Appendix 1

Analysis output for "Alcohol, cannabis, and nicotine use have common and distinct associations with COVID-19 pandemic-related experiences : A Bayesian network analysis across two timepoints"

This manuscript uses data from waves 9 and 16 of the COVID-Dynamic Longitudinal Study (https://coviddynamic.caltech.edu/) because those are the only waves in which both of the assessments of interest were collected (i.e., the EPII and the Monthly Substance Use Questionnaire)

The full assessment schedule is here: https://coviddynamic.caltech.edu/documents/20311/ table_W1-17_color.pdf

The data and code are in this github repository: https://github.com/papinisan/covid-substanceuse-network

1. Set-up

```
# load packages
library(pacman)
p_load(table1, BGGM, qgraph)

# load data
df_raw <- readRDS("df_epii_mosu_916.rds")
```

2. Check raw data and create dataframe for analysis

```
# number of unique participants
length(unique(df_raw$CVDID))
```

```
## [1] 1137
```

```
# number of unique participants after removing waves in which attention
# checks were failed
df_raw <- df_raw[df_raw$failed == 0, ]
length(unique(df_raw$CVDID))
```

```
## [1] 1123
```

```r
# list of all participants
list_pts <- unique(df_raw$CVDID)

# create long dataframe that includes rows for participants who missed 1 of
# the 2 waves
df_pts <- data.frame(CVDID = rep(unlist(list_pts), 2), wave = rep(c(9, 16), each = length(list_pts)))
df <- merge(df_pts, df_raw, by = c("CVDID", "wave"), all.x = TRUE)

# list of nodes that will appear in the network analyses
list_nodes <- names(df[, grepl("_use|epii", names(df))])
name_nodes <- c("cannabis\nuse", "alcohol\nuse", "nicotine\nuse", "work\nimpact",
    "home\nimpact", "social\nimpact", "economic\nimpact", "emotional\nimpact",
    "physical\nimpact", "infection\nisolation", "positive\nimpact")

# create subsets for waves 9 and 16
df9 <- df[df$wave == 9, list_nodes]
df16 <- df[df$wave == 16, list_nodes]
```

3. Demographic characteristics reported in the main text

1= Some high school; 2 = High school; 3 = Some college; 4 = Associate's degree; 5 = Bachelor's degree; 6 = Some graduate education; 7 = Master's degree; 8 = PhD; 9 = Professional degree

```r
table1(~female + age + hispanic + race + education, data = df_raw[duplicated(df_raw$CVDID) ==
    FALSE, ])
```

	Overall
	(N=1123)
female	
0	557 (49.6%)
1	566 (50.4%)
age	
Mean (SD)	39.5 (13.9)
Median [Min, Max]	38.0 [18.0, 77.0]
hispanic	
0	1009 (89.8%)
1	114 (10.2%)
race	
AI/AN	5 (0.4%)
Asian	111 (9.9%)
Black	80 (7.1%)
Mutiracial	51 (4.5%)
NH/PI	1 (0.1%)
Other	25 (2.2%)
White	850 (75.7%)
education	
1	10 (0.9%)
2	125 (11.1%)
3	259 (23.1%)
4	119 (10.6%)
5	387 (34.5%)
6	36 (3.2%)
7	149 (13.3%)
8	38 (3.4%)

4. Descriptive statistics of network variables for Table 1

```
table1(~alc_use + mj_use + nic_use + epii_work + epii_home + epii_social + epii_economic +
    epii_emotional + epii_physical + epii_infection_isolation + epii_positive |
    wave, data = df)
```

	9	16	Overall
	(N=1123)	(N=1123)	(N=2246)
alc_use			
Mean (SD)	1.42 (1.83)	1.36 (1.83)	1.39 (1.83)
Median [Min, Max]	0 [0, 6.00]	0 [0, 6.00]	0 [0, 6.00]
Missing	131 (11.7%)	265 (23.6%)	396 (17.6%)
mj_use			
Mean (SD)	0.626 (1.62)	0.578 (1.57)	0.604 (1.60)
Median [Min, Max]	0 [0, 6.00]	0 [0, 6.00]	0 [0, 6.00]
Missing	133 (11.8%)	262 (23.3%)	395 (17.6%)
nic_use			
Mean (SD)	0.954 (2.10)	0.869 (2.03)	0.914 (2.07)
Median [Min, Max]	0 [0, 6.00]	0 [0, 6.00]	0 [0, 6.00]
Missing	154 (13.7%)	286 (25.5%)	440 (19.6%)
epii_work			
Mean (SD)	1.19 (1.34)	1.19 (1.38)	1.19 (1.36)
Median [Min, Max]	1.00 [0, 8.00]	1.00 [0, 8.00]	1.00 [0, 8.00]
Missing	130 (11.6%)	262 (23.3%)	392 (17.5%)
epii_home			
Mean (SD)	0.794 (1.39)	0.791 (1.39)	0.792 (1.39)
Median [Min, Max]	0 [0, 12.0]	0 [0, 9.00]	0 [0, 12.0]
Missing	130 (11.6%)	262 (23.3%)	392 (17.5%)
epii_social			
Mean (SD)	3.00 (2.04)	3.27 (2.23)	3.13 (2.14)
Median [Min, Max]	3.00 [0, 10.0]	3.00 [0, 10.0]	3.00 [0, 10.0]
Missing	130 (11.6%)	262 (23.3%)	392 (17.5%)
epii_economic			
Mean (SD)	0.246 (0.660)	0.220 (0.600)	0.234 (0.633)
Median [Min, Max]	0 [0, 5.00]	0 [0, 4.00]	0 [0, 5.00]
Missing	130 (11.6%)	262 (23.3%)	392 (17.5%)
epii_emotional			
Mean (SD)	1.84 (1.47)	1.84 (1.54)	1.84 (1.50)
Median [Min, Max]	2.00 [0, 7.00]	2.00 [0, 7.00]	2.00 [0, 7.00]
Missing	130 (11.6%)	262 (23.3%)	392 (17.5%)
epii_physical			
Mean (SD)	2.04 (1.55)	2.17 (1.60)	2.10 (1.58)
Median [Min, Max]	2.00 [0, 8.00]	2.00 [0, 8.00]	2.00 [0, 8.00]
Missing	130 (11.6%)	262 (23.3%)	392 (17.5%)
epii_infection_isolation			
Mean (SD)	0.904 (1.34)	1.23 (1.62)	1.05 (1.49)
Median [Min, Max]	0 [0, 9.00]	1.00 [0, 8.00]	0 [0, 9.00]
Missing	130 (11.6%)	262 (23.3%)	392 (17.5%)
epii_positive			
Mean (SD)	5.71 (3.97)	5.64 (3.76)	5.68 (3.87)
Median [Min, Max]	5.00 [0, 19.0]	5.00 [0, 18.0]	5.00 [0, 19.0]
Missing	130 (11.6%)	262 (23.3%)	392 (17.5%)

