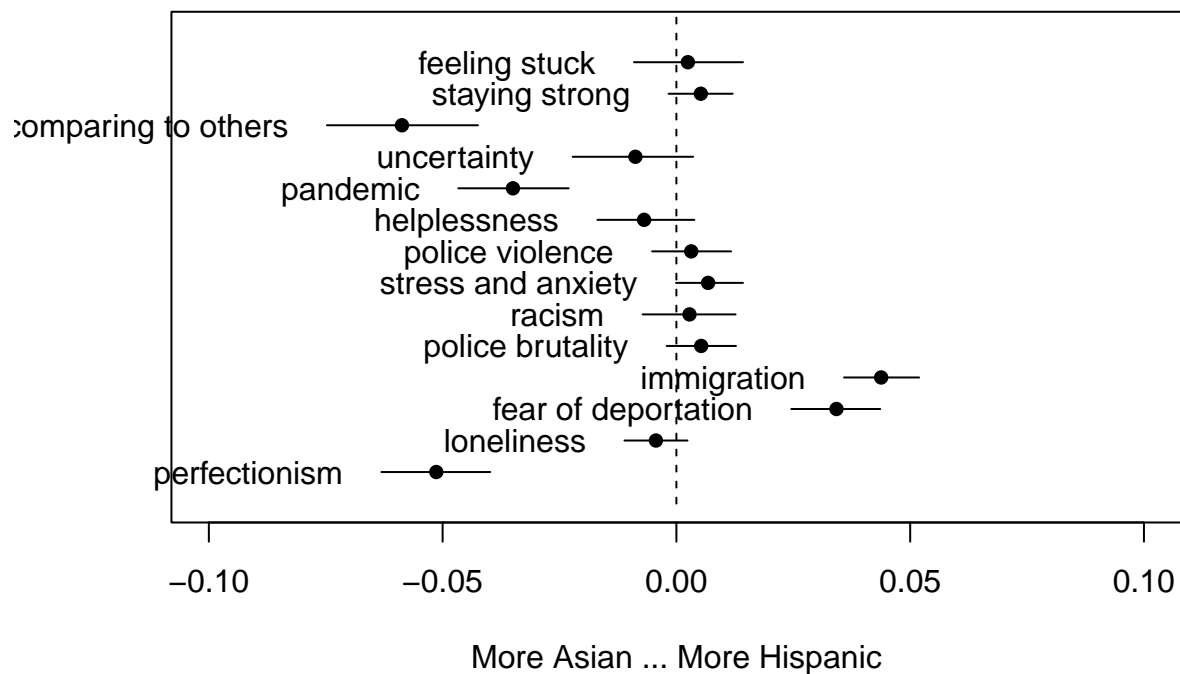
```
make_plot(h_a2, range_val,  "More Asian vs. More Hispanic",hispanic, asian,  "More Asian", "More Hispan
```
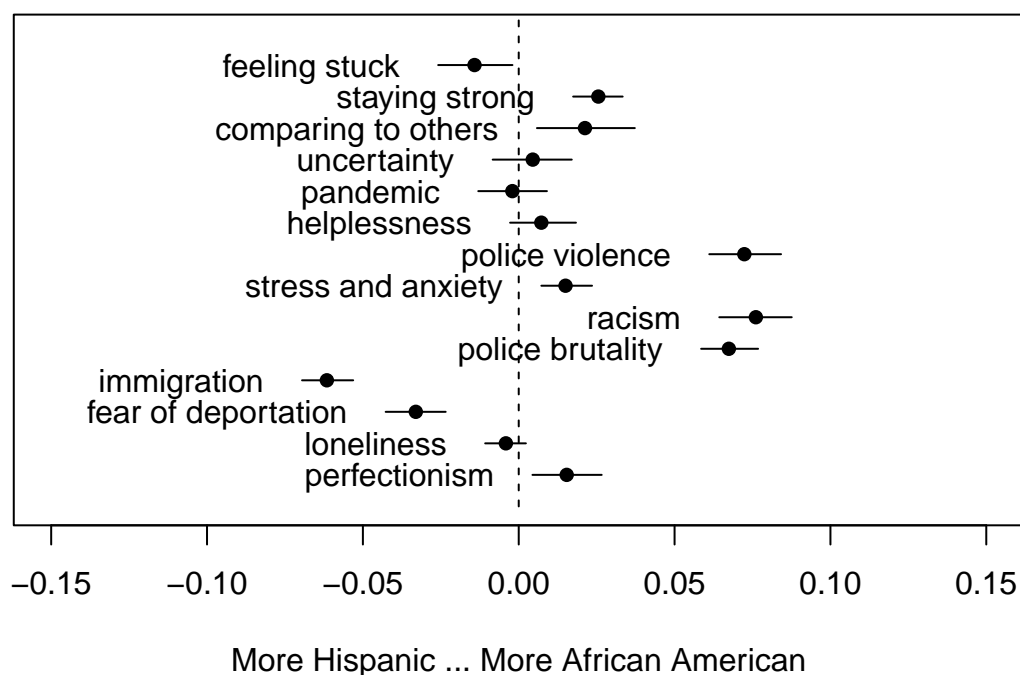