5. Run Bayesian Graphical Gaussian Network analyses

```
results_compare_est <- ggm_compare_estimate(df16, df9, impute = TRUE, seed = 2022,
    progress = FALSE)
summary_compare_est <- summary(results_compare_est)
```
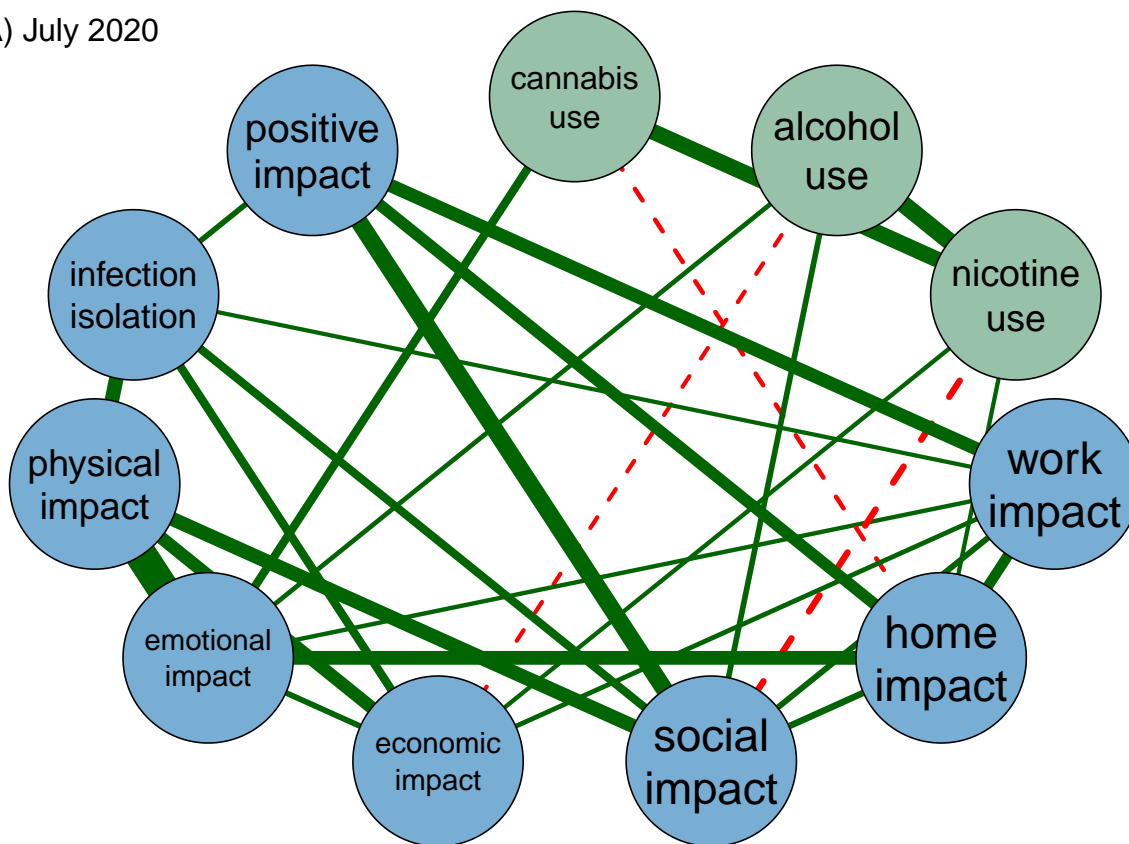
6. T1 (wave 9) network

```
# select edges with credible intervals that do not overlap with 0
edges_t1 <- select(results_compare_est$post_samp[[2]], cred = 0.95)

# pcor matrix for network graph
pcor_t1 <- edges_t1$pcor_adj

# network plot
qgraph(pcor_t1, fade = T, palette = "colorblind", labels = name_nodes, negDashed = TRUE,
    esize = 20, cut = 0.05, vsize = 15, color = c(rep("#97C1A9", 3), rep("#78AED3",
        8)), title = "A) July 2020")
```

A) July 2020


```
# edge values
edges95ci_t1 <- summary(results_compare_est$post_samp[[2]], cred = 0.95)$dat_results
edges95ci_t1
```

```
##                                  Relation Post.mean Post.sd Cred.lb Cred.ub
## 1                            mj_use--alc_use     0.053   0.032  -0.010   0.113
## 2                            mj_use--nic_use     0.207   0.031   0.146   0.267
## 3                           alc_use--nic_use     0.222   0.030   0.162   0.280
## 4                          mj_use--epii_work    -0.001   0.032  -0.064   0.060
## 5                         alc_use--epii_work     0.059   0.032  -0.003   0.121
## 6                         nic_use--epii_work     0.047   0.032  -0.015   0.110
## 7                          mj_use--epii_home    -0.083   0.031  -0.144  -0.021
## 8                         alc_use--epii_home    -0.030   0.032  -0.093   0.032
## 9                         nic_use--epii_home     0.079   0.031   0.018   0.140
## 10                     epii_work--epii_home     0.148   0.031   0.086   0.209
## 11                       mj_use--epii_social     0.014   0.032  -0.048   0.076
## 12                      alc_use--epii_social     0.094   0.031   0.033   0.155
## 13                      nic_use--epii_social    -0.103   0.032  -0.164  -0.039
## 14                    epii_work--epii_social     0.097   0.031   0.037   0.159
## 15                    epii_home--epii_social     0.104   0.031   0.042   0.166
## 16                     mj_use--epii_economic     0.047   0.031  -0.016   0.109
## 17                    alc_use--epii_economic    -0.079   0.031  -0.138  -0.017
## 18                    nic_use--epii_economic     0.081   0.032   0.019   0.144
## 19                  epii_work--epii_economic     0.085   0.032   0.024   0.146
## 20                  epii_home--epii_economic    -0.017   0.031  -0.077   0.046
## 21                epii_social--epii_economic     0.011   0.031  -0.050   0.072
## 22                    mj_use--epii_emotional     0.124   0.031   0.063   0.184
## 23                   alc_use--epii_emotional     0.085   0.031   0.024   0.145
## 24                   nic_use--epii_emotional     0.058   0.032  -0.004   0.119
## 25                 epii_work--epii_emotional     0.080   0.032   0.018   0.142
## 26                 epii_home--epii_emotional     0.183   0.030   0.123   0.242
## 27               epii_social--epii_emotional     0.044   0.031  -0.020   0.105
## 28             epii_economic--epii_emotional     0.096   0.032   0.033   0.157
## 29                    mj_use--epii_physical    -0.013   0.031  -0.075   0.050
## 30                   alc_use--epii_physical    -0.042   0.032  -0.105   0.020
## 31                   nic_use--epii_physical    -0.010   0.032  -0.071   0.054
## 32                 epii_work--epii_physical     0.013   0.032  -0.050   0.077
## 33                 epii_home--epii_physical     0.004   0.032  -0.060   0.067
## 34               epii_social--epii_physical     0.188   0.030   0.127   0.246
## 35             epii_economic--epii_physical     0.174   0.031   0.114   0.234
## 36             epii_emotional--epii_physical     0.382   0.028   0.328   0.433
## 37          mj_use--epii_infection_isolation    -0.051   0.032  -0.111   0.014
## 38         alc_use--epii_infection_isolation    -0.059   0.031  -0.121   0.002
## 39         nic_use--epii_infection_isolation     0.052   0.032  -0.011   0.115
## 40       epii_work--epii_infection_isolation     0.079   0.032   0.016   0.140
## 41       epii_home--epii_infection_isolation    -0.062   0.032  -0.123   0.000
## 42     epii_social--epii_infection_isolation     0.123   0.031   0.061   0.183
## 43   epii_economic--epii_infection_isolation     0.125   0.031   0.063   0.184
## 44   epii_emotional--epii_infection_isolation     0.026   0.032  -0.037   0.090
## 45    