More Asian vs. More Hispanic

Hispanic vs. African American

```
h_b2 <- plot(prep_eth, covariate = "race", model = model_depression, method = "difference",
    cov.value1 = "black", cov.value2 = "hispanic",
    xlab = "More Hispanic ... More African American",
    labeltype = "custom",
    custom.labels = topic_list,
     xlim = c(-0.15, 0.15),
    topics = topic_idx
```

```
    )
```


More Hispanic ... More African American

```
make_plot(h_b2, range_val,  "More Hispanic vs. More African American",black, hispanic,  "More Hispanic"
```
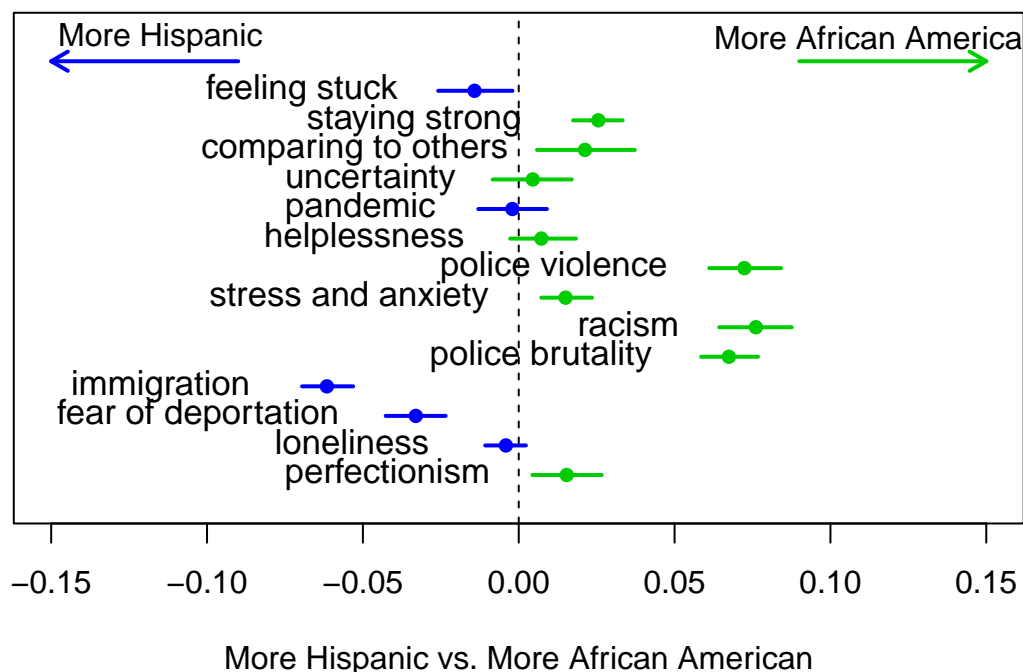