epii_physical--epii_infection_isolation     0.192   0.031   0.132   0.250
## 46                       mj_use--epii_positive     0.012   0.032  -0.050   0.075
## 47                      alc_use--epii_positive     0.011   0.031  -0.052   0.072
## 48                      nic_use--epii_positive     0.025   0.032  -0.038   0.087
## 49                   epii_work--epii_positive     0.179   0.030   0.119   0.238
## 50                   epii_home--epii_positive     0.161   0.031   0.099   0.221
## 51                 epii_social--epii_positive     0.223   0.030   0.163   0.282
## 52               epii_economic--epii_positive    -0.042   0.032  -0.102   0.022
## 53               epii_emotional--epii_positive    -0.033   0.032  -0.094   0.029
```

```
## 54             epii_physical--epii_positive    -0.062   0.032  -0.121   0.001
## 55 epii_infection_isolation--epii_positive      0.094   0.031   0.033   0.156
```

```r
# links between substance use and pandemic-experiences
substance_edges95ci_t1 <- edges95ci_t1[grepl("mj|nic|alc", edges95ci_t1$Relation),
    ]
substance_edges95ci_t1[order(substance_edges95ci_t1$Post.mean, decreasing = TRUE),
    ]
```

```
##                               Relation Post.mean Post.sd Cred.lb Cred.ub
## 3                       alc_use--nic_use     0.222   0.030   0.162   0.280
## 2                        mj_use--nic_use     0.207   0.031   0.146   0.267
## 22                 mj_use--epii_emotional     0.124   0.031   0.063   0.184
## 12                   alc_use--epii_social     0.094   0.031   0.033   0.155
## 23                alc_use--epii_emotional     0.085   0.031   0.024   0.145
## 18                 nic_use--epii_economic     0.081   0.032   0.019   0.144
## 9                      nic_use--epii_home     0.079   0.031   0.018   0.140
## 5                     alc_use--epii_work     0.059   0.032  -0.003   0.121
## 24                nic_use--epii_emotional     0.058   0.032  -0.004   0.119
## 1                        mj_use--alc_use     0.053   0.032  -0.010   0.113
## 39 nic_use--epii_infection_isolation      0.052   0.032  -0.011   0.115
## 6                      nic_use--epii_work     0.047   0.032  -0.015   0.110
## 16                  mj_use--epii_economic     0.047   0.031  -0.016   0.109
## 48                  nic_use--epii_positive     0.025   0.032  -0.038   0.087
## 11                    mj_use--epii_social     0.014   0.032  -0.048   0.076
## 46                  mj_use--epii_positive     0.012   0.032  -0.050   0.075
## 47                 alc_use--epii_positive     0.011   0.031  -0.052   0.072
## 4                      mj_use--epii_work    -0.001   0.032  -0.064   0.060
## 31                 nic_use--epii_physical    -0.010   0.032  -0.071   0.054
## 29                  mj_use--epii_physical    -0.013   0.031  -0.075   0.050
## 8                      alc_use--epii_home    -0.030   0.032  -0.093   0.032
## 30                 alc_use--epii_physical    -0.042   0.032  -0.105   0.020
## 37   mj_use--epii_infection_isolation     -0.051   0.032  -0.111   0.014
## 38 alc_use--epii_infection_isolation     -0.059   0.031  -0.121   0.002
## 17                 alc_use--epii_economic    -0.079   0.031  -0.138  -0.017
## 7                      mj_use--epii_home    -0.083   0.031  -0.144  -0.021
## 13                   nic_use--epii_social    -0.103   0.032  -0.164  -0.039
```
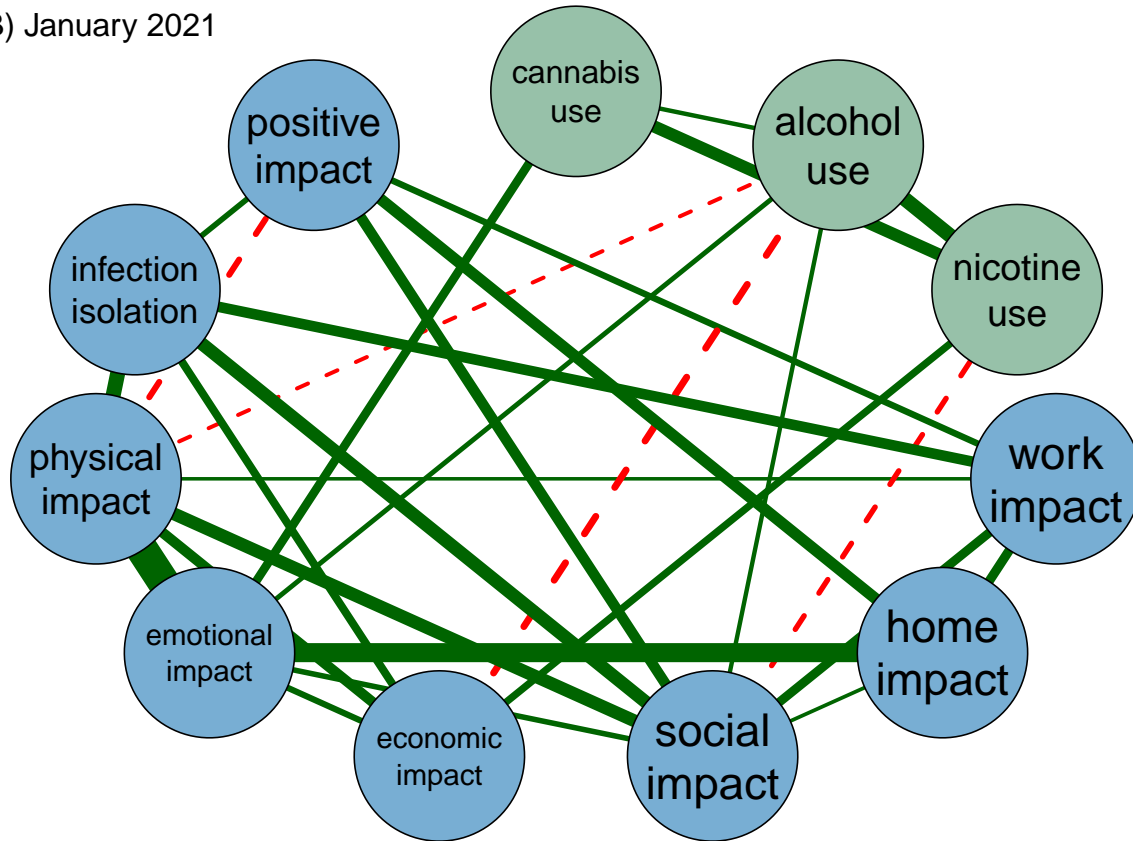
7. T2 (wave 16) network

```r
# select edges with credible intervals that do not overlap with 0
edges_t2 <- select(results_compare_est$post_samp[[1]], cred = 0.95)

# pcor matrix for network graph
pcor_t2 <- edges_t2$pcor_adj

# network plot
qgraph(pcor_t2, fade = T, palette = "colorblind", labels = name_nodes, negDashed = TRUE,
    esize = 20, cut = 0.05, vsize = 15, color = c(rep("#97C1A9", 3), rep("#78AED3",
        8)), title = "B) January 2021")
```

B) January 2021


```r
# edge values
edges95ci_t2 <- summary(results_compare_est$post_samp[[1]], cred = 0.95)$dat_results
edges95ci_t2
```

```
##                          Relation Post.mean Post.sd Cred.lb Cred.ub
## 1              mj_use--alc_use       0.080   0.033   0.015   0.145
## 2              mj_use--nic_use       0.164   0.033   0.097   0.228
## 3             alc_use--nic_use       0.188   0.033   0.123   0.253
## 4            mj_use--epii_work     0.044   0.033  -0.020   0.112
## 5           alc_use--epii_work     0.032   0.034  -0.034   0.098
## 6           nic_use--epii_work     0.040   0.034  -0.027   0.106
## 7            mj_use--epii_home    -0.044   0.034  -0.109   0.023
## 8           alc_use--epii_home     0.004   0.035  -0.066   0.071
## 9           nic_use--epii_home     0.061   0.034  -0.006   0.128
## 10        epii_work--epii_home     0.132   0.034   0.068   0.199
## 11         mj_use--epii_social   -0.057   0.034  -0.123   0.010
## 12        alc_use--epii_social    0.080   0.033   0.015   0.144
## 13        nic_use--epii_social   -0.090   0.034  -0.158  -0.023
## 14      epii_work--epii_social    0.128   0.034   0.062   0.195
## 15      epii_home--epii_social    0.073   0.034   0.004   0.140
## 16       mj_use--epii_economic    0.042   0.034  -0.025   0.109
## 17      alc_use--epii_economic   -0.107   0.034  -0.173  -0.041
## 18      nic_use--epii_economic    0.110   0.034   0.044   0.175
## 19    epii_work--epii_economic   -0.006   0.034  -0.070   0.060
## 20    epii_home--epii_economic    0.005   0.034  -0.058   0.072
## 21  epii_social--epii_economic   -0.009   0.034  -0.075   0.057
```

```
## 22                   mj_use--epii_emotional   0.125   0.034    0.059    0.191
## 23                   alc_use--epii_emotional  0.085   0.033    0.021    0.150
## 24                   nic_use--epii_emotional  -0.022  0.034   -0.087    0.044
## 25                   epii_work--epii_emotional  0.055 0.034   -0.011    0.120
## 26                   epii_home--epii_emotional  0.235 0.032    0.172    0.296
## 27                   epii_social--epii_emotional  0.092 0.033  0.027    0.157
## 28                   epii_economic--epii_emotional 0.099 0.033 0.035    0.161
## 29                   mj_use--epii_physical    0.009   0.034   -0.058    0.076
## 30                   alc_use--epii_physical   -0.076  0.034   -0.142   -0.010
## 31                   nic_use--epii_physical   -0.014  0.034   -0.081    0.052
## 32                   epii_work--epii_physical  0.071  0.034    0.005    0.137
## 33                   epii_home--epii_physical  -0.023 0.034   -0.087    0.044
## 34                   epii_social--epii_physical 0.170 0.033    0.105    0.234
## 35                   epii_economic--epii_physical 0.143 0.034  0.078    0.207
## 36                   epii_emotional--epii_physical 0.372 0.028 0.315    0.426
## 37          mj_use--epii_infection_isolation -0.027  0.034   -0.093    0.039
## 38          alc_use--epii_infection_isolation -0.034 0.035   -0.105    0.033
## 39          nic_use--epii_infection_isolation -0.003 0.035   -0.070    0.064
## 40       epii_work--epii_infection_isolation  0.146  0.033    0.081    0.210
## 41       epii_home--epii_infection_isolation -0.006  0.034   -0.070    0.063
## 42     epii_social--epii_infection_isolation  0.172  0.032    0.108    0.235
## 43   epii_economic--epii_infection_isolation  0.118  0.033    0.052    0.183
## 44   epii_emotional--epii_infection_isolation 0.002  0.034   -0.064    0.068
## 45    epii_physical--epii_infection_isolation 0.193  0.033    0.127    0.255
## 46                   mj_use--epii_positive    -0.009  0.034   -0.075    0.057
## 47                   alc_use--epii_positive    0.011  0.033   -0.053    0.075
## 48                   nic_use--epii_positive    0.039  0.034   -0.028    0.107
## 49                   epii_work--epii_positive  0.102  0.033    0.036    0.166
## 50                   epii_home--epii_positive  0.154  0.033    0.090    0.217
## 51                   epii_social--epii_positive 0.146 0.033    0.081    0.210
## 52                   epii_economic--epii_positive -0.015 0.034 -0.081   0.051
## 53                   epii_emotional--epii_positive -0.043 0.034 -0.110  0.024
## 54                   epii_physical--epii_positive -0.098 0.033 -0.163  -0.033
## 55   epii_infection_isolation--epii_positive  0.093  0.033    0.027    0.158
```

```r
# links between substance use and pandemic-experiences
substance_edges95ci_t2 <- edges95ci_t2[grepl("mj|nic|alc", edges95ci_t2$Relation),
    ]
substance_edges95ci_t2[order(substance_edges95ci_t2$Post.mean, decreasing = TRUE),
    ]
```

```
##                          Relation Post.mean Post.sd Cred.lb Cred.ub
## 3               alc_use--nic_use     0.188   0.033   0.123   0.253
## 2                mj_use--nic_use     0.164   0.033   0.097   0.228
## 22         mj_use--epii_emotional  0.125   0.034   0.059   0.191
## 18        nic_use--epii_economic   0.110   0.034   0.044   0.175
## 23        alc_use--epii_emotional  0.085   0.033   0.021   0.150
## 1                mj_use--alc_use     0.080   0.033   0.015   0.145
## 12          alc_use--epii_social   0.080   0.033   0.015   0.144
## 9             nic_use--epii_home   0.061   0.034  -0.006   0.128
## 4              mj_use--epii_work   0.044   0.033  -0.020   0.112
## 16         mj_use--epii_economic   0.042   0.034  -0.025   0.109
## 6              nic_use--epii_work   0.040   0.034  -0.027   0.106
## 48         nic_use--epii_positive  0.039   0.034  -0.028   0.107
```

```
## 5                  alc_use--epii_work    0.032   0.034   -0.034    0.098
## 47             alc_use--epii_positive    0.011   0.033   -0.053    0.075
## 29              mj_use--epii_physical    0.009   0.034   -0.058    0.076
## 8                   alc_use--epii_home    0.004   0.035   -0.066    0.071
## 39 nic_use--epii_infection_isolation   -0.003   0.035   -0.070    0.064
## 46              mj_use--epii_positive   -0.009   0.034   -0.075    0.057
## 31              nic_use--epii_physical  -0.014   0.034   -0.081    0.052
## 24             nic_use--epii_emotional  -0.022   0.034   -0.087    0.044
## 37  mj_use--epii_infection_isolation   -0.027   0.034   -0.093    0.039
## 38 alc_use--epii_infection_isolation   -0.034   0.035   -0.105    0.033
## 7                    mj_use--epii_home  -0.044   0.034   -0.109    0.023
## 11                 mj_use--epii_social  -0.057   0.034   -0.123    0.010
## 30              alc_use--epii_physical  -0.076   0.034   -0.142   -0.010
## 13                nic_use--epii_social  -0.090   0.034   -0.158   -0.023
## 17              alc_use--epii_economic  -0.107   0.034   -0.173   -0.041
```