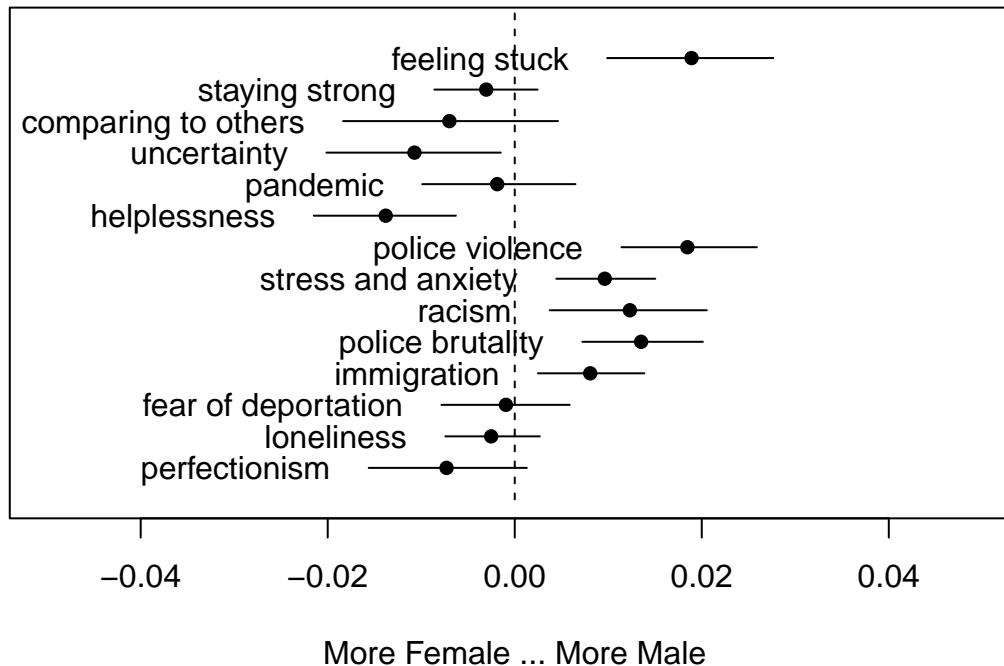
More Hispanic vs. More African American

Gender

```
w_m2 <- plot(prep_gender, covariate = "gender", model = model_depression, method = "difference",
    cov.value1 = "Male", cov.value2 = "Female",
    xlab = "More Female ... More Male",
    labeltype = "custom",
    custom.labels = topic_list,
    xlim = c(-0.05, 0.05),
    main = "Effect of Gender",
```

```
    topics = topic_idx
)
```
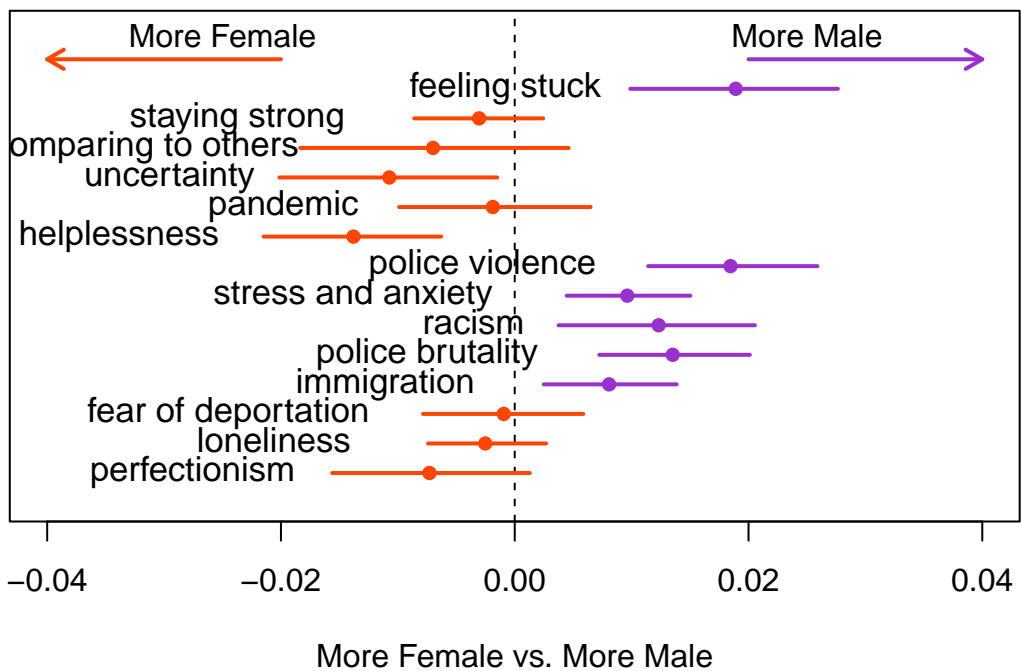
Effect of Gender

More Female ... More Male

```
make_plot(w_m2, range(-0.04, 0.04), "More Female vs. More Male",men, women, "More Female", "More Mal
```


More Female vs. More Male

```
sample <- plot(prep_gender, covariate = "gender", model = model_depression, method = "difference",
    cov.value1 = "Male", cov.value2 = "Female",
    xlab = "More Female ... More Male",
```

```
    labeltype = "custom",
    xlim = c(-0.05, 0.05),
    main = "Effect of Gender",
  topics = topic_idx
)
```

Effect of Gender

More Female ... More Male