8. Export Figure 1

```r
png("figure1.png", width = 6.5, height = 3.25, units = "in", res = 300)
layout(t(1:2))
qgraph(pcor_t1, fade = T, palette = "colorblind", labels = name_nodes, negDashed = TRUE,
    esize = 20, cut = 0.05, vsize = 15, color = c(rep("#97C1A9", 3), rep("#78AED3",
        8)), title = "A) July 2020")
qgraph(pcor_t2, fade = T, palette = "colorblind", labels = name_nodes, negDashed = TRUE,
    esize = 20, cut = 0.05, vsize = 15, color = c(rep("#97C1A9", 3), rep("#78AED3",
        8)), title = "B) January 2021")
dev.off()
```

```
## pdf
##   2
```

9. Compare network edges
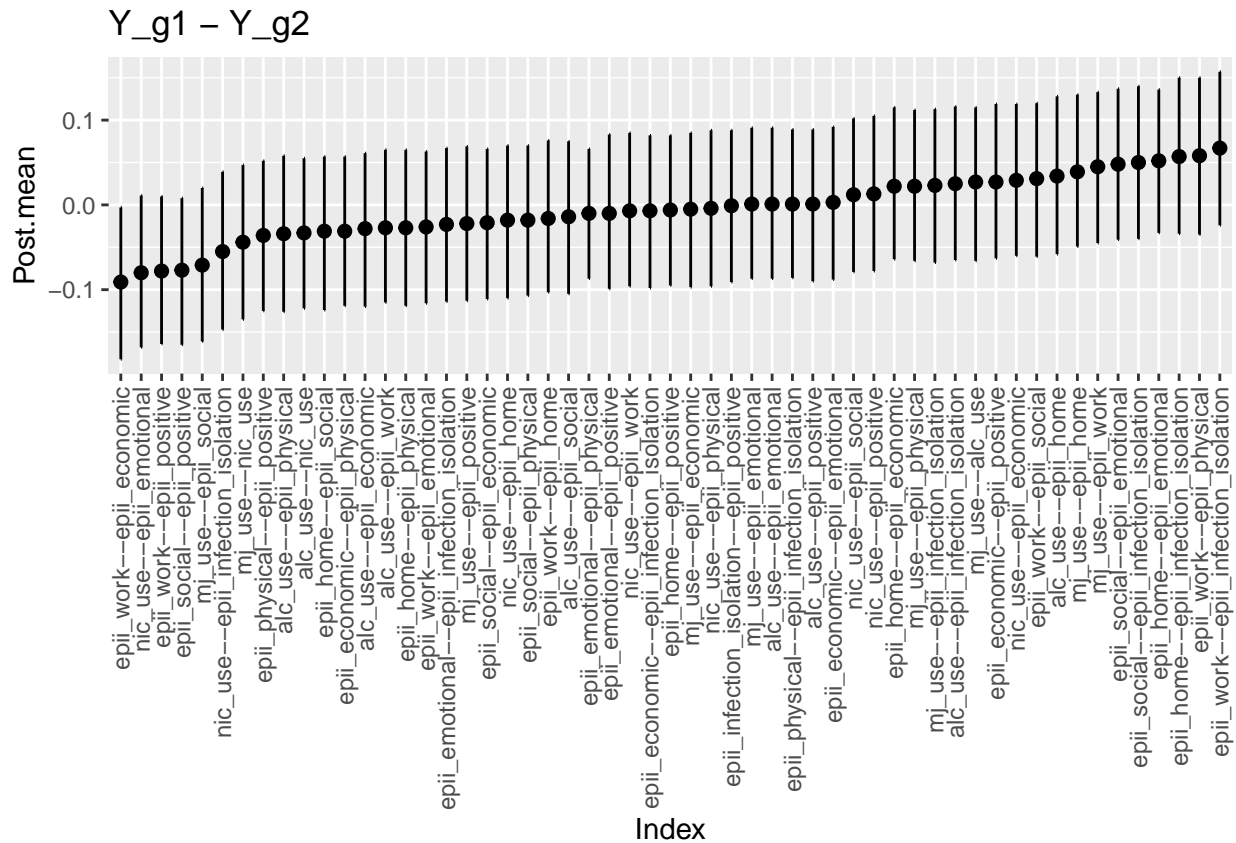
```r
summary_compare_est$dat_results
```

```
## [[1]]
##                          Relation Post.mean Post.sd Cred.lb Cred.ub
## 1            mj_use--alc_use      0.027    0.046  -0.066   0.115
## 2            mj_use--nic_use     -0.044    0.046  -0.135   0.047
## 3           alc_use--nic_use     -0.033    0.045  -0.122   0.055
## 4          mj_use--epii_work      0.045    0.046  -0.045   0.133
## 5         alc_use--epii_work     -0.027    0.046  -0.115   0.065
## 6         nic_use--epii_work     -0.007    0.046  -0.096   0.085
## 7          mj_use--epii_home      0.039    0.046  -0.049   0.130
## 8         alc_use--epii_home      0.034    0.047  -0.058   0.128
## 9         nic_use--epii_home     -0.018    0.045  -0.110   0.070
## 10     epii_work--epii_home     -0.016    0.046  -0.103   0.076
## 11        mj_use--epii_social    -0.071    0.046  -0.161   0.020
```

```
## 12                         alc_use--epii_social  -0.014   0.046  -0.105   0.075
## 13                         nic_use--epii_social   0.012   0.047  -0.079   0.102
## 14                       epii_work--epii_social   0.031   0.046  -0.061   0.120
## 15                       epii_home--epii_social  -0.031   0.046  -0.124   0.057
## 16                        mj_use--epii_economic  -0.005   0.047  -0.097   0.085
## 17                       alc_use--epii_economic  -0.028   0.047  -0.120   0.061
## 18                       nic_use--epii_economic   0.029   0.046  -0.060   0.119
## 19                     epii_work--epii_economic  -0.091   0.046  -0.182  -0.003
## 20                     epii_home--epii_economic   0.022   0.046  -0.064   0.115
## 21                   epii_social--epii_economic  -0.021   0.046  -0.111   0.066
## 22                       mj_use--epii_emotional   0.001   0.046  -0.087   0.091
## 23                      alc_use--epii_emotional   0.001   0.046  -0.087   0.091
## 24                      nic_use--epii_emotional  -0.080   0.046  -0.168   0.011
## 25                    epii_work--epii_emotional  -0.026   0.046  -0.116   0.063
## 26                    epii_home--epii_emotional   0.052   0.044  -0.033   0.136
## 27                  epii_social--epii_emotional   0.048   0.046  -0.041   0.137
## 28                epii_economic--epii_emotional   0.003   0.046  -0.088   0.092
## 29                        mj_use--epii_physical   0.022   0.046  -0.066   0.112
## 30                       alc_use--epii_physical  -0.034   0.047  -0.126   0.058
## 31                       nic_use--epii_physical  -0.004   0.047  -0.096   0.088
## 32                     epii_work--epii_physical   0.058   0.047  -0.035   0.150
## 33                     epii_home--epii_physical  -0.027   0.047  -0.119   0.065
## 34                   epii_social--epii_physical  -0.018   0.045  -0.107   0.070
## 35                 epii_economic--epii_physical  -0.031   0.045  -0.119   0.057
## 36                epii_emotional--epii_physical  -0.010   0.039  -0.087   0.066
## 37             mj_use--epii_infection_isolation   0.023   0.046  -0.068   0.113
## 38            alc_use--epii_infection_isolation   0.025   0.047  -0.065   0.116
## 39            nic_use--epii_infection_isolation  -0.055   0.048  -0.147   0.039
## 40          epii_work--epii_infection_isolation   0.067   0.046  -0.024   0.157
## 41          epii_home--epii_infection_isolation   0.057   0.047  -0.034   0.150
## 42        epii_social--epii_infection_isolation   0.050   0.045  -0.040   0.140
## 43      epii_economic--epii_infection_isolation  -0.007   0.046  -0.098   0.082
## 44     epii_emotional--epii_infection_isolation  -0.023   0.046  -0.114   0.067
## 45      epii_physical--epii_infection_isolation   0.001   0.045  -0.086   0.089
## 46                        mj_use--epii_positive  -0.022   0.046  -0.113   0.069
## 47                       alc_use--epii_positive   0.001   0.045  -0.090   0.089
## 48                       nic_use--epii_positive   0.013   0.047  -0.078   0.105
## 49                     epii_work--epii_positive  -0.078   0.045  -0.164   0.010
## 50                     epii_home--epii_positive  -0.006   0.045  -0.095   0.082
## 51                   epii_social--epii_positive  -0.077   0.045  -0.165   0.008
## 52                 epii_economic--epii_positive   0.027   0.047  -0.063   0.119
## 53                epii_emotional--epii_positive  -0.010   0.046  -0.099   0.083
## 54                epii_physical--epii_positive  -0.036   0.046  -0.125   0.052
## 55  epii_infection_isolation--epii_positive  -0.001   0.046  -0.091   0.088
```

```
plot(summary_compare_est)
```

```
## [[1]]
```

11

Y_g1 − Y_g2

Post.mean

0.1

0.0

−0.1

Index

10. Environment information

```
sessionInfo()
```

```
## R version 4.2.1 (2022-06-23)
## Platform: x86_64-apple-darwin17.0 (64-bit)
## Running under: macOS Big Sur ... 10.16
##
## Matrix products: default
## BLAS:   /Library/Frameworks/R.framework/Versions/4.2/Resources/lib/libRblas.0.dylib
## LAPACK: /Library/Frameworks/R.framework/Versions/4.2/Resources/lib/libRlapack.dylib
##
## locale:
## [1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8
##
## attached base packages:
## [1] stats     graphics  grDevices utils     datasets  methods   base
##
## other attached packages:
## [1] qgraph_1.9.2 BGGM_2.0.4   table1_1.4.2 pacman_0.5.1 knitr_1.40
##
## loaded via a namespace (and not attached):
##   [1] nlme_3.1-157      webshot_0.5.3       httr_1.4.3
##   [4] RColorBrewer_1.1-3  tools_4.2.1         backports_1.4.1
```

```
##   [7] utf8_1.2.2            R6_2.5.1              rpart_4.1.16
##  [10] Hmisc_4.7-1           DBI_1.1.3             colorspace_2.0-3
##  [13] nnet_7.3-17           tidyselect_1.1.2      gridExtra_2.3
##  [16] GGally_2.1.2          mnormt_2.1.0          compiler_4.2.1
##  [19] fdrtool_1.2.17        rvest_1.0.2           cli_3.4.1
##  [22] formatR_1.12          htmlTable_2.4.1       xml2_1.3.3
##  [25] network_1.17.2        labeling_0.4.2        scales_1.2.1
##  [28] checkmate_2.1.0       mvtnorm_1.1-3         psych_2.2.5
##  [31] pbapply_1.5-0         ggridges_0.5.3        systemfonts_1.0.4
##  [34] stringr_1.4.1         digest_0.6.29         pbivnorm_0.6.0
##  [37] foreign_0.8-82        minqa_1.2.4           svglite_2.1.0
##  [40] rmarkdown_2.14        extraDistr_1.9.1      base64enc_0.1-3
##  [43] jpeg_0.1-9            pkgconfig_2.0.3       htmltools_0.5.3
##  [46] lme4_1.1-30           highr_0.9             fastmap_1.1.0
##  [49] htmlwidgets_1.5.4     rlang_1.0.6           rstudioapi_0.14
##  [52] farver_2.1.1          generics_0.1.3        gtools_3.9.3
##  [55] statnet.common_4.6.0 dplyr_1.0.10          magrittr_2.0.3
##  [58] kableExtra_1.3.4      Formula_1.2-4         interp_1.1-3
##  [61] Matrix_1.5-1          Rcpp_1.0.9            munsell_0.5.0
##  [64] fansi_1.0.3           abind_1.4-5           lifecycle_1.0.2
##  [67] stringi_1.7.8         yaml_2.3.5            MASS_7.3-57
##  [70] plyr_1.8.7            lavaan_0.6-12         grid_4.2.1
##  [73] parallel_4.2.1        deldir_1.0-6          lattice_0.20-45
##  [76] splines_4.2.1         sna_2.7               pillar_1.8.1
##  [79] igraph_1.3.4          boot_1.3-28           bain_0.2.8
##  [82] corpcor_1.6.10        reshape2_1.4.4        stats4_4.2.1
##  [85] glue_1.6.2            evaluate_0.16         latticeExtra_0.6-30
##  [88] data.table_1.14.2     png_0.1-7             vctrs_0.4.1
##  [91] nloptr_2.0.3          Rdpack_2.4            gtable_0.3.1
##  [94] purrr_0.3.4           reshape_0.8.9         assertthat_0.2.1
##  [97] ggplot2_3.3.6         xfun_0.33             rbibutils_2.2.8
## [100] pracma_2.3.8          coda_0.19-4           viridisLite_0.4.1
## [103] glasso_1.11           survival_3.3-1        tibble_3.1.8
## [106] BFpack_1.0.0          cluster_2.1.3
```